User Manual

Retro AS-1 Version 1.1

Mac OS and Windows 95

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Chapter 1. Introduction

Chapter 1 Contents

1.1 Welcome!

The official Retro AS-1 logo

Thank you for your interest in Retro AS-1, the full-featured professional software synthesizer from BitHeadz. At last there is software that is so convenient and sounds so fantastic, your computer will become your favorite sound module. Using sizzling new DSP technology, you can recreate the sounds of all the classic analog synthesizers or create amazing new soundscapes of your own from scratch with full programmability.

Just imagine. Your creativity will no longer be stifled by "old-school" hardware limitations on oscillators, filters, modulation, and effects. And of course, it's fully polyphonic and multi-timbral, with fast response time, and more, all at a fraction of the price of hardware synthesizers.

Extensive MIDI implementation allows real-time control of all parameters and easy integration into existing MIDI setups. You can play Retro AS-1 "live" just like any other musical instrument with layers, splits, and full MIDI continuous control, or use it as a multi-timbral sound module running behind your favorite MIDI application on the same computer.

Use the full-featured arpeggiator to generate analog-style "sequences". You can even write the synthesizer's complete multi-timbral stereo output to disk as an audio file for use in your favorite digital audio applications.

Is it too good to be true? No! Computer hardware and software is finally fast enough to execute our latest "rocket science" music technology, and you get to enjoy the benefits of it.

Retro AS-1 will provide you with a wealth of new sonic opportunities. We hope you enjoy using Retro AS-1 as much as we enjoyed creating it!

1.2 Features

General

- Outstanding 16-bit, 44.1kHz sound quality
- Excellent real-time play response time
- 100 percent programmable
- Over 100 parameters; up to 200 values per parameter
- "Musician Friendly" user interface
- Unlimited presets; includes 1000 factory presets
- Full simultaneous MIDI application compatibility
- Up to 32 note polyphony (CPU dependent)
- CPU limiting to accommodate MIDI applications
- On-screen keyboard; no MIDI controller required to trigger sounds
- Ability to write synthesizer output to disk in audio file format (8, 16, or 24 bit)
- Stereo output

Oscillators

- Up to 3 oscillators per voice (not including low frequency oscillators)
- 8-octave range per oscillator
- 9 waveform types: Saw, Pulse, Triangle, Sine, Sine squared, Glottal, Noise (white, pink, red)
- Continuous control of waveform symmetry
- Sync any oscillator to any other oscillator or filter
- Frequency modulation from any oscillator or filter

Filters

- 2 assignable filters per voice
- 13 filter types, including 4-pole resonant lowpass, highpass, bandpass, allpass, notch, and state-variable
- Multiple inputs allow parallel and/or serial filtering
- Filters can be modulated by oscillators ("poly mod")

Modulation

- Dozens of modulation routings
- Dozens of envelopes and low frequency oscillators ("LFO's")
- Six different LFO shapes
- LFO's can be synchronized to MIDI clock
- Most parameters are available as a modulation source and/or destination
- Four continuous MIDI controller modulation sources are available simultaneously

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Effects
- 2 insert (serial) effects processors per voice
- 2 additional global (parallel) effects processors
- 2 global effect sends per MIDI channel
- Fully parametric and shelf equalizers
- Multiple stereo reverb and reflection algorithms
- Stereo delays, chorus, phaser, and flange
- Overdrive and distortion effects
- Delay times can be synchronized to MIDI clock

Arpeggiator
- Multiple latch and assignment modes
- Enter notes manually or use on-screen keyboard for controller-free play
- Arpeggiator can be synchronized to MIDI clock

MIDI
- MIDI Processor enables full control of layers and splits
- 16 simultaneous MIDI channel multi-timbral
- Real-time control of all parameters simultaneously via NRPNs
- Serial port application included for direct MIDI input (Mac OS only)

1.3 System Requirements
- 32 megabytes RAM
- Compatible CD-ROM drive
- 800 x 600 or higher resolution monitor with 256 (8-bit) or more colors

Mac OS
- 120MHz or faster PowerPC® processor
- Operating system software version 7.6.1 or higher (OS 8 or higher recommended)
- 40 MB free hard disk space (10 MB with HFS +)

Windows 95
- 200MHz or faster Pentium processor
- Direct X supported sound card
- 10 MB free hard disk space

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Package Contents

- Software installer on CD-ROM
- User Manual on CD-ROM
- Registration card

Suggested System Enhancements

- Quality stereo sound monitoring system
- MIDI controller and interface

1.4 Manual Organization

This user manual explains how to install, configure, and use the Retro AS-1 software synthesizer. There are nine main sections:

Chapter 1: Welcome to Retro AS-1!

- Chapter 1 introduces the user to the product features and concepts, system requirements, and software components. Important information about manual organization, conventions, and Mac OS/Windows 95 differences are also covered here.

Chapter 2: Installation and Setup

- This chapter provides instructions for product installation and system configuration on the Mac OS and Windows 95 platforms.

Chapter 3: Quick Start

- This chapter is written to get Retro AS-1 up and running quickly and gives brief instructions for the various software components.

Chapter 4: Working with MIDI

- This chapter provides details on how to use MIDI with Retro AS-1 and describes how to integrate Retro AS-1 into existing MIDI environments with OMS, FreeMIDI, and Windows 95.

Chapters 5 through 9: Reference Section

These chapters describe each software component function and parameter in full detail.

- Chapter 5: Control Panel Reference
- Chapter 6: MIDI Processor Reference
- Chapter 7: Editor Reference
- Chapter 8: Keyboard Reference
- Chapter 9: Mixer Reference

Appendices

- Appendix A: Working with Banks and Programs
- Appendix B: Optimizing Performance
- Appendix C: Troubleshooting
- Appendix D: Using Digidesign Direct IO
- Appendix E: Analog Synthesis Demystified
- Appendix F: MIDI Implementation
- Appendix G: Record To Disk
- Appendix H: QuickTime™ Driver
- Appendix I: OMS Names

1.5 Manual Conventions

Basic Computer Operations

This manual assumes you are proficient with the computer platform you are using. You should know how to use the mouse, launch and quit applications, open/save/delete files, navigate the hard disk, access control panel settings, and similar basic operating system functions.

Important Information

Of course, we recommend reading the entire manual to fully understand and implement the power of Retro AS-1. However, certain passages contain particularly important information.

> Information that is critical to the performance and/or sound quality of the synthesizer is denoted by "Mr. Waveform" and a cyan highlight box.

> Information that is particularly useful for the operation of the synthesizer is denoted by "Mr. Waveform" and a green highlight box.

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Cross-Platform Manual

The Retro AS-1 Manual is the same for both the Mac OS and Windows 95 platforms. All information presented is applicable to both systems unless otherwise denoted by the Mac OS and Windows 95 symbols shown here.

M The red "M" symbol indicates the information pertains only to the Mac OS platform.

W The blue "W" symbol indicates the information pertains only to the Windows 95 platform.

Screenshots

The manual uses pictures of the computer screen ("screenshots") to give a visual aid when describing features and functions of the software. The user interface on Mac OS and Windows 95 varies primarily in the appearance of the windows due to differences in the operating systems. However, because the layout within the windows, the objects contained within them, and their functionality is identical in both versions, Mac and Windows screenshots are used interchangeably in this manual.

When a particular screen is different between the two platforms, both screenshots will be shown.
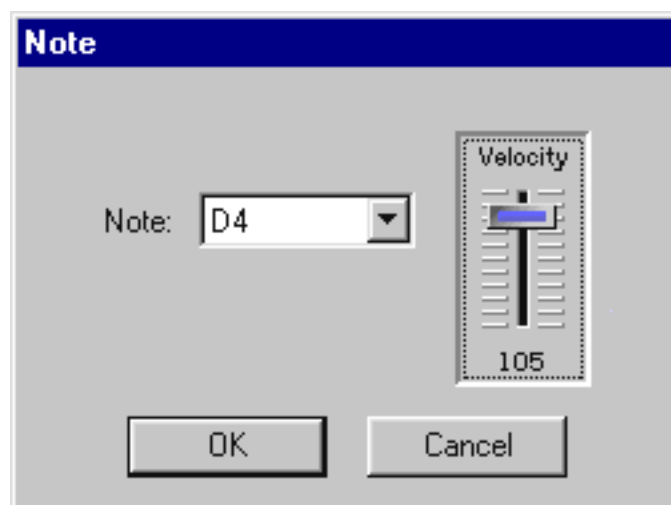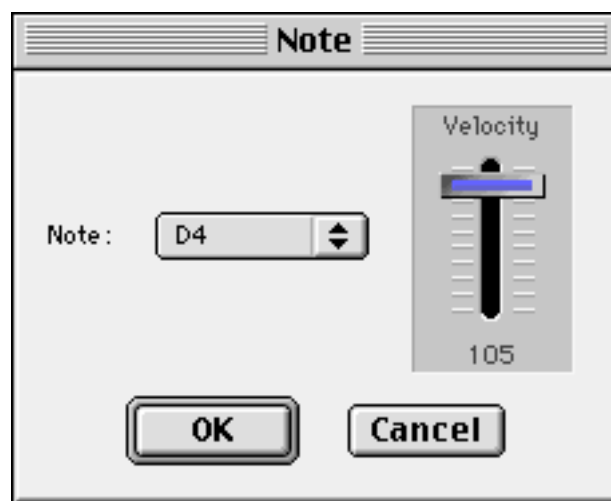
Even though they look slightly different, Mac OS and Windows 95 screenshots are shown interchangably in the manual if the window(s) have the same functionality.

The "Online" Portable Document Format

This manual is optimized to take advantage of the most useful Portable Document Format features. Here are some Adobe Acrobat Reader tips:

• The Table Of Contents, the Index, and blue underlined text are active hyperlinks. The cursor changes to a pointing hand when placed over a hyperlink. Click a hyperlink to jump directly to the corresponding linked page.

• The Bookmarks are handy for navigating around the manual. Bookmark sections can be expanded or contracted by clicking the disclosure triangle

• The manual opens to a default "view" size of 100%. The view size can be adjusted for readability. Use the Zoom function (click and hold the magnifying glass icon at bottom of window) to change the view size.

• The graphics (screenshots and illustrations) look best when viewed at the default view size of 100%. Graphics that look poor when viewed at 100% will look perfect when viewed at 200%.

• The manual can be printed for "hard copy" from within the Acrobat Reader application by selecting Print... from the File menu.

• All the graphics will look good when printed, regardless of the view size.

The Bookmarks and index are active hyperlinks. The cursor changes to a pointing finger when placed over a hyperlink. Click a hyperlink to jump directly to the page.

Click the bookmark triangles to expand and contract the hierarchy.

Click and hold the magnifying glass icon to change the view size.

1.7 Key Concepts

It's really a Synthesizer

All Retro AS-1 functionality is implemented using digital signal processing technology. There are no samples, wavetables, or digital audio recordings of any kind within Retro AS-1. All audio is generated on the fly, in real-time, as you manipulate and play back the sounds.

Use it like an instrument

No additional hardware or software is required to use Retro AS-1. Sounds can be triggered internally using the on-screen keyboard utility. Using a MIDI controller (such as a MIDI compatible keyboard) and interface (not included), sounds can be played in real-time like a conventional hardware synthesizer with layers, splits, and full MIDI continuous control. With the included MIDI drivers, Retro AS-1 can be used as a multi-timbral sound module, running in the background behind your favorite MIDI application on the same computer.

Program Files

All synthesizer voicing parameters are accessed using the Retro AS-1 Editor application. Each Editor file is a complete synthesizer "patch" that includes multiple oscillators, filters, modulation routings, and insert effects. We call this complete set of voicing parameters a program. The synthesizer engine loads program files from disk into RAM dynamically as required for playback on each of the 16 MIDI channels. Groups of related programs can be easily arranged into banks.

Setup Files

The Retro AS-1 MIDI Processor is a powerful performance tool that enables you to modify MIDI data in the synthesizer engine by programming layers (two programs sounding simultaneously), splits (two different programs on each side of the keyboard), and arpeggiations (notes in a chord played sequentially, one at time). The MIDI Processor can be thought of as our own version of the multis, performances, or combinations in hardware keyboard products. We call one complete group of layer, split, and arpeggiation settings a Setup. Each MIDI Processor file can contain dozens of setups.

Mixer Files

Multi-timbral settings can be created and modified using the Retro AS-1 Mixer application. Each Mixer file contains a complete set of values for bank and program selection, volume, pan, mute, solo, and global effect send levels on each of the 16 MIDI channels. Global effects parameters can also be accessed in the Mixer, and their values are stored in the Mixer file. Mixer files enable fast and easy multi-timbral reconfigurations for use in particular MIDI environments.

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MIDI

Retro AS-1 can run in the background behind your favorite MIDI application on the same CPU, providing excellent synthesizer timbres without additional hardware. Up to 4 simultaneous real-time modulations using standard MIDI controllers can be stored in a program for expressive performances. Additionally, almost every voicing parameter can be accessed simultaneously for real-time control using our extensive MIDI implementation.

Retro AS-1 includes a serial port driver that enables direct connection to a MIDI interface without the hassles of third-party MIDI operating systems such as MIDI Manager, OMS, or FreeMIDI. However, OMS and FreeMIDI drivers are included to allow for complete integration into existing MIDI setups.

Retro AS-1 uses any Windows MIDI input (hardware) port for external MIDI control. Also included is a standard Windows device driver to allow MIDI connections from MIDI software applications running on the same CPU.

Polyphony

Because there is no dedicated hardware to perform certain tasks, the computer's CPU must handle all synthesizer routines. Therefore, the available polyphony is dependent upon CPU type, clock and bus speed, voice complexity, and other applications that may be running simultaneously. CPU processing resources can be reserved or limited in the Retro AS-1 control panel, and polyphony can be restricted to allow use on slower computer systems.

Output

The Retro AS-1 output signal is sent to Sound Manager (Mac OS) or DirectSound (Windows 95), which then routes the signal to the audio outputs for connection to a mixer, headphones, stereo system, recording device, or any other audio input. Using the Record To Disk feature, the synthesizer output (including multi-timbral output with effects) can be recorded to disk as an audio file for use in digital audio applications.

The output of Retro AS-1 for Mac OS goes to the Sound Manager, part of the Macintosh operating system, for output to the Mac built-in audio outputs. Proper Sound Manager setup is critical for optimum performance and sound quality. Third-party digital audio expansion cards can be used for even higher fidelity and digital I/O.

The output of Retro AS-1 for PC goes to DirectSound (a sub-component of DirectX), part of the Windows 95 operating system. DirectSound then routes the signal to the sound card where the audio outputs are located.

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1.8 Software Components

The Retro AS-1 package is a modular collection of eight main software components, all designed to work together while maintaining ease of use and sensible functionality grouping. Each of the components is briefly described below. For detailed component descriptions, refer to its associated reference chapter.

Retro AS-1 Editor Application

The Editor is the main sound design application, where synthesizer programs are created, modified, and saved. The synthesizer voicing parameters are accessed here. The Editor is mainly for voicing only; it does not need to be open to use the synth. For details, see Chapter 7.

Retro AS-1 Editor

Editor Program file

Retro AS-1 MIDI Processor Application

The MIDI Processor is a powerful software controller that allows you to control layers, splits, arpeggiations, and other "live play" controls. It receives MIDI data from the synthesizer engine, then processes it using a variety of functions before returning it back to the engine for audio output. The MIDI Processor does not need to be open to use the synth. For details, see Chapter 6.

Retro AS-1 MIDI Processor

MIDI Processor Setup file

Retro AS-1 Keyboard Application

This is an on-screen keyboard that allows you to audition Retro AS-1 sounds without using a MIDI controller. It has several utility functions for selecting programs and triggering notes and chords. For details, see Chapter 8.

Retro AS-1 Keyboard

Retro AS-1 Mixer Application

The Mixer is where you can create, edit, and save multi-timbral mixes. You can also edit the global effects processors here and set their individual send levels per MIDI channel. For details, see Chapter 9.

Retro AS-1 Mixer

Mixer multi-timbral file

Retro AS-1 Status

The Status window allows you to view polyphony and CPU usage in real-time. It provides visual feedback to assist in optimizing system configuration parameters. For details, see Chapter 5.

Retro AS-1 Status

The Status window is always open on Windows 95 when the synthesizer is active.

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Retro AS-1 OMS Input, FreeMIDI Input, & Serial Input utilities (Mac OS only)

These utilities are used to get MIDI data from the Macintosh serial ports to the synth engine during "live play" or anytime OMS or FreeMIDI applications are not active. They are background applications that are opened automatically when the Editor, MIDI Processor, or Mixer applications are launched. For details, see Chapter 2.

Serial/OMS/FreeMIDI Input

Retro AS-1 OMS & FreeMIDI drivers (Mac OS only)

These driver components are used in conjunction with third-party MIDI operating systems to run the synthesizer from within existing MIDI software environments. They allow you to trigger Retro AS-1 from MIDI applications running on the same computer as the synthesizer. For details, see Chapter 2.

Retro AS-1 MIDI Driver

Retro AS-1 Windows Device Driver (Win 95 only)

The device driver for our software "MIDI module" is used by the Windows 95 MIDI Mapper and/or third-party MIDI applications to provide a multi-timbral destination for transmitting MIDI information to the Retro AS-1 synthesizer engine. For details, see Chapter 3.

Retro AS-1 Device Driver

Retro AS-1 Control Panel

The control panel is the global settings utility. It allows you to edit system configuration parameters such as polyphony, CPU usage, sample rate, MIDI controller assignments, output device, and more. For details, see Chapter 5.

Retro AS-1 Control Panel

Retro AS-1 Programs

The Retro AS-1 Programs folder is where the synthesizer programs are located. Program files can reside anywhere but must be within the Retro AS-1 Programs folder to receive MIDI Bank and Program change commands. Programs are arranged into banks by creating a folder hierarchy within the Retro AS-1 Programs folder. For details, see Appendix A.

Retro AS-1 Programs folder

Retro AS-1 Engine

The system components are the host-based processors that perform the actual synthesis. This "synth engine" performs its duties in the background at the system level, behind all other applications.

Retro AS-1 Engine

The synth engine itself, when activated, requires 6 megabytes of system memory in addition to any other applications being used.

Retro AS-1 Objects Library

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1.9 Who is BitHeadz?

BitHeadz is a software technology company specializing in the design and development of high quality software solutions for the computer and professional music industries. Our focus is to provide advanced software synthesis, professional quality sound sets, custom interactive content, and audio applications and tools for the PC and Macintosh environments. With our established expertise in these areas, BitHeadz is committed to providing the best sounding software in the industry.

BitHeadz long-range goal is to develop interactive music applications that will target two related markets; the computer industry and the professional electronic music industry. Current industry data shows that over the next five years, as a result of the convergence of these two markets, a significant increase of professional musicians and hobbyists alike will rely on computer technology to listen, play, enjoy, and create music of all types.

The official BitHeadz logo

www.bitheadz.com

Chapter 2. Installation and Setup

Chapter 2 Contents

Please pay special attention to this chapter. You should read the section for your computer operating system in its entirety. It contains information that will affect Retro AS-1 sound quality and performance.

2.1 Audio and MIDI Hardware Setup

Retro AS-1 is a high fidelity, stereophonic musical instrument. For maximum enjoyment, we recommend connecting your computer to a high quality stereo sound monitoring system such as stereo headphones, an amplifier/speaker combination, or mixer.

Audio Hardware Setup

> IMPORTANT! Turn the volume of your sound system all the way down until specifically instructed to turn it up.

Most computer sound output jacks accept a standard stereo 1/8-inch miniplug connector. Some systems may have RCA jacks for sound output. Use whichever output is most appropriate for your system.

Connect the computer sound output jack to the line-level input of your sound system using an appropriate adapter cable (not included). A typical cable for such connections is a "stereo 1/8-inch male TRS (tip-ring-sleeve) miniplug to dual-RCA plugs," available at any electronics supply store.

For more detailed instructions on how to interconnect your audio hardware components, consult the documentation that came with the audio hardware.
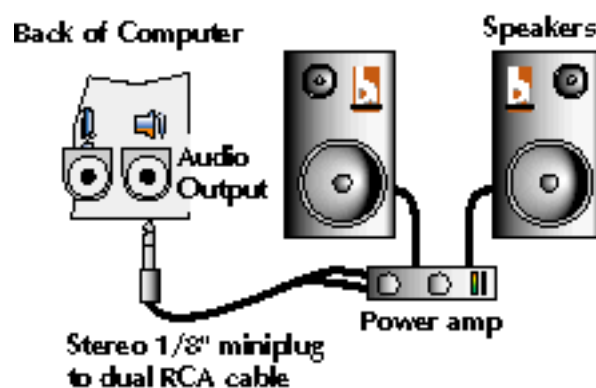
Figure 2.1.1. Connecting the computer to a sound system. Your particular audio setup may vary.

MIDI Hardware Setup

Follow the instructions included with your MIDI controller and MIDI interface to connect them to your computer.

Additional MIDI information, including MIDI software configuration, can be found in Chapter 4, Working with MIDI.

M 2.2 Mac OS Installation

This entire section is for Mac OS only. Installation and setup instructions for Windows 95 is in sections 2.4 and 2.5 of this chapter.

Retro AS-1 has an automated installer that places the necessary software components where they are needed on your hard disk.

How to install Retro AS-1

1. **Insert the Retro AS-1 CD-ROM disk into the Mac OS-compatible CD-ROM drive.**

   The CD-ROM icon will appear on the Desktop.

2. **Double-click the Retro AS-1 CD-ROM icon to open the Retro AS-1 CD-ROM window.**

3. **Double-click the Retro AS-1 Installer icon.**

   The Retro AS-1 splash screen will appear. Click Continue to advance to the Read Me screen.

4. **Read the important information contained in the text window.**

   The text window contains critical information about Retro AS-1. Click Continue to advance to the License Agreement screen.

5. **Please read the license agreement.**

   By installing the softw are, you are bound to its terms. Click A gree to advance to the password entry screen.
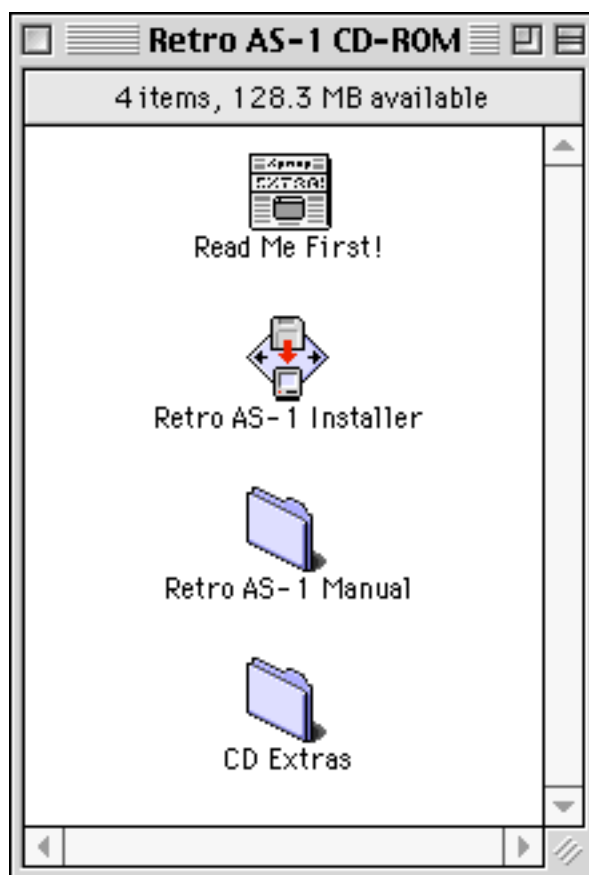
Figure 2.2.1. The Retro AS-1 CD-ROM window.

7. **Enter your password.**

   Enter your password from the Retro AS-1 registration card included in the box. Click OK to advance to the installation options scr een

8. **Click Install to install the default software package.**

   The default Easy Install package is recommended for initial installations. For advanced installation options, select Custom Install from the pull-do wn menu.

9. **Select a destination for the Retro AS-1 Folder then click Install.**

   The Retro AS-1 components will be written to disk at the location you select using the standar d Mac OS save dialog box. You can select volumes other than the startup volume for the Retro AS-1 Folder. The required system files will be installed into the System Folder on the volume you select.

10. **That's it! You do not need to restart when the process is complete.**

    Installation is now complete. However, to ensure you have the latest, greatest version of Retro AS-1, please proceed to step **1**.

11. **Download and install the latest version of Retro AS-1 from our web site.**

    BitHeadz is committed to ongoing product development. When product updates are released, they are posted on our web site for downloading at www.bitheadz.com/Updates.html . Instructions for updating are included in the update installer.

How to deinstall Retro AS-1

1. **Follow steps 1-7 of the installation procedure in the previous section.**

   The installation options window appears.

2. **Select Uninstall from the install options pull-down menu.**

   The Uninstall window appears.

3. **Click the Uninstall button.**

   Done! All of the R etro AS-1 components will be moved to the trash.

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M Where the software components are installed (Mac OS)

RETRO AS-1 COMPONENT	INSTALLED LOCATION
Retro AS-1 Folder	User selectable
Retro AS-1 Editor	Retro AS-1 Folder
Retro AS-1 MIDI Processor	Retro AS-1 Folder
Retro AS-1 Programs	Retro AS-1 Folder
Retro AS-1 Manual	Retro AS-1 Folder
Retro AS-1 Utilities Folder	Retro AS-1 Folder
Goodies Folder	Retro AS-1 Folder
Retro AS-1 Keyboard	Retro AS-1 Utilities Folder
Retro AS-1 Mixer	Retro AS-1 Utilities Folder
Retro AS-1 Status	Retro AS-1 Utilities Folder
Serial/OMS/FreeMIDI Input	Retro AS-1 Utilities Folder
Retro AS-1 Programs alias	System Folder: Root Level
Retro AS-1 Control Panel	System Folder: Control Panels
Retro AS-1 Engine	System Folder: Extensions
Retro AS-1 Objects Library	System Folder: Extensions
Retro AS-1 OMS Driver	System Folder: OMS Folder
Retro AS-1 FreeMIDI Driver	System Folder: FreeMIDI Folder

Figure 2.2.2. Where the software components are installed in Mac OS.

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M 2.3 Mac OS Setup

> NOTE: If you have a Digidesign audio expansion card installed in your system, please see also Appendix D.

The Mac OS Sound Manager software needs to be set up correctly for you to hear maximum fidelity from Retro AS-1. It only needs to be set up one time; control panel settings are retained even after system shutdown.

> IMPORTANT! Turn the volume of your sound system all the way down until specifically instructed to turn it up.

Sound control panel or Monitors and Sound control panel?

How the Sound Manager configuration windows look depends on which type of Macintosh you have, non-PCI (older style) or PCI (most Macs and clones since August 1995). You can usually tell which type of system you have by looking at the control panel used within the system software. Look in your Control Panels folder (accessed from the Apple Menu). If your system has only the Sound control panel, your system is probably not PCI. If your system has the Monitors & Sound control panel, you probably have a PCI Mac.

2.3.1 To set up the Sound Manager for non-PCI Macs using the Sound control panel (skip to section 2.3.2 for PCI Macs):

1. **Turn down the volume of your sound monitoring system to its minimum setting.**

2. **Open the Sound control panel.**

   The Sound control panel is located in the Control Panels folder, which can be accessed from the Apple Menu.

3. **Choose Volumes from the pull-down menu.**

4. **Drag the slider bar for Built-in volume all the way to maximum.**

   This is the Macintosh master output level control. It is independent of the Alert Sounds volume control.
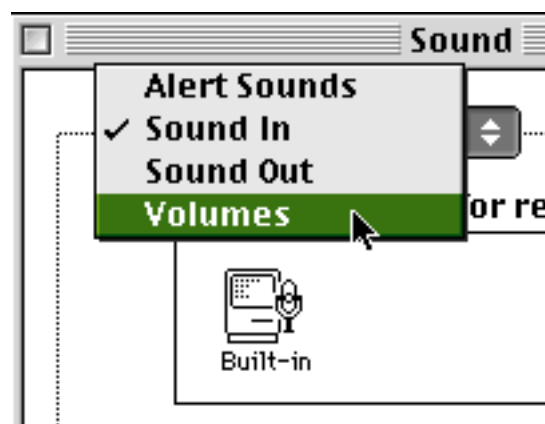
Figure 2.3.1. Choosing Volumes in the Sound control panel.

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IMPORTANT! The Volume slider controls the master system volume. It is a digital level control; the volume is lowered by "dropping bits." For maximum signal-to-noise ratio, leave this control at maximum and use your monitoring system controls to set the listening levels.

5. **Click on the volume slider bar when it is at maximum while slowly increasing the monitoring system volume to your desired listening level.**

6. **Choose Sound Out from the pull-down menu.**

   The Sound Out window details shown here may vary according your Macintosh model.

7. **Select the resolution for audio output.**

   Use the highest settings your Macintosh allows for maximum fidelity. We recommend the following settings:

Rate:	44.100kHz
Size:	16 bit
Use:	Stereo

IMPORTANT! The sample rate setting should match the setting in the Retro AS-1 control panel, otherwise additional CPU processing will be required for sample rate conversions. See Chapter 5. Control Panel Reference, for more information.
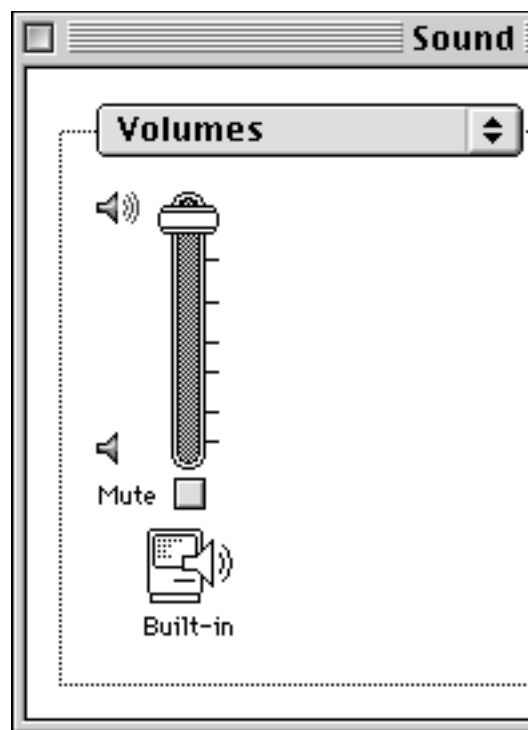
Figure 2.3.2. The Sound control panel Volumes window. This setting should always be at maximum for highest fidelity.
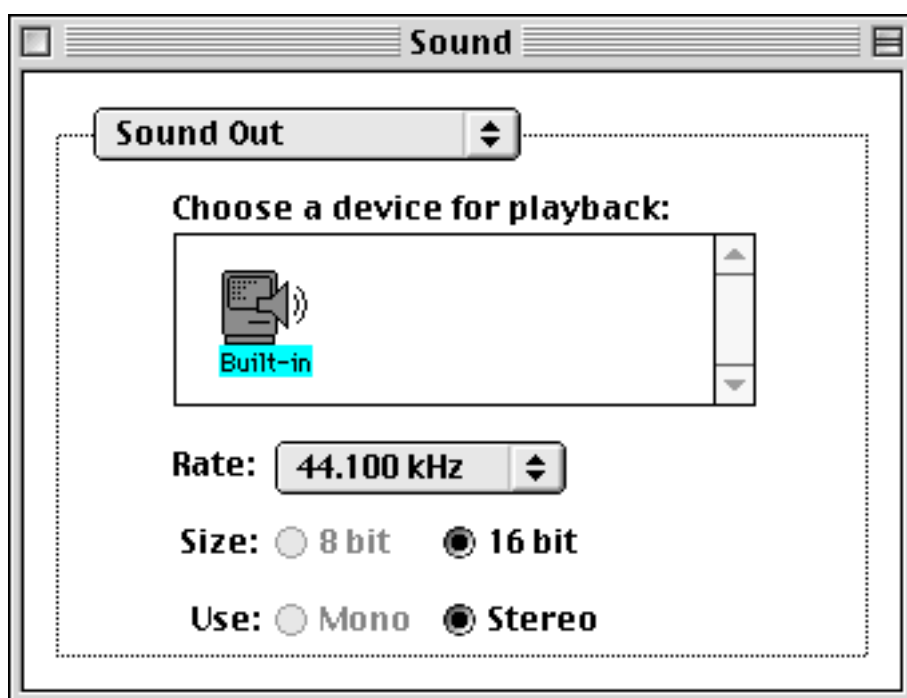
Figure 2.3.3. The Sound control panel Sound Out window. The Rate setting should always match the Retro AS-1 control panel sample rate setting.

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8. Choose Alert Sounds from the pull-down menu.

9. Set the system alert sound volume.

The Alert Volume slider controls only the level of the system alert sound. It is independent of the Volumes control, which is the master Macintosh level control. This setting should be considerably less than maximum (typically 30% or lower), so the system beep will not be as loud as the synthesizer output.

10.Close the Sound control panel.

That's it! Control panel settings remain current, even after rebooting.
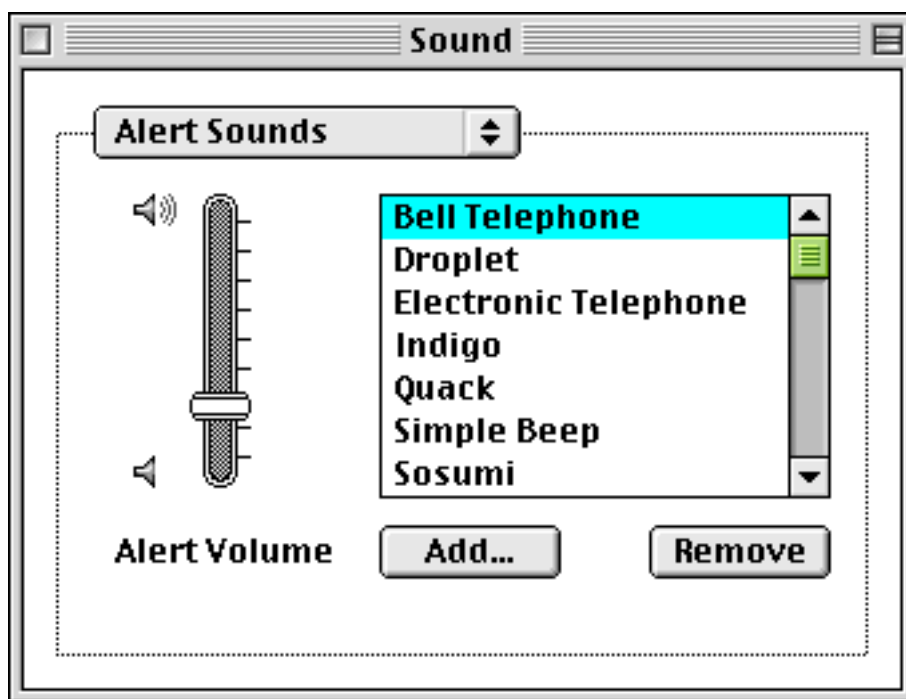
Figure 2.3.4. Sound Control Panel Alert Sounds window. The Alert volume should be lower than the Volumes level.

2.3.2 To set up the Sound Manager for PCI Macs using the Monitors & Sound control panel:

1. Turn down the volume of your sound monitoring system to its minimum setting.

2. Open the Monitors & Sound control panel.

The Monitors & Sound control panel is located in the Control Panels folder, which can be accessed from the Apple Menu.

3. Click on the Sound icon at the top of the Monitors & Sound window

4. Drag the slider bar for Sound Out Level all the way to maximum.

This is the Macintosh master output level control. It is independent of the Alert Sounds volume control.

Monitors & Sound

Monitor · Sound · Alerts

Sound Out Level

☐ Mute

Computer Speaker Volume

☒ Mute

Sound Out Balance

Computer Speaker Balance

Sound Output

Built-in

Sound Recording Input

Line In

☒ Listen

Sound Output Quality

44.100 kHz

IMPORTANT! The Volume slider controls the master system volume. It is a digital level control; the volume is lowered by "dropping bits." For maximum signal-to-noise ratio, leave this control at maximum and use your monitoring system controls to set the listening levels.

Figure 2.3.5. The Monitors & Sound control panel sound settings. The Sound Out Level should always be at maximum. The Sound Output Quality setting should match the Retro AS-1 control panel sample rate setting.

5. **Click on the volume slider bar when it is at maximum while slowly increasing the monitoring system volume to your desired listening level.**

6. **Select the Sound Output Quality.**

   We recommend 44.100kHz for maximum fidelity.

IMPORTANT! The sample rate setting should match the setting in the Retro AS-1 control panel, otherwise additional CPU processing will be required for sample rate conversions. See Chapter 5. Control Panel Reference, for more information.

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7. **Click on the Alerts icon at the top of the Monitors & Sound window.**

8. **Set the System Alert Volume.**

   The System Alert Volume slider controls only the level of the system alert sound. It is independent of the Sound Out Level control, which is the master Macintosh output level control. This setting should be considerably less than maximum (typically lower than 30%), so the system beep will not be as loud as the synthesizer output.

10. **Close the Monitors & Sound control panel.**

    That's it! Control panel settings remain active, even after rebooting.

Where to go from here

Retro AS-1 installation and basic Mac OS setup is now complete!

You are now ready to use Retro AS-1 as a stand-alone synthesizer with live MIDI input. Proceed to Chapter 3, QuickStart, to learn the basic operations of the Retro AS-1 applications.

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2.4 Windows 95 Installation

Before You Install

The Windows 95 computing environment can be complicated, especially when dealing with multimedia hardware and software. To ensure proper functionality when adding software and/or hardware components to your system (and to avoid troubleshooting hassles later!), operational problems should be resolved BEFORE installing new component(s).

Please confirm the following steps A, B, and C before proceeding with the installation of Retro AS-1:

A. Confirm that your sound card supports DirectSound.

Retro AS-1 requires DirectSound (a sub-component of DirectX) version 3.0 or higher. Contact the sound card manufacturer to confirm the card supports DirectSound. If the sound card supports DirectSound, the software that came with the sound card probably installed DirectX. You can confirm DirectX installation and support using the following technique:

1. **Open the Add/Remove Programs control panel.**

   Add/Remove Programs can be accessed using Start Menu>Settings>Control Panel.

2. **While Install/Uninstall is the active tab, double-click the DirectX Drivers item in the installed software list.**

   The DirectX Setup window appears. If DirectX Drivers is not shown in the list, DirectX is probably not installed. The Retro AS-1 Installer can optionally install DirectX.

Figure 2.4.1. The DirectX Setup window in the Add/Remove Programs control panel.
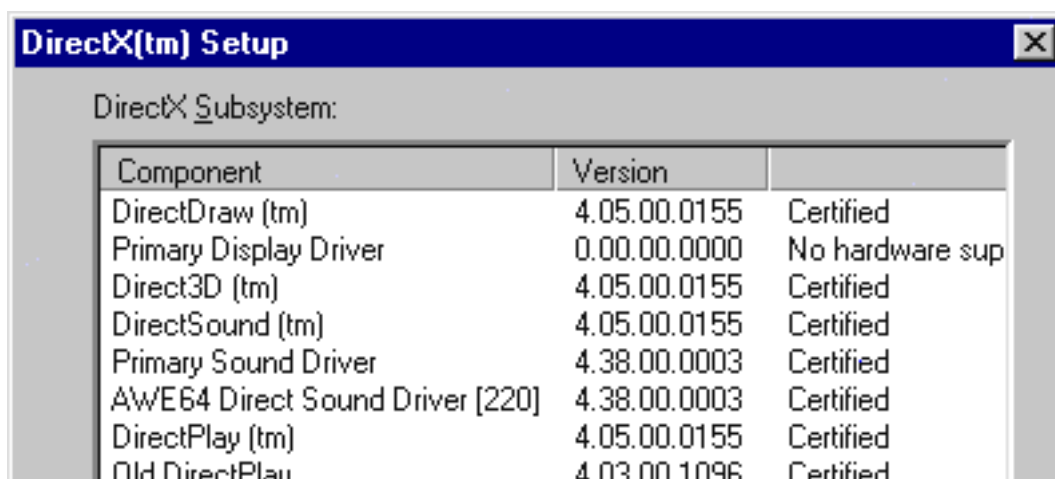
3. Confirm the DirectSound component is Certified.

If the DirectSound component row shows certified, your card supports DirectSound. If DirectSound shows No hardware support, your sound card does not support DirectSound.

NOTE: The Retro AS-1 Installer will optionally install the DirectX drivers to the latest version (5.0) if necessary.

B. The DirectSound-supported sound card and audio monitoring system must be properly installed and configured.

Follow the installation and configuration instructions that came with the hardware. Verify proper installation by using the MediaPlayer application that is included with Windows 95 (Start > Programs > Accessories > Multimedia) to confirm playback of digital audio (.WAV) files.

C. The MIDI interface (if any) must be properly installed and configured.

Follow the instructions that came with the hardware. Verify proper installation by confirming your MIDI application is sending and receiving MIDI. Retro AS-1 will use the MIDI hardware port for MIDI input.

NOTE: If you have any problems with the hardware or software, consult the soundcard, MIDI card, or PC manufacturer for assistance. BitHeadz cannot provide support for items unrelated to Retro AS-1.

W The Software Installer

Retro AS-1 has an automated installer that places the necessary software components where needed on your hard disk.

How to install Retro AS-1:

1. Insert the Retro AS-1 CD-ROM disk into the Windows 95-compatible CD-ROM drive.

2. Select Run... from the Windows 95 Start Menu.

The Run window appears.

3. Type D:Setup into the Open command line and click OK.

The Retro AS-1 Installer window appears. If your CD-ROM drive letter is not D, substitute the correct letter

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4. Follow the instructions on the screen.

The installer will guide you through the process.

5. Restart when the process is complete. That's it!

After rebooting, Retro AS-1 will be ready for use. However, to ensure you have the latest, greatest version of Retro AS-1, please proceed to step 11.

6. Download and install the latest version of Retro AS-1 from our web site.

BitHeadz is committed to ongoing product development. When product updates are released, they are posted on our web site for downloading at www.bitheadz.com/Updateshtml. Instructions for updating are included in the update installer.

W How to deinstall Retro AS-1:

1. Make sure all Retro AS-1 components are quit.

The Editor, Keyboard, MIDI Processor, Mixer, and any MIDI application(s) using the Retro AS-1 device driver must be closed.

2. Open the Add/Remove Programs control panel.

Add/Remove Programs can be accessed using Start Menu>Settings>Control Panel.

3. While Install/Uninstall is the active tab, select Retro AS-1 from the installed programs list then click the Add/Remove button.

The confirm File Deletion window appears.

4. Click Yes to remove Retro AS-1 from your system.

The installed Retro AS-1 components will be deleted. However, the device driver must be manually deleted.

5. In the Multimedia Properties control panel, click the Advanced tab.

The Retro AS-1 device driver is accessed here.

6. Click the plus sign next to MIDI Devices and Instruments.

The list of installed MIDI devices is displayed.

7. Double-click Retro AS-1 in the list.

The Retro AS-1 Properties window is displayed.

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8. Click Remove to delete the Retro AS-1 device driver then reboot.

Retro AS-1 deinstallation is now complete.

W Where the software components are installed (Windows 95)

RETRO AS-1 COMPONENT	INSTALLED LOCATION
Retro AS-1 Folder	User selectable
Retro AS-1 Editor	Retro AS-1 Folder
Retro AS-1 MIDI Processor	Retro AS-1 Folder
Retro AS-1 Keyboard	Retro AS-1 Folder
Retro AS-1 Mixer	Retro AS-1 Folder
Retro AS-1 Manual	Retro AS-1 Folder
Retro AS-1 Programs	\Windows\
RetroCfg.dll	\Windows\System\
RetroAS1.cpl	\Windows\System\
RetroAS1.drv	\Windows\System\
RetroAS1.vxd	\Windows\System\
RetroAS1.exe	\Windows\System\
RetroLib.dll	\Windows\System\
RetroAPI.dll	\Windows\System\

Figure 2.4.1. Where the software components are installed in Windows 95.

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2.5 Windows 95 Setup

Windows 95 needs to be set up correctly for you to hear maximum fidelity from Retro AS-1.

How To Set Volumes in Windows 95

Windows 95 controls the master system volumes for all devices using its built-in digital mixer and Volume Control application. For maximum fidelity within Retro AS-1, it is important to set up the system volumes correctly.

> IMPORTANT! Turn the volume of your sound system all the way down until specifically instructed to turn it up.

1. Open the Volume Control application (SNDVOL32.EXE).

Volume Control can be accessed from the Start Menu (Start>Programs>Accessories>Multimedia>Volume Control) or by double-clicking the Speaker icon at the right side of the Task Bar. The executable file SNDVOL32.EXE is located in the Windows directory.

Figure 2.5.1. Accessing Volume Control from the Start Menu.
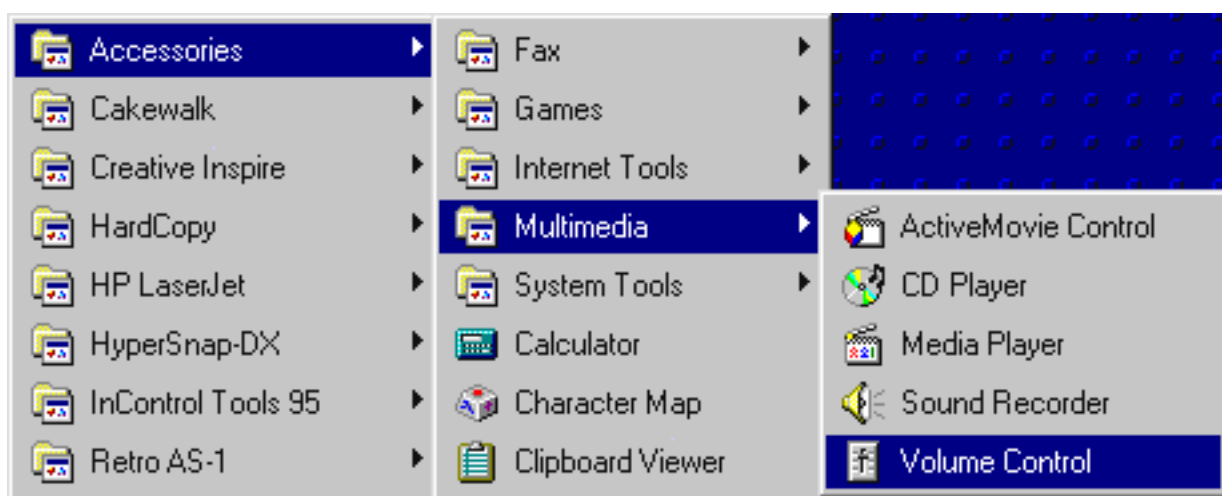
Figure 2.5.2 You can also double-click the Task Bar speaker icon to open Volume Control.

2. Move the MIDI slider to maximum.

This control sets the output level of the Retro AS-1 synthesizer engine relative to the other sliders (CD Audio, Wave, etc.)

3. Move the Volume Control (leftmost slider) to maximum.

This control sets the master output of the sound system (it effects all the other sliders).
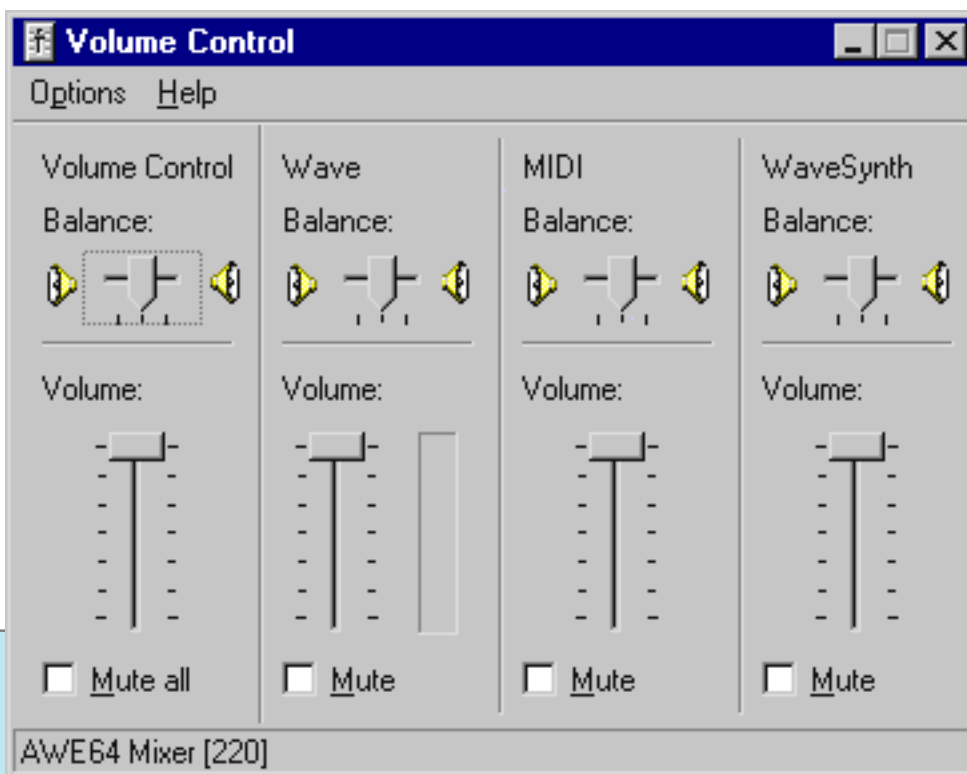
IMPORTANT! These sliders control the master system volumes. They are digital level controls; the volume is lowered by "dropping bits." For maximum signal-to-noise ratio, leave the MIDI and Volume Control sliders at maximum and use your monitoring system controls to set the listening levels.

Figure 2.5.3. The Volume Control interface. The MIDI slider should be at maximum. The "master" Volume Control slider (far left) should be as high as possible before the onset of clipping distortion.

4. Slowly increase the monitoring system volume to the desired listening level while sound is playing from the computer.

Use any audio source (Audio CD, WAV file, MIDI file , etc) for setting the monitoring volume. Media Player (accessed from Start Menu, same location as Volume Control) is great for playing any media quickly.

5. If clipping (digital distortion) occurs, lower the Master Volume Control (step 3) while monitoring the output just until the clipping disappears.

6. Done! You may close Sound Control or leave it open.

Where To Go From Here

Retro AS-1 installation and basic Windows 95 setup is now complete!

You are now ready to use Retro AS-1 as a stand-alone synthesizer with live MIDI input. Proceed to Chapter 3, QuickStart, to learn the basic operations of the Retro AS-1 applications.

Figure 2.5.4. This "mini slider" pops up when you click once on the Task Bar speaker icon. You can use it to control the master system volume.

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Chapter 3. Quick Start

Chapter 3 Contents

In this chapter you will learn how to play sounds using the Retro AS-1 Keyboard and a MIDI controller. Basic operations of the Editor and MIDI Processor applications are also covered here.

Advanced MIDI operations for Mac OS and Windows 95 are covered in Chapter 4; Working with MIDI.

Detailed explanations of every Retro AS-1 component and their parameters are covered in the Reference section of this manual which begins with Chapter 5.

All instructions included here assume you have already completed the installation and setup processes described in Chapter 2. If you haven't already installed the software, connected your audio and MIDI hardware, and configured the Sound Manager (Mac OS) or Volume Control (Windows 95) as described in Chapter 2, please do so before continuing with this chapter.

Important Synthesizer Information

We strongly recommend reading the Key Concepts section in Chapter 1 before proceeding. It contains a general overview of the product and how it works.

Retro AS-1 is comprised of several "modular" software components. The main component is the synthesizer engine. The synth engine is the component that produces the audio signal. The other modules (Keyboard, Editor, MIDI Processor, Mixer, MIDI driver) are components that control the synth engine.

IMPORTANT: The synth engine cannot be opened directly. It is only launched when activated by one of the other components.

3.1 Auditioning Sounds with the Keyboard

Keyboard Overview

The Retro AS-1 Keyboard application is an on-screen utility for triggering Retro AS-1 sounds without a MIDI controller or any other MIDI hardware or software. The Keyboard allows you to trigger a 9-octave range of individual notes and chords, change the active voice selection, control note velocity values, and transmit controller information. The Keyboard is the most direct and least complicated method of triggering sounds. It requires no MIDI input and very little CPU and RAM resources.

NOTE: Each Keyboard parameter and its function is explained in detail in Chapter 8.

To Trigger Sounds using the Retro AS-1 Keyboard:

1. Launch the Retro AS-1 Keyboard application.

The Keyboard window will appear.
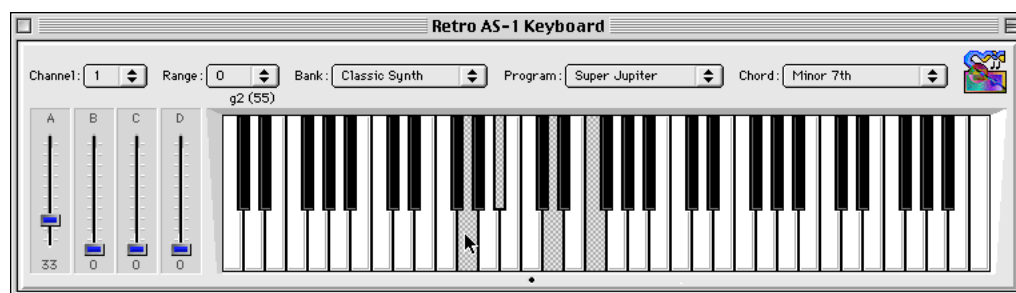
Figure 3.1.1. The Keyboard window. Where you click on the keys (top or bottom) determines the MIDI velocity for the note.

M With Mac OS, you can open the application in two ways: by choosing Keyboard... from the Synthesizer menu within the Editor, MIDI Processor, or Mixer applications, or by double-clicking the Retro AS-1 Keyboard application icon. Retro AS-1 Keyboard is located in the Retro AS-1 Utilities folder, inside the Retro AS-1 Folder.

W With Windows 95, you can open the application in three ways: by choosing Keyboard... from the Synthesizer menu within the Editor, MIDI Processor, or Mixer applications; by double-clicking the Retro AS-1 Keyboard application icon; or Start Menu>Programs>Retro AS-1>Retro AS-1 Keyboard. The application is installed (by default) at the following location: Program Files/BitHeadz/Retro AS-1/Retro AS-1 Keyboard.exe.

2. Click on the black and white "keys" to trigger sounds.

Clicking a key sends the corresponding MIDI pitch to the synthesizer. You are now hearing the active program file. Where you click on the key determines the velocity value of the note. Clicking towards the top of the key transmits a lower velocity for the note; clicking towards the bottom of the note transmits a higher velocity value. The computer QWERTY keyboard will also trigger sounds when the Keyboard application is active.

IMPORTANT! If you don't hear sound output from the Keyboard or sound quality is poor, refer to Appendix C, Troubleshooting.

3. Select and audition various voices.

The program that is displayed under the Program pull-down menu is the program you will hear. Use the Bank and Program menus to select various factory programs to familiarize yourself with the amazing sonic capabilities of Retro AS-1.

NOTE: If the Editor is open, you can select Editor from the Bank and Program menus, allowing you to hear and modify the program(s) that are currently loaded into the Editor.

NOTE: More information about Banks and Programs is covered in Appendix A, Working with Banks and Programs.

4. Experiment with the Chord and Range functions.

Multiple notes can be triggered with the Chord function. Use the pull-down menus to change the chord quality and the octave range.

In most of the factory programs, Controller A will affect the sound. We invite you to try the Controller A slider when auditioning programs (refer to figure 3.1.1).

Important! If synthesizer performance is poor (limited polyphony and/or sluggish CPU response), see Appendix B, Optimizing Performance.

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3.2 Activating MIDI Input

NOTE: This section is about using Retro AS-1 "stand alone" with a MIDI controller. For information about integrating Retro AS-1 with third-party MIDI applications, see Chapter 4, Working With MIDI.

Overview

Retro AS-1 can be "played" just like any other MIDI sound module using a MIDI controller and interface. Such situations include playing the synthesizer live, using a hardware (external) sequencer, or running MIDI applications on a separate computer. How MIDI input is activated is determined by the computer platform.

In .Mac OS, when the synth engine launches, Retro AS-1 Serial Input (the direct serial port driver application) launches automatically when "Serial" is selected as the Default MIDI Input source in the Retro AS-1 control panel. Retro AS-1 Serial Input receives MIDI information from the Macintosh serial port and passes it directly to the synth engine. It is used any time you want to use Retro AS-1 as a sound module without using OMS or FreeMIDI. Retro AS-1 Serial Input remains active when it is in the background.

In Windows 95, when the synth engine launches, Retro AS-1 "grabs" the default hardware MIDI input port if "use Direct MIDI Input" is selected in the Retro AS-1 control panel. The default MIDI hardware port that will be used is specified in the Retro AS-1 control panel. Once the MIDI input port is in use by Retro AS-1, it cannot be used by another MIDI application. Conversely, if another MIDI application "grabs" the MIDI input port before Retro AS-1 is launched, the MIDI input port will be unavailable to Retro AS-1. Installed MIDI hardware devices can be viewed in the System Properties Device Manager (System control panel) under Sound, video and game controllers.

To Activate MIDI Input on Mac OS:

1. Verify the MIDI hardware is properly connected.

You will need a MIDI controller (or something else that transmits MIDI), MIDI cable, MIDI interface, and serial cable (none are included with Retro AS-1). Follow the installation instructions that came with the MIDI hardware.

2. Launch the Serial Input application.

Double-click the Retro AS-1 Serial Input application icon from the Mac OS Finder. The application is located in the Retro AS-1 Utilities folder, inside the Retro AS-1 Folder. The Serial Input application window will be visible.
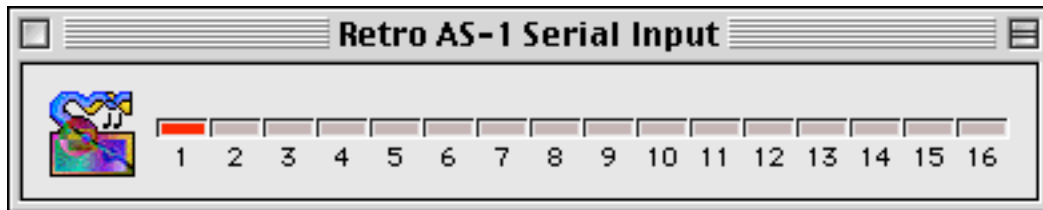
NOTE: Retro AS-1 Serial Input is launched automatically when the Editor, MIDI Processor, or Mixer application is launched. This default action can be disabled in the Retro AS-1 control panel.

Figure 3.2.1. The Serial Input window. The application is used to get MIDI from the serial port to the synth engine. The "LEDs" indicate incoming MIDI activity on each of the 16 MIDI channels.

3. Choose the MIDI port you are using.

When Serial Input is the active (foremost) application, the Port menu will be visible . Choose the Macintosh serial port your MIDI interface is connected to from the Port menu. Select either Printer or Modem. For PowerBooks with only one serial port, select Modem. If you have a MIDI Time Piece in Fast mode, choose Fast from the Port menu. The active selection is indicated with a check mark.

IMPORTANT! If you are using the Printer port for MIDI connections, AppleTalk must be unloaded while using MIDI. To unload AppleTalk, make it Inactive in the Chooser utility, which is accessed from the Apple Menu, then reboot.
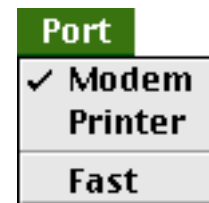
Figure 3.2.2. The Port menu in Retro AS-1 Serial Input. Select the serial port your MIDI interface is connected to.

4. Trigger sounds using the MIDI source.

Now you can "play" your computer like a MIDI sound module . You can select different programs using MIDI program change commands or the Keyboard, Editor, MIDI Processor, or Mixer applications. You can modify programs in real-time while receiving MIDI from the controller using the Editor if the MIDI Channel parameter on the Editor global page matches the MIDI transmission channel. If you are transmitting MIDI to the synthesizer on more than one channel, you can use the Retro AS-1 Mixer to specify the synthesizer's multi-timbral settings.

IMPORTANT! The Serial Input utility requires a Macintosh hardware module called Serial DMA which is built into most PowerMacs. Serial Input will display the message "This Macintosh does not have the hardware required to support the Serial DMA Driver" on Macintosh models that do not support Serial DMA. In this case, the OMS or FreeMIDI systems must be used to get MIDI into Retro AS-1. See Chapter 4 for more information.

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W To Activate MIDI Input on Windows 95:

1. Verify the MIDI hardware is properly connected and configured.

You will need a MIDI controller (or something else that transmits MIDI), MIDI cable, and MIDI interface (none are included with Retro AS-1). Follow the installation instructions that came with the MIDI hardware.

2. Verify no other MIDI applications are active.

The first MIDI application to launch (usually) "grabs" the MIDI input hardware port. Quit all MIDI applications to ensure the MIDI input port is available to Retro AS-1.

3. Launch the synth engine to activate MIDI input.

The synth engine is launched whenever a Retro AS-1 component (Keyboard, Editor, MIDI Processor, Mixer, MIDI driver) is launched. For this example, launch the Retro AS-1 Keyboard using the method described in the previous section. The synth engine "grabs" the MIDI input port (this default action can be disabled) specified in the Retro AS-1 control panel.

Figure 3.2.3. In Windows 95 only, the Retro AS-1 window is open whenever the synth engine is active. The "LEDs" indicate incoming MIDI activity on each of the 16 MIDI channels.
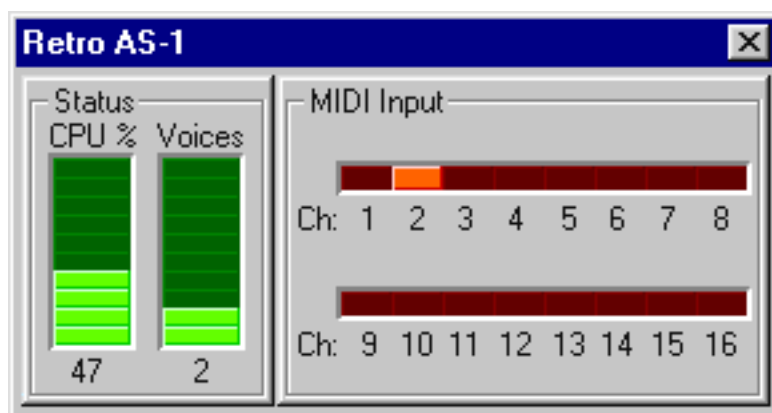
Important! If multiple MIDI input hardware ports are installed in your system, the input port you want Retro AS-1 to use is specified in the Retro AS-1 control panel. The default selection is port ID #0.

4. Trigger sounds using the MIDI source.

Now you can "play" your computer like a MIDI sound module. You can select different programs using MIDI program change commands or the Keyboard, Editor, MIDI Processor, or Mixer applications. You can modify programs in real-time while receiving MIDI from the controller using the Editor if the MIDI Channel parameter on the Editor global page matches the MIDI transmission channel. If you are transmitting MIDI to the synthesizer on more than one channel, you can use the Retro AS-1 Mixer to specify the synthesizer's multi-timbral settings.

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3.3 Basic Editor Operations

The Retro AS-1 Editor is the main sound design application, where synthesizer programs are created, modified, and saved. All voicing parameters are contained within the program. Each program file is a complete synthesizer "patch."

This section explains how to open, audition, and edit voice documents.

> NOTE: The primary function of the Editor is to create and modify synthesizer program voicings. It does not need to be open to play existing programs.

> NOTE: Each Editor parameter and its function is explained in detail in Chapter 7.

Editor Program File Overview

When the Retro AS-1 Editor application is launched, a standard document file window appears. This file contains all of the synthesizer voicing parameters and is called a Retro AS-1 program. Each program is a complete synthesizer "patch" that includes multiple oscillators, filters, modulation routings, and effects. The program can be edited as desired and saved as a file.

So, to audition or edit your favorite synthesizer voice, just open it from disk using the standard open file dialog box. When you are finished auditioning and/or modifying the voice, you may save it under the same or different name or just close the file window without saving.

The Editor application and its program files can be thought of as similar to a word processor, spreadsheet, or other application and its associated document files. Multiple program windows can be open simultaneously; the frontmost active window (the one with grey lines in the title bar) is always the active program available for auditioning.

Opening and Saving Program Files

To Open Existing Programs from Disk:

1. Launch the Retro AS-1 Editor application.

With Mac OS, you can open the application in two ways: by choosing Editor... from the Synthesizer menu within the Keyboard, MIDI Processor, or Mixer applications, or by double-clicking the Retro AS-1 MIDI Processor application icon. The Retro AS-1 Editor is located at the root level of the Retro AS-1 Folder.

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With Windows 95, you can open the application in three ways: by choosing MIDI Processor... from the Synthesizer menu within the Keyboard, MIDI Processor, or Mixer applications; by double-clicking the Retro AS-1 Editor application icon; or from Start Menu>Programs>Retro AS-1>Retro AS-1 Editor. The application is installed (by default) at the following location: Program Files/BitHeadz/Retro AS-1/Retro AS-1 Editor.exe.

2. Open a program file.

Choose "Open..." from the File menu (make sure Retro AS-1 Editor is the active application). Navigate to the Retro AS-1 Programs folder at the root level of the Retro AS-1 Folder using the standard open file dialog box routines. Select the program file you want, then click Open. The program appears in a window. At this point, the program is active and ready to be auditioned and/or edited. Alternately, you can double-click a program file to open it.
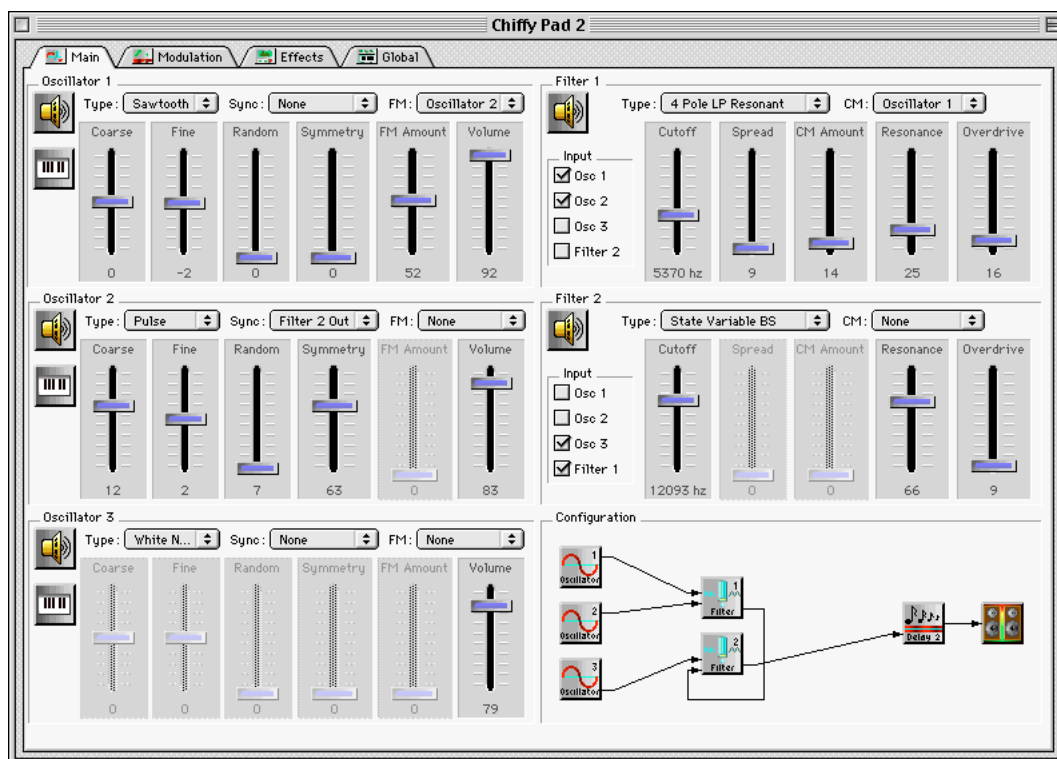
NOTE: Multiple program files can be open simultaneously; the frontmost window is always the active program. If more than one program file is open, you can switch between them using the Window menu.

Figure 3.3.1. The main page, one of four parameter pages in a program file. All voicing parameters are accessed using the Editor.

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NOTE: Sounds can be triggered from within the Editor by pressing the space bar. This option, and the note that is played, can be changed in the Preferences window under the Edit menu.

To Create a New Program File:

1. Launch the Retro AS-1 Editor application.

If it isn't open already, launch the Editor using the methods described in the previous section.

2 Select New... from the File menu.

A new default program window appears. The program can now be auditioned and/or edited as desired. The default program has very basic settings but should always produce a sound output.

NOTE: A new default program is created every time the Editor is launched. This factory default action can be disabled in the Editor Preferences window, which is accessed from the Edit menu in the Editor.

NOTE: The default program can be customized. See "Save as 'New' Template" in Chapter 7, section 7.2.1 for details.

To Save the Changes in a Program file:

1. Activate the program you want to save.

2. Choose Save from the File menu.

If you choose Save from the File menu, the original document will be permanently overwritten and cannot be recovered. (Factory programs can always be restored from the CD-ROM.) To save the file without overwriting the original document, use the Save As... command, described below.

To Save a Program with a New Name Leaving the Original File Untouched:

1. Activate the program you want to save.

2. Choose Save As... from the File menu.

Save As... will write a new file to disk and change the name in the title bar of the active file window. To overwrite the existing file without creating a new file, use the Save command.

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3. Type a new name for the file.

If you are saving to a different location than the original file , you can use the same name without overwriting the original file .

4. Select a location for the new file.

Navigate to the location of your choice using the standard save dialog box routines.

5. Click Save to write the file to disk.

If you select the same location as the original file and use the same name, you will be asked if you want to replace the original file with the new file.

Editing Programs

Editor Overview

Programs can be edited by altering parameters in the factory sounds or by creating a new voice from scratch by selecting New from the File menu.

There are four pages of parameters in a program: Main (oscillators and filters), Modulation, Effects, and Global. Each page contains a group of related parameters. Change pages by selecting from the Page menu, or click the page tabs at the top of the voice window.

All parameters in a program are always active and available for editing. Experiment with changing parameter values to see what affect they have on a sound. Studying the factory program settings is a good way to learn how parameters interact to get a particular sound.
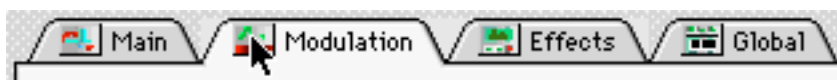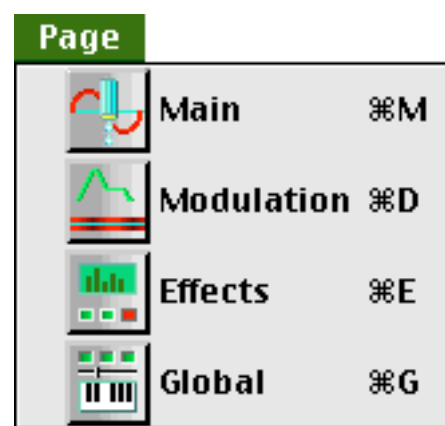
Figure 3.3.2. Pages within an Editor program can be selected from the Page menu or by clicking the page tabs within the program window.

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It Ain't Broke!

You may find that changing a parameter value does not affect the sound. This can be a common occurrence, but it does not mean something is wrong. A synthesizer is a complex device. Oscillators, filters, and modulations can all affect each other, depending on signal routings.

If the parameter you are changing belongs to a component that is not active (for example, changing the frequency of an LFO that is not assigned to a destination), the change will have no effect. Additionally, a parameter may be under the control of another parameter. For example, lowering the filter cutoff directly will have no effect if that filter is already opened by a modulator such as an envelope.

> NOTE: For related information, see Appendix E, Analog Synthesis Demystified.

3.4 Basic MIDI Processor Operations

Overview

The Retro AS-1 MIDI Processor allows you to modify MIDI data in the synthesizer engine. It is here that you can program layers, splits, and arpeggiations. The MIDI Processor can be thought of as our own version of the Multis or Combinations of other manufacturer's hardware keyboards. Each MIDI Processor document file can contain dozens of layers, splits, and arpeggiations that we call "Setups".

Once launched, the MIDI Processor remains active even when running behind other applications, such as the Editor. For example, you can edit your favorite programs in real time while playing an arpeggiation. The MIDI Processor is most effectively used with a MIDI controller, although the Retro AS-1 Keyboard and MIDI applications can be used as well. Several setups were placed in the MIDI Processor Setups folder at the root level of the Retro AS-1 Folder during installation. These Setup files demonstrate the versatility and sonic power of Retro AS-1.

> NOTE: Each MIDI Processor parameter and its function is explained in detail in Chapter 6.

To use the MIDI Processor:

1. Launch the MIDI Processor application.

With Mac OS, you can open the application in two ways: by choosing MIDI Processor... from the Synthesizer menu within the Keyboard, Editor, or Mixer applications, or by double-clicking the Retro AS-1 MIDI Processor application icon. The Retro AS-1 MIDI Processor is located at the root level of the Retro AS-1 Folder.

With Windows 95, you can open the application in three ways: by choosing MIDI Processor... from the Synthesizer menu within the Keyboard, Editor, or Mixer applications; by double-clicking the Retro AS-1 MIDI Processor application icon; or from Start Menu>Programs>Retro AS-1>Retro AS-1 MIDI Processor. The application is installed (by default) at the following location: Program Files/BitHeadz/Retro AS-1/Retro AS-1 MIDI Processor.exe.

Figure 3.4.1. The MIDI Processor window. Each setup name in the list on the left represents a complete setup with unique parameter values. Click the setup name to make a setup active.

2. Open a MIDI Processor Setup file.

Choose Open... from the MIDI Processor's File menu. The factory setups are located inside the MIDI Processor Setups folder, inside the Retro AS-1 Folder. Alternately, you can double-click a Setup file icon.

3. Audition the setups in the list while playing MIDI.

Each setup in the list represents a completely unique set of parameters. Each setup may be a split, layer, arpeggiation, some combination thereof, or just a cool program. Click a setup name from the list to instantly make the setup values active. Feel free to experiment by modifying the setups. All parameters can be modified in real time.

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NOTE: Sounds can be triggered from within the MIDI Processor by pressing the space bar. This option, and the note that is played, can be changed in the Preferences window under the Edit menu.

3.5 Parameter Editing Conventions

All of the Retro AS-1 components use a consistent interface design for ease of use. The parameters of these components use a combination of menu items, on/off switches, pull-down menus, and sliders to manipulate the available settings.

• Parameter switches such as oscillator on/off buttons and filter input checkboxes are changed by clicking on them once with the mouse.

• Pull-down menus such as waveform type are selected by click-hold-dragging the menu item, then releasing the mouse on the desired selection.

• Parameter slider values can be manipulated in four different ways (figure 3.5.1):

1. Click, hold, and drag the horizontal slider bar.
2. Increment or decrement by a value of one by clicking at the top or bottom of the slider.
3. Increment or decrement by a value of ten percent of the total range by clicking on the vertical slider line, between the horizontal slider bar and the end of the vertical slider range.
4. Option-click the slider value to call up a text entry box. Input a number directly using the number keys on your computer keyboard, then press Return or Enter.

Click the slider name to increment by one.

Click above slider bar to increment by ten percent.

Coarse

Click, hold, and drag the slider bar.

Click below slider bar to decrement by ten percent.
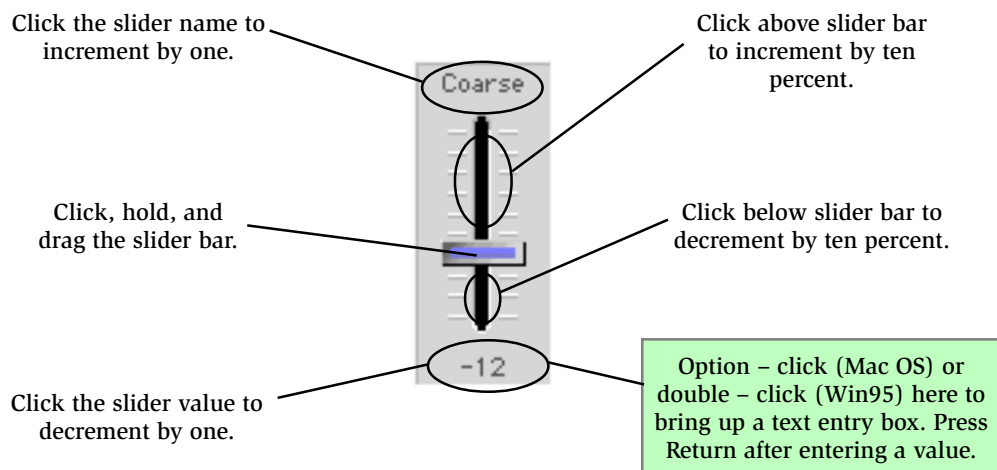
Figure 3.5.1. Parameter Slider "hot spots" for editing values

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Option – click (Mac OS) or double – click (Win95) here to bring up a text entry box. Press Return after entering a value.

Click the slider value to decrement by one.

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Where to go from here

TO LEARN MORE ABOUT:	REFER TO:
Using MIDI with Retro AS-1	Chapter Four
Retro AS-1 Control Panel	Chapter Five
Retro AS-1 MIDI Processor	Chapter Six
Retro AS-1 Editor	Chapter Seven
Retro AS-1 Keyboard	Chapter Eight
Retro AS-1 Mixer	Chapter Nine
Banks & Programs	Appendix A
Optimizing Performance	Appendix B
Troubleshooting	Appendix C
Audio Expansion Hardware	Appendix D
Analog Synthesis Basics	Appendix E
MIDI Implementation	Appendix F
Record To Disk	Appendix G
QuickTime™ Driver	Appendix H
OMS Names	Appendix I

Chapter 4. Working with MIDI

Chapter 4 contents

4.1 MIDI Overview

Retro AS-1 has powerful MIDI implementation. The synthesizer programs can be accessed multi-timbrally via a multitude of MIDI sources, and all voicing parameters are available for real-time editing via the MIDI protocol. BitHeadz designed the program to allow for maximum flexibility in configuring the system for professional use. There are a number of advanced parameters that can be set to match your particular working style.

This chapter explains some MIDI concepts, using external MIDI controllers, and using third-party MIDI applications with Retro AS-1. For details on advanced MIDI implementation, see Appendix G.

MIDI can get into the Retro AS-1 synthesizer engine in three ways:

1. With the Retro AS-1 Keyboard application, our on-screen keyboard utility. No MIDI controller or interface is required to use the Keyboard. Chapter 8 describes the Keyboard functionality in detail.

2. With a MIDI controller or other external MIDI device (such as a hardware sequencer) via the Serial Input, OMS Input, or FreeMIDI Input applications (Mac OS) or a MIDI hardware input port (Windows).

3. With a MIDI application running on the same CPU as Retro AS-1 via the Retro AS-1 MIDI Drivers (Retro AS-1 FreeMIDI Driver and Retro AS-1 OMS Driver for Mac OS, or Retro AS-1 device driver for Windows). When using MIDI applications such as a sequencer, it is up to those applications to get the MIDI input. Their "Play Through" function then passes MIDI to the Retro AS-1 MIDI driver. (In the Mac OS, when a MIDI sequencer is used in conjunction with a Retro AS-1 MIDI driver, the Serial Input, OMS Input, or FreeMIDI Input applications are NOT used.)

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Once MIDI data is received by the synthesizer engine, additional MIDI processing can take place using the Retro AS-1 MIDI Processor application. The MIDI Processor can be thought of as an insert effect or plug-in to the synth engine. It creates layers, splits, and arpeggiations of the MIDI data. This processing only takes place if the Retro AS-1 MIDI processor is launched, and processing continues even if the application is in the background. See Chapter 6 for MIDI Processor details.

4.1.1 Key MIDI Concepts

1. MIDI data processed by the MIDI Processor is not transmitted to anything except the synthesizer engine. MIDI output from the Processor and the synthesizer engine is not available to MIDI applications or the MIDI out port(s).

2. The MIDI Processor only receives data from the Retro AS-1 synthesizer engine. The Processor will not run "stand-alone" without the synth engine.

3. The Retro AS-1 Applications do not transmit to MIDI applications or the MIDI out port(s).

4. The Retro AS-1 Keyboard and Editor do not receive MIDI data.

5. In Mac OS, the MIDI Input utilities should not be used when OMS or FreeMIDI applications are active. Double note triggers may result.

6. In Windows 95, the first MIDI application launched takes control of the MIDI input port(s). For this reason, it is important to pay attention to the launch order of any application that uses MIDI input. You can stop Retro AS-1 from "grabbing" MIDI input port(s) using the Retro AS-1 control panel I/O setting.

7. The synth engine is launched whenever an MIDI application is launched if the application uses OMS or FreeMIDI (Mac OS) or the Retro AS-1 device driver (Windows) if those MIDI drivers are installed and configured.

7. In Mac OS, OMS or FreeMIDI must be used for MIDI input on systems that do not support Serial DMA.

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M 4.2 External MIDI input (Mac OS)

4.2.1 MIDI Flow within Retro AS-1

In order to properly use Retro AS-1 with your MIDI system, it is important to understand the flow of MIDI data within Retro AS-1. The diagram below illustrates how MIDI is routed between the various Retro AS-1 components.

Figure 4.2.1. Mac OS MIDI flow with Retro AS-1.
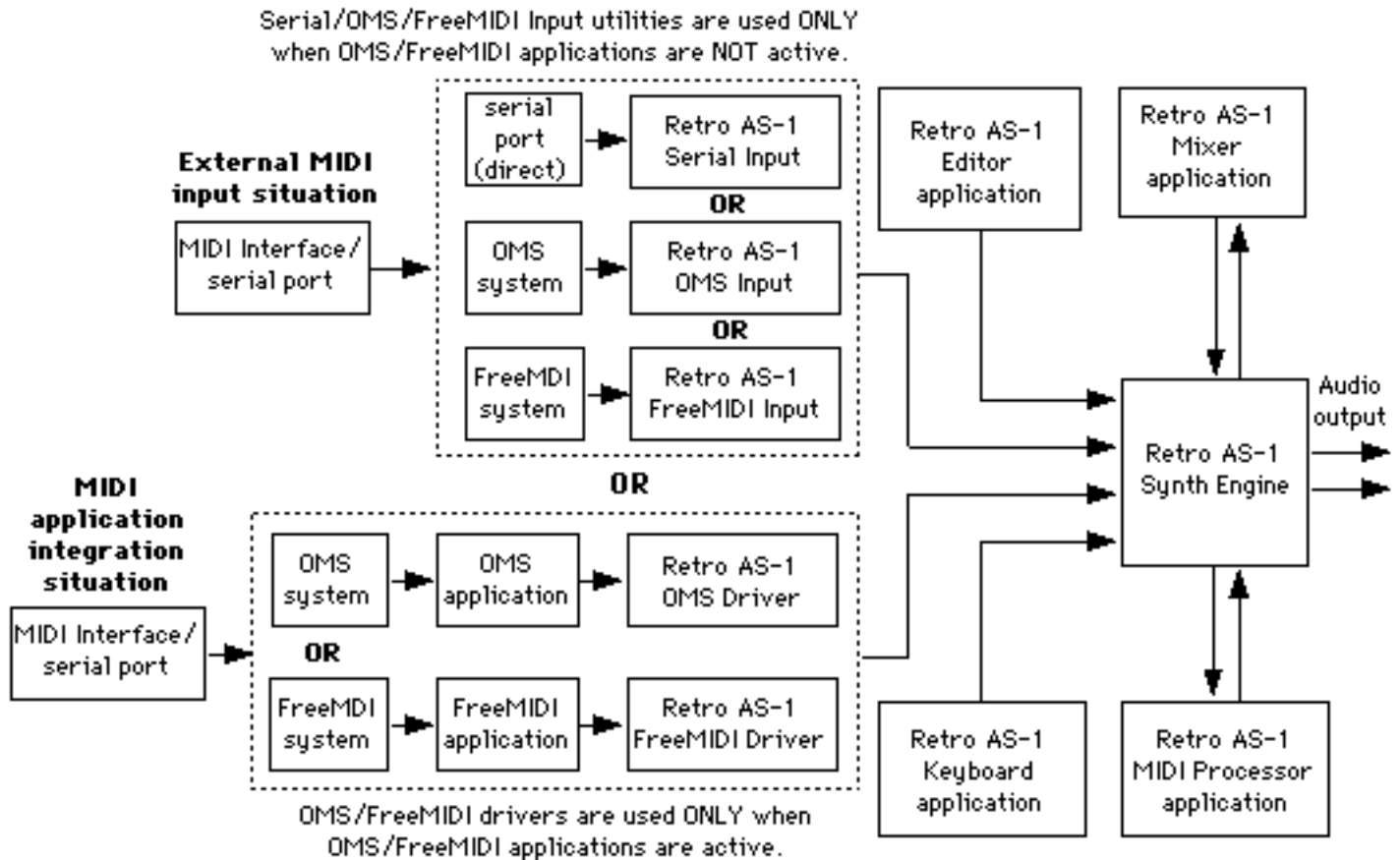
Using Retro AS-1 "stand-alone" with an external MIDI source (such as a MIDI controller or external sequencer) is the simplest way to use MIDI within Retro AS-1. In this scenario, OMS and FreeMIDI can be bypassed altogether by using the Retro AS-1 Serial Input utility application (see section 4.2.2).

If OMS or FreeMIDI is installed, you have the option to get MIDI to the synth engine without launching your MIDI application by using the Retro AS-1 OMS Input or Retro AS-1 FreeMIDI Input applications. The only purpose of these utilities is to get MIDI from the serial ports to the synthesizer engine when OMS or FreeMIDI applications (such as sequencers) are NOT open.

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Any of the Retro AS-1 Serial/OMS/FreeMIDI Input applications can be opened automatically whenever the Editor, MIDI Processor, or Mixer applications are launched. The MIDI Input utility launched (if any) is specified by the Default MIDI Input menu within the Retro AS-1 Control Panel (see Chapter 5, section 5.5).

When using external MIDI input on multiple channels, the Retro AS-1 Mixer application is useful for setting up and saving multi-timbral configurations. See Chapter 9 for more information about the Retro AS-1 Mixer.

4.2.2 Using Retro AS-1 Serial Input

The Retro AS-1 Serial Input application is used any time you want to use Retro AS-1 as a sound module without using OMS or FreeMIDI. Such

Figure 4.2.1. The Serial Input application window. The "LEDs" indicate incoming MIDI activity on each of the 16 MIDI channels.

situations include playing the synthesizer "live" with a MIDI controller, using a hardware (external) sequencer, or running MIDI applications on a separate computer. The Serial Input configuration is recommended for voice programming and live performance because it delivers the best note-on to sound-out response time and it maximizes available polyphony by eliminating the CPU processing required to run OMS and FreeMIDI.

Retro AS-1 Serial Input is launched automatically by default when the Editor, MIDI Processor, or Mixer application is launched. Full instructions for launching and configuring Retro AS-1 Serial Input are detailed in section 3.2 of Chapter 3.

If a port selected for MIDI is in use by another application such as AppleTalk, fax or modem software, or OMS/FreeMIDI, Serial Input will display "Port is in use by another application." If you get this message, quit the application(s) that are using the port or use a different port for the MIDI interface.

IMPORTANT: If you are using the Printer port for MIDI connections, AppleTalk must be unloaded while using MIDI. To unload AppleTalk, make it Inactive in the Chooser utility, which is accessed from the Apple Menu, then reboot.

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When Retro AS-1 Serial Input is opened, the synth engine is started and you can "play" your computer like a MIDI sound module. No other Retro AS-1 applications need to be launched. You can select different programs using the MIDI program change commands or the Keyboard, Editor, MIDI Processor, or Mixer applications. You can modify programs in real-time while receiving MIDI from the controller using the Editor if the MIDI Channel parameter on the Editor global page matches the MIDI transmission channel. If you are transmitting MIDI to the synthesizer on more than one channel, you can use the Retro AS-1 Mixer to specify the synthesizer's multi-timbral settings.

The Serial Input utility requires a Macintosh hardware component called the Serial DMA which is built into most PowerMacs. Serial Input displays an error message (figure 4.2.2) on Macintosh models that do not have the Serial DMA component. Unfortunately, a list containing such systems does not exist. In this case, the OMS or FreeMIDI operating systems must be used to get MIDI into Retro AS-1. Make sure the Serial DMA software component extensions are installed before concluding your machine does not support Serial DMA!

To use external MIDI input with Retro AS-1 on systems without Serial DMA hardware, either OMS or FreeMIDI must be installed. Then the Retro AS-1 OMS Input or Retro AS-1 FreeMIDI Input utility is used get MIDI data from OMS or FreeMIDI and pass the MIDI data to the synthesizer engine. If you don't have any OMS or FreeMIDI applications (which usually install these MIDI operating systems), the OMS and FreeMIDI installers are provided for your convenience in the CD Extras folder on the Retro AS-1 CD-ROM.

4.2.3 Using Retro AS-1 OMS Input and Retro AS-1 FreeMIDI Input

IMPORTANT: The Retro AS-1 OMS and FreeMIDI Input applications cannot be used until the Retro AS-1 OMS Driver or Retro AS-1 FreeMIDI Driver is configured using the instructions in section 4.3 of this chapter.

If OMS or FreeMIDI is installed, you can get MIDI to the synth engine without launching your MIDI application by using the Retro AS-1 OMS Input or Retro AS-1 FreeMIDI Input applications in conjunction with the Retro AS-1 OMS Driver and Retro AS-1 FreeMIDI Driver. The only purpose of these utilities is to get MIDI from the serial ports to the synthesizer engine when OMS or FreeMIDI applications such as sequencers are NOT open.
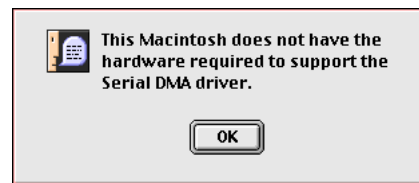
Figure 4.2.2. The No Serial DMA Hardware warning. Retro AS-1 Serial Input cannot be used when this dialog appears. Retro AS-1 OMS/FreeMIDI Input must be used instead.

These are the software components of Serial DMA. They must be installed in the Extensions folder on hardware systems that support Serial DMA.

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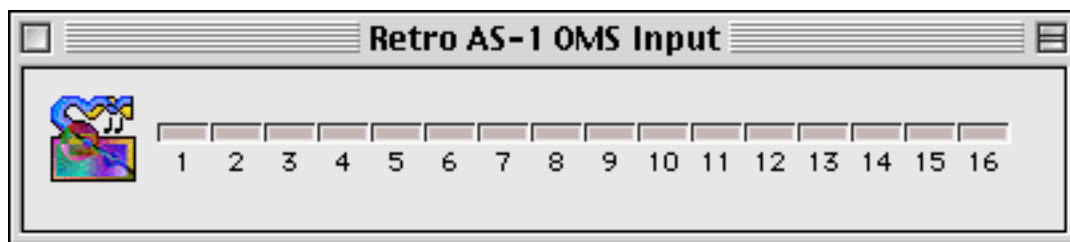
Figure 4.2.3. The Retro AS-1 OMS Input window
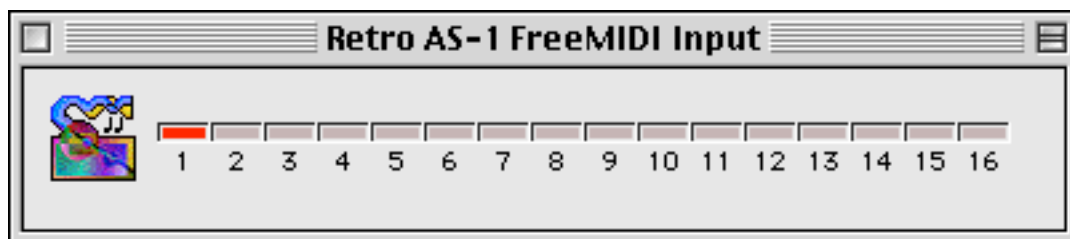
Figure 4.2.4. The Retro AS-1 FreeMIDI Input window.

On systems that don't support Serial DMA, Retro AS-1 OMS Input or Retro AS-1 FreeMIDI Input must be used to get MIDI into the synth engine when OMS or FreeMIDI applications are not active. If an OMS or FreeMIDI application is active, the Retro AS-1 Serial/OMS/FreeMIDI Input should NOT be used, or double note triggers will result. When an OMS or FreeMIDI application is active, it is up to that application's "Play Through" function to pass MIDI to the synth engine via the Retro AS-1 OMS or FreeMIDI Driver.

Retro AS-1 OMS and FreeMIDI Inputs are functionally identical to Retro AS-1 Serial Input. The only difference is in the Port menu. Instead of selecting Modem or Printer ports, the items displayed in the Port menu reflect the controllers in the current OMS or FreeMIDI configuration.

The item selected in the Port menu (indicated by a check mark) is the controller that will transmit MIDI to the synth engine.
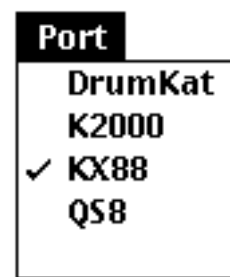
Figure 4.2.5. The Port menu in Retro AS-1 OMS & FreeMIDI Input applications. The MIDI controllers displayed in the Port menu reflect the configuration of the current OMS or FreeMIDI setup.

M 4.3 MIDI Software Integration (Mac OS)

This section is dedicated to users of OMS and FreeMIDI that wish to integrate Retro AS-1 into existing MIDI environments for use with sequencers and other MIDI applications running on the same CPU. If you do not use OMS or FreeMIDI, you can skip the rest of this chapter entirely.

4.3.1 OMS and FreeMIDI Overview

These MIDI systems are third-party software packages that operate at the system level to convert data at the serial port(s) into usable MIDI information and transfer that data between various MIDI applications such as Retro AS-1, MIDI sequencers, and other MIDI applications.

OMS™ ("Open Music System") from Opcode Systems in Palo Alto, CA, and FreeMIDI™ from Mark Of The Unicorn in Cambridge, MA, are the two main MIDI systems. They are used by popular MIDI applications such as the Vision™ and Performer™ sequencers. Using OMS and FreeMIDI, various MIDI applications (such as sequencers and keyboard editor/librarians) can communicate with each other by sharing MIDI data.

MIDI software application developers typically provide OMS and/or FreeMIDI "drivers" to allow their MIDI product to communicate with other MIDI software products. OMS and FreeMIDI do all the MIDI routing and processing, while the drivers provide software inputs and outputs for the MIDI operating system.

Retro AS-1 can communicate with OMS and FreeMIDI using our supplied OMS and FreeMIDI drivers. After configuring our drivers, your OMS- or FreeMIDI-compatible application can transmit MIDI data to Retro AS-1 without hardware routing. These drivers cause OMS and FreeMIDI to recognize Retro AS-1 as another "sound module" in the MIDI environment defined from within the OMS and FreeMIDI setup applications.

After OMS and FreeMIDI are configured to recognize Retro AS-1 as another module, the MIDI application that uses OMS or FreeMIDI can be configured to use Retro AS-1 as a destination for MIDI data. The individual MIDI application tracks can then be assigned to various Retro AS-1 "instruments" (MIDI channels). Once the MIDI application is transmitting MIDI data to Retro AS-1 on one or more MIDI channels, MIDI commands and/or the Retro AS-1 Mixer are used to define the settings (program selection, volume, pan, mute, solo, and global effects) for multi-timbral operation.

M 4.4 Configuring the OMS Driver

If you are using an OMS-compatible MIDI application, you probably have already installed and configured OMS for use in your MIDI environment. This section does not describe how to install and configure OMS; it only explains how to add and configure our driver for use with OMS. Consult the documentation that came with your OMS software for general OMS instructions.

OMS only needs to be configured when your MIDI environment changes. You will only have to follow the steps in this section once to use OMS with Retro AS-1.

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IMPORTANT! OMS must be already installed and configured before proceeding with the Retro AS-1 OMS Driver configuration.

The Retro AS-1 OMS Driver was placed inside the OMS Folder (located at the root level of the active System Folder) by the Retro AS-1 Installer. If OMS was not already installed, the folder was created for you. If you *never* use OMS you can delete the OMS Folder without harm.

NOTE: As of this writing, the latest version of OMS is 2.3.4. We recommend updating to the latest version of OMS for maximum performance and stability.

To configure OMS to recognize the Retro AS-1 OMS Driver:

1. Launch the OMS Setup application.

The OMS Setup application is the component of OMS used to define the MIDI hardware setup. It is located inside the OMS Applications folder, installed at the user defined location during OMS installation.

2. Execute the Update Setup routine.

The Update Setup command is found under the Interfaces menu item in OMS Setup versions below 2.0, and under the MIDI Cards & Interfaces menu item in versions 2.0 and up. See figure 4.1.1.

IMPORTANT! OMS will not recognize Retro AS-1 until after the Update Setup command is run within the OMS Setup application.

3. Verify the configuration.

When the setup is properly configured, the Retro AS-1 Driver icon is visible in the setup window. There will be no connections to the MIDI interface. If you use the "Test Studio" function from the Studio menu, you should hear Retro AS-1 sound output. See figure 4.4.2.
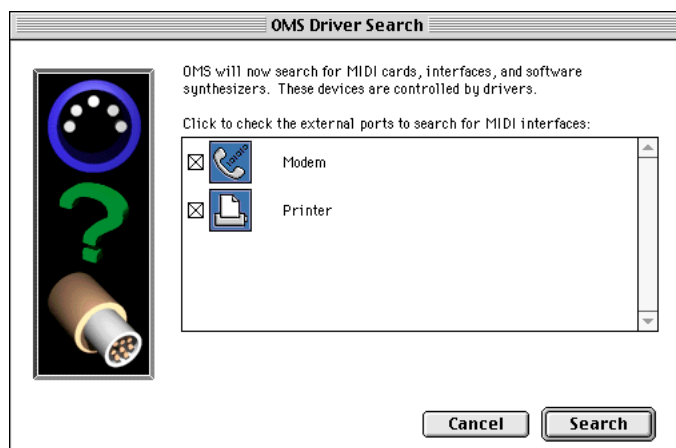
Figure 4.4.1. The Update Setup dialog within the OMS Setup application.

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4. Quit the OMS Setup application.

OMS is now configured for use with Retro AS-1. You won't have to use the OMS Setup application again unless your MIDI environment changes.
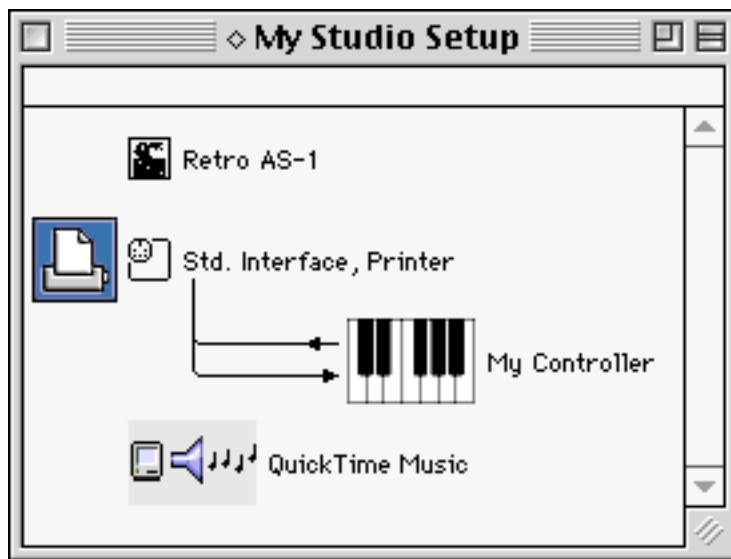
NOTE: Please refer all technical questions regarding OMS (not related to Retro AS-1) to the technical support department of Opcode Systems at (650) 856-3331.

5. Configure the OMS-compatible MIDI application to recognize the new device.

This step will vary depending upon which particular MIDI software you are using to control Retro AS-1. The command found within the OMS-compatible application will probably be called Instruments, MIDI Devices, or something similar. See the next section for specific instructions.

NOTE: Please refer all technical questions regarding your MIDI application that are not directly related to Retro AS-1 to the manufacturer's technical support department.

Figure 4.4.2. The Retro AS-1 OMS Driver properly installed, configured, and recognized by OMS. Your interface and controller settings may vary from those shown here. The QuickTime Music Driver is NOT required.

4.4.1 Configuring OMS MIDI applications

How to setup Opcode Vision/StudioVision

1. Select Instruments from the Windows menu.

The MIDI Instruments window appears, showing the currently available output devices.

2. In the MIDI Instruments window, click and hold the small disclosure triangle in the MIDI Instrument window title bar.

The MIDI Instruments sub-menu appears. See figure 4.4.3.

3. Select Make from Studio Setup... from the MIDI Instruments sub-menu.

This action will automatically create a new instrument from each device in your current OMS Studio Setup. You can optionally select New Instrument to add devices one at a time. See figure 4.4.4. After issuing the command, individual Instrument outputs may be re-assigned if desired.

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Figure 4.4.3. The MIDI Instruments sub-menu within Vision/StudioVision.

Figure 4.4.4. The Make from Studio Setup command automatically creates output devices based on the current OMS Studio Setup.

4. Close the Instruments window.

Vision/StudioVision is now able to select Retro AS-1 on any of the 16 MIDI channels as a track destination or MIDI "Play Thru" channel.

How to setup Steinberg Cubase

There is only one step: Choose your Output! Cubase always displays all OMS Devices.

4.4.2 Setting up MIDI Clock Sync via OMS

Retro AS-1 version 1.10 and higher allows synchronization of LFO's, effect delay times, and the arpeggiator to MIDI beat clock. This section describes how to configure OMS MIDI applications to send MIDI clock to Retro AS-1.

NOTE: Time changes in Retro AS-1 will occur if the tempo changes more than 5% of the previous tempo. This 5% "buffer" protects against the constant changes of MIDI Sync inaccuracies that typically shift +/- 3%.

Figure 4.4.5. The OMS IAC Driver icon. This file must be installed in the OMS Folder to use the MIDI Sync features in Retro AS-1.

Vision/StudioVision Sync Setup

1. Install the OMS IAC Driver.

To transmit MIDI clock commands to Retro AS-1, Vision requires the IAC (Inter-Application Communications) Driver to be in the OMS Folder. The OMS IAC Driver MUST be installed using the OMS installer Custom Install option; it is not installed using Easy Install. The OMS Installer is located on the Retro AS-1 CD-ROM in the CD Extras folder.

Figure 4.4.6. The OMS Installer Custom Install window. The IAC Driver is NOT installed during Easy Install.

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2. Update the OMS Studio Setup to recognize the OMS IAC Driver.

Follow the instructions in section 4.4 of this chapter.

3. From the main menu in Vision, select Options>Sync Options.

The Vision Sync window appears.
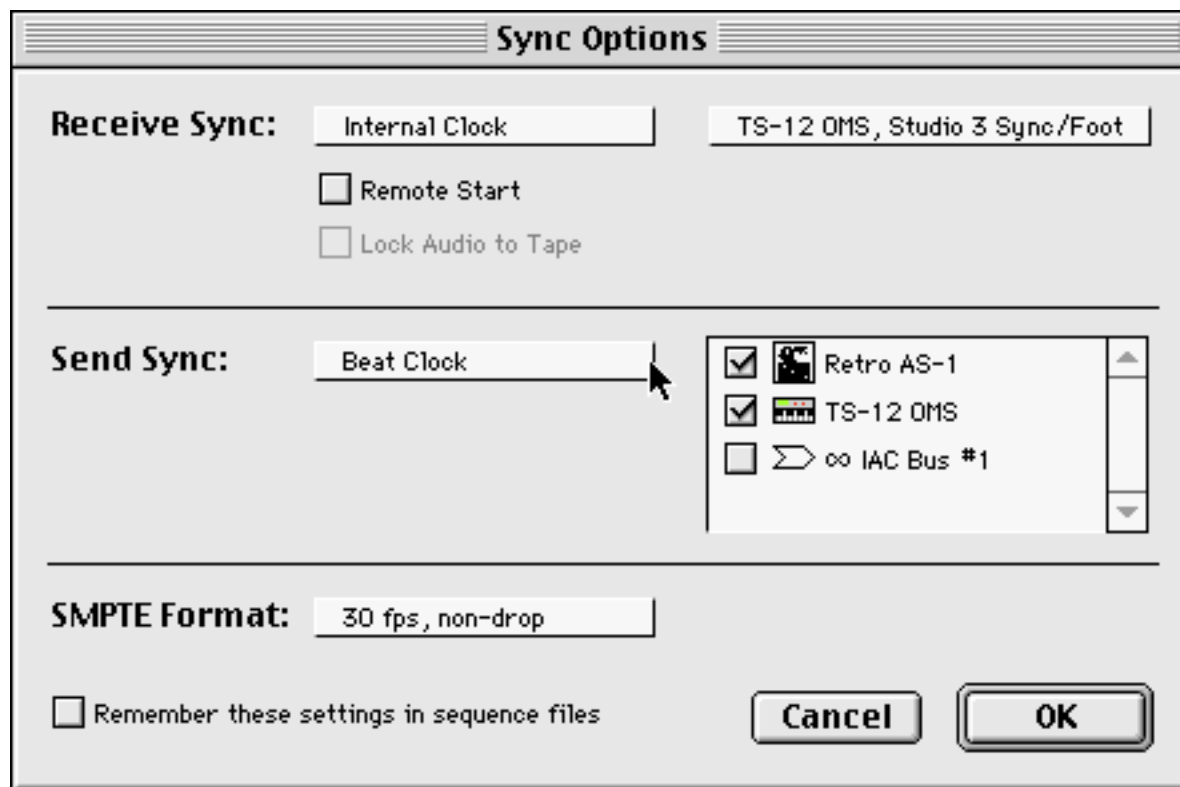
4. Select Retro AS-1 as a destination for Beat Clock.

Make sure the box next to Retro AS-1 is checked and Beat Clock is selected from the Send Sync pull-down menu, then click OK.

5. Done!

Retro AS-1 will now "chase" tempo changes sent to any activated MIDI Sync component (LFO rate, delay times, arpeggiator).

Cubase Sync Setup

1. From the main menu in Cubase, select Options>Synchronization.

The Cubase Synchronization window appears.

```
┌─────────────────────── Synchronization ───────────────────────┐
│ ┌─ Sync Sources ──────────────┐  ┌─ Offsets ─────────────────┐ │
│ │ Timecode Base  [ Intern  ▼] │  │ Song Start   [0: 0: 0: 0: 0]│ │
│ │ From Input     [ ANY     ▼] │  │ Time Display [0: 0: 0: 0: 0]│ │
│ │ MMC Output     [Retro AS-1 ▼]│  │ Bar Display      [  0  ]   │ │
│ │ Frame Rate     [ 25 fps  ▼] │  └───────────────────────────┘ │
│ │                             │  ┌─ Write Timecode ──────────┐ │
│ │ Tempo Base     [ Intern  ▼] │  │ From  [0: 0: 0: 0]  [Start]│ │
│ │ From Input     [ ANY     ▼] │  └───────────────────────────┘ │
│ └─────────────────────────────┘  ┌─ Sync Options ────────────┐ │
│ ┌─ Sync Out ──────────────────┐  │ Lock Time      [  6  ]     │ │
│ │ MIDI Timecode  [ Off     ▼] │  │ Dropout        [ 25  ]     │ │
│ │ MIDI Clock     [Retro AS-1 ▼]│  │ ☐ Detect Frame Change      │ │
│ └─────────────────────────────┘  └───────────────────────────┘ │
│ ┌─ MROS resolution ───────────┐                                │
│ │ PPQs  [ 192  ▼]             │    [ Cancel ]    [   OK   ]    │
│ └─────────────────────────────┘                                │
└────────────────────────────────────────────────────────────────┘
```

2. Select Retro AS-1 for destination of MIDI Clock.

In the Sync Out portion of the Cubase Synchronization window, select Retro AS-1 from the MIDI Clock pull-down menu, then click OK.

3. Done!

Retro AS-1 will now "chase" tempo changes sent to any activated MIDI Sync component (LFO rate, delay times, arpeggiator).

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M 4.5 Configuring the FreeMIDI Driver

If you are using an FreeMIDI-compatible MIDI application, you probably have already installed and configured FreeMIDI for use in your MIDI environment. This section does not describe how to install and configure FreeMIDI; it only explains how to add and configure our driver for use with FreeMIDI. Consult the documentation that came with your FreeMIDI software for general FreeMIDI instructions.

FreeMIDI only needs to be configured when your MIDI environment changes. You will only have to follow the steps below once to use FreeMIDI with Retro AS-1.

> IMPORTANT! FreeMIDI must be already installed and configured before proceeding with the Retro AS-1 FreeMIDI Driver configuration.

The Retro AS-1 FreeMIDI Driver was placed inside the FreeMIDI Folder (located at the root level of the active System Folder) by the Retro AS-1 Installer. If FreeMIDI was not already installed, the folder was created for you. If you *never* use FreeMIDI you can delete the FreeMIDI Folder without harm.

> NOTE: As of this writing, the latest version of FreeMIDI is 1.35. We recommend updating to the latest version of FreeMIDI for maximum performance and stability.

To configure FreeMIDI to recognize the Retro AS-1 FreeMIDI Driver:

1. Launch the FreeMIDI Setup application.

The FreeMIDI Setup application is the component of FreeMIDI used to define the MIDI hardware setup. It is located inside the FreeMIDI Applications folder, installed at the user defined location during FreeMIDI installation.

2. Execute the Update Interfaces routine.

The Update Interfaces command is found under the Configuration menu item in the FreeMIDI Setup application. See figure 4.5.1.

> IMPORTANT! FreeMIDI will not recognize Retro AS-1 until after the Update Interfaces command is run within the FreeMIDI Setup application.

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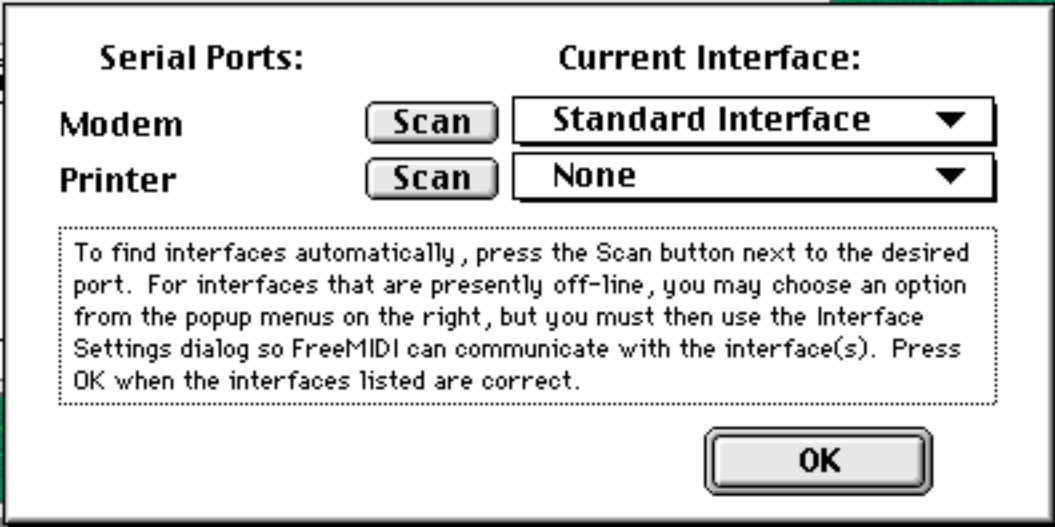
Figure 4.5.1. The Update Interfaces dialog within the FreeMIDI Setup application.

3. Verify the configuration.

When the setup is properly configured, the Retro AS-1 Driver icon is visible in the setup window (see figure 4.5.2). There will be no connections to the MIDI interface. The "Test Connections" menu command within FreeMIDI will not trigger Retro AS-1 sounds because FreeMIDI does not support AppleEvents, which our driver requires to establish contact with the synthesizer.

Figure 4.5.2. The Retro AS-1 FreeMIDI Driver properly installed, configured, and recognized by FreeMIDI. Your interface and controller settings may vary from those shown here.

64
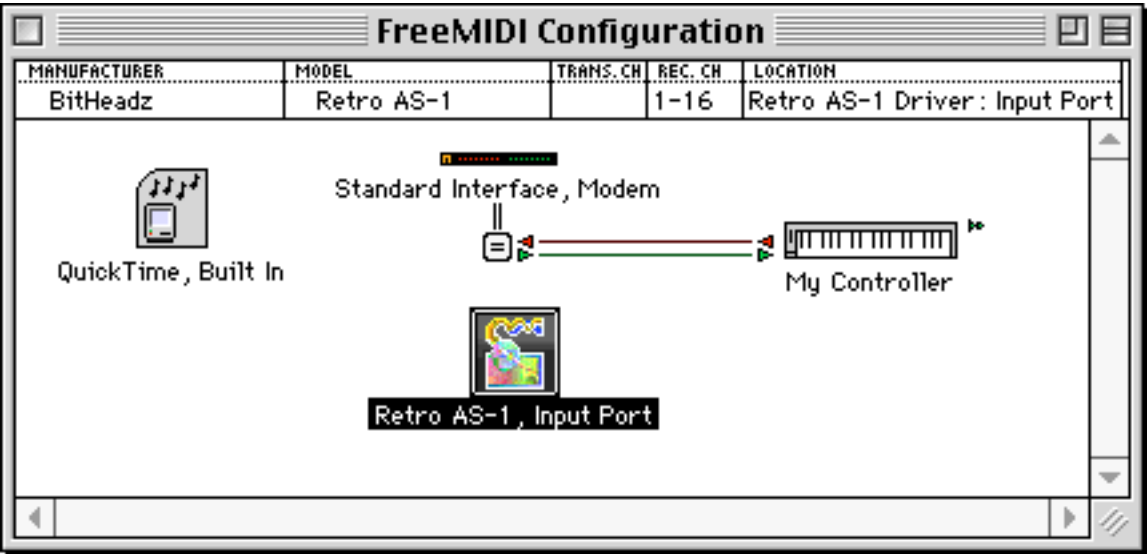
If you still do not see the Retro AS-1 FreeMIDI Driver in the FreeMIDI configuration window as shown above, open the FreeMIDI Preferences window by selecting FreeMIDI Preferences... from the File menu within the FreeMIDI Setup application. Check the Retro AS-1 Driver Input Port checkbox as shown below, then click OK and save the configuration. See Figure 4.5.3.

FreeMIDI Preferences

Software Compatibility
● FreeMIDI applications only
○ Allow other applications

Extras
☑ Monitor patch changes
☐ Generate Active Sensing
☐ Emulate OMS

Use the "MIDI Configuration" check boxes to enable or disable a port for MIDI. If necessary, newly added ports will be scanned for interfaces automatically. To disable a port temporarily, use the Interface Settings dialog.

MIDI Configuration
Serial Ports:
☑ Modem
☐ Printer
Applications:
☐ Inter-application MIDI
Retro AS-1 Driver:
☑ Input Port
QuickTime:
☐ Built In

[OK] [Cancel]

4. Quit the FreeMIDI Setup application.

FreeMIDI is now configured for use with Retro AS-1. You won't have to use the FreeMIDI Setup application again unless your MIDI environment changes.

Figure 4.5.3. Make sure the Retro AS-1 Driver Input Port is checked in the FreeMIDI Setup Preferences window.

NOTE: Please refer all technical questions regarding FreeMIDI (not related to Retro AS-1) to the technical support department of Mark Of The Unicorn at (617) 576-3066.

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5. Configure the FreeMIDI-compatible MIDI application to recognize the new device.

This step will vary depending upon which particular MIDI software you are using to control Retro AS-1. The command found within the FreeMIDI-compatible application will probably be called Instruments, MIDI Devices, or something similar.

NOTE: Please refer all technical questions regarding your MIDI application that are not directly related to Retro AS-1 to the manufacturer's technical support department.

Your FreeMIDI application should now be able to select Retro AS-1 on any of the 16 MIDI channels as a destination or MIDI "Play Through" channel.

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W 4.6 External MIDI input (Windows)

4.6.1 MIDI Flow within Retro AS-1 and Windows 95

In order to properly use Retro AS-1 with your MIDI system, it is important to understand the flow of MIDI data within Retro AS-1. The diagram below illustrates how MIDI is routed between the various Retro AS-1 components.
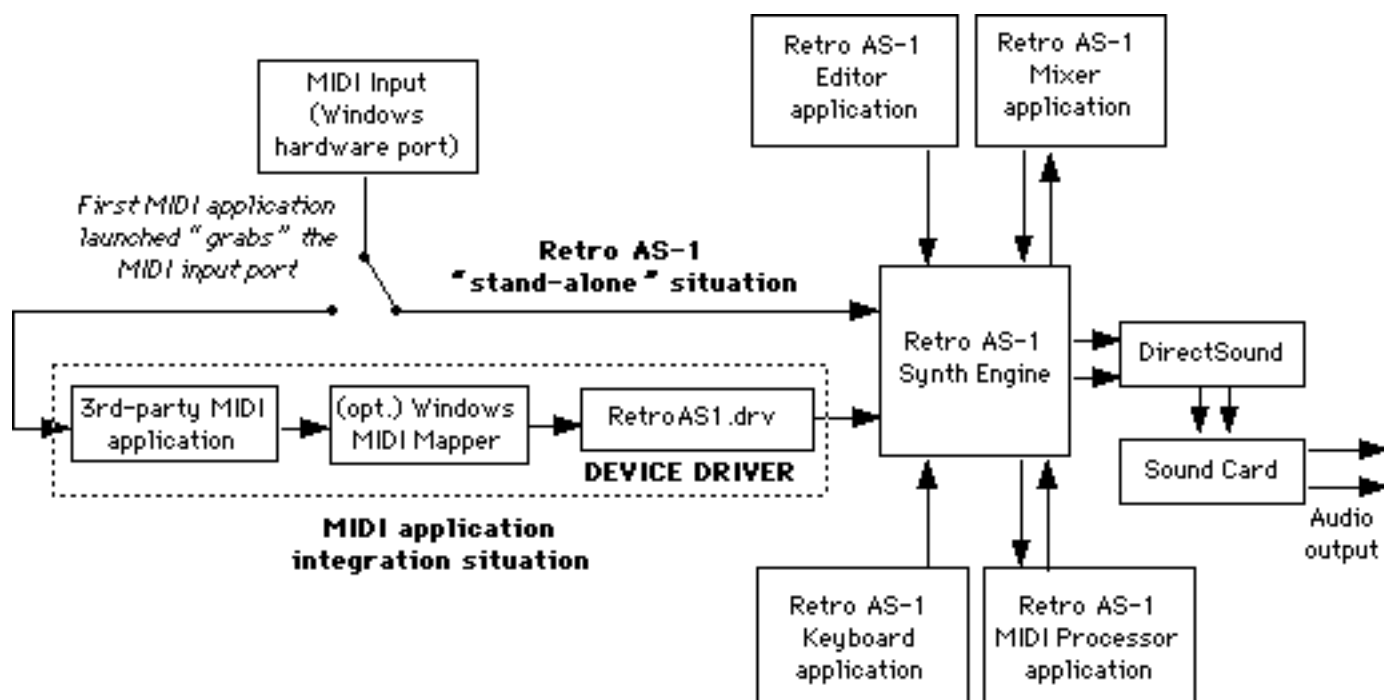
Figure 4.6.1. Windows MIDI flow with Retro AS-1.

4.6.2 Retro AS-1 Without 3rd-Party MIDI Applications

Using Retro AS-1 "stand-alone" without third-party MIDI applications is the simplest way to use Retro AS-1. Using the Retro AS-1 Keyboard, you can trigger sounds without a MIDI input port and MIDI controller.

Using a MIDI input port, Retro AS-1 can be played with external MIDI control just like any other MIDI sound module. Such situations include playing the synthesizer "live" with a MIDI controller, or using any external MIDI source.

In this scenario, whenever the Retro AS-1 Keyboard, Editor, MIDI Processor, or Mixer application is launched, the Retro AS-1 engine "grabs" the default MIDI input port if "Use Direct MIDI Input" is selected in the Retro AS-1 control panel.

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4.6.3 The MIDI Input Port

MIDI input port(s) in Windows 95 are created when MIDI input hardware such as a joystick port on a sound card or an MPU-401 card is installed.

When the MIDI input port is in use by Retro AS-1, it cannot be utilized by any other MIDI application. If a port selected for MIDI in the Retro AS-1 control panel is in use by another application when Retro AS-1 is launched, Retro AS-1 will display "The selected MIDI port is in use by another application." If you get this message, quit the application(s) that are using the port or select a different MIDI port in the Retro AS-1 control panel.

4.6.4 Stand-Alone Operation

To use Retro AS-1 with an external MIDI controller, the MIDI input port needs to be activated by starting the synthesizer engine. The synth engine is started by launching the Keyboard, Editor, MIDI Processor, or Mixer application.

To simply play the synthesizer with a MIDI controller, we recommend using the Retro AS-1 Keyboard application to start the engine and activate the MIDI input port. The Retro AS-1 Keyboard has very low RAM and CPU requirements and it allows you to access all the Retro AS-1 banks and programs (sounds) with pull-down menus.

Once the synth engine is activated, you can "play" your computer like a MIDI sound module. You can select different programs using MIDI program change commands or the Keyboard, Editor, MIDI Processor, or Mixer applications. You can modify programs in real-time while receiving MIDI from the controller using the Editor if the MIDI Channel parameter on the Editor global page matches the MIDI transmission channel.

When using external MIDI input on multiple channels, the Retro AS-1 Mixer application is useful for setting up and saving multi-timbral configurations. See Chapter 9 for more information about the Retro AS-1 Mixer.

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4.7 MIDI Software Integration (Windows)

This section is for users that wish to integrate Retro AS-1 into existing MIDI environments for use with other MIDI applications running on the same CPU. If you do not use third-party MIDI applications, you can skip the rest of this chapter entirely.

Configuring Retro AS-1 for use with third-party MIDI applications (such as a sequencer) can vary in complexity, depending on your experience, the MIDI application(s), your existing MIDI environment, and other variables. You will need to have a basic understanding about device drivers and the Windows MIDI Mapper.

4.7.1 Device Driver

Retro AS-1 is designed to behave as "virtual hardware" in the Windows 95 environment. We provide a 16-bit device driver for our software "MIDI module" that the Windows 95 MIDI Mapper and/or third-party MIDI applications can use as a multi-timbral destination for transmitting MIDI information to the Retro AS-1 synthesizer engine. This is a unique situation within Windows 95 because device drivers are usually used for hardware purposes only.

When the third-party MIDI application is launched, the MIDI input port is "grabbed" by the MIDI application and cannot be used directly by the Retro AS-1 applications. However, the third-party MIDI application "MIDI thru" function allows you to play Retro AS-1 "live" with the MIDI input port even though it is in use by another application.

4.7.2 Multimedia Control Panel

The default MIDI device many Windows 95 MIDI applications use for MIDI output is specified by the Windows MIDI Mapper, accessed in the Multimedia control panel. The MIDI Mapper allows you to select the default MIDI device for all 16 MIDI channels, or you can map individual MIDI channels to separate MIDI devices. Many advanced MIDI applications have their own MIDI Mapper settings for specifying MIDI output to device drivers. If an application uses their own maps, the Windows MIDI Mapper is not used and will have no effect.

After the Windows MIDI Mapper is configured to recognize Retro AS-1 as the default MIDI module, any MIDI application that uses the Windows MIDI Mapper (such as MediaPlayer) will use Retro AS-1 as a destination for MIDI data. The individual MIDI application tracks can be assigned to various Retro AS-1 "instruments" (MIDI channels). Once the MIDI application is transmitting MIDI data to Retro AS-1 on one or more MIDI channels, MIDI commands and/or the Retro AS-1 Mixer are used to define the settings (program selection, volume, pan, mute, solo, and global effects) for multi-timbral operation.

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4.8 Configuring the Retro AS-1 Device Driver (Windows)

4.8.1 Configuring the Windows MIDI Mapper to use Retro AS-1 as the default MIDI device

This setup will cause Retro AS-1 to respond to all 16 MIDI channels.

1. Open the Multimedia control panel.

The Multimedia control panel can be accessed from the Start Menu (Start>Settings>Control Panel). The Multimedia Properties window is displayed.

2. Click the MIDI tab.

This is where you will specify the MIDI output device.

3. Click the Single Instrument radio button.

All MIDI data will be output to the selected Single Instrument device.

4. Select Retro AS-1 as the MIDI output destination.

In the Single Instrument area, there is a list of MIDI device drivers that are installed in Windows 95. Scroll the list until you see Retro AS-1, then click Retro AS-1 so it becomes highlighted. See figure 4.7.2.

5. Click Apply then OK to close the control panel.

Done! Now any MIDI application that uses the Windows MIDI Mapper will play Retro AS-1 as the default output device.
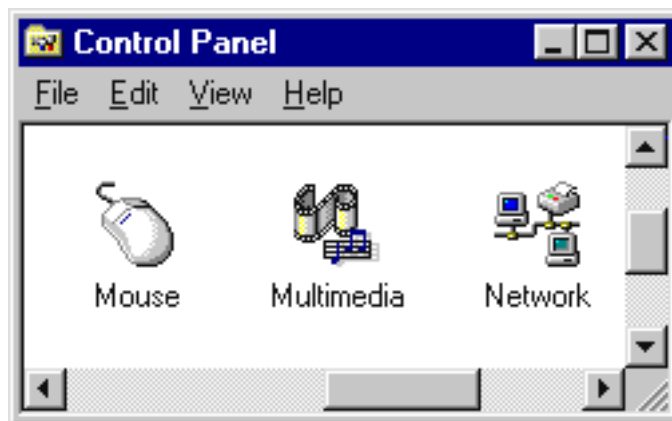
Figure 4.8.1. The Multimedia control panel applet. Double-click the icon to open the Multimedia Properties window.
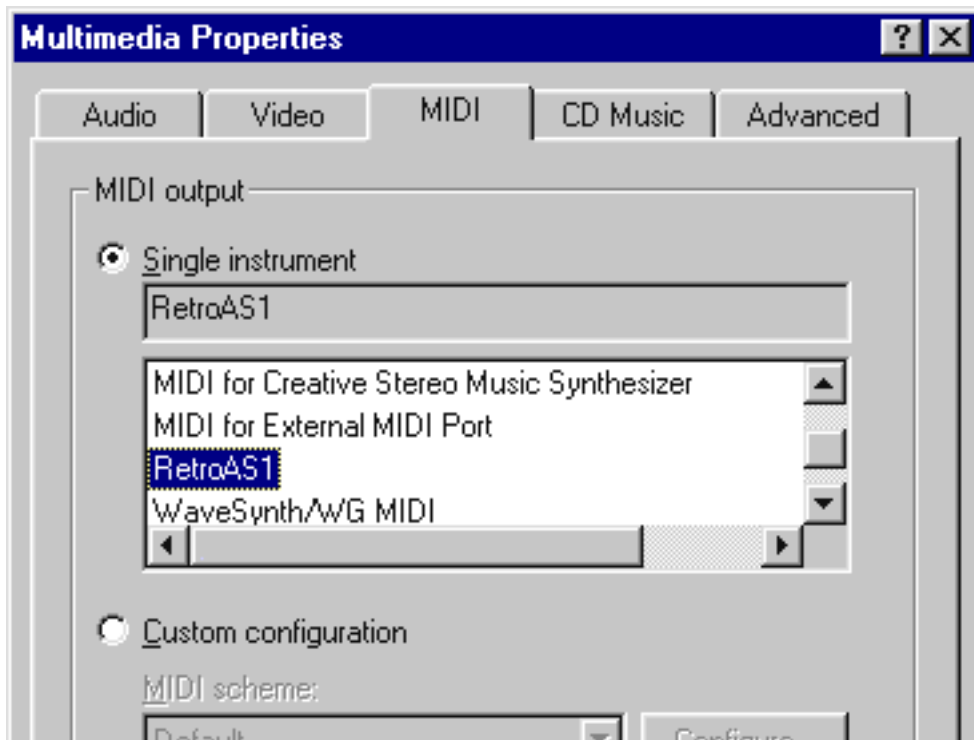
Figure 4.8.2. The Windows MIDI Mapper configured to use Retro AS-1 on all 16 MIDI channels.

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4.8.2 Configuring the Windows MIDI Mapper to use Retro AS-1 as one of several MIDI devices

This setup will enable multiple MIDI devices to respond, each on its own particular MIDI channel(s). You need to decide which MIDI channel(s) you want Retro AS-1 to respond to.

1. Open the Multimedia control panel.

The Multimedia control panel can be accessed from the Start Menu (Start>Settings>Control Panel). The Multimedia Properties window is displayed.

2. Click the MIDI tab.

This is where you will select the MIDI output device.

Figure 4.8.3. Selecting Custom configuration in the Windows MIDI Mapper. Click Configure... to open the MIDI Configuration window.

3. Click the Custom configuration radio button.

We will be creating a new custom MIDI Scheme (map).

4. Click the Configure button.

The MIDI Configuration window appears. In the default configuration, no MIDI channels are assigned to MIDI devices.

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MIDI Configuration

Schemes

Default | Save As... | Delete

Configuration

To choose instruments, select one or more channels below, and then click Change.

Channel: Instrument:

1   (None)
2   (None)
3   (None)
4   (None)
5   (None)
6   (None)
7   (None)
8   (None)

Change...

Figure 4.8.4. The default MIDI Configuration window. Custom MIDI Schemes (maps) are created here.

5. Click Channel 1 to select it then click the Change... button.

The Change MIDI Instrument window appears.

Change MIDI Instrument

Choose a new instrument for the following channels:

Channel 1

Instrument:

RetroAS1

OK | Cancel
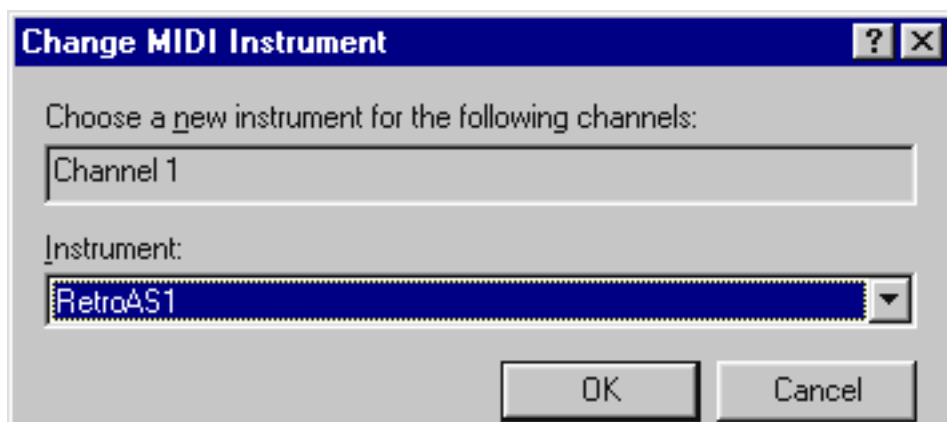
Figure 4.8.5. The Change MIDI Instrument window, where a different MIDI device can be specified for each MIDI channel.

6. Select the desired MIDI output device for Channel 1 from the Instrument pull-down menu then click OK.

The pull-down menu contains the list of MIDI device drivers that are installed in Windows 95. The MIDI output device you choose will receive the MIDI data transmitted by MIDI applications on MIDI channel 1.

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7. Repeat steps 5 and 6 for each of the 16 MIDI channels.
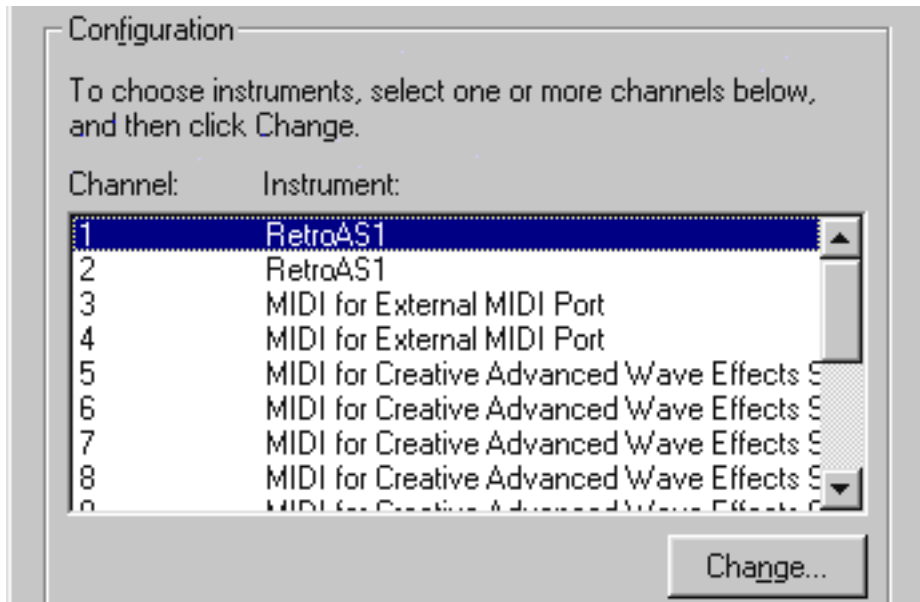
Figure 4.8.6. A custom MIDI Scheme with all channels configured.

8. Save the MIDI Scheme with a unique name.

Click the Save As... button in the Schemes area to save the configuration. Enter a unique name in the Save MIDI Scheme As dialog box.
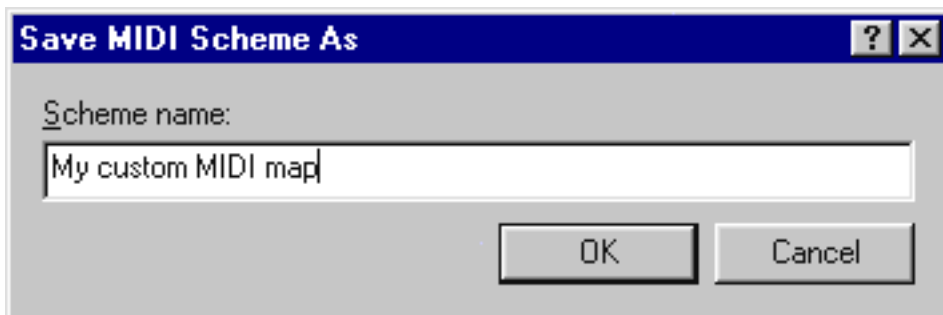
Figure 4.8.7. Saving the custom MIDI Scheme with a new name.

9. Click Apply then OK to close the control panel.

Your custom configuration is now complete. You can create multiple custom configurations for use in different MIDI situations.
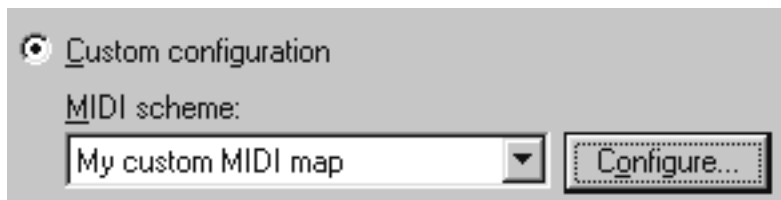
Figure 4.8.8. The newly customized MIDI Scheme is selected and ready for use.

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4.8.3 Real-World Examples

Configuring Retro AS-1 for use within Cakewalk

This example shows how to setup Cakewalk, a MIDI sequencer, to allow use of Retro AS-1 as a MIDI destination.

1. Verify correct installation of Retro AS-1 before launching Cakewalk.

You should be able to hear the synthesizer using the Retro AS-1 Keyboard application and with MIDI input. Close all Retro AS-1 components before proceeding.

2. Launch the Cakewalk application.

The Track window appears.

3. Select MIDI Devices... from the Cakewalk Tools menu.

The MIDI Ports window appears. A list of installed device drivers is shown in the Output Ports list.
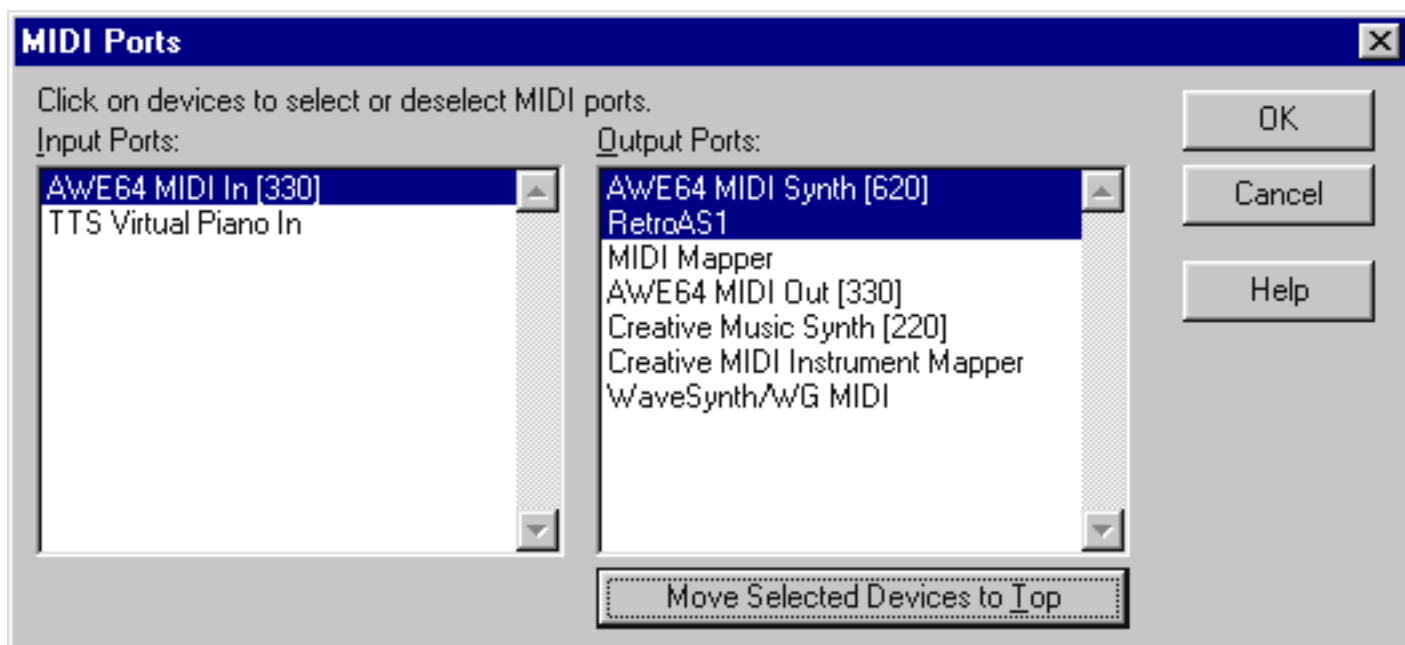
4. Click Retro AS-1 in the Output Ports list to select it.

Retro AS-1 and all the other MIDI output devices you want to use should be highlighted.

Figure 4.8.9. The Cakewalk MIDI Ports window. Make sure Retro AS-1 is highlighted.

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5. Click OK to close the MIDI Ports window.

This action initializes the Retro AS-1 device driver. The Retro AS-1 status window will open, indicating the synthesizer engine is active.
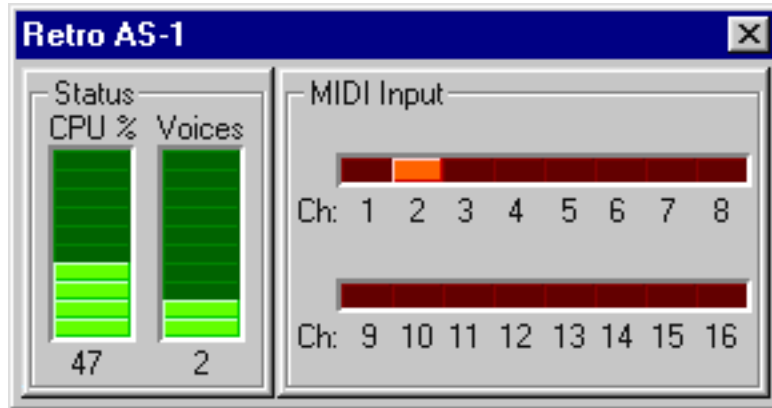
Figure 4.8.10. The Retro AS-1 Status window. The synth engine is active when this window is open.

6. In the Cakewalk Track window, double-click the Port for a track.

The Track Properties window appears. See figure 4.8.12.

Figure 4.8.11. Double-click the Port for a track to open the Track Properties window.
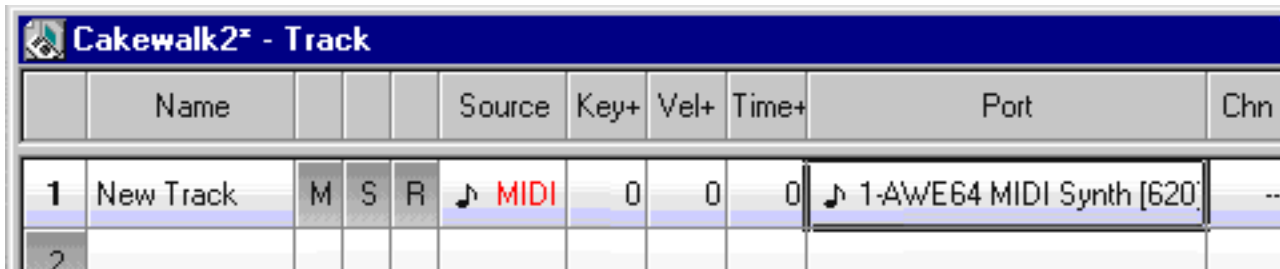
7. In the Track Properties window, select Retro AS-1 from the Port pull-down menu.

This action causes Retro AS-1 to be used as a MIDI destination for the track. See figure 4.8.12.

8. In the Track Properties window, select the desired MIDI channel for the track from the Channel pull-down menu.

This action selects the MIDI channel Retro AS-1 will respond to for the track. See figure 4.8.12.

9. Click OK to close the Track Properties window.

Retro AS-1 now appears as the destination device for the track port.

At this point, if MIDI is shown as the source for the track (this is the "MIDI Thru" function), you can play Retro AS-1 "live" with your MIDI controller.
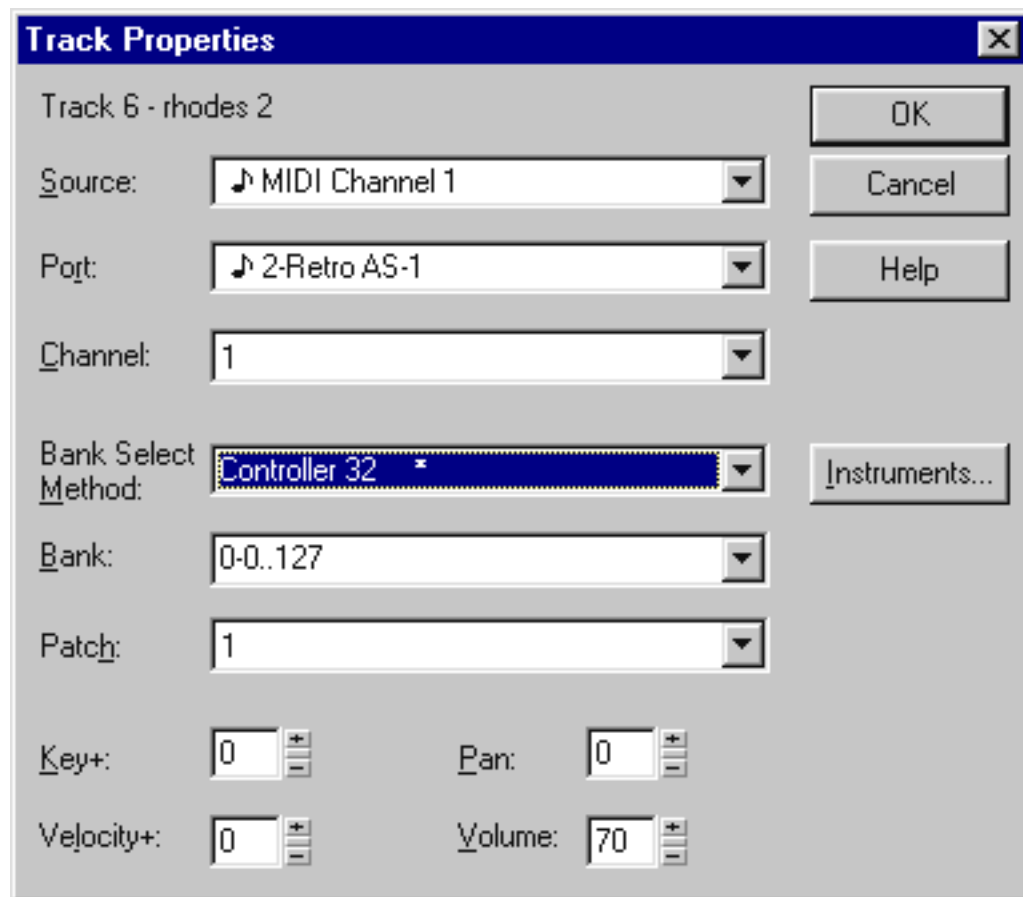
Figure 4.8.12. The Cakewalk Track Properties window. Make sure Retro AS-1 is selected from the Port menu.

Configuring Retro AS-1 for use within Cubase

This example shows how to setup Cubase, a MIDI sequencer, to allow use of Retro AS-1 as a MIDI destination.

1. Verify correct installation of Retro AS-1 before launching Cubase.

You should be able to hear the synthesizer using the Retro AS-1 Keyboard application and with MIDI input. Close all Retro AS-1 components before proceeding.

2. Launch the Cubase application.

The default Arrange window appears.

3. Click and hold the Output field in the Arrange window.

A list of installed device drivers is shown in the Output list.

Figure 4.8.13. Selecting Retro AS-1 as a MIDI destination from the Cubase Output column menu.
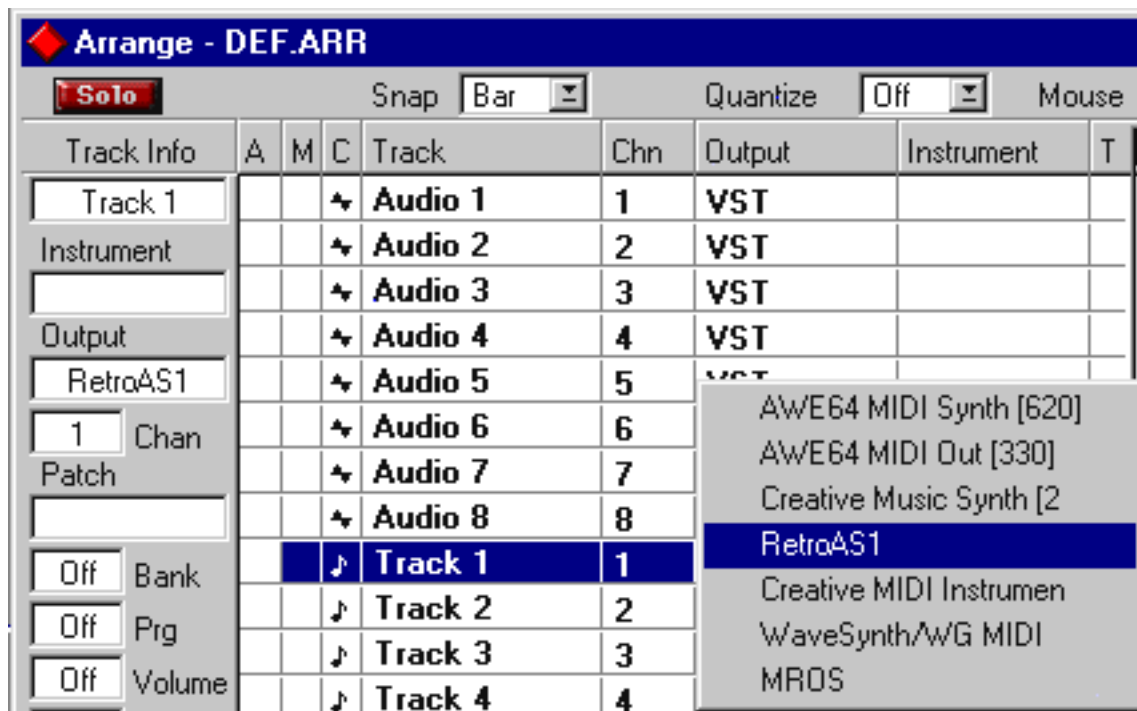
4. Click Retro AS-1 in the Output list to select it.

The track is now configured to use Retro AS-1 for output. Done!

At this point, you can play Retro AS-1 "live" with your MIDI controller. You can select a different MIDI channel for the track by double-clicking the "Chn" column for the track.

4.8.4. Using Retro AS-1 With Third-Party Audio Sequencers

An "audio sequencer" is a hybrid MIDI/digital audio application. It records and plays back digital audio files as well as MIDI data.

4.8.5. Audio Sequencers and DirectSound

Sound cards require a "wave driver" to pass digital audio from an application to the sound card outputs. Most audio sequencer packages include their own proprietary wave driver to pass digital audio to the sound card.

DirectSound, which is utilized (and required) by Retro AS-1, also uses a wave driver to pass digital audio to the sound card. However, most sound cards do not support multiple clients. In other words, only one wave driver connection can be active at any given time.

In order for Retro AS-1 to run concurrently alongside an audio sequencer using the same sound card, the audio sequencer must use DirectSound, or the sound card must support multiple clients. Unfortunately, both of these scenarios are uncommon.

In order to use Retro AS-1 and an audio sequencer concurrently using the same sound card, you may need to disable the digital audio features of the audio sequencer and instead use MIDI only. Another alternative is to install another sound card.

Chapter 5. Control Panel Reference

Chapter 5 Contents

5.1 Control Panel Overview

Figure 5.1.1. The Retro AS-1 control panel window (Mac OS).

The Retro AS-1 control panel is where system-wide configuration parameters are modified and stored. It was placed into the Control Panels folder by the Retro AS-1 Installer.

5.1.1 System Performance

Depending upon the speed of your computer, your polyphony and sound quality requirements, and other MIDI applications that are running, the synthesizer system parameters will probably need to be "tweaked" to optimize performance. The Configuration parameters are the settings that will affect Retro AS-1 performance and sound quality.

Because Retro AS-1 uses the computer's CPU to handle all of its tasks, it is possible to overload the CPU, especially on slower systems. The main cause of CPU overload occurs when too many notes are played. When the CPU is overloaded, sound output will stutter or cut out altogether.

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To eliminate this problem the Number of Voices, Maximum CPU %, Sample Rate, and Buffer Length settings must be optimized for use with your particular environment. These settings are all interdependent and experimentation is sometimes required to find the "sweet spot" that works best in your environment.

Figure 5.1.2. The Retro AS-1 control panel window (Windows 95).

5.1.2 Key Control Panel Concepts

1. Setting changes are not activated until the control panel is closed and the synthesizer is relaunched. Relaunching the synth means ALL Retro AS-1 components (including MIDI applications using the Retro AS-1 MIDI drivers) must be quit.

2. Configuration parameters should be experimented with to get the best performance from your particular computing environment.

3. Generally speaking, lowering the Polyphony setting is the simplest way to avoid overloading the CPU while maintaining fidelity.

4. Global Effects behavior is determined in the control panel.

5. Changing the Sample Rate and Buffer Length settings may affect the sound of a program. For best results, voice your programs with the settings you intend to use them with.

IMPORTANT! Whenever control panel settings are modified, Retro AS-1 must be restarted in order for the changes to take effect. To restart Retro AS-1, quit all Retro AS-1 components (Editor, Keyboard, MIDI Processor, Mixer, Serial/OMS/FreeMIDI Input, MIDI drivers). New settings will take affect the next time one of these components is launched.

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5.2 Configuration settings

Number Of Voices

This parameter sets the maximum polyphony (simultaneous voices) that Retro AS-1 will reproduce. The range is from 1 to 32 voices. The default value is 8.

A larger Number Of Voices value generally requires a higher Maximum CPU % and/or Buffer Length setting to compensate for the increased CPU demands of additional polyphony. If the synthesizer "chokes" (stutters or cuts out), enter a smaller Number Of Voices value and/or change the other configuration settings.

Figure 5.2.1. The Configuration parameters. These are the settings that affect performance and fidelity.

> Note: Polyphony can be limited on a per-program basis with the Maximum Voices setting in the Editor Global page.

Maximum CPU %

This parameter sets the amount of CPU processing horsepower reserved by the synthesizer engine. The range is from 10% to 60%. When using Direct IO for output (Mac OS only), the range is from 10% to 40%. The default value is 40%.

If the synthesizer "chokes" (stutters or cuts out), enter a larger Maximum CPU % value and/or change the other configuration settings. If you experience problems with other MIDI applications (such as sluggish screen response or poor timing) decrease the CPU percentage. If you are using Retro AS-1 by itself (for example, using the synthesizer "live" as a musical instrument) you can crank this setting up without negative effects.

The reserved CPU is relinquished to other applications whenever the synth engine is not active (that is, when all components are quit).

Sample Rate

This parameter determines the sample rate of the synthesizer output. The value is expressed in Hertz; the range is from 8000Hz to 48000Hz. The default value is 44100.

A higher setting results in better upper frequency response, fidelity, and voicing parameter resolution, but requires additional CPU processing. A lower value requires less CPU processing and allows more polyphony for the same CPU percentage. If the synthesizer "chokes" (stutters or cuts out), enter a smaller Sample Rate value and/or change the other configuration settings.

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IMPORTANT! The Sample Rate setting affects not only the frequency response, but also the resolution of the voicing parameters. Changing the Sample Rate setting can affect the sound of a program. For best results, voice your programs with the same sample rate setting that you intend to use them with.

Many "vintage-style" synth voices do not require the sparkly-crisp high end response we have become accustomed to in this digital era. A Sample Rate setting of 22050 or even lower may be acceptable (or even desirable) in many scenarios, including live performance and "lo-fi" recordings.

IMPORTANT (Mac OS only)! This number should match the Sound Manager sample rate setting for optimum system performance. If the numbers don't match, the Sound Manager must perform a sample rate conversion which requires additional CPU processing and may decrease available polyphony.

Buffer Length

This parameter determines how often data is passed from the synthesizer to the Sound Manager (Mac OS) or DirectSound (Windows 95). The values are expressed in samples; the range is from 32 to 1024. The default value is 64.

A lower value delivers higher voicing parameter resolution and faster note-on response time but requires more CPU processing. A higher value allows more polyphony for the same CPU percentage, but the sound quality may be "grainier" and the lag time between note-on and sound output may increase. If the synthesizer "chokes" (stutters or cuts out), enter a larger Buffer Length value and/or change the other configuration settings.

For live play with a MIDI controller, a value of 32 offers the best note-on to sound-out response time (latency). A value of 64-128 may be acceptable in many situations. When you are using a MIDI application where the note data is already input (when you aren't playing a controller), you may get away with an even higher value.

IMPORTANT! The Buffer Length setting affects not only the latency response, but also the resolution of the voicing parameters. Changing the Buffer Length setting can affect the sound of a program. For best results, voice your programs with the same buffer length setting that you intend to use them with.

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About the 'Best of Retro AS-1@22kHz' bank

The Retro AS-1 factory programs are voiced at 44.1kHz with a buffer length of 64 for high sound quality. Because the Sample Rate and Buffer Length settings can affect the sound quality of programs, we have provided a copy of the 'Best of Retro AS-1' bank that is optimized for 22050/ settings for use with slower computer systems. We recommend using this bank only when Sample Rate = 22050 and Buffer Length = in the Retro AS-1 control panel.

5.3 Controllers Settings

Controllers A, B, C, D overview

Controllers A, B, C, and D allow four MIDI continuous controllers to be active simultaneously for highly expressive performances. These controller parameters allow you to set up your favorite modulation sources for use with Retro

Figure 5.3.1. The Controller assignment parameters.

AS-1 programs. This is a flexible arrangement that allows you to use different controllers without having to modify your program modulations when switching MIDI environments.

For example, let's say Mod Wheel is selected for Controller A in the control panel. Whenever Controller A is selected as a source for modulation in a program, the modulation wheel will be used for that modulation. So if Controller A is assigned to control LFO amount in a program, the modulation wheel will control the LFO amount. Then if you switch to a wind controller, you could change Controller A to be Breath Control and your programs would still have the same modulation routings with your alternate controller.

Controller A, B, C, D menu

Each Controller has a menu for selecting the desired assignment. The controller numbers associated with the menu items are detailed in this table.

Figure 5.3.2. The Controllers A, B, C, D menu.

Item Selected From Controller Menu	Controller # Assigned to Controller Source
Modulation Wheel	1
Breath Control	2
Foot Control	3
Expression Controller	11

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Where's the Data Slider (controller #6)?

Retro AS-1 reserves MIDI controller number 6 (data slider) for real-time control of all synthesizer parameters via MIDI using non-registered parameter numbers. See Appendix F for more information.

Pedal menu

The Pedal parameter determines which MIDI controller number will be used as a source when Pedal is selected as the trigger mode for program modulators. For example, you could program an LFO modulator to turn on only when a pedal (footswitch) is depressed.

MIDI controller #64 (sustain) is "hard wired" within Retro AS-1 to always control sustain, regardless of any other settings. This parameter only effects program modulators set to trigger mode.

```
● Sustain
  Portamento On/Off
  Sostenuto
  Soft
  Legato Footswitch
  Hold 2
```
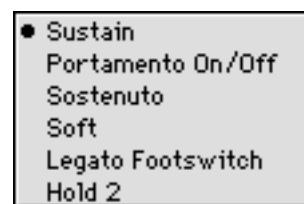
Figure 5.3.3. The Controllers Pedal menu.

Item Selected From Pedal Menu	Controller # Assigned to Modulator Pedal
Sustain	64
Portamento	65
Sostenuto	66
Soft	67
Legato	68
Hold 2	69

NOTE: The names shown in the Pedal menu do not indicate functionality within Retro AS-1. They are merely the names given to these controller numbers by the MIDI specification.

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5.4 Global Effects Settings

These parameters determine the behavior of the two global effects processors. The global effects parameters are detailed in Chapter 7, section 7.5. Global effects behavior is interactive between the Mixer and Editor. How the global effects respond is defined by these settings. Each possible scenario is detailed below.
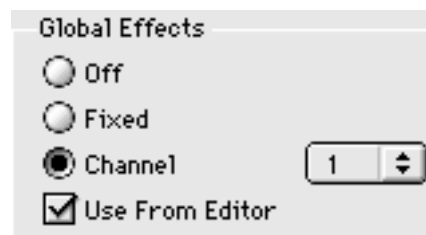
Figure 5.4.1. The Global Effects configuration parameters.

Scenario 1. Global Effects Off, 'Use From Editor' unchecked

No global effects will be used by the synth. Settings in the Editor and Mixer will have no effect. CPU processing requirements can be reduced with this setting.

Scenario 2. Global Effects Off, 'Use From Editor' checked

Global effects will be heard only when the Editor is active. The global effects parameters on the effects page in the active Editor program determine the settings. Settings in the Mixer will have no effect.

Scenario 3. Fixed selected, 'Use From Editor' unchecked

The current global effects settings will be used. The current settings reflect the state of the last used Mixer settings. If a Mixer file is opened, the global effects settings from that file become the current effects settings. In this scenario, the Mixer is the only place where global effect changes will be heard in real time.

Scenario 4. Fixed selected, 'Use From Editor' checked

The current global effects settings from the Mixer will be used unless the Editor is active. In this scenario, when the Editor is open the global effects settings on the effects page of the active Editor program are used, overriding the settings in the Mixer. When the Editor is quit, the global effects settings revert back to the current Mixer settings.

Scenario 5. Channel is selected, 'Use From Editor' unchecked

The global effects settings on the effects page of the current program on the specified MIDI channel will be used. Settings in the Mixer and Editor are not used even if those applications are open. In this scenario, global effects settings are changed whenever the program on the specified MIDI channel is changed.

Scenario 6. Channel is selected, 'Use From Editor' checked

The Global Effects settings on the effects page of the current program on the specified MIDI channel will be used unless the Editor is open. In this scenario, when the Editor is open the global effects settings on the effects page of the active Editor program are used, overriding the settings on the specified MIDI channel. When the Editor is quit, the global effects settings revert back to the current program on the specified MIDI channel.

5.5 Input/Output Settings

M Default MIDI Input menu (Mac OS only)

This setting determines which (if any) MIDI input utility application (Serial Input, OMS Input, or FreeMIDI Input) is used for MIDI input when the Editor, MIDI Processor, or Mixer is launched. The selected utility will be launched automatically and run in the background allowing live MIDI input while using the Retro AS-1 applications.

Selecting OMS or FreeMIDI requires those MIDI operating systems to be installed. If your PowerMac does not have serial DMA hardware, Serial Input cannot be used and OMS or FreeMIDI must be installed to allow MIDI input into Retro AS-1. See Chapter 4 for more information.

M Audio Output menu (Mac OS only)

This parameter determines where the synthesizer output is directed. The default value is the Sound Manager, for use with PowerMac built-in audio hardware.

When Direct IO is selected, the Sound Manager is bypassed altogether, and Retro AS-1 is routed directly to installed Digidesign digital audio expansion hardware. If no Digidesign audio card is installed, the Direct IO menu item is grayed out, indicating it is unavailable for selection.

NOTE: For more information about using Direct IO with audio expansion hardware, see Appendix D.

M Record To Disk Size menu (Mac OS only)

This parameter determines the digital bit depth of the audio files produced by the Retro AS-1 Record To Disk feature. 8, 16, and 24 bits are supported. See section 7.2 for details about Record To Disk.

W MIDI Input Device (Windows 95 only)

This pull-down menu determines which MIDI hardware port will be used for MIDI input when the Use Direct MIDI Input checkbox is checked. The items listed in the menu are the MIDI input hardware devices that are properly installed and configured in Windows 95.

Select your preferred device for live MIDI input from this menu. The selection will have no effect if the Use Direct MIDI parameter is unchecked.
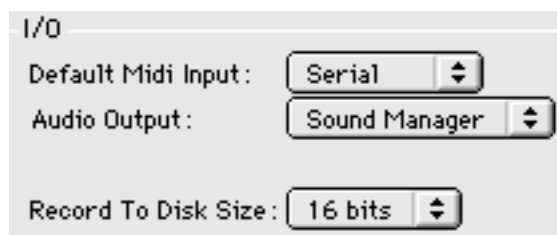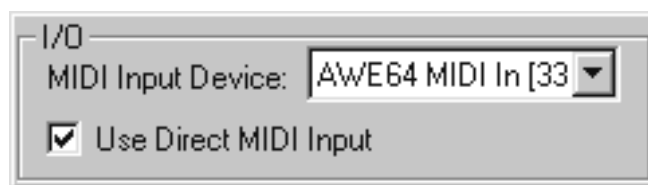
Figure 5.5.1. Input/Output settings (Mac OS)
Figure 5.5.2. The Default MIDI Input menu (Mac OS only).
Figure 5.5.3. The Audio Output menu (Mac OS only).
Figure 5.5.4. The Record To Disk Size menu (Mac OS only).
Figure 5.5.5. Input/Output settings (Windows 95)

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W IMPORTANT! The first MIDI application launched "grabs" the MIDI input port, making it unavailable for MIDI applications that are launched subsequently. Be sure to launch the MIDI application that requires the MIDI input before launching other MIDI applications.

W Use Direct MIDI Input (Windows 95 only)

This checkbox determines if Retro AS-1 will "grab" the MIDI input port when the synth engine is launched. The port that is used when this parameter is active is determined by the MIDI Input Device parameter.

If you are using a third-party MIDI application to control Retro AS-1 in conjunction with the Retro AS-1 device driver (as opposed to using Retro AS-1 stand-alone), this box should be unchecked. In this scenario, you want the third-party MIDI application to use the MIDI input port. You would then use the "MIDI through" function of the third-party MIDI application to pass MIDI to Retro AS-1 via the Retro AS-1 device driver.

5.6 Miscellaneous Settings

M Warn About AppleTalk checkbox (Mac OS only)

AppleTalk requires continuous CPU processing and will reduce Retro AS-1 performance. We strongly recommend turning AppleTalk off whenever Retro AS-1 is being used. When this option is checked, a warning window will appear once each time the synth engine is launched if AppleTalk is active.
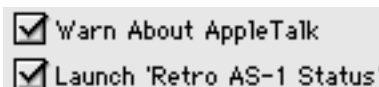
Figure 5.6.1. Miscellaneous settings (Mac OS only).

To disable the warning, uncheck the Warn About AppleTalk checkbox. In either case, you can continue to use Retro AS-1 even if AppleTalk is active, although with reduced performance. AppleTalk is disabled in the Chooser utility, accessed from the Apple Menu.

Figure 5.6.2. The Status window (Mac OS only).

M Launch Retro AS-1 Status (Mac OS only)

Retro AS-1 Status is a utility application that gives a visual indication of polyphony used and the amount of CPU usage occurring at any given moment. The Status utility can help you determine optimum settings for your system. Retro AS-1 Status is located in the 'Retro AS-1 Utilities' folder, inside the Retro AS-1 Folder.

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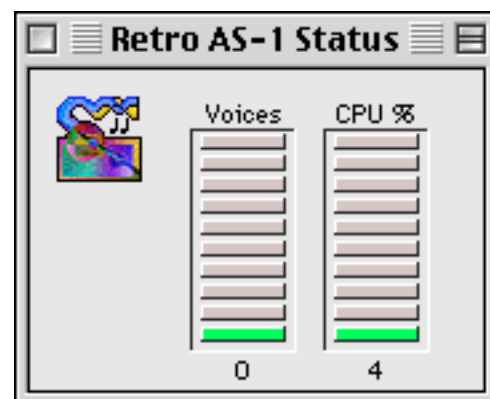
When 'Launch Retro AS-1 Status' is checked, the utility is opened automatically whenever the synthesizer is launched, and quits automatically when the synthesizer is closed. The window position of Retro AS-1 Status is saved as a preference.

MIDI Processor Settings (Windows 95 only)

MIDI Channel

This parameter determines the MIDI channel that the active MIDI Processor file will respond to. The default setting is All MIDI channels.

The MIDI Channel setting allows MIDI processing to occur only when transmitting on a particular MIDI channel. When set to All, MIDI processing will occur regardless of the MIDI transmission channel.
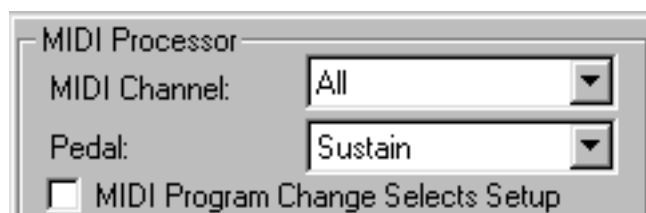
Figure 5.6.3. The MIDI Processor settings (Windows 95 only).

Note that the selection affects the MIDI reception channel only. It has no effect on the MIDI Channel parameter of a layer.

MIDI Program Change Selects Setup

If this option is checked, the active setup in the Setup List will be modified with MIDI Program Change commands. The first setup in the Setup List will be selected with MIDI program change #1, the second setup will be selected with MIDI program change #2, and so forth. For your convenience, setups can be reordered by dragging a setup up or down in the list.

If this option is unchecked, synthesizer program changes will occur normally on each MIDI channel. However, the program displayed in the MIDI Processor will not be updated to reflect the current program. This is due to internal architecture limitations.

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Chapter 6. MIDI Processor Reference

Chapter 6 Contents

6.1 MIDI Processor Overview

The Retro AS-1 MIDI Processor allows you to modify the synthesizer engine MIDI data in realtime by programming layers (two programs sounding simultaneously), splits (two different programs on each side of the keyboard), and arpeggiations (notes in a chord played sequentially, one at time). The MIDI Processor can be thought of as or own version of the Multis or Combinations of other manufacturer's hardware keyboards.

Once launched, the MIDI Processor remains active even when running behind other applications such as the Editor or Keyboard. The MIDI Processor can be used with a MIDI controller during live performance, and also with third-party MIDI applications.

6.1.1 MIDI Processor Setups

The MIDI Processor supports two simultaneous programs, each on its own MIDI channel. Any bank or program in the Retro AS-1 Programs folder can be selected for each sound. The two programs can have the same range (layered), or they can be limited to separate partial ranges (split). Each layer can be transposed chromatically as well as by octave.

The arpeggiator can be applied to one, both, or neither layers. Arpeggiations can be specified by chords that are played or by one-note play. Complex note patterns can be recorded or entered manually in a list. A variety of modifiers and trigger modes are provided.

We call one complete set of layer, split, and arpeggiation settings a Setup. Each setup name in the setup list contains a completely unique set of parameters. Setups in the list become active as soon as they are selected by the mouse. MIDI program change commands can select setups as well, making Retro AS-1 a powerful live performance tool.

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6.1.2 MIDI Processor Files

Each MIDI Processor window containing multiple setups is a document that can be saved as a disk file. Multiple files can be open simultaneously; the active (frontmost) window is always the active document.

The design of multiple setups within a file and multiple files accommodates your working style. You could, for example, have all your favorite splits in one document, layers in another, and arpeggiations in another. Additionally, you could arrange all the splits, layers, and arpeggiations for one song or live set in one document, and another song in a different document.
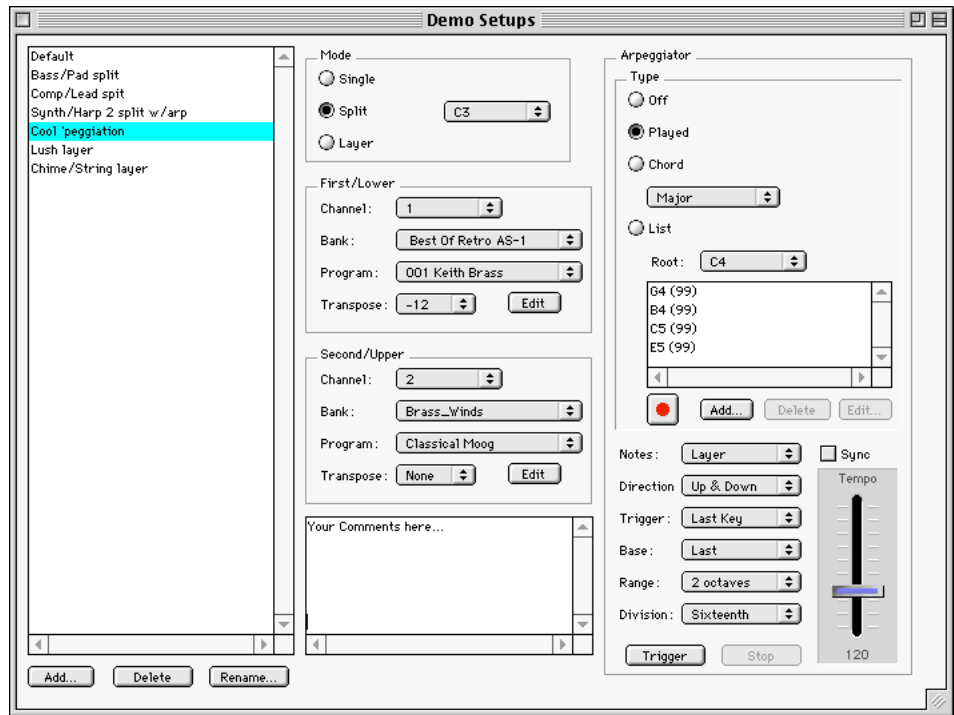
Figure 6.1.1. The MIDI Processor window. The parameter values change when a Setup is selected from the list on the left.

6.2 Key MIDI Processor Concepts

1. MIDI data processed by the MIDI Processor is not transmitted to anything except the synthesizer engine.

2. MIDI output from the Processor and the synthesizer engine is not available to MIDI applications or the MIDI output port(s).

3. The MIDI Processor receives data only from the synthesizer engine.

4. The MIDI Processor will not run "stand-alone" without the synthesizer engine.

5. To hear programs that are currently loaded in the Editor, select Editor from the Bank and Program menus.

6. The MIDI Processor switches to Bypass mode when there are no MIDI Processor windows open.

7. Setups in the list can optionally be selected with MIDI program change commands.

8. Notes can be triggered with the computer keyboard space bar when the MIDI Processor is active. This preference can be disabled if desired.

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6.3 MIDI Processor Menus

File menu

The File menu contains commands for controlling management tasks such as loading and saving files.

New

The New command creates a new, untitled document with default MIDI Processor settings. Use the New command when you want to create new setups from scratch.

> Note: You can create your own default settings using the Save As 'New' Template command in the File menu.

Figure 6.3.1. The File menu.

Open...

The Open command loads a previously saved MIDI Processor document from disk, using the standard Open File dialog box. You can also open a saved file by double-clicking its icon.

Close

The Close command closes the active MIDI Processor document. Alternately, you can click the close box in the window title bar. If the file has been modified since it was opened, you will be asked if you want to save the changes. If you don't want to overwrite the existing disk file, choose the Save As... command instead.

Save

The Save command writes the active program file to disk, overwriting the previously saved version of the file. If you don't want to overwrite the existing disk file, choose the Save As... command instead.

Save As...

The Save As command writes a new file to disk, leaving the original file unchanged. You will have the choice to rename the file. The active document window title will change to the name of the new file after saving.

Save As 'New' Template

The Save As 'New' Template command allows you to create your own default settings for new MIDI Processor documents. The settings in the active window when this command is executed will be the same settings created when "New..." is selected from the File menu.

To restore the factory template settings, delete the Retro AS-1 MIDI Processor preferences file inside the Preferences folder in the active System Folder (Mac OS), or in the Retro AS-1 Programs folder (Windows 95).

Revert

The Revert command reloads the last saved version of the file from disk. All changes made to the file since the last Save command are permanently lost. Revert is convenient when you don't like the most recent series of modifications to your setups since the last Save command.

Quit

The Quit command closes the Retro AS-1 MIDI Processor application. If any Processor files that are open have been modified since the last save, you will be asked if you want to keep those modifications.

If no other Retro AS-1 applications (Editor, Keyboard, Mixer, MIDI driver) are open, quitting the MIDI Processor will also quit the synth engine.

Edit Menu

The Edit menu contains several timesaving utility commands for modifying program files. General program preferences are also found in this menu.

Undo

The Undo command will revert the program back to the condition it was in just before performing an edit function. Use Undo when you don't like the results of a parameter change.

Cut

The Cut command deletes selected data and stores it in the Clipboard (a temporary storage buffer). The data in the Clipboard can then be placed elsewhere using the Paste command. Cut differs from the Copy command in that the selected data is deleted.

Copy

The Copy command copies selected data and stores it in the Clipboard. The copied data can then be placed elsewhere using the Paste command.

Figure 6.3.2. The Edit menu.

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Paste

The Paste command places the data from the Clipboard into the selected data field.

Clear

The Clear command deletes the selected data without storing it in the Clipboard.

> NOTE: The Cut, Copy, Paste, and Clear commands only work on Setups in the Setup List (see Figure 6.4.1) and comments in the text field (see Figure 6.5.6).

Bypass

The Bypass command stops the MIDI Processor from manipulating any MIDI data. A checkmark indicates the Bypass status.

Normally, as soon as the MIDI Processor is launched, its settings are active until the application is quit. Using Bypass allows you to turn off MIDI processing even when the MIDI Processor application is open.

Latch

The Latch command forces the MIDI Processor to ignore MIDI note-off messages. Incoming notes will continue to play even if a note-off command is received.

Figure 6.3.3a. The MIDI Processor Preferences window (Mac OS).
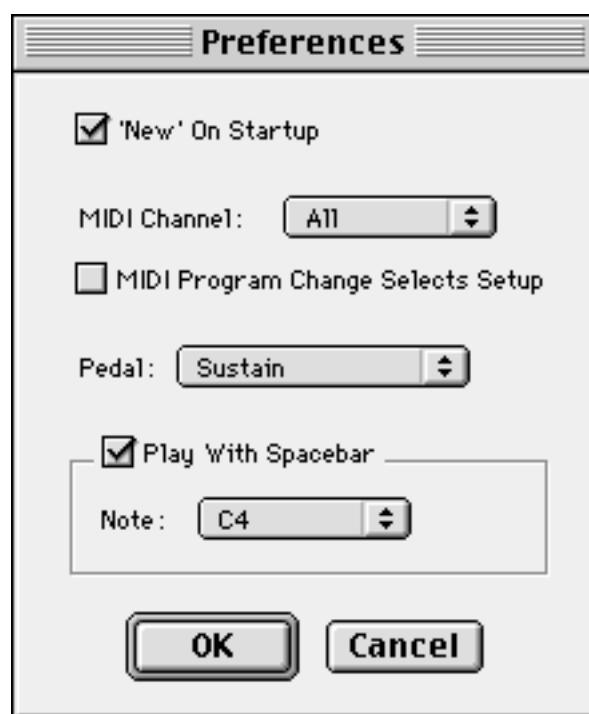
Preferences...

The Preferences command opens the Preferences window which contains options for specifying general program behavior. Preference settings are retained from previous sessions until they are modified and saved.

'New' On Startup

If this option is checked, when the MIDI Processor is launched, a new window with the default settings will be automatically opened.

MIDI Channel

This parameter determines the MIDI channel that the active MIDI Processor file will respond to. The default setting is All MIDI channels.

The MIDI Channel setting allows MIDI processing to occur only when transmitting on a particular MIDI channel. When set to All, MIDI processing will occur regardless of the MIDI transmission channel.

Note that the selection affects the MIDI reception channel only. It has no effect on the MIDI Channel parameter of a layer.

M MIDI Program Change Selects Setup

If this option is checked, the active setup in the Setup List will be modified with MIDI Program Change commands. The first setup in the Setup List will be selected with MIDI program change #1, the second setup will be selected with MIDI program change #2, and so forth. For your convenience, setups can be reordered by dragging a setup up or down in the list.

Figure 6.3.3b. The MIDI Processor Preferences window (Windows 95).

If this option is unchecked, synthesizer program changes will occur normally on each MIDI channel. However, the program name displayed in the MIDI Processor will not be updated to reflect the current program. This is due to internal architectural limitations.

W NOTE: In Windows 95, the MIDI Channel and MIDI Program Change Selects Setup parameters are located in the Retro AS-1 control panel.

Figure 6.3.4. The Preferences Pedal menu.

Pedal menu

The preferences Pedal menu defines which MIDI controller will be used when Pedal is selected in the arpeggiator Trigger menu (see Figure 6.6.7). To view the list of MIDI controller numbers that are assigned to the menu, see Chapter 5, section 5.3.

Play With Spacebar

Play With Spacebar allows you to hear the current MIDI Processor setup without having to use a MIDI controller or the Retro AS-1 Keyboard application. When Play With Spacebar is active (when the box is checked), pressing the space bar on the computer keyboard will trigger the note selected from the Note pull-down menu.

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Synthesizer Menu

The Synthesizer menu contains several utility commands, offering access to other key components of the Retro AS-1 package.

All Notes Off

Selecting All Notes Off from the Synthesizer menu stops all Retro AS-1 sounds from playing. It is a "MIDI panic button" which is useful for silencing notes that are stuck on as a result of MIDI controller faults or other problems.

Reset

This command resets the synth engine and forces all MIDI continuous controller values to be reset to zero.

Figure 6.3.5. The Synthesizer menu.

Start Record To Disk...

The Record To Disk function writes the stereo output of the synthesizer engine to your hard drive as an audio file. Whatever the synthesizer is playing (notes, chords, riffs, arpeggiations, etc, on all MIDI channels, including effects) is written directly to disk. Complete instructions for Record To Disk are in Appendix G.

Stop Record To Disk

The Stop Record To Disk command ends the Record To Disk process. This command will have no result unless the Record To Disk function is active.

Control Panel...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Control Panel, where system-level configuration settings are specified For specific information about the control panel, refer to Chapter 5.

Status... (Mac OS only)

Selecting this item from the Synthesizer menu opens the Retro AS-1 Status window, for displaying polyphony and CPU usage. For specific information about the Status window, refer to Chapter 5.

Keyboard...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Keyboard, for triggering notes without a MIDI controller. For specific information about the Keyboard, refer to Chapter 8.

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Editor...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Editor application, for accessing synthesizer voicing parameters. For specific information about the Editor, refer to Chapter 7.

Mixer...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Mixer application, for setting up multi-timbral operations. For specific information about the Mixer application, refer to Chapter 9.
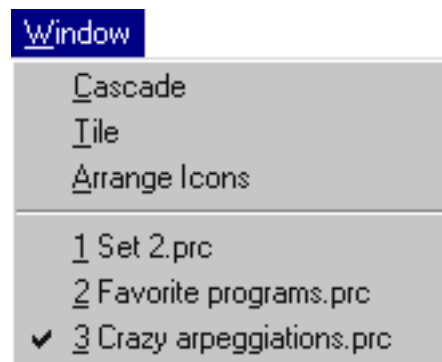
Figure 6.3.6a. The Windows menu (Windows 95) selects between open MP documents, NOT between the Setups within one document.

Windows Menu

The Windows menu allows you to switch between active MIDI Processor documents. The Windows menu does NOT select Setups in the Setup List of the active document. The number of items in the Windows menu matches the number of open document files. Selecting a document from the menu brings that document to the front and makes it active.

M (Mac OS only) The first ten windows (in the order that they were opened) can be activated with keyboard equivalents Command-1 through Command-10. The number of setup windows you can have open is limited only by the application memory allocation in the Finder.
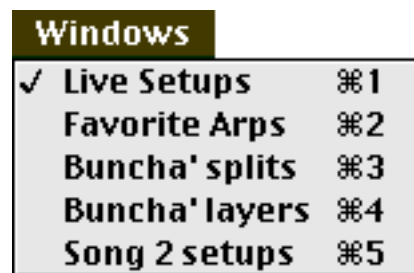
Figure 6.3.6b. The Windows menu (Mac OS) selects between open MP documents, NOT between the Setups within one document.

6.4 Setup List Parameters

The Setup List

The names of all setups in the active MIDI Processor document are displayed in the Setup List. Each setup name represents a complete set of MIDI Processor parameters. Selecting a different setup from the list makes the new setup parameters active.

Select setups from the list by clicking on setup names with the mouse. Alternately, you can use the up/down arrow keys to move up and down sequentially in the list.

Setups can be selected with MIDI program changes, if the option is selected in the Preferences window (Mac OS, see figure 6.3.3) or the Retro AS-1 control panel (Windows 95, see figure 5.6.3). Program change #1 will select the first setup in the list, program change #2 will select the second setup, and so forth.

You can click and drag setups to reorder items in the Setup List. Additionally, the Cut, Copy, and Paste commands work with setups in the list. After performing a Cut or Copy command, click an empty area in the list then select Paste. A new setup from the Clipboard will appear in the list.

Add... button

Clicking the Add... button creates a new setup in the list. The Setup Name window (Figure 6.4.3) will be opened, allowing you to type in a name for the setup.

New setups added to the list have the default settings. Use the Save As 'New' Template command in the File menu to create new default settings.

Delete button

Clicking the Delete button removes the currently selected setup from the list. Selecting Undo from the Edit menu will restore a deleted setup if there have been no other edits since the deletion.

Rename... button

Clicking the Rename... button allows you to modify the name of an existing setup. The Setup Name window is opened when the button is pressed, allowing you to modify the setup name.
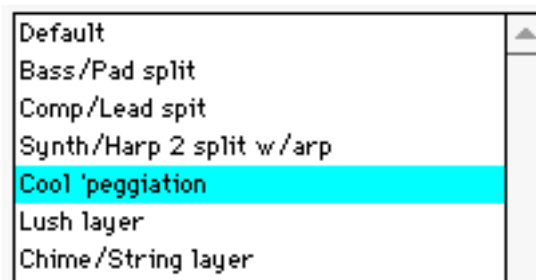
Figure 6.4.1. The Setup List. Each Setup represents a complete set of MIDI Processor parameters.
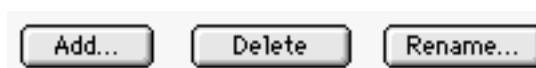
Figure 6.4.2. The Setup Add, Delete, and Rename buttons.

Figure 6.4.3. The Setup Name window.

6.5 Split/Layer Parameters

Mode radio buttons

When the arpeggiator is on, the arpeggiator Notes menu (see figure 6.6.5) will override the Mode setting.

Single Mode

When Single mode is selected, no split or layering will occur; only the First/Lower program will sound. Incoming MIDI data is re-channelized and sent to the synthesizer on the First/Lower MIDI channel.
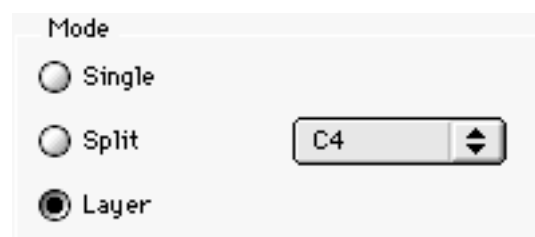
Figure 6.5.1. The Mode radio buttons and Split Note menu.

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Split Mode

When Split mode is selected, the First/Lower program will sound below the split note, and the Second/Upper program will sound above the split note. The split note is selected within the split note pull-down menu.

Split Note menu

This menu determines the break point between the two sounds in the split. MIDI note #60 equals C4.

Layer radio button

When Layer mode is selected, the First/Lower program and Second/Upper program will sound simultaneously.

Setup Layers

Because the First/Lower and Second/Upper sections are essentially the same, their parameters are detailed only once.

Channel

This parameter selects which MIDI channel for the layer will be used by the synthesizer. Incoming MIDI data is re-channelized to match this channel. The MIDI Processor will only respond to incoming MIDI data on the MIDI channel specified in the Preferences window (Mac OS, see figure 6.3.3) or the Retro AS-1 control panel (Windows 95, see figure 5.6.3).

Figure 6.5.2. The Setup Layer parameters. The First/Lower and Second/Upper parameters are identical.

Bank

This parameter selects which Bank for the layer will be used by the synthesizer. To use programs that are being modified in the Editor, select Editor from this menu.

Program

This parameter selects which Program for the layer will be used by the synthesizer. To use programs that are being modified in the Editor, select Editor 1-16 from this menu. The numbers 1-16 indicate the MIDI channel that the program is set to in the Editor global page.

Transpose

This parameter selects the transposition for the layer. Transposition can be adjusted up or down two octaves in half-step intervals. Use Transpose to shift the layer into a more usable range if desired. If transpositions more than two octaves are required, modify the program itself on the Editor global page.

Edit

This parameter automatically opens the selected program in the Editor and switches the MIDI channel value on the Editor global page to match the channel specified by the MIDI Processor setup layer. The Edit button makes it easy to modify sounds while programming setups.
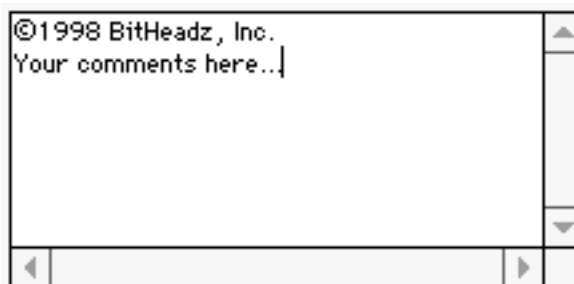
Figure 6.5.2. The Comments window

IMPORTANT! If Editor 1-16 is selected in the setup layer program and you edit, save, and close that program in the Editor, to hear those changes you must reselect the program in the setup layer to reload the program from disk.

Comments Window

A text box is provided as a place to type your notes about the setup document. Up to 255 characters can be entered or pasted into the comment field. Comments are saved in the setup file. The Cut, Copy, and Paste commands can be used.

6.6 Arpeggiator Parameters

Figure 6.6.1 The Arpeggiator Type buttons

An arpeggiator plays the notes of a chord monophonically (one at a time) in sequence.

Arpeggiation Type Radio Buttons

Off

When the Off option is selected from the arpeggiator Type radio buttons, no arpeggiation will occur.

Played

When the Played option is selected, incoming polyphonic MIDI data will arpeggiated. If the Range menu is active when Played is selected.
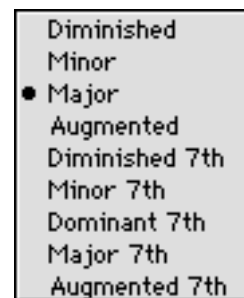
Figure 6.6.2. The Chord menu

Chord

When the Chord option is selected, a single incoming MIDI note will be played as the root of a chord selected from the chord pull-down menu (Figure 6.6.2). If more than one note is played when the chord function is on, the Base menu determines which note of the incoming chord will be used as the root of the chord function.

List

The arpeggiator list (Figure 6.6.3) is essentially a "riff recorder." When List is selected, notes in the arpeggiator note list will be played. Incoming MIDI data will determine the transposition of the notes in the list, relative to the Root menu (Figure 6.6.3) selection. Each MIDI note in the list is followed by a number in parenthesis which indicates the MIDI velocity value of the note. Notes are added to the list with the Add button (Figure 6.4.3) and Record button (Figure 6.4.4).

NOTE: Notes in the list can be reordered by dragging them with the mouse.
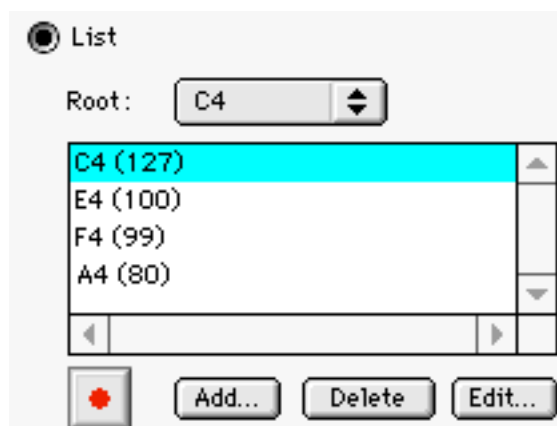
Figure 6.6.3. The Arpeggiator List. A velocity value of 0 creates a rest.

Root menu

The Root menu (Figure 6.6.3) is a transpose feature for the Chord menu and arpeggiator List. It is active whenever Chord or List is selected as the arpeggiator Type.

Because the Root menu and incoming MIDI notes both transpose the arpeggiator list, "double transpositions" will occur when the Note menu value is not C4 AND incoming MIDI is not C4.

List Record button

The Record button (Figure 6.6.4) allows step-entry of notes into the arpeggiator list. Held MIDI notes are added to the arpeggiator list when Record is pressed. To add notes to the list using this feature, play and hold a note (or notes) with a MIDI controller, then press the Record button and release the note(s). If new notes are played and Record is pressed again, the new notes will be added to the existing notes.

Figure 6.6.4. The List Record button.

Add... button

The Add... button opens the Note window (see figure 6.6.5), where new notes are added to the arpeggiator list one at a time. In the Note window, select a note from the pull-down menu, then select a velocity with the Velocity slider. After pressing OK the added note and its velocity will be displayed in the arpeggiator list.

Delete button

The Delete button removes existing notes from the arpeggiator list. The note that is selected (highlighted) is the note that will be deleted.

Figure 6.6.5. The Note window.

Edit...

The Edit... button opens the Note window (Figure 6.6.5), allowing the modification of pitch and velocity of existing notes in the arpeggiator list. The note that is selected (highlighted) is the note that will be edited. Alternately, you can double-click a note in the list to open the Note window.

Other Arpeggiator Controls

Notes menu

The Notes menu (Figure 6.6.6) determines which sound (First/Lower , Second/Upper) will be arpeggiated. The function of each menu item is described on the next page.
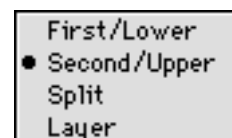
Figure 6.6.6. The Notes menu.

First/Upper

Arpeggiation will occur on the First/Lower layer only.

Second/Upper

Arpeggiation will occur on the Second/Upper layer only.

Split

Arpeggiation will occur on both layers as a split, overriding the setup mode setting. The sound switches back and forth between layers if the arpeggiation crosses the split note.

Layer

Arpeggiation will occur on both layers simultaneously, overriding the setup mode setting.

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Direction menu

This option selects the order in which the notes of a chord are played.

Figure 6.6.7. The Direction menu.

Trigger menu

Triggering the arpeggiator begins playing the arpeggiator notes. The Trigger menu determines by what method the arpeggiator notes will be activated. The function of each menu item is described below.
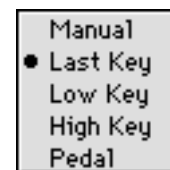
Figure 6.6.8. The Trigger menu.

Manual

The arpeggiator will be triggered only when the Trigger button is clicked.

Last Key

The arpeggiator retriggers each time a note is played.

Low Key

The arpeggiator retriggers each time the lowest note of a chord is played. If a low note is held, upper notes can be added to the chord without retriggering.

High Key

The arpeggiator retriggers each time the highest note of a chord is played. If a high note is held, lower notes can be added to the chord without retriggering.

Pedal

The arpeggiator retriggers each time the MIDI pedal defined in the MIDI Processor Preferences window (see Figure 6.3.3) is pressed.

Base menu

The Base menu (figure 6.6.9) selects which note of an incoming chord will be used as the root of the arpeggiation when the Chord or List feature is active. Because incoming notes transpose the Chord and List features, which note of an incoming chord to be used as the root note can be specified. The function of each menu item is described on the next page.

Figure 6.6.9. The Base menu.

Last

The last played note of the chord will determine the root.

Lowest

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The lowest note of the chord will determine the root.

Highest

The highest note of the chord will determine the root.

Figure 6.6.10. The Range menu

Range menu

This option allows the arpeggiator notes to extend beyond the played notes. If 1 octave is selected, only the played notes (or notes in the List and Chord functions) will sound. If more than 1 octave is selected, first the played notes will sound, then the played notes will sound again, transposed up by the number of octaves selected.

Division menu

The Division menu determines each arpeggiator note's rhythmic value as a division of the Tempo.

Figure 6.6.11. The Division menu.

Trigger button

The Trigger button begins playback of notes in the arpeggiation list, allowing arpeggiations to begin without incoming MIDI notes. If the Trigger menu is set to Manual, only the trigger button will activate the arpeggiator.

Figure 6.6.12. The Trigger button.

Stop button

Pressing this button stops the arpeggiator. The button is grayed out if the arpeggiator is not active.
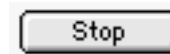
Figure 6.6.13. The Stop button.

MIDI Sync checkbox

The arpeggiator will be synchronized to the tempo of incoming MIDI beat clock events when this box is checked. Use the Division menu to subdivide the incoming MIDI clock tempo.

Tempo slider

Determines the tempo of the arpeggiation in beats per minute. Use the Division menu to subdivide the tempo.

The tempo cannot be manually adjusted when MIDI Sync is active. If the MIDI Sync box is checked, the tempo slider is greyed out. However, if MIDI Sync is checked and no MIDI clock is being received by the synth engine, the tempo is determined by the tempo slider value.
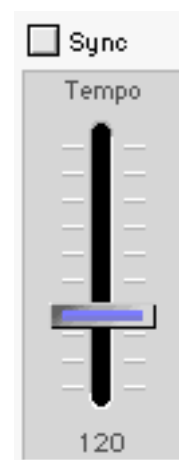
Figure 6.6.14. The Tempo slider and MIDI Sync checkbox.

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Chapter 7. Editor Reference

Chapter 7 Contents

Figure 7.0. The Editor Main Page. There are 4 pages of voicing parameters.
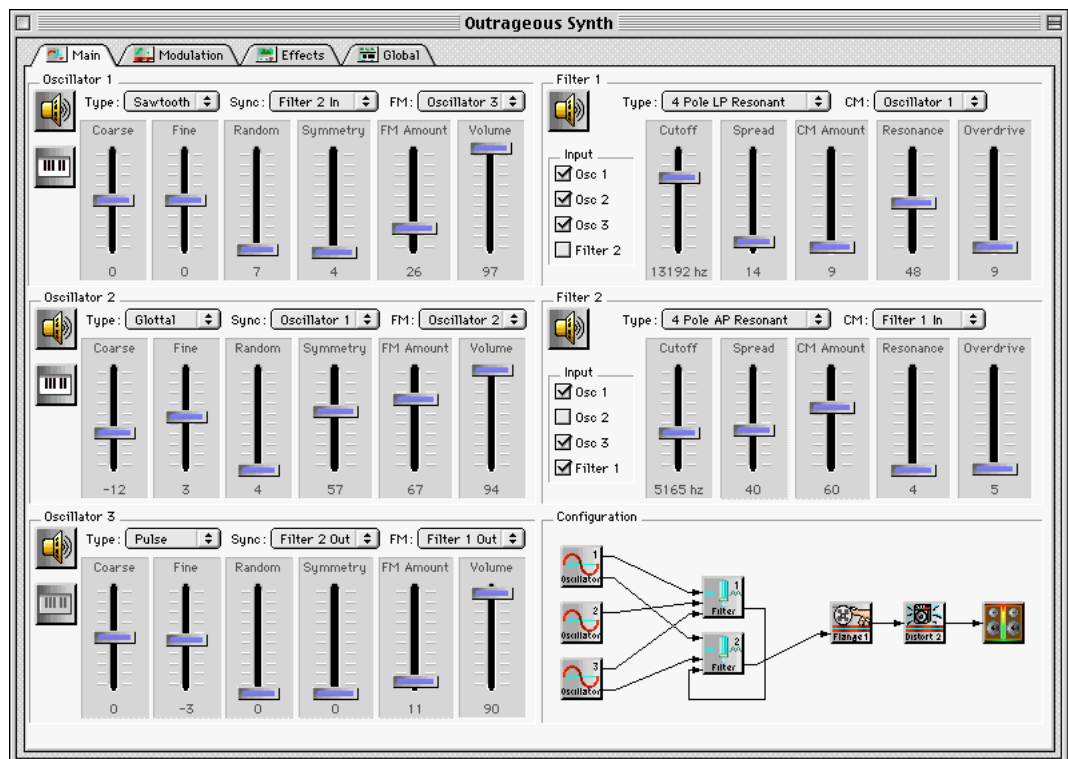
7.1 Editor Overview

The Retro AS-1 Editor is the main sound design application. The Editor allows you to create, edit, and save program files. All the voicing parameters for a complete synthesizer "patch" are contained within a program file. Multiple program windows can be open simultaneously; the frontmost window (the one with grey lines in the title bar) is always the active program. Voicing parameters are grouped into four pages: Main (oscillators and filters), Modulation, Effects, and Global. Each page contains dozens of related settings.

To edit programs in real-time using when using a MIDI controller or MIDI application, the MIDI channel parameter on the Global page must match the MIDI transmission channel of the incoming note data. This is the only parameter in the Editor that is not saved within a program file. Programs being modified in the Editor can be heard within the MIDI Processor, Keyboard, and Mixer applications only if Editor is selected from those application's Bank and Program menus.

7.1.2 Key Editor Concepts

1. The primary function of the Editor is to create and modify synthesizer program voicing parameters. It does not need to be open to use the synthesizer for playing existing programs.

2. The MIDI channel of the program being edited is selected on the Global page. This is the only parameter that is not saved with the program file.

3. To edit a program that is selected by the MIDI Processor, Mixer, or Keyboard, first load the program into the Editor, then select 'Editor' from the Bank/Program menus in those applications.

4. To hear the Global Effects settings that are in a program while it is loaded into the Editor, select 'Use From Editor' in the Retro AS-1 control panel.

5. Files can be saved anywhere, but to be accessible from the MIDI Processor, Keyboard, Mixer, or MIDI Bank/Program change commands, they must reside in the Retro AS-1 Programs folder.

M (Mac OS only) An alias to this folder with the exact name "Retro AS-1 Programs" must reside at root level of the System Folder.

6. Notes can be triggered with the computer keyboard space bar when the Editor is active. This preference can be disabled if desired.

7.1.3 Parameter Editing Conventions

All of the Retro AS-1 components use a consistent interface design for ease of use. The parameters of these components use a combination of menu items, on/off switches, pull-down menus, and sliders to manipulate the available settings.

Listed below are instructions for adjusting the various parameter types:

• Parameter switches such as oscillator on/off buttons and filter input checkboxes are changed by clicking on them once with the mouse.

• Pull-down menu parameters such as waveform types are selected by click-hold-dragging the menu item, then releasing the mouse on the desired selection.

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• Parameter slider values can be manipulated in four different ways (see Figure 7.1.1):

1. Click, hold, and drag the horizontal slider bar.

2. Increment or decrement by a value of one by clicking at the top or bottom of the slider.

3. Increment or decrement by a value of ten percent of the total range by clicking on the vertical slider line, between the horizontal slider bar and the end of the vertical slider range.

4. Option-click (Mac OS) or double-click (Windows 95) the slider value to call up a text entry box. Input a number directly using the number keys on your computer keyboard, then press Return or Enter.

Click the slider name to increment by one.

Click above slider bar to increment by ten percent.

Coarse
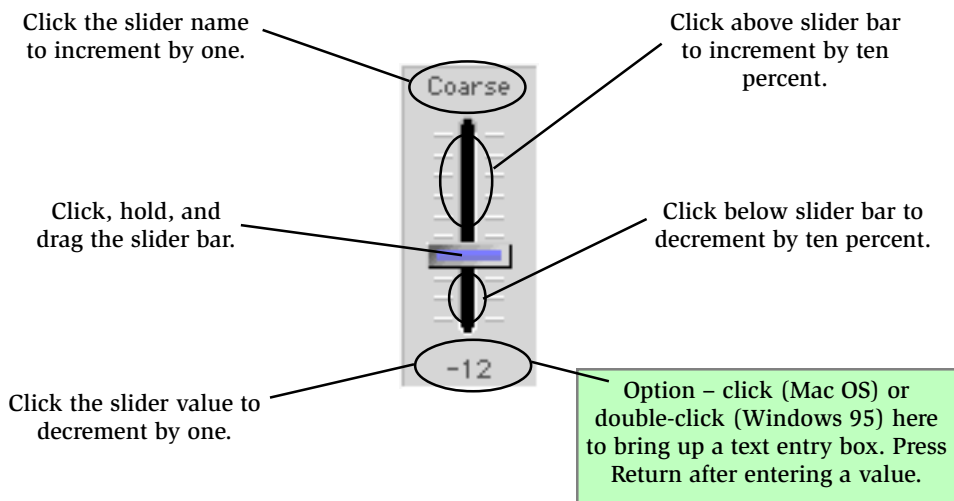
Figure 7.1.1. Parameter Slider "hot spots" for editing values.

Click, hold, and drag the slider bar.

Click below slider bar to decrement by ten percent.

−12

Click the slider value to decrement by one.

Option – click (Mac OS) or double-click (Windows 95) here to bring up a text entry box. Press Return after entering a value.

7.2. Editor Menu Items

This section explains the commands found in each of the five menus.

File Menu

The File menu contains commands for controlling management tasks such as loading and saving files.

File

New	⌘N
Open...	⌘O
Close	⌘W
Save	⌘S
Save As...	
Save As 'New' Template	
Revert	
Quit	⌘Q

Figure 7.2.1. The Editor File menu.

New

The New command creates a new, untitled program file with the default program settings. Use the New command when you want to create a new default synthesizer program from scratch.

> Note: You can create your own default settings using the Save As 'New' Template command in the File menu.

Open...

The Open command loads a previously saved program file from disk, using the standard Open File dialog box. You can also open a saved file by double-clicking its icon.

Close

The Close command closes the active program file. Alternately, you can click the close box of the window title bar. If the file has been modified since it was opened, you will be asked if you want to save the changes. If you don't want to overwrite the existing disk file, choose the Save As... command instead.

Save

The Save command writes the active program file to disk, overwriting the previously saved version of the file. If you don't want to overwrite the existing disk file, choose the Save As... command instead.

Save As...

The Save As command writes a new file to disk, leaving the original file unchanged. You will have the choice to rename the file. The active program window title will change to the new name after saving.

Save As 'New' Template

The Save As 'New' Template command allows you to create your own default settings for new Editor programs. The settings in the active window when this command is executed will be the same settings created when "New..." is selected from the File menu.

To restore the factory template defaults, delete the Retro AS-1 Editor preferences file inside the Preferences folder in the active System Folder (Mac OS), or at the root level of the Retro AS-1 Folder (Windows 95).

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Revert

The Revert command reloads the last saved version of the file from disk. All changes made to the file since the last Save command are permanently lost. Revert is handy when you don't like the most recent series of modifications to your program since the last Save command.

Quit

The Quit command closes the Retro AS-1 Editor application. If any program files that are open have been modified since saving, you will be asked if you want to save those modifications.

If no other Retro AS-1 applications (MIDI Processor, Keyboard, Mixer, MIDI driver) are open, quitting the Editor will also quit the synth engine.

Edit Menu

The Edit menu contains several timesaving utility commands for modifying programs. General program preferences are found here also.

Undo

The Undo command will revert the program back to the state it was in just before performing an edit function. Use Undo when you don't like the results of a parameter change.

Cut

The Cut command deletes selected data and stores it in the Clipboard (a temporary storage buffer). The stored data can then be placed elsewhere using the Paste command. Cut differs from the Copy command in that the selected data is deleted.

Figure 7.2.2. The Edit menu

Copy

The Copy command copies selected data and stores it in the Clipboard. The copied data can then be placed elsewhere using the Paste command.

Paste

The Paste command places the data from the Clipboard into the selected data field.

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NOTE: The Cut, Copy, and Paste commands work only for Modulators on the Modulation page (figure 7.4.5), and Comments on the Global page (figure 7.6.1).

Clear

The Clear command deletes selected data but does not place that data in the Clipboard.

Select All

The Select All command selects all of the text in the Comments window (Figure 7.6.1), in preparation for the Copy or Cut commands.

Randomize

The Randomize command randomly assigns a new value to every slider parameter in the program. Randomize does not change the status of menus or on/off buttons. Use Randomize when you want a different sound NOW!

Preferences...

The Preferences command opens the Preferences window, which contains several options for specifying general program behavior. Preference settings are stored as a preference and remain the same until they are modified.

'New' On Startup

If this option is checked, a new, untitled program file with the default template settings is created when the Editor is launched.

MIDI Channel

The MIDI channel that the active Editor program responds to is determined by the MIDI Channel parameter on the Global page. This preference parameter determines which MIDI channel will be the default value when selecting a 'New' program from the File menu.

Envelope Editing radio buttons

This option allows you to reverse how Modulator envelope parameter values are displayed. If the Rate/Time selection is changed, the envelope modulator parameter values are inverted.
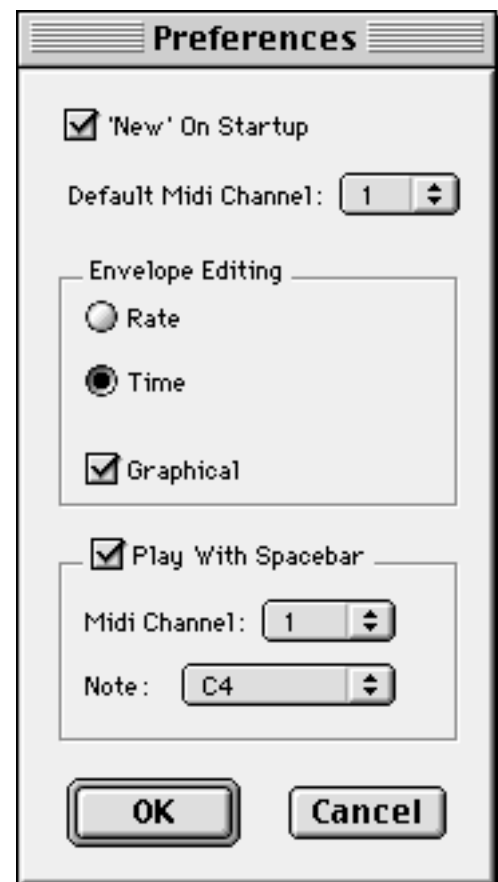
Figure 7.2.3. The Editor Preferences window.

Rate

When Rate is selected, a higher envelope parameter value means a greater rate. A value of 100 will mean "fast rate of time" and a value of 0 will mean "slow rate of time."

Time

When Time is selected, a higher envelope parameter value means a greater time. A value of 0 will mean "fast length of time" and 100 will mean "slow length of time."

Graphical checkbox

Modulator envelopes can be displayed and modified using the graphical envelope feature. When this box is checked, envelopes will be displayed graphically instead of as sliders. The Rate/Time preference applies to the graphical envelopes.

Play With Spacebar checkbox

Play With Spacebar allows you to hear the current Editor program without having to use a MIDI controller or the Retro AS-1 Keyboard application. When Play With Spacebar is active (when the box is checked), pressing the space bar on the computer keyboard will trigger the note selected from the Note pull-down menu. The MIDI channel of the note transmitted to the engine by the spacebar is specified by the MIDI Channel menu.

Page Menu

The Page menu allows navigation through the four pages of parameters as an alternative to clicking on the window page tabs. (Figure 7.2.5)

Main

Select Main from the Page menu to switch to the main (oscillators and filters) parameter page.

Modulation

Select Modulation from the Page menu to switch to the modulation parameter page.

Figure 7.2.4. The Page menu.

Effects

Select Effects from the Page menu to switch to the effects parameter page.
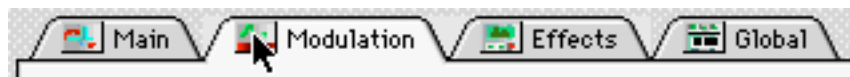
Figure 7.2.5. The Page tabs in a program window perform the same function as the Page menu.

Global

Select Global from the Page menu to switch to the global parameter page.

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Synthesizer Menu

The Synthesizer menu contains several utility commands, offering access to other key components of the Retro AS-1 package

All Notes Off

Selecting All Notes Off from the Synthesizer menu stops all Retro AS-1 sounds from playing. It is a "MIDI panic button" which is useful for silencing notes that are stuck on as a result of MIDI controller faults or other problems.

Reset

Selecting Reset from the Synthesizer menu resets the synth engine and forces all MIDI continuous controller values to be reset to zero.

Figure 7.2.6. The Editor Synthesizer menu.

Start Record To Disk...

The Record To Disk function writes the stereo output of the synthesizer engine to your hard drive as an audio file. Whatever the synthesizer is playing (notes, chords, riffs, arpeggiations, etc, on all MIDI channels, including effects) is written directly to disk. Complete instructions for Record To Disk are in Appendix G.

Stop Record To Disk

The Stop Record To Disk command ends the Record To Disk process. This command will have no result unless the Record To Disk function is active.

Control Panel...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Control Panel, where system-level configuration settings are specified. For specific information about the control panel, refer to Chapter 5.

Status... (Mac OS only)

Selecting this item from the Synthesizer menu opens the Retro AS-1 Status window, for displaying polyphony and CPU usage. For specific information about the Status window, refer to Chapter 5.

Keyboard...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Keyboard, for triggering notes without a MIDI controller. For specific information about the Keyboard, refer to Chapter 8.

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MIDI Processor...

Selecting this item from the Synthesizer menu opens the Retro AS-1 MIDI Processor application, for programming splits, layers, and arpeggiations. For specific information about the MIDI Processor, refer to Chapter 6.

Mixer...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Mixer application, for setting up multi-timbral operations. For specific information about the Mixer application, refer to Chapter 9.

Windows Menu

The Windows menu allows you to switch between active Editor programs. The number of items in the Windows menu matches the number of open document files. Selecting a document from the menu brings that document to the front and makes it active.

M (Mac OS only) The first 10 open programs can be selected by pressing command 1-0. The number of simultaneously open program windows is limited only by the application memory allocation in the Finder.

Figure 7.2.7a. The Editor Windows menu allows you to switch between multiple programs that are open in the Editor.

7.3 Main Page

The Main page (see figure 7.0) contains the oscillator and filter voicing parameters for the synthesizer. Modulation parameters for the oscillators and filters are located on the Modulation page.

Oscillator Overview

The oscillator is the primary building block in synthesis, the source upon which all other synthesis functions act upon.

There are three oscillators available for each program. All oscillators can be used simultaneously for a three-layer sound. Oscillators do not have to be routed through a filter in order to be audible. An oscillator can be used as a source for Synchronization (Sync), Frequency Modulation emulation (FM), or Cutoff Modulation (CM) without being routed through a filter.
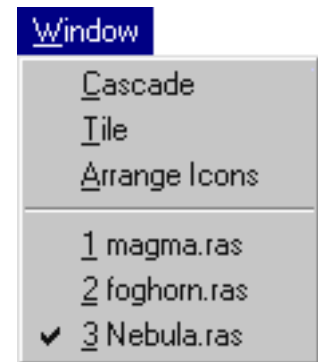
Figure 7.2.7b. The Editor Windows menu (Windows 95).

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There are nine waveform types available for each oscillator. Each waveform has its own sound due to its unique harmonic overtone structure. By using the Sync, Symmetry, and FM parameters, an (almost) unlimited number of waveform harmonic variations can be created. All available oscillator sliders are available as a modulation destination for dynamic pitch and timbre changes over time.

In addition to the three audio-frequency oscillators, multiple low-frequency oscillators (LFOs) can be used as modulation sources. See the Modulation Page (section 7.4) for more information on LFOs.

For more information about synthesizer basics, see Appendix E.

Oscillator Parameters
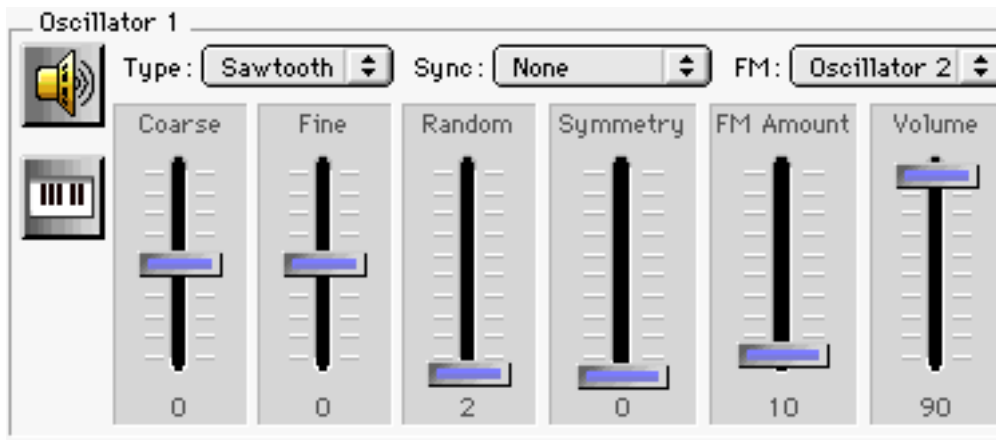
Figure 7.3.1. The oscillator parameters.

Because oscillators 1, 2, and 3 are identical, their parameters are detailed in this section only once. Refer to Figure 7.3.1 for this section.

Oscillator On/Off button

The oscillator On/Off button is represented by a speaker icon. When the oscillator is off, the button is blue. When it is on, the button changes to yellow.

Click the button once to toggle the on/off state of the oscillator. The Configuration window will update to indicate the change.

On

Off

Figure 7.3.2. The oscillator On/Off button

IMPORTANT! Turning an oscillator on requires more processing power from the CPU. Leave oscillators off unless you are actually using them in a sound.

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Oscillator Keyboard Track button

When Keyboard Track is on, the oscillator pitch will "track" (play the pitch of) the incoming MIDI note number. When Keyboard Track is off, the oscillator will produce the same pitch regardless of the MIDI note played. The base note of C4 (middle C) when Keyboard Track is off can be modified with the Coarse and Fine tuning parameters.

On

Off

Figure 7.3.2b .The Keyboard Track button. Keyboard Track is the oscillator "non-transpose" option.

Oscillator Menus

Each oscillator has three pull-down menus. Click, hold, drag, and release on the desired menu item to change the selection.

Oscillator Type Menu

The Type menu selects the waveform shape for the oscillator. Waveform variations can be created using the Symmetry parameter.
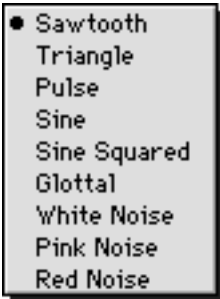
Figure 7.3.3 .The Oscillator Type menu
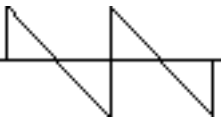
Sawtooth
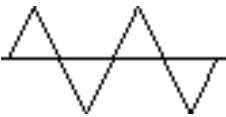
Triangle
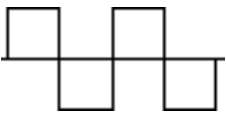
Pulse
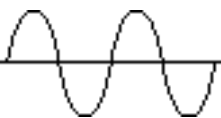
Sine
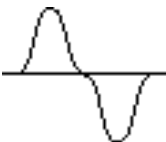
Sine Squared

Glottal

Noise

White Noise	Full bandwidth noise (all frequencies equal)
Pink Noise	Upper frequencies attenuated by -3db per octave
Red Noise	Upper frequencies attenuated by -6db per octave

Figure 7.3.4. The waveform types

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Sync Menu

Synchronization is a waveform reset function. It forces an oscillator to trigger again at the beginning of its cycle each time the modulator (the Sync menu selection, Figure 7.3.5) completes its cycle.

The Sync menu selects which oscillator or filter will be used as a synchronization source. If a source oscillator is selected from the Sync menu, the source oscillator must be enabled; however it does not have to be routed through a filter. Each parameter of the Sync source will have an effect on the carrier waveform.
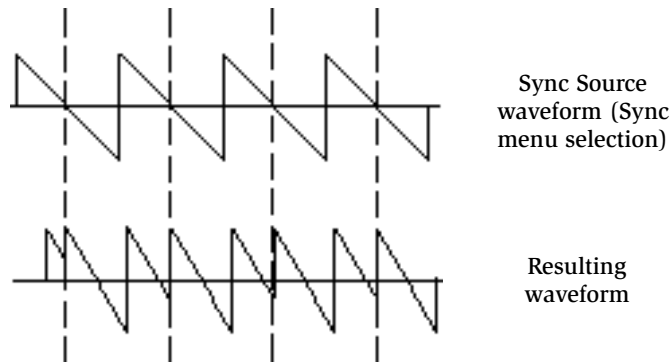
Figure 7.3.5. The Sync and FM menus. The source selections are identical for both menus.

Sync Source waveform (Sync menu selection)

Resulting waveform

Figure 7.3.6. Waveform Sync illustration. When the sync source waveform crosses zero, the destination waveform cycle is forced to begin its cycle from zero.

FM Menu

Frequency Modulation (FM) emulation is used to modulate the frequency of one oscillator (the carrier) with another oscillator or filter (the modulator). Retro AS-1 takes FM emulation to the next level by using FM in conjunction with subtractive synthesis (filtering).

The FM menu (Figure 7.3.5) selects the source modulator. If a source oscillator is selected from the FM menu, the source oscillator must be enabled. However, it does not have to be routed through a filter. Each parameter of the FM source will have an effect on the waveform.

When a source is selected in the FM menu, the FM Amount parameter must be increased above zero to have an effect.

IMPORTANT! Turning FM on requires more processing power from the CPU. Leave FM off unless you are actually using it in a sound.

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Oscillator Sliders

Refer to Figure 7.3.1. for the oscillator slider descriptions.

Coarse

The Coarse parameter determines the frequency of the oscillator in musical semitones (1 semitone = 1 half step = 100 cents). When the Coarse value is zero, playing MIDI note number 60 will sound Middle C (C4). If the value is 12, the pitch of the oscillator will increase by one octave; –24 will decrease the pitch by two octaves; 7 will increase the pitch by a perfect fifth, and so forth. There is an eight-octave (+ / –four octaves) range.

> NOTE: To change the global tuning for the entire program (not just one oscillator), use the Global Transpose parameter, located on the Global Page.

Fine

The Fine parameter tunes the oscillator frequency between musical semitones. The range is 100 cents (+ /– 50 cents), or one quarter-step sharp or flat. If you need to tune beyond this range, use the Coarse parameter. Use the Fine parameter to "detune" oscillators for a chorus type of effect.

Random

Random is designed to add "analog instability" to the oscillator. When the value is set above zero, the oscillator will play out of tune by a random amount each time a note is triggered.

The Random parameter determines the maximum amount of pitch deviation. With a Random amount of 100, the maximum pitch deviation is one semitone.

Symmetry

This parameter alters the shape of the waveform selected in the Type menu. The Symmetry parameter allows continuous control of the waveform shape, yet another new tool for creative sound design. For example, Symmetry changes a Square waveform to a Pulse waveform and all points between. A Sawtooth wave with a symmetry value of 100 becomes a triangle wave.

The Symmetry slider effects only the Sawtooth, Pulse, and Glottal waveforms. It is unavailable when other waveforms are selected. See Figure 7.3.7 below for an illustration of Symmetry control.

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Sawtooth wave with symmetry valve of 0

Sawtooth wave with symmetry valve of 100
(becomes a triangle wave)

Square wave with symmetry valve of 0

Square wave with symmetry valve of 100
(becomes a pulse wave)

Glottal wave with symmetry valve of 0

Glottal wave with symmetry valve of 100
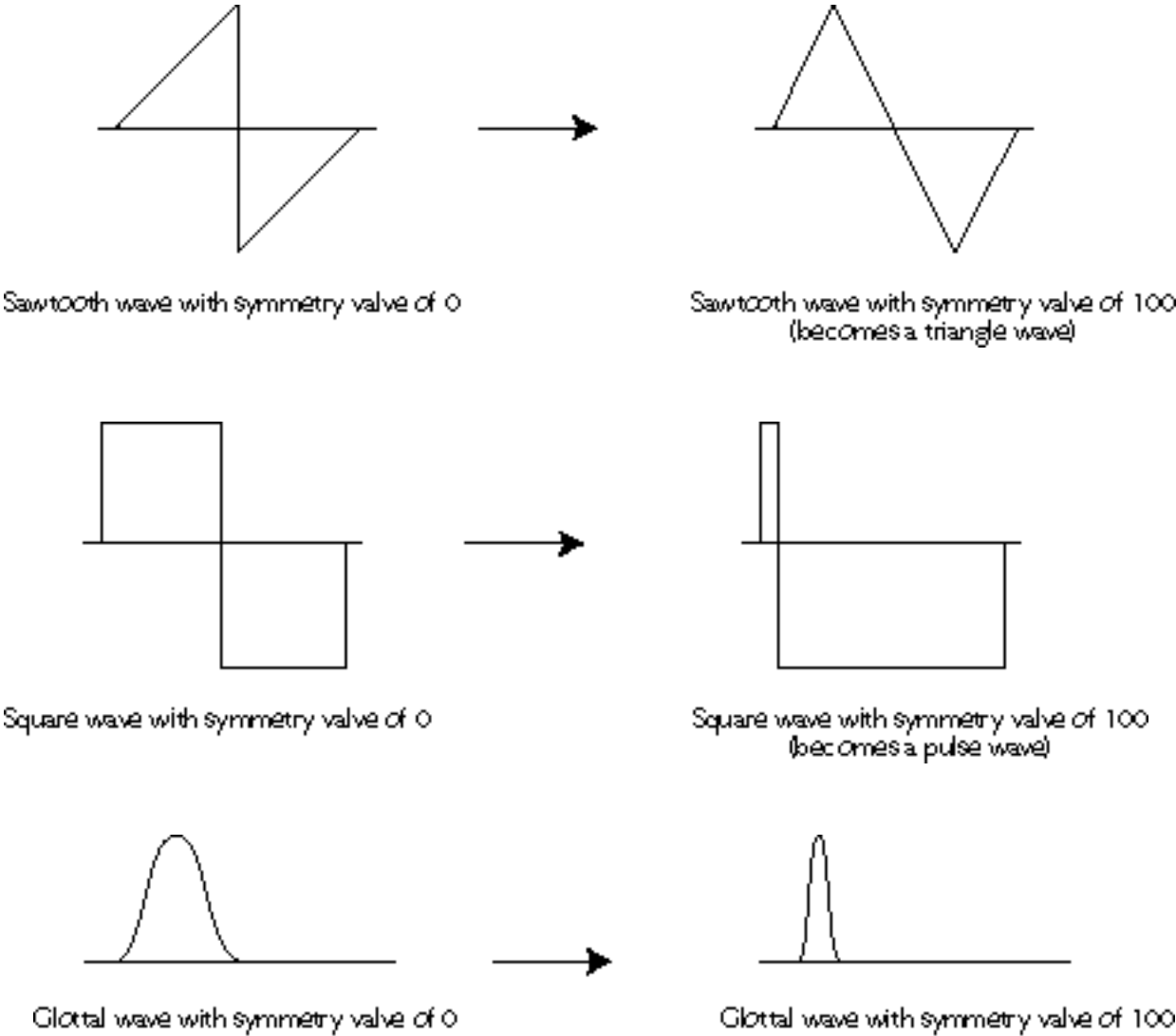
Figure 7.3.7. How Symmetry
affects waveform shape

FM Amount

FM Amount determines the amount of frequency modulation emulation to be applied to the oscillator. This parameter is unavailable when the FM menu (Figure 7.3.5) is set to None.

Oscillator Volume

The Volume level sets the output level of the oscillator before it is routed to the filter. Use the Volume parameter to set the relative volume levels when multiple oscillators are active.

Enabled oscillator volumes are added at the filter input (Figure 7.3.11). If multiple oscillators are enabled and their volumes are set high, clipping distortion may occur. We allow this for your creative freedom. If distortion is not wanted, reduce the oscillator volume when multiple oscillators are used.

> NOTE: To change the Global volume for the entire program (not just one oscillator), use the Global volume parameter, located on the Global page.

Filters Overview

Filters are another important building block in the synthesis process. Filters work by removing harmonic content from a waveform, resulting in a different sound. This process is known as subtractive synthesis.

Retro AS-1 has two programmable filters available per program. One, two, or all three oscillators can be routed through one or both filters. 13 filter types are available for each filter. Each filter can accept input from the other filter, allowing for serial or parallel filtering effects. This can effectively double the available filter slope, for up to 48 decibels (db) per octave of filter roll-off.

Filters can be overdriven for distortion, and be made to self-oscillate with resonance. And all filter sliders are available as a modulation destination for dynamic timbre changes over time. You will find many new ways to create rich new sounds with the Retro AS-1 filters.

> For more information about synthesizer basics, see Appendix E.
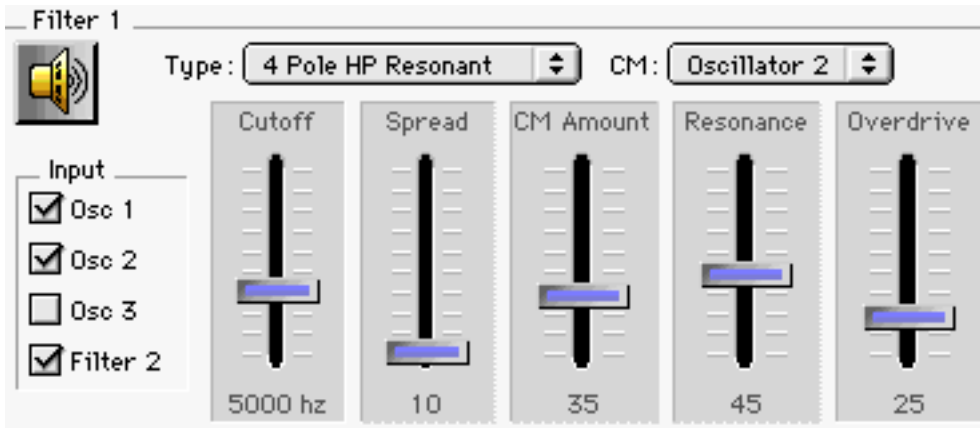
Figure 7.3.8. The Filter parameters.

Filter Parameters

Because filters 1 and 2 are identical, their parameters are detailed in this section only once. Refer to Figure 7.3.8 for parameter descriptions.

Filter On/Off button

The Filter On/Off button is represented by a speaker icon. When the filter is off, the button is blue. When it is on, the button changes to yellow.

Click the button once to toggle the on/off state of the filter. The Configuration window will update to indicate the change.

On

Off

Figure 7.3.8. The Filter On/Off button.

> IMPORTANT! Turning a filter on requires more processing power from the CPU. Leave filters off unless you are actually using them in a sound.

Filter Type menu

Thirteen filter types are available. Each processes the waveform(s) differently and will result in a different sound. Each filter type is described below.

1 Pole Low Pass

This is the most basic filter type, and is the least CPU-intensive. It attenuates frequencies above the cutoff frequency, with a filter slope of 6db per octave. The Spread and Resonance parameters (see figure 7.3.7) are unavailable when this filter type is selected.
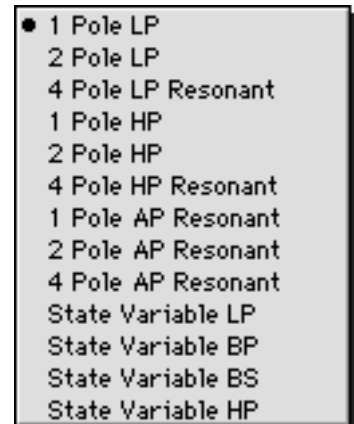
Figure 7.3.9. The Filter Type menu.

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2 Pole Low Pass

This filter type attenuates frequencies above the cutoff frequency, with a filter slope of 12db per octave. The Resonance parameter is unavailable when this filter type is selected. If you want resonance in a 2-pole filter, use the State Variable Low Pass filter type.

4 Pole Low Pass Resonant

This filter type attenuates high frequencies above the cutoff frequency with a filter slope of 24db per octave, with resonance (filter feedback).

1 Pole High Pass

This is the most basic filter type, and is the least CPU-intensive. It attenuates frequencies below the cutoff frequency, with a filter slope of 6db per octave. The Spread and Resonance parameters (see figure 7.3.7) are unavailable when this filter type is selected.

2 Pole High Pass

This filter type attenuates frequencies below the cutoff frequency, with a filter slope of 12db per octave. The Resonance parameter is unavailable when this filter type is selected. If you want resonance in a 2-pole filter, use the State Variable High Pass filter type.

4 Pole High Pass Resonant

This filter type attenuates high frequencies below the cutoff frequency with a filter slope of 24db per octave, with resonance (filter feedback).

The All Pass Filters

The All Pass filter types pass all frequencies equally with no attenuation. With no resonance applied in an all pass filter, the sound is unaffected. You may ask then, what's the point? The point is, the resonance parameter creates a frequency boost at the cutoff frequency. The bandwidth of this emphasis peak is determined by the number of poles in the filter. By adding resonance to an all pass filter, interesting sonic variations are created.

1 Pole All Pass Resonant

The resonance parameter creates an emphasis boost at the cutoff frequency with a 6db per octave bandwidth.

2 Pole All Pass Resonant

The resonance parameter creates an emphasis boost at the cutoff frequency with a 12db per octave bandwidth.

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4 Pole All Pass Resonant

The resonance parameter creates an emphasis boost at the cutoff frequency with a 24db per octave bandwidth.

State Variable LP (Low Pass)

This filter type attenuates frequencies above the cutoff frequency, with a filter slope of 12db per octave. It is the similar to the 2-Pole Low Pass type, and includes the Resonance parameter. The Spread parameter is unavailable when this filter type is selected. If you want a 2-pole filter but don't need resonance, you can use the 2-Pole Low Pass type to save on CPU processing.

State Variable BP (Band Pass)

This is a bandpass filter with a slope of 12db per octave. Frequencies at the cutoff frequency are allowed to pass. Frequencies above and below the cutoff frequency are attenuated. The Spread parameter is unavailable when this filter type is selected.

The filter bandwidth is varied with the Resonance parameter. A lower value of Resonance has a wider bandwidth; a higher value has a narrower bandwidth.

State Variable BS (Band Stop)

This is a notch filter with a slope of 12db per octave. Frequencies at the cutoff frequency are attenuated. Frequencies above and below the cutoff frequency are allowed to pass. The Spread parameter is unavailable when this filter type is selected.

The filter bandwidth is varied with the Resonance parameter. A lower value of Resonance has a wider bandwidth; a higher value has a narrower bandwidth.

State Variable HP (High Pass)

This is a highpass filter with a slope of 12db per octave. Frequencies above the cutoff frequency are allowed to pass. Frequencies below the cutoff frequency are attenuated. The Spread parameter is unavailable when this filter type is selected.

CM (Cutoff Modulation) Menu

This menu selects the source of filter cutoff frequency modulation ("PolyMod"). When a source is selected in the CM menu, the CM Amount parameter must be increased above zero to have an effect.
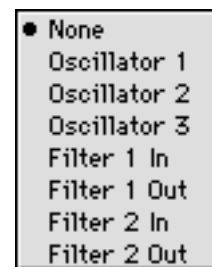
Figure 7.3.10. The CM menu.

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IMPORTANT! Turning CM on requires more processing power from the CPU. Leave CM off unless you are actually using it in a sound.

Input source checkboxes

The filter input source checkboxes are used to select what signal(s) will be routed into the filter for processing. One, two, or all three oscillators can be routed through one or both filters.

Filter 1 output can be routed to Filter 2 input, or vice-versa, for serial filtering effects. The result is like one very steep filter, effectively adding the slope of the two filters together. Or, use 2 different filter types in parallel for great special effects.
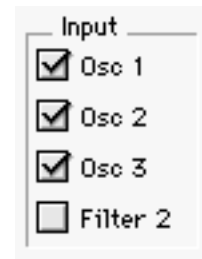
Figure 7.3.11. The Filter input source checkboxes.

Filter Sliders

Refer to figure 7.3.8 for the Filter Slider descriptions.

Cutoff

The Cutoff parameter determines the frequency at which the filtering will begin to take effect. In a lowpass filter, a higher value will result in a brighter sound. The filter cutoff value is expressed in Hertz.

If changing this parameter value has no effect, there is probably a modulation routing with filter cutoff as the destination. Lower the filter cutoff modulation routing amount to make the initial cutoff value more noticeable.

Spread

2 Pole and 4 Pole filters are simply 1 Pole filters cascaded in series, normally with the same cutoff frequency. The Spread parameter varies the cutoff frequencies of the cascaded filters. Increasing the Spread value makes the filtering slope not as steep and not as smooth, effectively introducing more "slop" in the filter for additional sonic possibilities.

The Spread parameter is unavailable when 1 Pole or State Variable filter types are selected.

CM Amount

Determines the amount of filter cutoff frequency modulation ("PolyMod") applied to the filter. This parameter is unavailable if the CM menu is set to None. A cutoff modulation source must be selected with the CM pull-down menu.

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Resonance

Resonance is filter feedback. It causes the filter output signal to be routed back to the filter input. On all pass and state variable band pass/band stop filter types, Resonance controls the filter bandwidth. Increase the Resonance value for more filter feedback.

NOTE: Filter resonance becomes more noticeable as the Cutoff value is lowered.

High Resonance values may cause self-oscillation, which can be useful for chirping sounds or other special effects. When the Resonance and Cutoff values are both very high, the oscillator(s) output level may drop.

Resonance is not available in 1 and 2 pole low pass and high pass filter types.

Overdrive

The Overdrive parameter is a gain stage before the filter input. Increasing the Overdrive value adds clipping distortion to the filter signal, resulting in an overdriven, distorted sound. Overdrive is great for adding "bite" to a sound, which can help cut through a mix, or for creating special effects.

Configuration Display

The Configuration Display is a graphic representation of the current oscillator, filter, and insert effect signal path routings. It is for viewing only; the icons and routings cannot be changed here. Use the oscillator and filter on/off buttons and input checkboxes and insert effects parameters to change the graphic display.
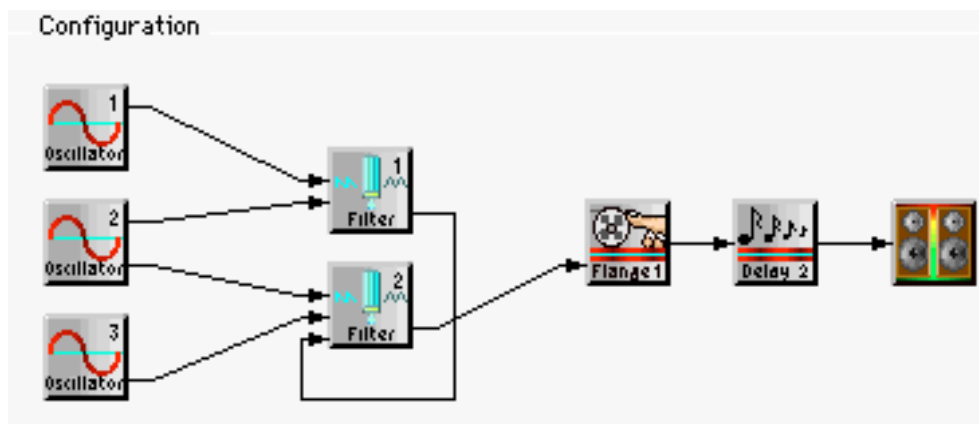
Figure 7.3.12. The Configuration display.

7.4 Modulation Page
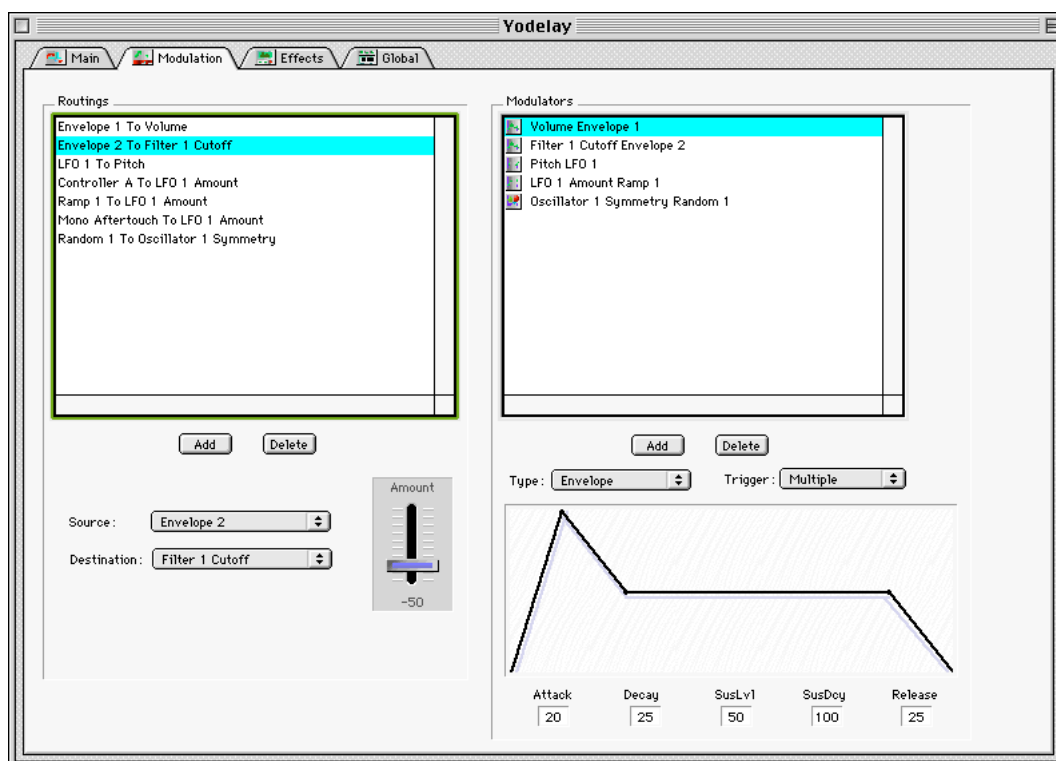
The Modulation page contains all of the parameters for program
modulations. Modulation sources, destinations, and amounts are all
defined on the Modulation page.

There are two main groups of parameters on the modulation page:
Routings and Modulators. The Routings parameters are used to define
modulation destinations and modulation amounts. The Modulators
parameters are used to define modulation sources.

> For more information about synthesizer basics and modulation, see
> Appendix E.

Routings Parameters

Modulation routings (figure 7.4.2) are the software "patchcords" used
to connect a modulation source to a modulation destination. To create
a modulation routing, first the source and destination is defined, then
the modulation amount is set. Modulation sources are defined by the
Modulators parameters (see figure 7.4.5).

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The number of modulation routings you can use in a program is limited only by the CPU processing power that is available.

NOTE: For more information about CPU usage and polyphony, see Chapter 5, Control Panel Reference.

Routings List

The Routings List displays all the modulation routings currently defined in a program, in the order that they were created.

Each line item in the list indicates how the modulation "patch" is defined. For example, "Envelope 1 To Volume" means that Envelope #1 is the modulator, and Volume is the modulation destination.

To select a routing in the list, click the routing name once. When a routing is selected, the Source, Destination, and Amount parameters are visible and can be modified. If the Source or Destination values are changed, the routing name is updated in the list to reflect the new settings.

The order in which the items are displayed has an effect on real-time MIDI control via non-registered parameter numbers. See Appendix F for more information about real-time MIDI control.

Figure 7.4.2. The Routings parameters. The list is in the upper area, and the settings for each routing is below.
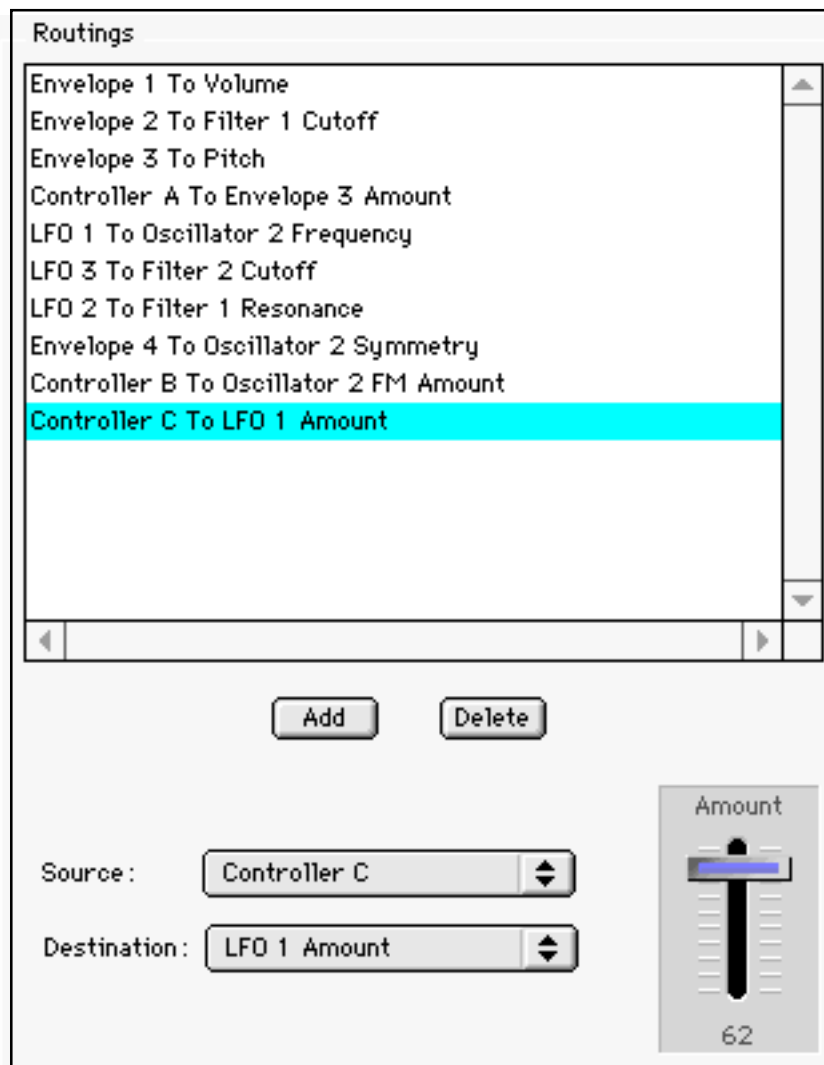
IMPORTANT! Each modulation routing requires additional processing power from the CPU. Delete unused routings from the list to increase available polyphony.

Routing Add Button

The Add button is used to create new modulation routings. To add a routing, click the Add button once. The newly created routing will be automatically selected, and the source, destination, and amount parameters can be modified as desired.

Routing Delete Button

The Delete button is used to remove existing modulation routings. To delete a routing, first select the routing you want to delete from the list by clicking on it once, then click the Delete button to remove the item from the list. You can use the Undo command if you accidentally delete a routing and need to get it back.

Routing Source Menu

The Source pull-down menu is used to select the modulation source for a routing. To edit the source of a routing, first click on the routing in the Routings List to select it, then choose a new source from the pull-down menu.

Items in the Source menu are created in the Modulators section of the Modulation Page (see figure 7.4.5). Once a Modulator is created, that new Modulator then becomes available as an item in the Source menu.

Some MIDI controller sources are "hard wired" and are always available in the Source menu, even if there are no Modulators in the Modulator list. The MIDI controllers that are always available for modulation sources are: Note & Pitchbend, Velocity, Mono Aftertouch, Poly Aftertouch, and Controllers A, B, C, and D.

Routing Destination Menu

The Destination pull-down menu is used to select the modulation destination for a routing. To edit the destination of a routing, first click on the routing in the list to select it, then choose a new destination from the pull-down menu. Items displayed in the destination list are determined by items in the Modulators list (figure 7.4.5).

Routing Amount Slider

The Amount slider (figure 7.4.2) is used to adjust the modulation amount for a routing. To edit the amount of a routing, first click on the routing in the list to select it, then modify the Amount parameter as desired. The modulation Amount value range is +/– 100.

Note
Velocity
Mono Aftertouch
Poly Aftertouch
Controller A
Controller B
Controller C
Controller D
• Envelope 1
Envelope 2
Envelope 3
LFO 1
LFO 2
LFO 3
Random 1
Random 2
Ramp 1
Ramp 2
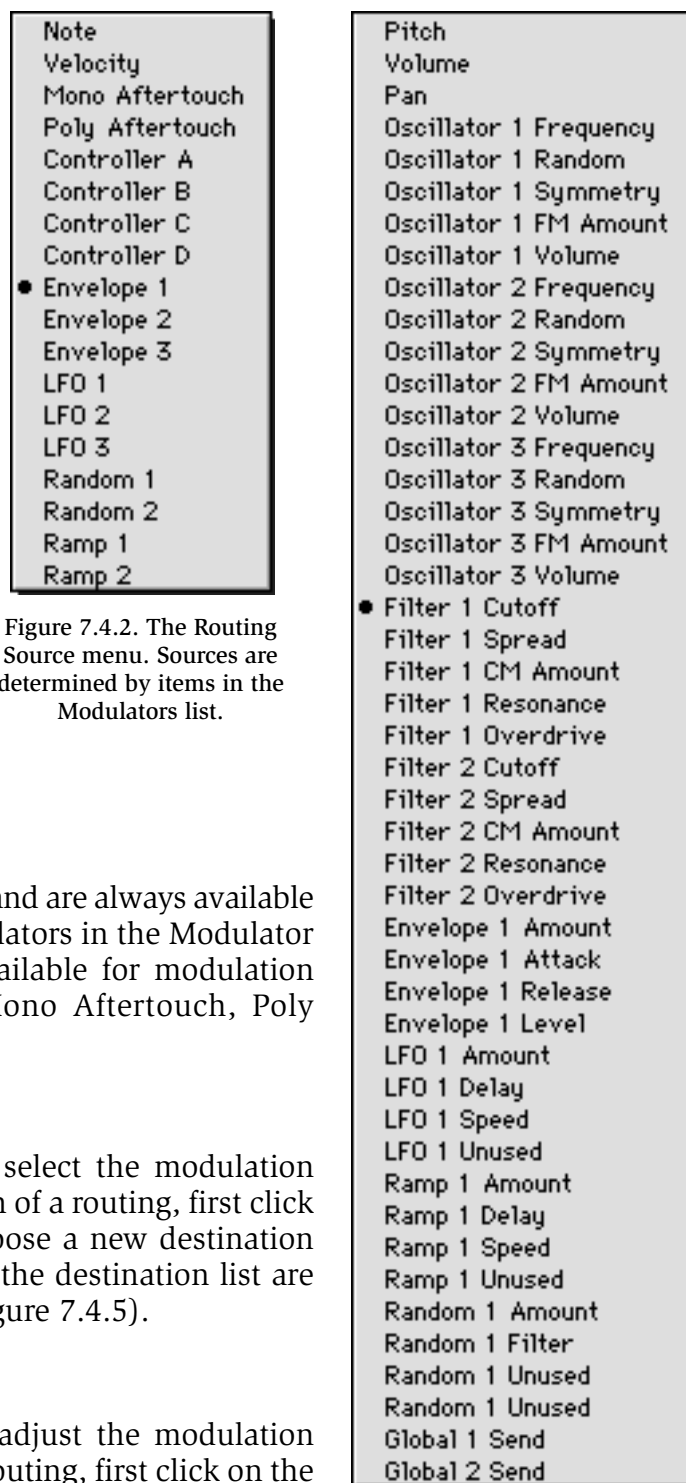
Figure 7.4.2. The Routing Source menu. Sources are determined by items in the Modulators list.

Pitch
Volume
Pan
Oscillator 1 Frequency
Oscillator 1 Random
Oscillator 1 Symmetry
Oscillator 1 FM Amount
Oscillator 1 Volume
Oscillator 2 Frequency
Oscillator 2 Random
Oscillator 2 Symmetry
Oscillator 2 FM Amount
Oscillator 2 Volume
Oscillator 3 Frequency
Oscillator 3 Random
Oscillator 3 Symmetry
Oscillator 3 FM Amount
Oscillator 3 Volume
• Filter 1 Cutoff
Filter 1 Spread
Filter 1 CM Amount
Filter 1 Resonance
Filter 1 Overdrive
Filter 2 Cutoff
Filter 2 Spread
Filter 2 CM Amount
Filter 2 Resonance
Filter 2 Overdrive
Envelope 1 Amount
Envelope 1 Attack
Envelope 1 Release
Envelope 1 Level
LFO 1 Amount
LFO 1 Delay
LFO 1 Speed
LFO 1 Unused
Ramp 1 Amount
Ramp 1 Delay
Ramp 1 Speed
Ramp 1 Unused
Random 1 Amount
Random 1 Filter
Random 1 Unused
Random 1 Unused
Global 1 Send
Global 2 Send

Figure 7.4.3. The Routing Destination menu. Destinations are determined by items in the Modulators list.

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The Amount value is always added to the existing value of the modulation destination. For example, if the initial filter cutoff value on the main page is set to 50 and a modulation routing destination is set to filter cutoff with an amount of 50, the resulting filter cutoff will be 100. If the initial filter cutoff value on the main page is set to 75 and the modulation amount is set to -50, the resulting filter cutoff would be 25.

Therefore, for a modulation routing to have any effect, the initial value of the modulation destination must be less than its maximum possible setting for a positive Amount value (or more than its minimum possible setting for a negative Amount value).

> IMPORTANT! To have any effect, the modulation destination initial value must be decreased for positive modulation amounts, or increased for negative amounts.

The total resulting parameter value (initial setting plus modulation amount) can never exceed the maximum possible initial value for a parameter. For example, if the initial filter cutoff value on the main page is set to 50 and a modulation routing destination is set to filter cutoff with an amount of 75, the resulting filter cutoff would only be 100 (not 125) because 100 is the maximum possible setting for filter cutoff.

> IMPORTANT! You can never exceed the maximum possible setting for the destination value, regardless of the modulation Amount value.

Modulators Parameters

Modulators are used to define sources for modulation routings. Once a modulator is defined, it becomes available in the routings Source menu for assignment to a modulation destination, and the modulator parameters become available in the routings Destination menu.

The Modulators parameters are used to define envelope, low frequency oscillator (LFO), ramp, and random modulation sources and their control values. MIDI controllers (Note & Pitchbend, Velocity, Mono Aftertouch, Poly Aftertouch, Controllers 1 & 2) are "hard wired" modulation sources and are always available in the Routings Source menu without being defined as Modulators.

To create a modulation routing, first the modulator type and its trigger mode are defined, then the associated modulator parameters are adjusted. The number of modulation routings you can use in a program is limited only by the CPU processing power that is available.

> IMPORTANT! Each modulator requires additional processing power from the CPU. Unused modulators should be deleted from the list to increase available polyphony.

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Modulators List

The Modulators List displays all the modulation sources currently defined in a program, in the order that they were created. The order in which the items are displayed has no operational relevance.

Each line item in the list indicates a modulation source. If the modulator is assigned in a routing, its destination is indicated in the list. For example, "Filter 1 Cutoff Envelope 2" means that Envelope #2 is defined as a modulation source, and it has been routed to the filter 1 cutoff parameter in the Routings Editor. If the list says only "Envelope 2" it means the modulator has been created, but it is not yet assigned to a routing.

To select a modulator in the list, click the modulator name once. When a modulator is selected, the Type/Trigger menus and modulator parameters are visible and can be modified. If the Type or Trigger values are changed, the modulator name is updated in the list to reflect the new settings.

Modulator Add Button

The Add button is used to create new modulation sources. To add a modulator, click the Add button once. The newly created routing will be automatically selected. Then modify the Type, Trigger, and the associated modulator parameters as desired.
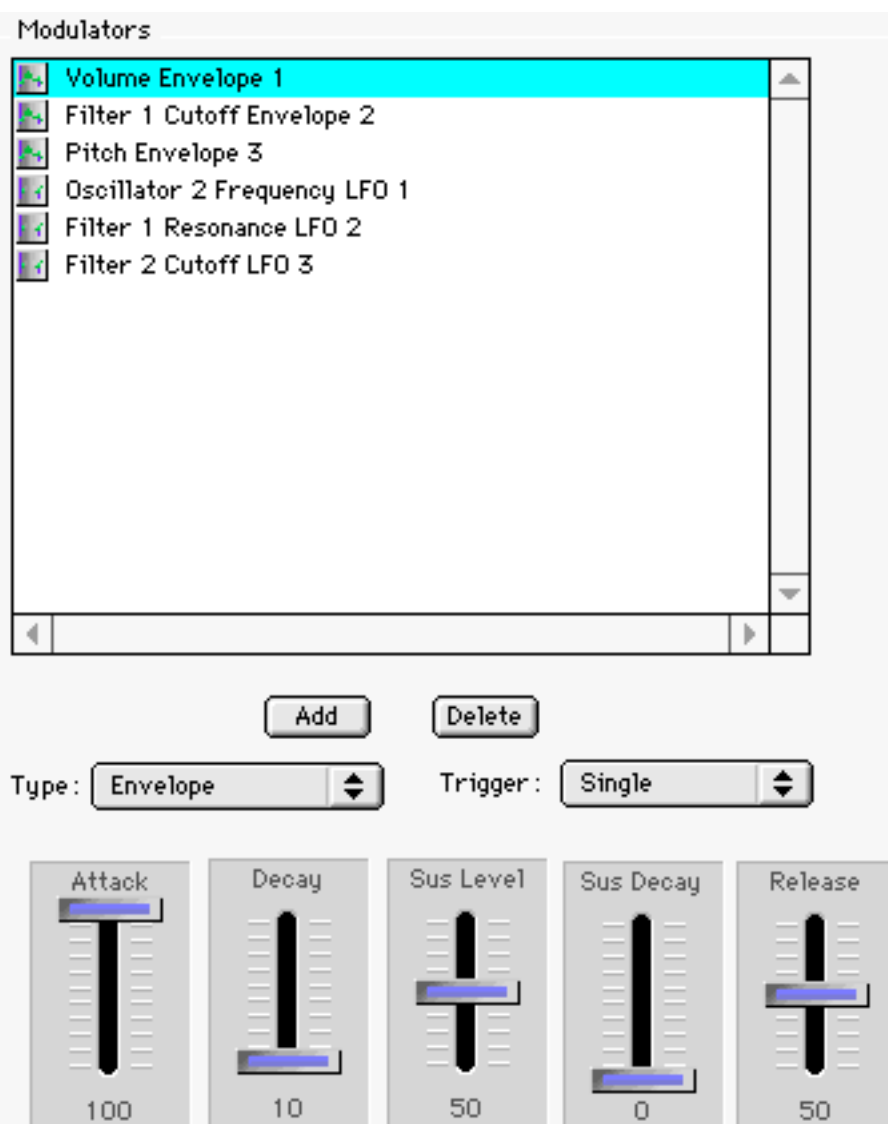

Figure 7.4.5. The Modulators parameters. Items in the list are available as sources for modulation routings. Each list item is a unique modulator with its own set of parameters. Click a modulator in the list to display its parameter values.

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Modulator Delete Button

The Delete button is used to remove existing modulation sources. To delete a modulator, first select the modulator you want to delete from the list by clicking on it once. Then click the Delete button to remove the item from the list. You can use the Undo command if you accidentally delete a modulator and need to get it back.

Modulator Type Menu

The Modulator Type menu defines which type of modulation source will be used. The available modulator types are Envelope, LFO, Random, and Ramp.

When an item is selected in the modulator list, changing the Type selection will update the modulator name. If the modulator is assigned to a routing, its associated routing list item will also be updated.

Figure 7.4.6. The modulator Type menu.

The selected modulator type determines which parameters are available for editing. Each modulator type and its associated parameters are described in detail in this section.

Envelope Modulator

Retro AS-1 uses standard 5-stage envelopes (figure 7.4.8). Envelopes can be viewed as sliders or graphically, and values can be displayed as Rate or Time. The Graphical and Rate/

Time options are specified in the Editor Preferences window (figure 7.2.3). If the Rate/Time value is changed, the envelope modulator values are inverted. Each stage parameter is described in detail on the next page.

Figure 7.4.7a. The Envelope modulator parameters displayed as sliders.

Figure 7.4.7b. The Envelope modulator parameters displayed graphically.

Figure 7.4.8. The stages of an Envelope modulator.

Attack

The Attack parameter determines how long it takes for the envelope to reach its peak value. The peak value is the maximum modulation Amount defined by a routing. If the preference is set to Time, a lower value will have a faster attack. If set to Rate, a higher value will have a faster attack.
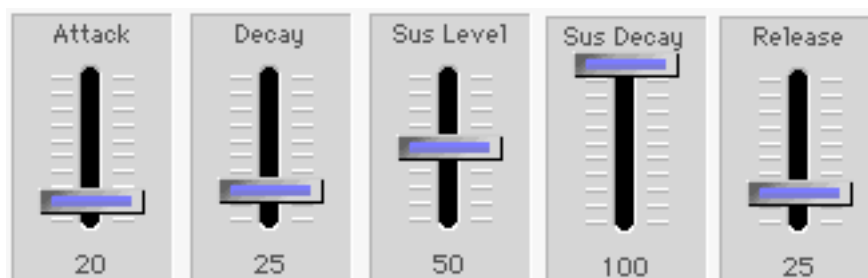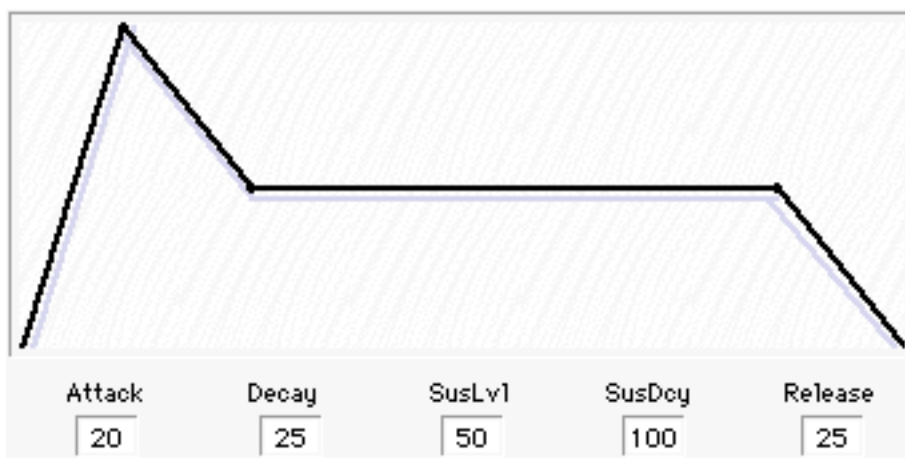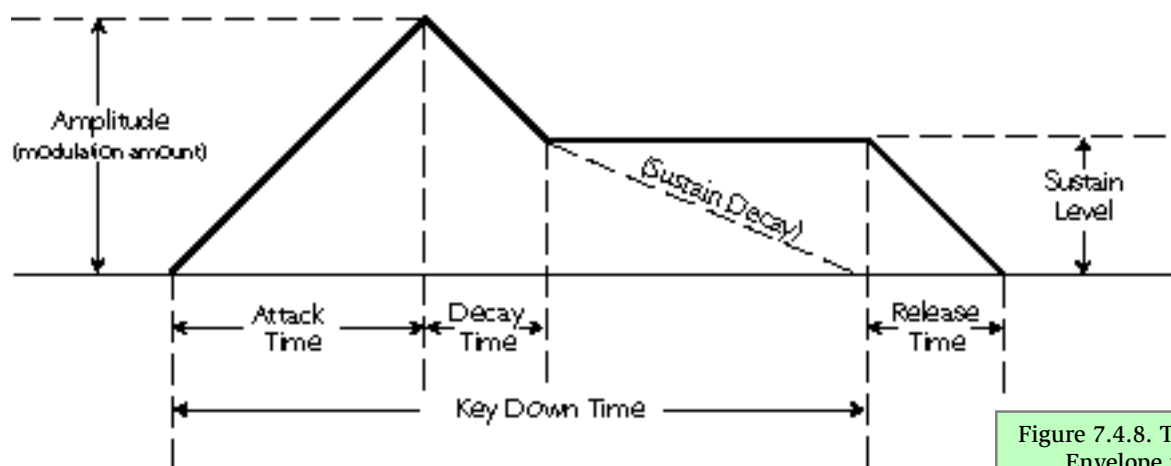
Decay

The Decay parameter determines how long it takes for the envelope to reach the sustain stage after completing the attack stage. If the preference is set to Time, a lower value will have a faster decay. If set to Rate, a higher value will have a faster decay.

Sustain Level

The Sustain Level determines the amount of modulation after the attack and decay stages have completed their cycle. A lower value will have a lower modulation amount during the sustain stage. A higher value will have a higher modulation amount during the sustain stage.

Sustain Decay

The Sustain Decay parameter forces the normally flat sustain level to gradually go to zero, even if the current note is not released. The Sustain Decay parameter determines the slope of the sustain stage, or how long it takes for the sustain level to reach zero after completing the attack and decay stages. If the preference is set to Time, a lower value will have a faster sustain decay, and value of 100 causes the Sustain level to remain flat with no slope. If set to Rate, a higher value will have a faster sustain decay, and value of zero causes the Sustain level to remain flat with no slope.

Release

The Release parameter determines how long it takes for the envelope to reach a modulation amount of zero after a note-off command is issued. If the preference is set to Time, a lower value will have a faster release. If set to Rate, a higher value will have a faster release.

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Modifying Envelopes in Graphical Mode

When displayed graphically, envelope segment values can be modified by click-dragging the segments or by entering a value in the text boxes. Envelopes are not drawn exactly to scale. Extreme settings may display a shape that doesn't look like it sounds.

These diagrams illustrate the graphical "hot spots" for modifying segment values. When you click on the segment in the graphic display, the cursor changes to red arrows to remind you which direction to drag the mouse. It is helpful to watch the text values as you drag the segments.
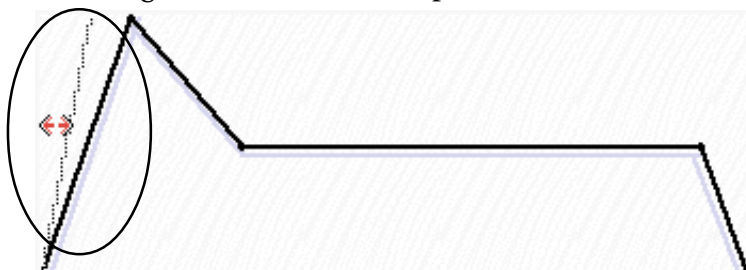
To edit the attack value, click on the attack segment and drag horizontally.

To edit the decay value, click on the decay segment and drag horizontally.
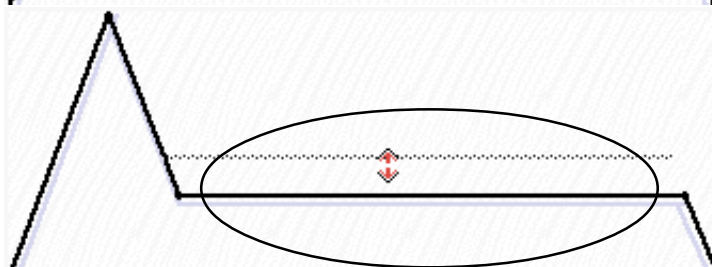
To edit the sustain value, click on the sustain segment and drag vertically.
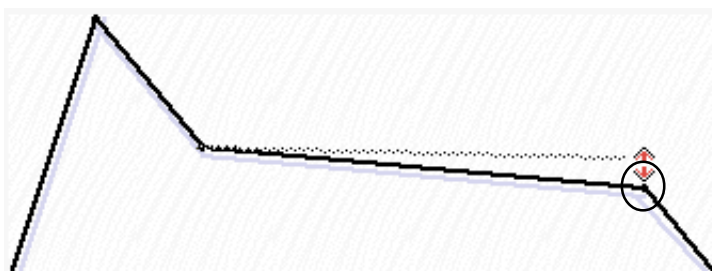
To edit the sustain decay value, click on the point connecting the sustain and release segments and drag vertically.

To edit the release value, click on the release segment and drag horizontally.

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LFO Modulator

LFO Type

The LFO Type parameter determines the waveform shape for the LFO modulator. Choose an LFO Type by clicking once on the waveform's associated radio button.

LFO Delay

The LFO Delay parameter determines how long it takes for the LFO modulation amount (determined in the Routings Editor) to ramp up to full value. A lower value will make the LFO take effect faster. A higher value will gradually increase the LFO effect.

Figure 7.4.9. The LFO modulator parameters.

LFO Speed

The LFO Speed parameter defines the frequency (speed) of the LFO. Values are displayed in Hertz.

Random checkbox

Normally, an LFO begins from "zero," at the beginning of its cycle every time it is triggered. When Random is checked, the LFO does not begin from zero, but instead from a random location in its cycle each time it is triggered.

MIDI Sync checkbox

When MIDI Sync is checked, the LFO speed will be synchronized to (determined by) incoming MIDI beat clock events. The Division menu is then used to subdivide the beat if desired.

The Speed parameter is unavailable when MIDI Sync is checked. However, if MIDI Sync is checked and no MIDI clock is being received by the synth engine, the LFO speed is determined by the Speed slider value.

Figure 7.4.9b. Activating MIDI Sync enables the Division menu and disables the Speed slider.

Division menu

When MIDI Sync is active, LFO speed is determined by the incoming MIDI clock tempo. This incoming tempo can be subdivided with the Division menu.

To make an LFO faster relative to a set MIDI tempo, select a higher subdivision value.
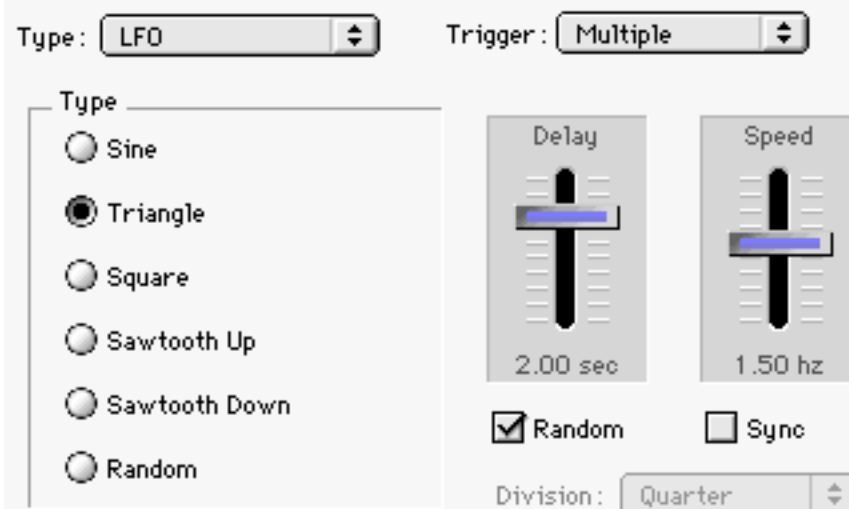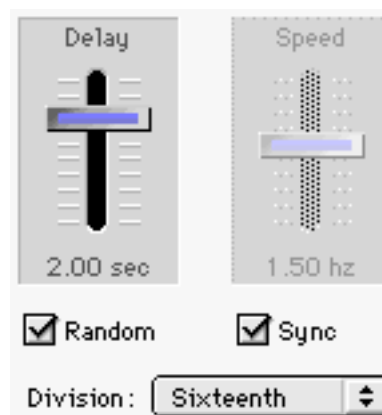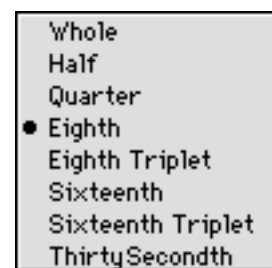

Figure 7.4.9c. The Division menu.

Random Modulator

The Random modulator is simply a noise generator.

Random Modulator Filter slider

The Random modulator Filter is a one-pole filter for the Random modulator.

Ramp Modulator

The Ramp modulator is a slope generator. It creates a linear slope that gradually increases the value of the modulation destination from zero to the value set by the routing Amount parameter.

Ramp Delay slider

The Delay parameter determines the time it takes before the ramp modulation will begin.

Ramp Speed slider

The Speed parameter determines the time it takes for the ramp modulator to go from no modulation to the modulation value set by the routing Amount parameter.

For example, if a ramp modulator is routed to filter 1 cutoff and the initial filter 1 cutoff value is set to 50 on the main page, the ramp Speed parameter would determine how long it takes for the cutoff value to reach 50.

Modulator Trigger Menu

Each modulator type allows you to select the triggering method with the Trigger menu. The Trigger menu determines how the modulator will be implemented when multiple notes are triggered. Each Trigger mode is described in detail below.

Multiple

When Multiple trigger mode is selected, every played note triggers the modulator from the beginning of its cycle.

For example, let's say an envelope with a very slow attack and decay is routed to filter cutoff in multiple trigger mode. When a note is triggered, the envelope cycle begins and the filter starts to open. When the next note is triggered, the filter envelope starts again at "point zero" regardless of the previous note.
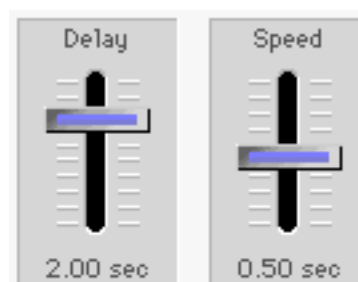

Figure 7.4.10. The Random modulator parameter.

Figure 7.4.11. The Ramp modulator parameters.
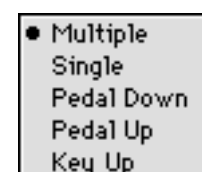
Figure 7.4.12. The modulator Trigger menu.

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Multiple trigger mode is often used in Polyphonic mode (global page setting) so each note will have the exact same sound.

Single

When Single trigger mode is selected, if multiple notes are played together the modulator does not trigger at the beginning of its cycle. Instead, the modulator continues from where it was when the first note was played. Single mode is effectively creates a "monophonic" modulator for polyphonic notes.

For example, let's say an envelope with a very slow attack and decay is routed to filter cutoff in single trigger mode. When a note is triggered and held, the envelope cycle begins and the filter starts to open. When another note is added to the chord, the filter is still opening, using the envelope from the first note. Only after all held notes are released (or the modulator completes its cycle) will the modulator begin a new cycle when a new note is played.

Single trigger mode is often used in Legato mode (global page setting) for a smoother transition between notes.

Pedal Down

When Pedal Down trigger mode is selected, the modulator is triggered when the pedal (footswitch) is pressed. The MIDI pedal number that activates the trigger is defined in the Retro AS-1 control panel.

Pedal Up

When Pedal Up trigger mode is selected, the modulator is triggered when the pedal (footswitch) is released. The MIDI pedal number that activates the trigger is defined in the Retro AS-1 control panel.

Key Up

When Key Up trigger mode is selected, the modulator is triggered as the note is released. To hear any effect, the amplitude and/or filter envelope (if any) release parameter(s) must be increased above a zero length of time.

7.5 Effects Page

Effects Overview

Retro AS-1 includes four effects processors. Two processors are insert (serial) effects, and two are global (parallel) effects. The two insert effects are stored into the program itself, and always process the program (if enabled) regardless of any other settings. Global effects settings are saved with the program, but their behavior is interactive between the Editor and the Mixer.

Figure 7.5.1. The Effects Page.
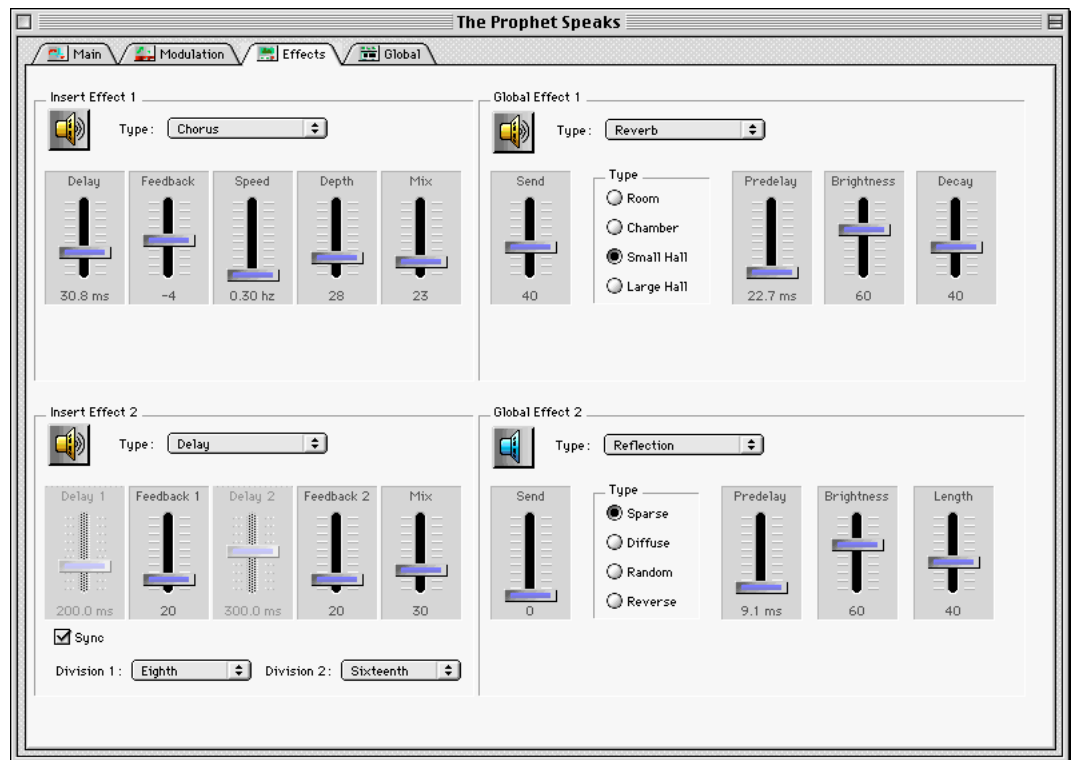
How the global effects respond between Editor and Mixer settings is determined by the Global Effects parameters in the Retro AS-1 control panel (see Chapter 5, figure 5.4.1). Each possible scenario is detailed below.

Scenario 1. Global Effects Off, 'Use From Editor' unchecked

No global effects will be used by the synth. Settings in the Editor and Mixer will have no effect. CPU processing requirements can be reduced with this setting.

Scenario 2. Global Effects Off, 'Use From Editor' checked

Global effects will be heard only when the Editor is active. The global effects parameters on the effects page in the active Editor program determine the settings. Settings in the Mixer will have no effect.

Scenario 3. Fixed selected, 'Use From Editor' unchecked

The current global effects settings will be used. The current settings reflect the state of the last used Mixer settings. If a Mixer file is opened, the global effects settings from that file become the current effects settings. In this scenario, the Mixer is the only place where global effect changes will be heard in real time.

Scenario 4. Fixed selected, 'Use From Editor' checked

The current global effects settings from the Mixer will be used unless the Editor is active. In this scenario, when the Editor is open the global effects settings on the effects page of the active Editor program are used, overriding the settings in the Mixer. When the Editor is quit, the global effects settings revert back to the current Mixer settings.

Scenario 5. Channel is selected, 'Use From Editor' unchecked

The global effects settings on the effects page of the current program on the specified MIDI channel will be used. Settings in the Mixer and Editor are not used even if those applications are open. In this scenario, global effects settings are changed whenever the program on the specified MIDI channel is changed.

Scenario 6. Channel is selected, 'Use From Editor' checked

The Global Effects settings on the effects page of the current program on the specified MIDI channel will be used unless the Editor is open. In this scenario, when the Editor is open the global effects settings on the effects page of the active Editor program are used, overriding the settings on the specified MIDI channel. When the Editor is quit, the global effects settings revert back to the current program on the specified MIDI channel.

Effects On/Off Button

The four effects each have its own on/off button. Each on/off button is represented by a speaker icon. When the effect is off, the button is blue. When it is on, the button changes to yellow. Click the button once to toggle the on/off state of the effect.

IMPORTANT! Effects require significant processing power from the CPU. Effects should be disabled when not required to increase available polyphony.

On

Off

Figure 7.5.2. The Effects On/Off button.

The Insert Effect Parameters

The insert effects are in series; the insert effect 1 output always goes to the insert effect 2 input. Both insert effect processors are identical.

Insert Effect menu

8 different insert effect types are available. The type of insert effect that is selected from the Insert Effect menu determines which parameters are available for editing. Each insert effect type and its associated parameters are detailed in this section.

The Insert Effect menu.

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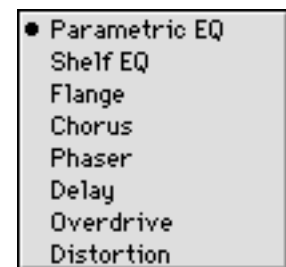
Parametric EQ

The Parametric EQ insert effect is an equalizer (tone control) for amplifying or attenuating any specific frequency, with full control of the bandwidth.

Frequency

The Frequency parameter specifies the frequency that will be amplified or attenuated. The range is from zero to one-half the sample rate specified in the Retro AS-1 control panel.

Q

The Q parameter specifies the bandwidth of the equalizer. A high Q value has a narrow bandwidth, meaning only frequencies close to the Frequency parameter value will be affected. A low Q value has a wide bandwidth, meaning the equalizer will effect a broader frequency spectrum. A Q value of 2 has a bandwidth of 1 octave.

Gain

The Gain parameter specifies the amount of amplification or attenuation that will be applied to the Frequency value. A positive value for Gain will amplify (boost) the specified frequencies. A negative value will attenuate (cut) the specified frequencies. The Gain range is + /– 12db.

Shelf EQ

The Shelf EQ insert effect is an equalizer for amplifying or attenuating two specific frequencies, without control of the bandwidth. It is essentially a two-band parametric EQ with fixed bandwidth.

Low

The Low parameter specifies the frequency that will be amplified or attenuated in the low frequency section of the two-band equalizer. The Low frequency range is from zero to one-half the sample rate specified in the Retro AS-1 control panel (the low and high bands are actually identical).

Figure 7.5.3. The Parametric EQ parameters.
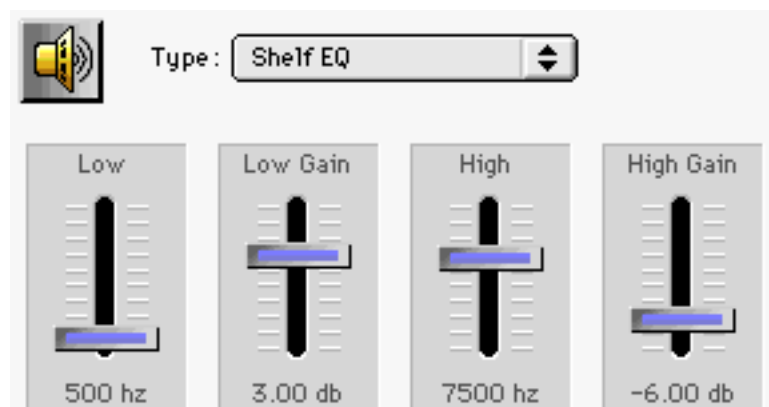
Figure 7.5.4. The Shelf EQ parameters.

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Low Gain

The Low Gain parameter specifies the amount of amplification or attenuation that will be applied to the Low frequency value. A positive value for Gain will amplify (boost) the specified frequencies. A negative value will attenuate (cut) the specified frequencies. The Gain range is + /– 12db.

High

The High parameter specifies the frequency that will be amplified or attenuated in the high frequency section of the two-band equalizer. The High frequency range is from zero to one-half the sample rate specified in the Retro AS-1 control panel (the low and high bands are actually identical).

High Gain

The High Gain parameter specifies the amount of amplification or attenuation that will be applied to the High frequency value. A positive value for Gain will amplify (boost) the specified frequencies. A negative value will attenuate (cut) the specified frequencies. The Gain range is + /– 12db.
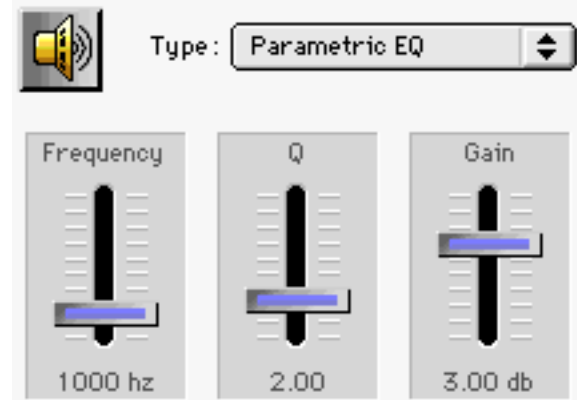
Flange

The Flange insert effect is a very short modulated delay line with feedback. Flange produces a thick, swirling, hollow-sounding effect.

Delay

Amount of time in milliseconds before the delayed signal is heard.

Feedback

Amount of processed signal that is looped back to the input to be processed again. A negative value inverts the phase of the feedback signal.

Speed

The rate of pitch modulation expressed in Hertz (cycles per second).

Depth

The amount of pitch modulation.
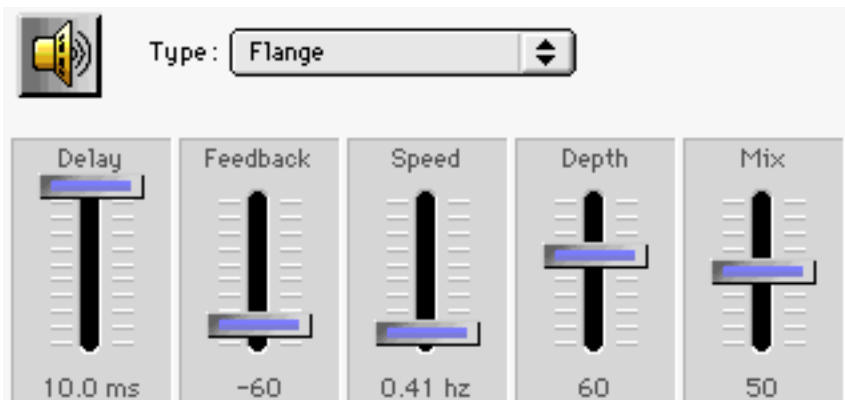
Figure 7.5.5. The Flange parameters.

Mix

Controls the dry-to-wet ratio (balance) of the direct unprocessed signal and the wet processed signal.

Chorus

The Chorus insert effect is a stereo modulated delay line with feedback. Chorus produces a thicker, richer tone by turning one sound into a "chorus" of sounds.

Delay

Amount of time in milliseconds before the delayed signal is heard.

Feedback

Figure 7.5.6. The Chorus parameters.

Amount of processed signal that is looped back to the input to be processed again. A negative value inverts the phase of the feedback signal.

Speed

The rate of pitch modulation expressed in Hertz.

Depth

The amount of pitch modulation.

Mix

Controls the dry-to-wet ratio (balance) of the direct unprocessed signal and the wet processed signal.
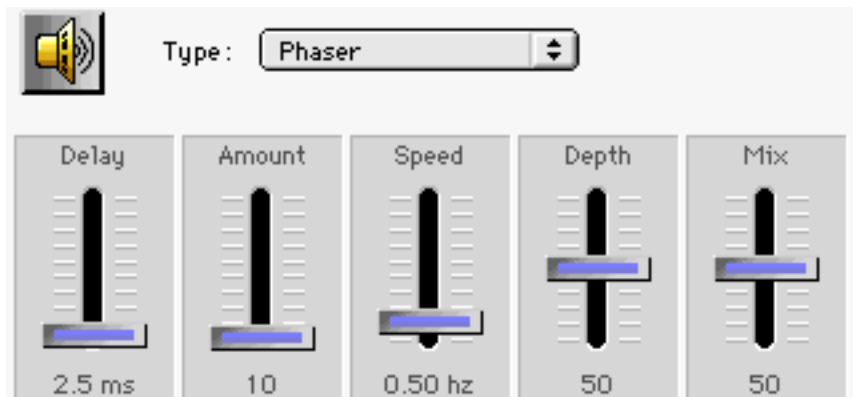
Figure 7.5.7. The Phaser parameters.

Phaser

Phaser is a popular "retro" effect that produces filter phase distortions, creating a swirling, swooshy sound.

Delay

Amount of time in milliseconds before the delayed signal is heard.

Amount

Amount of phase distortion.

Speed

The rate of phase modulation expressed in Hertz.

Depth

The amount of phase modulation.

Mix

Controls the dry-to-wet ratio (balance) of the direct unprocessed signal and the wet processed signal.

Insert Delay

Delay is a two-tap delay line with feedback and independent control of the tap delay times. Delay produces an "echo canyon" effect.

Delay 1

Controls the time of the first delay tap.

Feedback 1

Amount of tap 1 delay signal that is looped back to the input to be processed again. A negative value inverts the phase of the feedback signal.

Figure 7.5.8. The Insert Delay parameters.

Delay 2

Controls the time of the second delay tap.

Feedback 2

Amount of tap 2 delay signal that is looped back to the input to be processed again. A negative value inverts the phase of the feedback signal.

Mix

Controls the dry-to-wet ratio (balance) of the direct unprocessed signal and the wet processed signal.

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MIDI Sync checkbox

When MIDI Sync is checked, the delay times will be synchronized to (determined by) incoming MIDI beat clock events. The Division menu is then used to subdivide the beat if desired.

The delay parameters are unavailable when MIDI Sync is checked. However, if MIDI Sync is checked and no MIDI clock is being received by the synth engine, the delay times are determined by the delay slider values.

IMPORTANT! (Mac OS only) Using MIDI Sync with OMS requires the OMS IAC (Inter-Application Communication) Driver. See chapter 4 for details.

Division menu

When MIDI Sync is active, delay times are determined by the incoming MIDI clock tempo. This incoming tempo can be subdivided with the Division menu. The Division menus are unavailable when MIDI Sync is not checked.

To make a delay time shorter relative to a set MIDI tempo, select a higher subdivision value.
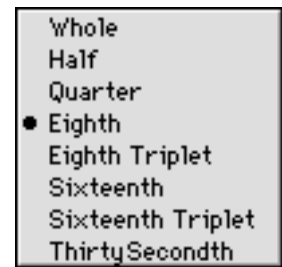
The MIDI Sync Division menu.

Overdrive

Overdrive produces a "soft clipping" effect that results in a saturated, compressed sound. Technically, it distorts the higher-amplitude portion of a signal.

Gain

Scales the signal before the threshold parameter.

Threshold

Amount of signal that needs to be present before distortion is added. A lower value will produce a more prominent effect.

Amount

Amount of Overdrive of the signal above the threshold.
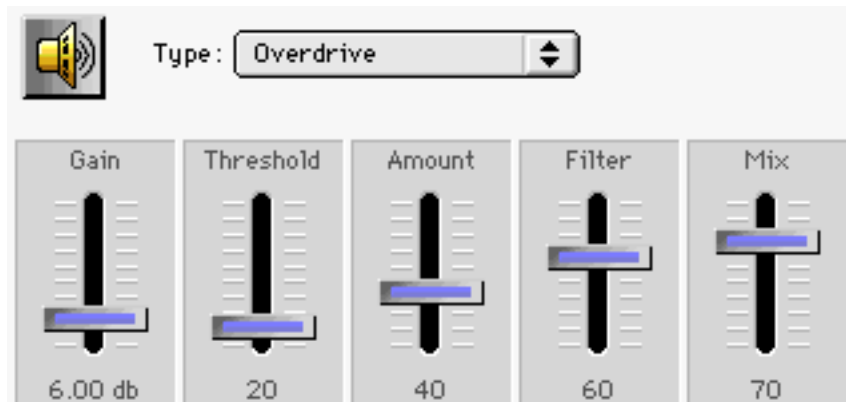
Figure 7.5.9. The Overdrive parameters.

Filter

Attenuates higher frequencies. A higher value will produce a brighter sound.

Mix

Controls the dry-to-wet ratio (balance) of the direct unprocessed signal and the wet processed signal.

Distortion

Distortion produces a "crossover distortion" effect that results in a biting, distorted sound. Technically, it distorts the lower-amplitude portion of a signal.

Threshold

Amount of signal that needs to be present before distortion is added. A higher value will produce a more prominent effect.

Figure 7.5.10. The Distortion parameters.

Hysteresis

Amount of distortion below the threshold. Technically, this is the amount that the zero-crossings of the waveform are displaced.

Tone

Attenuates higher frequencies. A higher value will produce a brighter sound.

Mix

Controls the dry-to-wet ratio (balance) of the direct unprocessed signal and the wet processed signal.

The Global Effects

Global effects behavior is interactive between the Editor and Mixer and is dependent upon the Retro AS-1 control panel settings. See the beginning of section 7.5 for a complete explanation.

Global Effect menu

3 different global effect types are available. The type of global effect that is selected from the Global Effect menu determines which parameters are available for editing. Both global effects processors are identical. Each global effect type and its associated parameters are detailed in this section.

The Global Effect menu.

Delay

Delay is a true stereo delay line with feedback and independent control of the left and right channel delay times. Delay produces an "echo canyon" effect.

Figure 7.5.11. The Global Delay parameters.
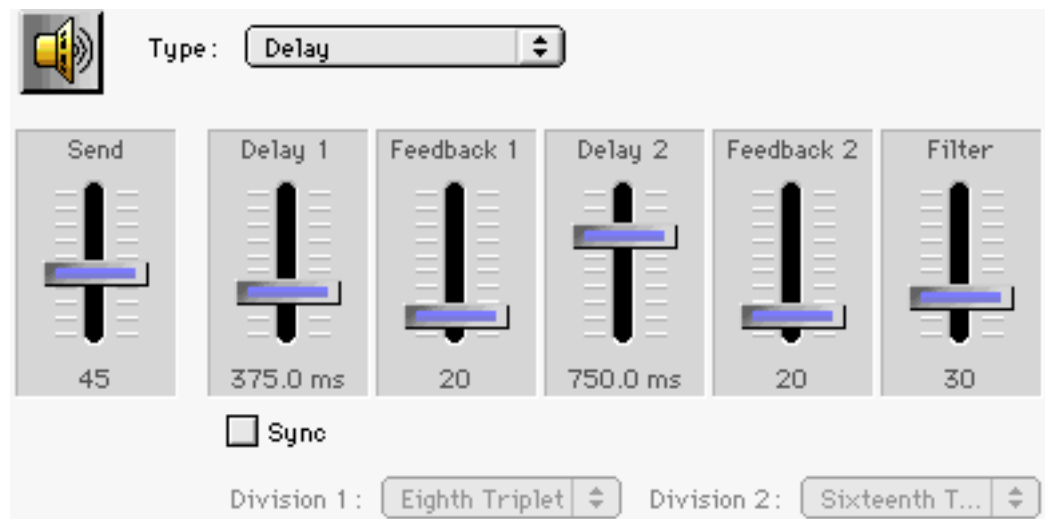
Send

Controls the amount of dry signal that is sent to the delay for processing. A higher value will have a more pronounced effect.

Delay 1

Controls the time of the left delay channel.

Feedback 1

Amount of delay 1 signal that is looped back to the left input to be processed again. A negative value inverts the phase of the feedback signal.

Delay 2

Controls the time of the right delay channel.

Feedback 2

Amount of delay 2 signal that is looped back to the right input to be processed again. A negative value inverts the phase of the feedback signal.

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Filter

Attenuates higher frequencies in the delay processor. A higher value will produce a brighter sound.

MIDI Sync checkbox

When MIDI Sync is checked, the delay times will be synchronized to (determined by) incoming MIDI beat clock events. The Division menu is then used to subdivide the beat if desired.

The delay parameters are unavailable when MIDI Sync is checked. However, if MIDI Sync is checked and no MIDI clock is being received by the synth engine, the delay times are determined by the delay slider values.

> IMPORTANT! (Mac OS only) Using MIDI Sync with OMS requires the OMS IAC (Inter-Application Communication) Driver. See chapter 4 for details.

The MIDI Sync
Division menu.

Division menu

When MIDI Sync is active, delay times are determined by the incoming MIDI clock tempo. This incoming tempo can be subdivided with the Division menu.

To make a delay time shorter relative to a set MIDI tempo, select a higher subdivision value.

Reflection

Reflection is a series of multi-tap delay processors that produce a result somewhere between a delay line and a reverb.

Figure 7.5.12. The Reflection parameters.

Send

Controls the amount of dry signal that is sent to the delays for processing. A higher value will have a more pronounced effect.

Reflection Mode Radio Buttons

Choose from one of four different reflection types by clicking once on its associated radio button.

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Sparse

Produces longer random delay times of lower density with a logarithmic decay curve. Creates the impression of a larger ambient space.

Diffuse

Produces shorter random delay times of higher density with a logarithmic decay curve. Creates the impression of a smaller ambient space.

Random

Produces random density reflections with random delay times and no decay curve. Creates the impression of an unnatural ambient space.

Reverse

Plays the reflection delays with a growing amplitude curve for special effect.

Predelay

Amount of time before the first reflection is heard. Larger values give the impression of a larger ambient environment.

Brightness

A high frequency attenuation filter. A higher value will result in a brighter sound.

Length

Sets the delay times of the early reflections. Larger values give the impression of a larger ambient environment.

Reverb

Reverbs add an ambient quality to a sound, giving the impression that the sound originates in an acoustic environment.
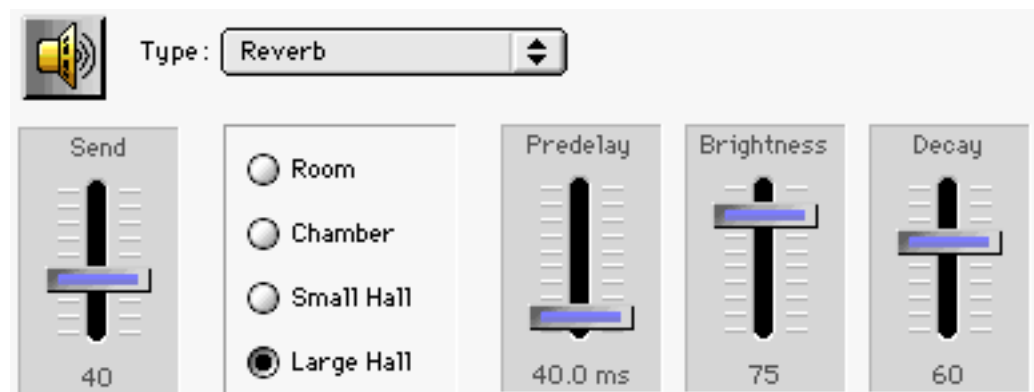
Figure 7.5.13. The Reverb parameters.

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Send

Controls the amount of dry signal that is sent to the reverb for processing. A higher value will have a more pronounced effect.

Reverb Mode Radio Buttons

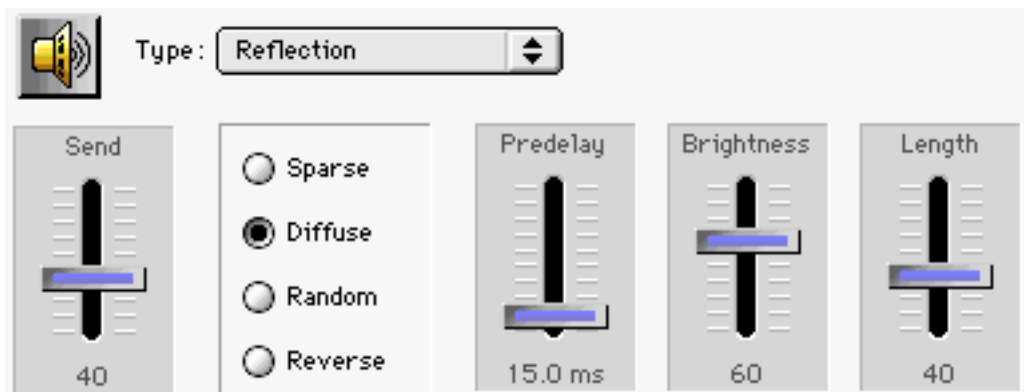Choose from one of four different reflection types by clicking once on its associated radio button.

Room

Creates the impression of a small acoustical environment.

Chamber

Creates the impression of a medium-sized acoustical environment.

Small Hall

Creates the impression of a large-sized acoustical environment.

Large Hall

Creates the impression of a huge acoustical environment.

Predelay

Amount of time before the reverb signal is heard. Larger values give the impression of a larger acoustical environment.

Brightness

A high frequency attenuation filter. A higher value will result in a brighter reverb.

Decay

Controls the amount of time before the reverb "tail" cannot be heard. Larger values give the impression of a larger acoustical environment.

7.6 Global Page
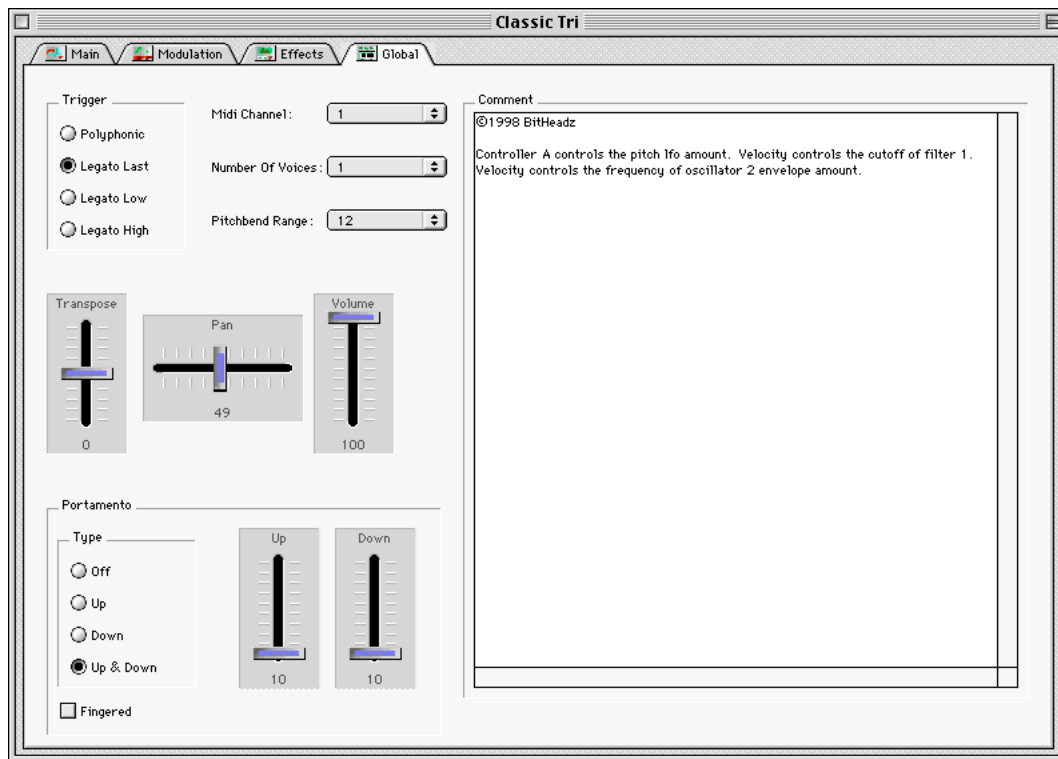
The Global page contains parameters that affect the entire program. Refer to Figure 7.6.1 for Global parameter descriptions.

Trigger Mode

The Trigger radio buttons determines how the synthesizer will respond to multiple incoming MIDI notes. You can select from several different triggering modes.

Polyphonic

Polyphonic trigger mode is the standard mode for playing multiple MIDI notes (chords) simultaneously. In Polyphonic mode, the maximum number of simultaneous notes that will sound is determined by the Number Of Voices parameter on the Global page, but it can never exceed the Number Of Voices setting in the Retro AS-1 control panel.

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Legato Last

When Legato Last is selected as the trigger mode only one note will play at a time. The note that plays will always be the last note played, regardless of any other held notes. This is the "classic" legato (mono) mode.

Legato Low

When Legato Low is selected as the trigger mode only one note will play at a time. The note that sounds will always be the lowest note played, regardless of any other played notes. For example, if a low C is triggered and held, any notes played above low C will not trigger.

Legato High

When Legato High is selected as the trigger mode only one note will play at a time. The note that sounds will always be the highest note played, regardless of any other played notes. For example, if a high C is triggered and held, any notes played below high C will not trigger.

MIDI Channel

> IMPORTANT! The MIDI Channel parameter is the only Editor parameter that is not stored within the program file.

The MIDI Channel parameter determines which incoming MIDI channel the program will respond to when loaded into the Editor. The MIDI Channel setting allows multiple programs loaded in the Editor to play on separate MIDI channels.

This feature enables real-time editing of the programs on different MIDI channels when using the Retro AS-1 in multi-timbral mode. To switch between open programs in the Editor, use the Windows menu.

If multiple programs open in the Editor are set to the same channel, only the active (frontmost) program on that channel will be heard.

If multiple programs open in the Editor are set to the same channel and a program on a different MIDI channel is the active program, the frontmost window of the program sharing the same MIDI channel will play.

The default MIDI Channel value for new programs is specified in the Editor Preferences window.

Number Of Voices

This parameter allows you to limit the number of notes in a particular program. This can help performance on slower systems by eliminating extraneous notes. For example, a lead program could be restricted to 1 or 2 notes if you know you will never play big chords with it. The Number Of Voices setting in the Retro AS-1 control panel can never be exceeded regardless of this setting.

NOTE: For more information about polyphony, see Chapter 5, Retro AS-1 control panel Reference.

Transpose

The Transpose parameter sets the overall tuning for the entire program in musical semitone (half-step) increments. The displayed value indicates the transposition interval in semitones. When the Transpose value is zero, the note pitch is determined by the oscillator Coarse and Fine tuning parameters.

Pan

The Pan parameter determines the left/right stereo positioning of the program. This parameter will be overridden with a change in the MIDI controller #10 value.

Volume

This Volume parameter is the global volume setting for the entire program. Use this parameter to set the "master" volume, or to adjust relative volumes between program files. This parameter will be overridden with a MIDI controller #7 change.

Relative volumes between oscillators can be set using the oscillator volume parameter on the Main page.

Portamento

Portamento (also known as Glissando or Glide) is a classic synthesizer effect that moves the pitch of one played note smoothly and continuously to the pitch of the next played note, much like the human voice. In order for portamento to be active, the "new" note must be played before the "old" note is released.

Portamento is only active in Legato trigger mode.

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Portamento Type

Off

When Off is selected, there is no portamento effect.

Up

When Up is selected, only notes played above the previous note will use portamento.

Down

When Down is selected, only notes played below the previous note will use portamento.

Up & Down

When Up & Down is selected, the new note will always use portamento.

Fingered

If Fingered is checked, portamento will only be applied if a previous note is held down. To always use portamento, regardless of whether a note is currently playing or not, uncheck this box.

Up Slider

The Up slider value determines the portamento time (how long a new note takes to move to its pitch) when Up or Up & Down is selected as the portamento type. A value of zero will have no portamento effect. A higher value specifies a longer time.

Down Slider

The Down slider value determines the portamento time (how long a new note takes to move to its pitch) when Down or Up & Down is selected as the portamento type. A value of zero will have no portamento effect. A higher value specifies a longer time.

Comment Field

A text box is provided as a place to type your notes about the program. Up to 255 characters can be entered or pasted into the comment field. Comments are saved in the program file.

(Mac OS only) The Retro AS-1 Program Cleaner utility (inside the Goodies folder) will automatically generate controller routing information and append it to the text in the comment field.

Chapter 8: Keyboard Reference

Chapter 8 Contents

8.1 Keyboard Overview

Figure 8.0. The Keyboard window.

The Retro AS-1 Keyboard application is an on-screen utility for triggering Retro AS-1 sounds without a MIDI controller or any other MIDI hardware or software. The Keyboard allows you to trigger a 9-octave range of individual notes and chords, change the active voice selection, control note velocity values, and transmit controller information.

You can open the application in two ways: by choosing Keyboard… from the Synthesizer menu within the Editor, MIDI Processor, or Mixer applications, or by double-clicking the Retro AS-1 Keyboard application icon. The application was installed at the root level of the Retro AS-1 Folder.

NOTE: If you don't hear sound output from the Keyboard, refer to Appendix C, Troubleshooting.

8.2 Key Keyboard Concepts

1. The Keyboard is becomes active as soon as it is launched. No other AS-1 components need to be launched in order to play synthesizer programs with the Keyboard.

2. To hear programs loaded in the Editor when using the Keyboard, select Editor from the Bank and Program menus.

3. The Retro AS-1 Keyboard does not transmit to MIDI applications or the MIDI out port(s).

4. The Retro AS-1 Keyboard does not receive MIDI data from MIDI applications or the MIDI out port(s).

5. On Windows 95, launching Retro AS-1 Keyboard is the recommended method for activating MIDI input because of its low RAM and CPU requirements.

8.3 Keyboard Menus

File Menu

The File menu contains one item: Quit. Select Quit to close the Keyboard application. Clicking the Close Box in the keyboard window will also quit the application.

If no other applications are using the synthesizer engine (Editor, MIDI Processor, Mixer, MIDI drivers) the synth engine will quit also.

Figure 8.3.1. The File menu.

Edit Menu

The Edit menu contains one item: Latch Mode. When Latch Mode is enabled, notes triggered with the Keyboard will continue to play when you release the mouse, as if you were still holding the note down. This feature allows you to hold a note so you can switch to the Editor and modify the program when you don't have a MIDI controller connected.

A checkmark next to Latch Mode indicates the feature is active.

Figure 8.3.2. The Edit menu.

Synthesizer Menu

The Synthesizer menu contains several utility commands, offering access to other key components of the Retro AS-1 package

All Notes Off

Selecting All Notes Off from the Synthesizer menu stops all Retro AS-1 sounds from playing. It is a "MIDI panic button" which is useful for silencing notes that are stuck on as a result of MIDI controller faults or other problems.

Reset

Selecting Reset from the Synthesizer menu resets the synth engine and forces all MIDI continuous controller values to be reset to zero.

Start Record To Disk...

The Record To Disk function writes the stereo output of the synthesizer engine to your hard drive as an audio file. Whatever the synthesizer is playing (notes, chords, riffs, arpeggiations, etc, on all MIDI channels, including effects) is written directly to disk. Complete instructions for Record To Disk are in Appendix G.

Figure 8.3.3. The Synthesizer menu.

Stop Record To Disk

The Stop Record To Disk command ends the Record To Disk process. This command will have no result unless the Record To Disk function is active.

Control Panel...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Control Panel, where system-level configuration settings are specified. For specific information about the control panel, refer to Chapter 5.

Status... (Mac OS only)

Selecting this item from the Synthesizer menu opens the Retro AS-1 Status window, for displaying polyphony and CPU usage. For specific information about the Status window, refer to Chapter 5.

Mixer...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Mixer, for setting up multi-timbral operations. For specific information about the Mixer, refer to Chapter 9.

Editor...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Editor application, for accessing program voicing parameters. For specific information about the Editor application, refer to Chapter 7.

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MIDI Processor...

Selecting this item from the Synthesizer menu opens the Retro AS-1 MIDI Processor application, for programming splits, layers, and arpeggiations. For specific information about the MIDI Processor, refer to Chapter 6.

8.4 Keyboard Parameters

The Graphic Keyboard

Clicking a key with the mouse sends the corresponding MIDI pitch to the synthesizer. You will hear the active program file as displayed in the Bank/Program menus.

Where you click on the key determines the velocity value of the note. Clicking towards the top ("rear") of the key transmits a lower velocity for the note; clicking towards the bottom ("front") of the key transmits a higher velocity value.

You can also trigger sounds with the computer's QWERTY keyboard (see figure 8.4.1). The C Major scale will be triggered by the bottom row of keys beginning with the letter Z. The "black" notes are triggered by the second row of keys. To extend beyond the one octave range of the qwerty notes, use the Range function.

QWERTY key	Note	QWERTY key	Note
Z	C	G	F#
S	C#	B	G
X	D	H	G#
D	D#	N	A
C	E	J	A#
V	F	M	B
		<	C

Figure 8.4.1. The computer keyboard will trigger these MIDI note values.

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Channel menu

This parameter determines the MIDI channel of the Keyboard notes transmitted to the synthesizer.

Range menu

This parameter allows you to extend the range of the Keyboard beyond its visible 5-octaves by shifting the note values up and down in octaves. You can shift the keys up or down +/− 2 octaves, allowing for a full 9-octave range.

Bank and Program menus

These parameters determine which program will be heard when using the Keyboard. When changing these parameters, MIDI bank and program change values are transmitted to the synthesizer on the MIDI channel selected with the Channel pull-down menu.

NOTE: For information about Bank and Program organization, see Appendix B, Working with Banks and Programs.

Bank menu

This menu determines the active bank. The sounds available in the program menu are determined by the bank selection.

If the Editor is open the Editor bank becomes enabled, allowing you to select the program(s) that are loaded into the Editor with the program menu.

Program menu

This menu determines the active program. The sounds available in the Program menu are determined by the bank selection.

To use programs that are being modified in the Editor, select Editor 1-16 from this menu. The numbers 1-16 indicate the MIDI channel that the program is set to in the Editor global page.

Chord menu

This parameter activates the Chord function. When a Chord is selected from the pull-down menu, more than one note will be triggered when a key is clicked on the on-screen or computer keyboards. Many chord voicings are available. The notes of the chord will highlight on the keyboard when played.

```
None
Fifth
Octave
Major 1
Major 2
Minor 1
Minor 2
● Major 7th
Maj. 7th Flat 3rd
Minor 7th
Min. 7th Flat 5th
Dominant 7th
Dom. 7th Sus. 4th
Dom. 7th Aug. 5th
Dom. 7th Flat 5th
Dom. 7th Flat 9th
Dom. 7th Aug. 9th
Dom. 7th Aug. 11th
Augmented
Diminished
Sixth
Minor Sixth
Sixth add 9
Ninth
Major Ninth
Minor Ninth
Ninth Sus. 4th
Ninth Aug. 5th
Ninth Flat 5th
Thirteenth
Thirteenth Flat 9th
```

Figure 8.4.2. The Chord menu.

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NOTE: If the active program is in Legato (monophonic) mode, the Chord function will have no effect. Legato mode is set on the Editor global page.

Controller A, B, C, D sliders

These sliders transmit MIDI continuous controller information to the synthesizer. The controller numbers used are determined by the Controller preferences specified in the Retro AS-1 Control Panel.

NOTE: For information about controller assignments, see Chapter 5, Control Panel Reference.
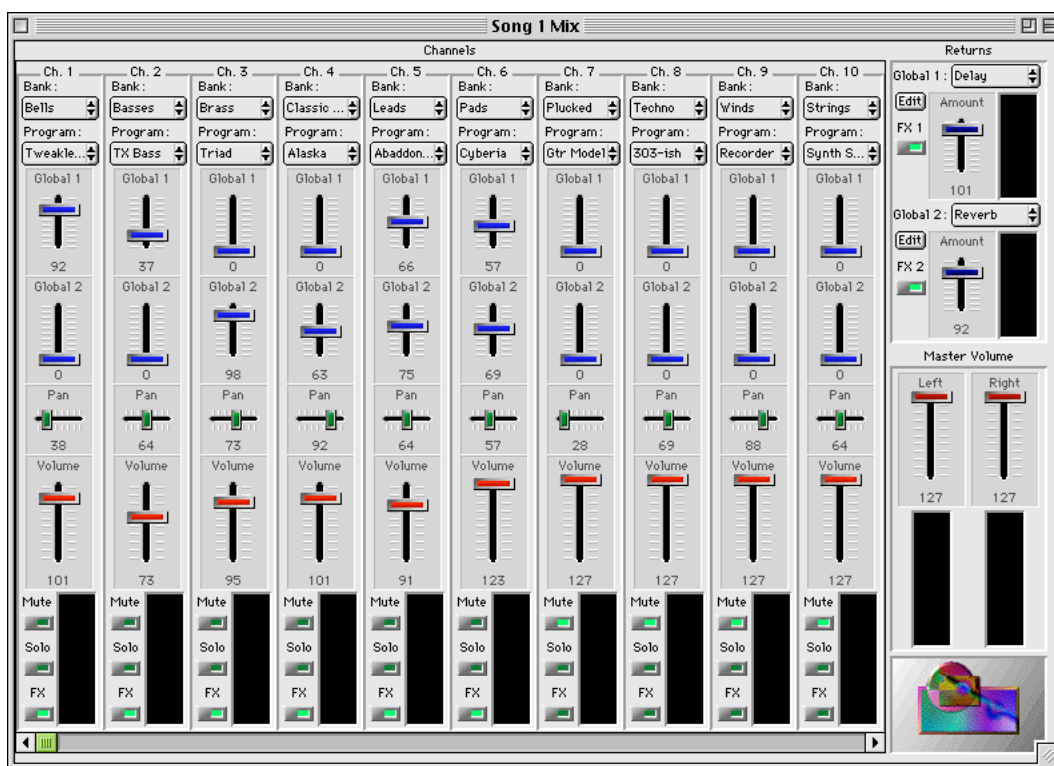
Chapter 9. Mixer Reference

Chapter 9 Contents

Figure 9.0. The Mixer window.

9.1 Mixer Overview

The Retro AS-1 Mixer application is a software "audio console" used to define the Bank and Program Selection, Volume, Pan, Mute, Solo, and Global Effect settings of the Retro AS-1 synthesizer on each of the 16 MIDI channels during multi-timbral operation.

Mixer settings can be saved to disk as a file; Mixer files contain complete settings for a unique multi-timbral setup. This "snapshot automation" makes it very fast and easy to recall settings for a particular MIDI song, for example.

Each time a Mixer file is opened, it searches the Retro AS-1 folder to load the banks and programs used by the file. It will still find the correct banks and programs even if the bank/program hierarchy has been modified. If the bank and/or program can't be found (if it no longer resides in the Retro AS-1 Programs folder), question marks will be displayed instead of the bank/program name and no sound will play on that MIDI channel until a new program is selected.

The Mixer constantly queries the synth engine and the display is updated to reflect the current synthesizer settings for bank, program, volume, pan, and global send information. For example, if you use controller 7 to change the MIDI volume from within your sequencer application, the volume slider for that channel in the Mixer will be updated to reflect the new volume setting.

Because the Mixer is always asking the synth what the current settings are, it requires CPU processing even if it is just idle in the background, unlike the other Retro AS-1 applications. Since many sequencers and other MIDI applications have there own methods of transmitting volume, pan, and other controller information, you may find it more CPU efficient to use those features instead of the Mixer.

Using the Mixer with the Editor

The Retro AS-1 Editor can be open and active at the same time as the Mixer; you can modify programs with the Editor while the multi-timbral settings are being modified by the Mixer. To hear programs that are currently loaded in the Editor while using the Mixer, select Editor from the Bank and Program pull-down menus when the Editor is open. The voice being modified by the Editor is determined by the MIDI channel specified on the Editor Global page.

Global Effects with the Mixer

Global Effects parameters can be edited from within the Mixer and saved with a Mixer file. The next time that Mixer file is opened, the current Global Effects settings will be updated to the stored settings. If Global Effects are modified in the Mixer and the active file is closed, the current settings stay in RAM and remain current until a different Mixer file is opened. When the synth engine is closed, the current Global Effects settings are written to a Preference file to be used when the synth is reactivated.
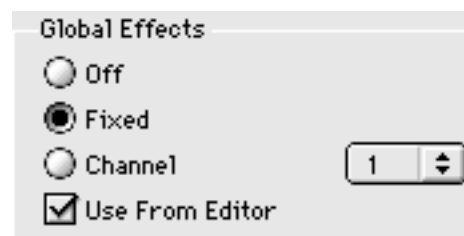

Figure . Global Effects settings in the Retro AS-1 control panel. These parameters determine the behavior of the Global Effects processors in the Mixer.

Global Effects behavior is interactive between the Mixer and Editor. How the Global Effects respond is defined by the Retro AS-1 Control Panel settings. Each possible scenario is detailed on the next page.

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Scenario 1. Global Effects Off, 'Use From Editor' unchecked

No global effects will be used by the synth. Settings in the Editor and Mixer will have no effect. CPU processing requirements can be reduced with this setting.

Scenario 2. Global Effects Off, 'Use From Editor' checked

Global effects will be heard only when the Editor is active. The global effects parameters on the effects page in the active Editor program determine the settings. Settings in the Mixer will have no effect.

Scenario 3. Fixed selected, 'Use From Editor' unchecked

The current global effects settings will be used. The current settings reflect the state of the last used Mixer settings. If a Mixer file is opened, the global effects settings from that file become the current effects settings. In this scenario, the Mixer is the only place where global effect changes will be heard in real time.

Scenario 4. Fixed selected, 'Use From Editor' checked

The current global effects settings from the Mixer will be used unless the Editor is active. In this scenario, when the Editor is open the global effects settings on the effects page of the active Editor program are used, overriding the settings in the Mixer. When the Editor is quit, the global effects settings revert back to the current Mixer settings.

Scenario 5. Channel is selected, 'Use From Editor' unchecked

The global effects settings on the effects page of the current program on the specified MIDI channel will be used. Settings in the Mixer and Editor are not used even if those applications are open. In this scenario, global effects settings are changed whenever the program on the specified MIDI channel is changed.

Scenario 6. Channel is selected, 'Use From Editor' checked

The Global Effects settings on the effects page of the current program on the specified MIDI channel will be used unless the Editor is open. In this scenario, when the Editor is open the global effects settings on the effects page of the active Editor program are used, overriding the settings on the specified MIDI channel. When the Editor is quit, the global effects settings revert back to the current program on the specified MIDI channel.

9.2 Key Mixer Concepts

1. The Mixer communicates only with the synth engine. It does not transmit or receive MIDI data to/from other MIDI sources.

2. Global Effects can be modified within the Mixer only when the effects mode is set to 'Fixed' in the Retro AS-1 control panel.

3. To hear programs loaded in the Editor when using the Mixer, select Editor from the Bank and Program menus in the Mixer.

4. The Mixer parameters reflect the current MIDI state of the synthesizer, even if changes are made from an external source. Because this feature requires CPU processing even in the background, quit the Mixer when CPU resources are limited.

9.3 Mixer Menus

File Menu

The File menu contains commands for controlling management tasks such as loading and saving files.

New

The New command creates a new, untitled mix. Use the New command when you want to create a new mix from scratch.

Open...

The Open command loads a previously saved Mixer file from disk, using the Mac OS standard Open file dialog box. You can also open a saved file by double-clicking its icon in the Mac OS Finder.

Close

The Close command closes the active Mixer document. Alternately, you can click the close box at the left of the window title bar. If the file has been modified since it was opened, you will be asked if you want to save the changes. If you don't want to overwrite the existing disk file, choose the Save As... command instead.

Save

The Save command writes the active Mixer file to disk, overwriting the previously saved version of the file. If you don't want to overwrite the existing disk file, choose the Save As... command instead.

Figure 9.3.1. The File menu.

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Save As...

The Save As command writes a new file to disk, leaving the original file unchanged. You will have the choice to rename the file. The active document window title will change to the new name after saving.

Quit

The Quit command closes the Retro AS-1 Mixer application. If any Mixer files that are open have been modified since saving, you will be asked if you want to save those modifications.

Edit Menu

Global Effect 1...

Choosing Global Effect 1 opens the parameter window (figures 9.5.3, 9.5.4, and 9.5.5) for global effect processor 1. This is the same as pressing the Edit button in the Returns area of the Mixer window (see figure 9.5.1).

Figure 9.3.2. The Edit menu.

Global Effect 2...

Choosing Global Effect 2 opens the parameter window (figures 9.5.3, 9.5.4, and 9.5.5) for global effect processor 2. This is the same as pressing the Edit button in the Returns area of the Mixer window (see figure 9.5.1).

NOTE: For an explanation of each specific effect parameter, refer to Chapter 7, Editor Reference, section 7.5.

Figure 9.3.3. The Preferences window.

Preferences...

Choosing Preferences opens the Mixer Preferences window, for specifying general options within the Mixer. Select the preferred options by clicking its associated radio button or checkbox. The settings are retained until they are modified.

NOTE: See section 9.1 of this chapter for more information about global effects behavior.

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Use default settings

All MIDI channels will be initialized to default values when the Mixer is launched. Volume and global effect sends will be set to maximum, and Pan will be set to center on all MIDI channels, regardless of current synth engine settings.

Use current synth settings

When the Mixer is launched, the synth engine is queried and current synth settings for each MIDI channel are used.

Warn about missing banks and programs

If a Mixer file is opened and a bank or program used by the file is no longer installed in the Retro AS-1 Programs folder, the Mixer will display a warning dialog if this option is checked.

Warn about effect editing control

Global Effects can be modified in the Mixer only when the Retro AS-1 control panel effect setting is set to 'Fixed.' When this option is checked, if the control panel is not set to Fixed, a reminder dialog will appear.

Synthesizer Menu

The Synthesizer menu contains several utility commands, offering access to other key components of the Retro AS-1 package

All Notes Off

Selecting All Notes Off from the Synthesizer menu stops all Retro AS-1 sounds from playing. It is a "MIDI panic button" which is useful for silencing notes that are stuck on as a result of MIDI controller faults or other problems.

Reset

Selecting Reset from the Synthesizer menu resets the synth engine and forces all MIDI continuous controller values to be reset to zero.

Figure 9.3.4. The Synthesizer menu.

Start Record To Disk...

The Record To Disk function writes the stereo output of the synthesizer engine to your hard drive as an audio file. Whatever the synthesizer is playing (notes, chords, riffs, arpeggiations, etc, on all MIDI channels, including effects) is written directly to disk. Complete instructions for Record To Disk are in Appendix G.

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Stop Record To Disk

The Stop Record To Disk command ends the Record To Disk process. This command will have no result unless the Record To Disk function is active.

Control Panel...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Control Panel, where system-level configuration settings are specified. For specific information about the control panel, refer to Chapter 5.

M Status... (Mac OS only)

Selecting this item from the Synthesizer menu opens the Retro AS-1 Status window, for displaying polyphony and CPU usage. For specific information about the Status window, refer to Chapter 5.

Keyboard...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Keyboard, for triggering sounds without a MIDI controller. For specific information about the Mixer, refer to Chapter 8.

Editor...

Selecting this item from the Synthesizer menu opens the Retro AS-1 Editor application, for accessing program voicing parameters. For specific information about the Editor application, refer to Chapter 7.

MIDI Processor...

Selecting this item from the Synthesizer menu opens the Retro AS-1 MIDI Processor application, for programming splits, layers, and arpeggiations. For specific information about the MIDI Processor, refer to Chapter 6.

9.4 Channel Strips

The Mixer contains 16 channel strips; each strip controls the parameters for a different MIDI channel. 10 channel strips are visible at a time. To view the rest of the strips, use the standard scroll bars at the bottom of the Mixer window. Because each of the 16 strips is identical, their parameters are described only once.

Bank and Program menus

These parameters determine which program will be heard on the MIDI channel. When changing these parameters, MIDI bank and program change values are transmitted to the synthesizer on the MIDI channel of the strip.

> NOTE: For information about Bank and Program organization, see Appendix B, Working with Banks and Programs.

Bank menu

This menu determines the active bank for the MIDI channel. The sounds available in the program menu are determined by the bank selection.

If the Editor is open the Editor bank becomes enabled, allowing you to select the program(s) that are loaded into the Editor with the program menu.

Program menu

This menu determines the active program for the MIDI channel. The sounds available in the Program menu are determined by the bank selection.

To hear programs that are being modified in the Editor, select Editor 1-16 from this menu. The numbers 1-16 indicate the MIDI channel that the program is set to on the Editor global page.

Global Slider 1

Determines the send level to global effect processor 1 for the MIDI channel. For this parameter to have any effect, the FX button must be on for the channel, the global 1 effect master on/off button must be on, and the global 1 return value must be increased above zero.

Global Slider 2

Determines the send level to global effects processor 2 for the MIDI channel. For this parameter to have any effect, the FX button must be on for the channel, the global 2 effect master on/off button must be on, and the global 2 return value must be increased above zero.

> NOTE: See section 9.1 of this chapter for more information about global effects behavior.
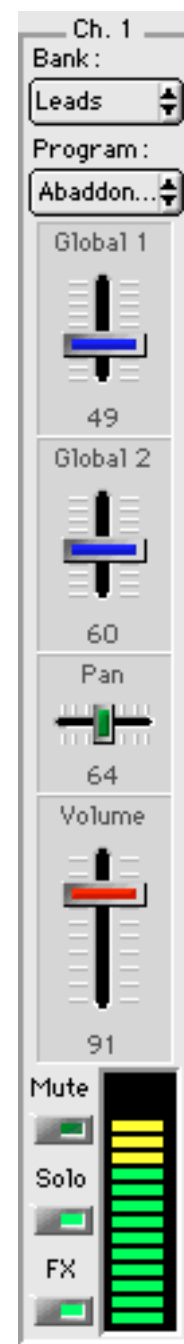
Figure 9.4.1. The Mixer Channel Strip. Each strip contains the controls for a different MIDI channel.

Pan Slider

Determines the left/right stereo positioning for the MIDI channel. A value of 64 will center the sound in the stereo field.

Volume Slider

Determines the output level for the MIDI channel. Volume settings in the Mixer attenuate volumes set in the program by the Editor on the global page. This is not a gain stage.

Mute Button

Turns off the output of the MIDI channel so no sound is heard. The channel is muted when the button is green.

Solo Button

Mutes all channels whose Solo function is not active. Useful for auditioning a single MIDI channel during multi-timbral operation. The channel is in solo mode when the button is green.

FX Button

Activates global effect processing for the MIDI channel. For this parameter to have any effect, the global effect master on/off button must be on and the send and return level(s) must be increased above zero. The channel effects are 'on' when the button is green.

Level Meter

Gives a visual indication when a sound is playing on the MIDI channel and what the relative volume of the signal is.

9.5 Master Section

Global Effects Controls

The Global Effects setting in the Retro AS-1 control panel must be set to 'Fixed' to modify the global effects from within the Mixer.

> See section 9.1 of this chapter for more information about global effects behavior.

Because Global Effects 1 and 2 are identical, their controls are detailed only once.

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NOTE: For an explanation of each specific effect parameter, refer to Chapter 7, Editor Reference, section 7.5.

Effect Type menu

Determines the type of effect for the Global processor. The available choices are Delay, Reflections, and Reverb.

Edit Effect button

Opens the parameter windows (figures 9.5.3-5) for the Global Effects processor. Choosing Global Effect... from the Edit menu performs the same function.

Master FX On/Off button

Enables the effect processor. The effect is 'on' when the button is green.

Effect Amount Slider

Determines the return level for the global effect processor. For this parameter to have any effect, the Channel and Master FX button must be 'on' and the global send for a given MIDI channel must be increased above zero.

Global Level Meter

Gives a visual indication of the effects level for the global effect processor.

Master Volume Sliders

Determines the overall output level of the synthesizer. The left and right channels of the stereo output can be adjusted independently.

Master Level Meters

Gives a visual indication of the stereo output level of the synthesizer.
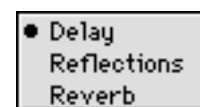
Figure 9.5.1. The Master section.

Figure 9.5.2. The Global Effect Type menu.

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Delay

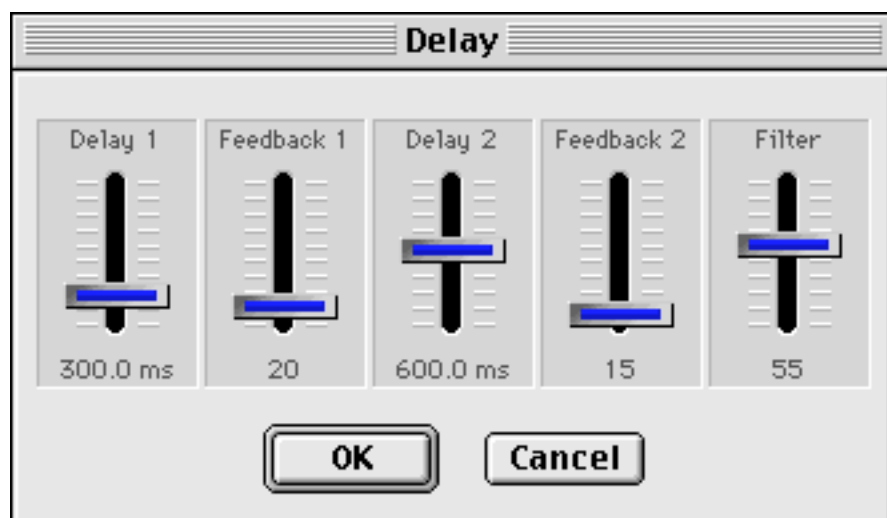| Delay 1	Feedback 1	Delay 2	Feedback 2	Filter
300.0 ms	20	600.0 ms	15	55

OK   Cancel

Figure 9.5.3. The global Delay parameters window.

NOTE: For an explanation of each specific parameter, refer to section 7.5 in chapter 7, Editor Reference.
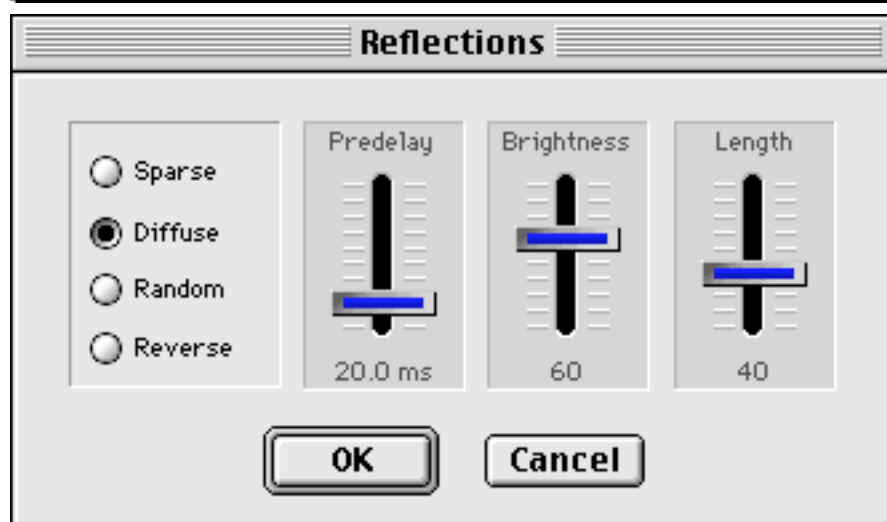
Reflections

○ Sparse
● Diffuse
○ Random
○ Reverse

Predelay	Brightness	Length
20.0 ms	60	40

OK   Cancel

Figure 9.5.3. The global Reflections parameters window.

Reverb

○ Room
○ Chamber
○ Small Hall
● Large Hall

Predelay	Brightness	Decay
40.0 ms	60	80

OK   Cancel
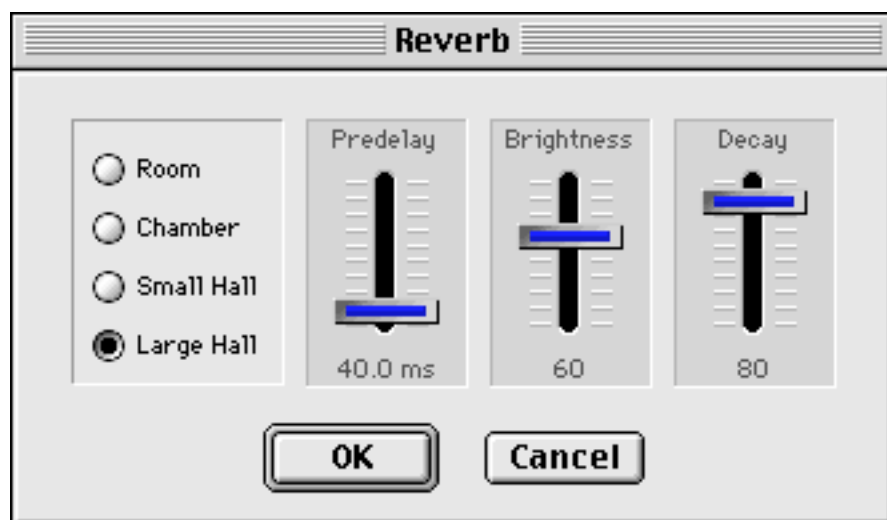
Figure 9.5.3. The global Reverb parameters window.

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Appendix A: Working with Banks and Programs

Program Overview

Retro AS-1 programs are created and modified in the Retro AS-1 Editor application. Each program is a separate file document and contains all the voicing parameters for a single sound. Programs that reside inside the Retro AS-1 Programs folder can be selected from within the Retro AS-1 MIDI Processor, Keyboard, and Mixer applications or with MIDI bank and program change commands.

Bank Overview

Retro AS-1 programs are grouped into banks. A bank is a collection of programs. Banks allow you to arrange related programs together for quick access when selecting voices with MIDI bank and program change commands or from within the Retro AS-1 MIDI Processor, Keyboard, and Mixer applications.

Because the bank and program groupings are completely user-programmable, you can choose whatever grouping method best suits your working style. For example, you could put your bass sounds in one bank, your lead sounds in another bank, and so forth. Or, you could group all the programs for a particular song into a bank.

Hierarchy Overview

Programs are arranged into banks in the Finder (Mac OS) or My Computer/Windows Explorer (Windows 95). Arranging programs into banks is a simple process. The alphabetical order of the programs and bank folders within the Retro AS-1 Programs folder determines the bank and program hierarchy. So, to create custom banks, simply create the desired folder hierarchy within the Retro AS-1 Programs folder. Give the folders the bank names you want to use, then put the program files you want in the bank into those folders. That's it!

> NOTE: The 128 programs at the root level of the Retro AS-1 Programs folder are exact duplicates of the 'Best of Retro AS-1' bank. You may find it useful to delete these programs at the root level. You can then replace them with your favorite factory or custom programs, so they will be grouped in the same bank and accessed easily without bank change commands.

M Mac OS Specifics

The Retro AS-1 Programs folder is placed inside Retro AS-1 Folder by the Retro AS-1 Installer. Program files that are not inside the Retro AS-1 Programs folder can reside anywhere; they can be opened, heard, and modified from within the Editor. However, they will not be recognized by the Retro AS-1 MIDI Processor, Keyboard, and Mixer applications or with MIDI bank and program change commands.

Because banks and programs are arranged alphabetically, you will find it easier to work with the bank and program hierarchy if you view the Retro AS-1 Programs folder by name. To view the folder by name, open the Retro AS-1 Programs folder window, then select 'by Name' (System 7) or 'as List' (OS 8) from the View menu in the Finder. Here's a "power tip" to quickly view the entire folder hierarchy: Select all folders in the window (Command + A), then press Command + Option + Right Arrow to open the entire hierarchy of a folder. Press Command + Option + Left Arrow to collapse the view.

Retro AS-1 fully supports the file and folder alias feature of the Mac OS. You can use aliases for any program file or bank folder. You can have aliases point to programs or banks inside the Retro AS-1 Programs folder, or you can do the opposite by having aliases inside the Retro AS-1 Programs folder point to programs or banks that reside elsewhere.

IMPORTANT! To allow the MIDI Processor, Keyboard, Mixer, and MIDI Bank/Program change commands to select banks and programs, an alias to the Retro AS-1 Programs folder (or the actual folder itself) with the exact name 'Retro AS-1 Programs' must reside at the root level of the active System Folder. An alias to the Retro AS-1 Programs folder was placed at the root level of the active System Folder during installation. If the alias is moved or renamed there will be no sound output from the synthesizer unless using the Editor.
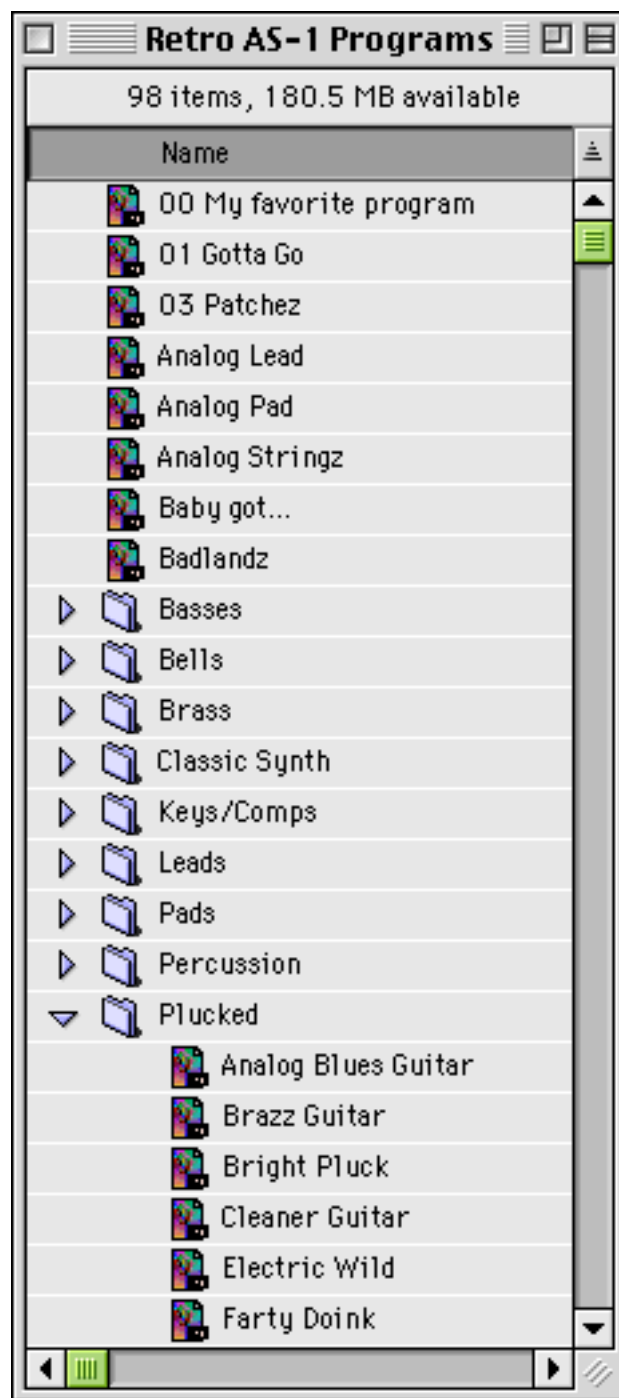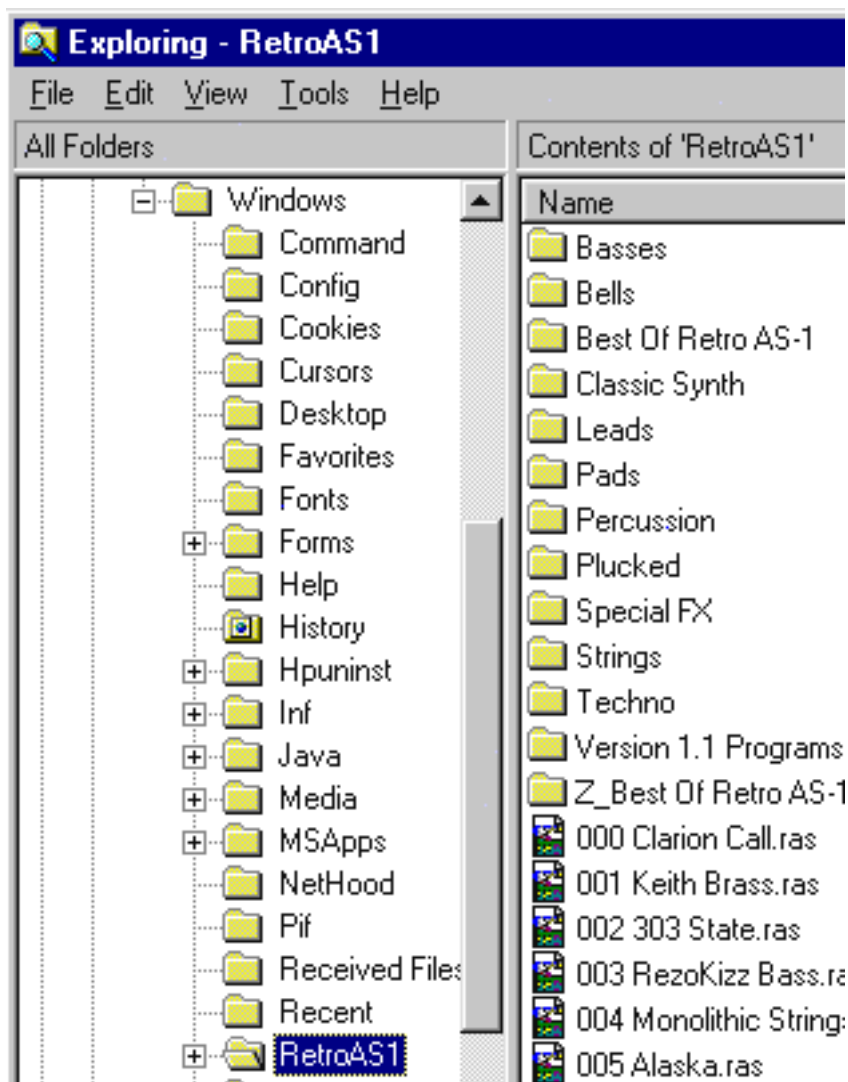

Figure A1. The Retro AS-1 Programs folder in Mac OS. The bank and program hierarchy is arranged by alphabetical order.

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Windows 95 Specifics

The Retro AS-1 Programs folder is placed at the root level of the Windows directory by the Retro AS-1 Installer. The name of this special folder is RetroAS1. Program files that are not inside the Retro AS-1 Programs folder can reside anywhere; they can be opened, heard, and modified from within the Editor. However, they will not be recognized by the Retro AS-1 MIDI Processor, Keyboard, and Mixer applications or with MIDI bank and program change commands.

Because banks and programs are arranged alphabetically, you will find it easier to work with the bank and program hierarchy if you view the Retro AS-1 Programs folder by name. To view the folder by name, navigate to the Retro AS-1 Programs folder window using My Computer or Windows Explorer. Then click Name column to sort the list by name. If you are currently viewing by icon, click the list icon first.

IMPORTANT! Only programs in the Retro AS-1 Programs folder are recognized by the MIDI Processor, Keyboard, Mixer, and MIDI Bank/ Program change commands. The Retro AS-1 Programs folder with the exact name 'RetroAS1' must reside at the root level of the active Windows directory. If the folder is moved or renamed there will be no sound output from the synthesizer unless using the Editor.

Figure A1. The Retro AS-1 Programs folder in Windows 95. The bank and program hierarchy is arranged by alphabetical order.

Selecting banks and programs via MIDI

The numbering scheme for MIDI program change commands is the alphabetical order of the programs within a bank. The first alphabetical program in a bank is MIDI program number 0, the second program is MIDI program 1, and so forth.

Programs at the root level of the Retro AS-1 Programs folder (not in a bank subfolder) are considered to be in MIDI bank number 0. The first bank subfolder (in alphabetical order) is MIDI bank number 1, the second bank subfolder is MIDI bank 2, and so forth.

Although there are only 128 MIDI program changes available (0-127), by arranging programs into banks you can access more than 128 programs using MIDI bank change commands. Up to 16,384 banks are supported, allowing selection of 2,097,152 (!!!) different programs via MIDI.

When creating your bank/program hierarchy, each bank folder should have no more than 128 program files contained within it. Following this constraint allows all the programs within the bank to be selected with MIDI bank and program change commands.

The required MIDI commands

To select programs via MIDI

Send a MIDI program change value between 0 and 127. If no bank change command is sent before the program change command, programs within bank 0 will be selected.

To select banks via MIDI

For bank numbers 0 through 127, send controller 0 with a value of 0, then controller 32 with a value between 0 and 127, with zero being the root level, 1 being the first bank subfolder, and so forth. Follow the bank change command with a program change command.

NOTE: We refer to the first program in a bank as MIDI program number 0 and the first bank as MIDI bank number 0 because these are the actual MIDI commands used. Many controllers use a numbering scheme of 1-128 but they are actually transmitting "zero based" commands.

Appendix B: Optimizing Performance

Optimizing Overview

Because there is no dedicated hardware to perform certain tasks, the computer's CPU must handle all synth routines. Therefore, the available polyphony is dependent upon CPU type, clock and bus speed, voice complexity, and other applications that may be running simultaneously. CPU processing resources can be reserved or limited in the Retro AS-1 control panel, and polyphony can be restricted for use on slower systems.

Depending upon the speed of your computer, your polyphony requirements, and other MIDI applications you may be running, the synthesizer system parameters may need to be "tweaked" to optimize performance. The Retro AS-1 control panel Configuration parameters are the primary settings that affect Retro AS-1 performance.

The main cause of CPU overload occurs when too many notes are played. When the CPU is overloaded, the sound output will stutter or cut out altogether. To eliminate this problem the Number of Voices, Maximum CPU %, Sample Rate, and Buffer Length settings must be optimized for use with your particular environment. These settings are all interdependent and experimentation is sometimes required to find the "sweet spot" that works best in your environment.

Performance Variables

There are several parameters within Retro AS-1 and the computer that will affect CPU performance and polyphony.

> NOTE: Chapter 5 contains detailed descriptions of all the Retro AS-1 control panel parameters.

Retro AS-1 Variables

- Retro AS-1 Control Panel Maximum CPU %: Increase the value to increase polyphony. How high you can go depends on your CPU speed and other applications you are running concurrently. If you are using Retro AS-1 "stand-alone" without other applications, you can crank it up to 60%. You can't go to 100% because the operating software needs some CPU also.

- Retro AS-1 Control Panel Sample Rate: Decrease the value to increase polyphony. Sometimes you don't need or want the crisp highs that a higher sample rate provides. 22050Hz is perfectly adequate for many applications. You can go down to 8000Hz.

IMPORTANT! (Mac OS only) Make sure the sample rate set in the Retro AS-1 control panel matches the Sound Manager setting. Otherwise, additional processing will be required by the Sound Manager for sample rate conversions.

- Retro AS-1 Control Panel Buffer Length: Increase the value to increase polyphony. This parameter can affect the note-on to sound-out response time (latency). If you are not playing the synth "live" (for example, you are using a sequencer and the notes are already input), you could increase this value.

IMPORTANT! The Sample Rate and Buffer Length settings affect not only the frequency response and latency, but also the resolution of the voicing parameters. Changing the Sample Rate and Buffer Length settings can affect the sound of a program. For best results, voice your programs with the same Sample Rate/Buffer Length settings that you intend to use them with.

- Retro AS-1 Editor Programs: Turn off unnecessary parameters to increase polyphony. Oscillators, filters, modulation routings, and effects all require CPU processing. Always disable unused oscillators, filters, and effects in a program. Delete modulation routings and modulators if they are not necessary for the sound. Set the FM & CM menus to None if the FM/CM Amount is zero.

Mac OS Variables

There are several factors within the Macintosh operating system that require CPU processing and may affect performance as well.

- Virtual Memory: Virtual Memory and similar memory allocation utilities usually degrades performance in many applications, and can cripple Retro AS-1. We strongly recommend you turn off VM in the Memory control panel and reboot. The synth engine itself requires about 6mb of available system RAM to launch.

- AppleTalk: Turn off AppleTalk in the Chooser unless you need to be actively on a network. The 'Warn about AppleTalk' checkbox in the Retro AS-1 control panel is useful as a reminder when AppleTalk is on.

- Control Panels and Extensions: Many system components use background CPU processing. Disable unnecessary Control Panels and Extensions using the Extensions Manager control panel or 3rd party utility and reboot. The only absolutely required extensions for Retro AS-1 in system 7.6.1 or higher is Shared Library Manager and Shared Library Manager PPC.

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- Retro AS-1/Sound Manager sample rate conflict: Additional CPU processing is required by the Sound Manager for sample rate conversions if the Sound Manager setting doesn't match the Retro AS-1 setting. Chapter 2 explains how to set the Sound Manager sample rate.

- Hardware: Buy a faster computer. Ya, easy for us to say…

Windows 95 Variables

There are several factors within the Windows 95 operating system that require CPU processing and may affect performance as well.

- System extensions: Many system components (such as system monitors) use background CPU processing. Tiny icons at the right end of the Taskbar sometimes represent active system-level items. Disable unnecessary system extensions and reboot.

- Microsoft PLUS! for Windows 95: This system add-on for Windows 95 WILL degrade Retro AS-1 performance, including inducing noise, clicks, and pops. We strongly recommend de-installing Microsoft PLUS! if using Retro AS-1.

- Hardware: Buy a faster computer. Ya, easy for us to say…

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Appendix C: Troubleshooting

Sound Problems

Symptom: No sound output.

Cause: Monitoring system problem.

Fix: Check connections and monitor system volume.

Cause: Sound Manager output level muted or set to zero.

Fix: Increase the Sound Out level in the Sound or Monitors and Sound control panel. See chapter 2 for details.

Cause: Synth engine can't load sound programs.

Fix: Place the Retro AS-1 Programs folder or its alias with exact name 'Retro AS-1 Programs' at root level of System Folder, or reinstall factory sounds with the Retro AS-1 Installer.

Cause: MIDI Input problem.

Fix: Check MIDI connections and controller settings. Verify Port menu setting within the Retro AS-1 MIDI Input applications. Very synth engine is functioning by using the Retro AS-1 Keyboard application.

Symptom: Poor sound quality.

Cause: The Sample Rate setting in the Retro AS-1 control panel is set too low.

Fix: Increase the Sample Rate setting. See Chapter 5 for details.

Cause: The Buffer Length setting in the Retro AS-1 control panel is set too high.

Fix: Decrease the Buffer Length setting. See Chapter 5 for details.

Cause: The Sample Rate setting in the Sound Manager control panel is set too low.

Fix: Increase the Sound Manager sample rate setting. See Chapter 2 for details.

Cause: The Sound Out level in the Sound or Monitors and Sound control panel is not set to maximum.

Fix: Increase the Sound Manager output level. See Chapter 2 for details.

Cause: Poor quality monitoring system.

Fix: Use good quality headphones or amplifier/speaker combination.

Symptom: Sound output is choppy, stutters, and/or cuts out.

Cause: CPU is overloaded by requesting too many notes.

Fix: Play less notes and/or modify the configuration settings in the Retro AS-1 control panel. See Chapter 5 for details.

MIDI & Input Problems

Symptom: 'Port is in use by another application' window when launching the Serial/OMS/FreeMIDI Input applications.

Cause: It's really true...

Fix: Select a different serial port or quit the application(s) using the requested port. Sometimes it's not obvious what is using the port. Fax and modem software, AppleTalk, OMS, and FreeMIDI are the most common culprits. Often, merely turning off the software is not enough to release the port(s); you may need to disable its associated extensions and reboot. Disabling AppleTalk does not release the printer port; you need to "unload" AppleTalk by rebooting the system after it is disabled.

Symptom: 'This Macintosh does not have the hardware required to support the Serial DMA driver' window when launching Retro AS-1 Serial Input.

Cause: The Serial (Built-in) library file is not in your Extensions folder.

Fix: This is the Mac OS Serial DMA support file. Install/enable the file and reboot.

Cause: Your Mac OS system does support direct memory access to the serial port(s).

Fix: Use OMS or FreeMIDI in conjunction with Retro AS-1 OMS/FreeMIDI Input and Retro AS-1 OMS/FreeMIDI Drivers. See Chapter 4 for more information.

Symptom: Poor "live play" response time (latency).

Cause: Virtual Memory is on.

Fix: Turn of Virtual Memory in the Memory control panel and reboot.

Cause: Buffer Length setting is too high.

Fix: Decrease the Buffer Length setting. See Chapter 5 for details.

Symptom: Can't select Retro AS-1 as destination in OMS/FreeMIDI applications.

Cause: The Retro AS-1 OMS/FreeMIDI Drivers have not been configured.

Fix: Configure the Retro AS-1 MIDI Drivers using the instructions in Chapter 4.

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Symptom: Double note triggers; flanged/chorused sound with effects off.

Cause: The Retro AS-1 OMS or Retro AS-1 FreeMIDI Input applications are open at the same time as an OMS/FreeMIDI application.

Fix: Retro AS-1 OMS/FreeMIDI Input are used ONLY when OMS/FreeMIDI applications are NOT open. Quit the MIDI application(s) or use the MIDI application's "Play Through" feature to trigger the synth instead.

Polyphony Problems

Symptom: Suddenly performance is poorer than previously experienced.

Cause: Another application is hogging the CPU.

Fix: Increase the CPU % setting in the Retro AS-1 control panel and restart the synth. See Chapter 5 for more information.

Symptom: MIDI applications are sluggish (poor timing, slow screen redraws, etc.) when Retro AS-1 is active.

Cause: Retro AS-1 is hogging the CPU.

Fix: Decrease the CPU % setting in the Retro AS-1 control panel and restart the synth. See Chapter 5 for more information.

Symptom: There is simply not enough polyphony.

Cause: Retro AS-1 is complex, CPU-hungry software.

Fix: Optimize system configuration settings and program voicing parameters. See Appendix B for more information.

Retro AS-1 Application Problems

Symptom: 'Can't connect to synthesizer' when launching Retro AS-1 applications.

Cause: Not enough available RAM. There must be enough free RAM for Retro AS-1 application(s) and the synthesizer engine. The synth engine itself requires approximately 6 MB RAM.

Fix: Quit unused applications and/or reduce system size by eliminating unnecessary components. If it appears you have plenty of memory available, your RAM may be fragmented. Reboot to defragment RAM.

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Symptom: Changing a parameter in the Editor has no effect.

Cause: The parameter is being controlled by a modulator.

Fix: Decrease the modulation routing amount for the destination. Here's an example. If the filter 1 cutoff parameter on the main page has no effect, go to the modulation page. A modulation routing probably has Filter 1 cutoff as a destination. Select the routing in the list then lower the value of the modulation Amount slider.

Symptom: The Global Effects don't sound or behave erratically.

Cause: The Global Effects settings in the Retro AS-1 control panel aren't configured the way you want.

Fix: Change the Global Effects setting in the control panel. See Chapter 5 for details.

Symptom: Can't control a modulation routing "initial amount" when using a continuous controller assigned to that modulator's destination amount.

Cause: A continuous controller's range is between zero and the destination amount.

Fix: Add another modulation routing.

Symptom: Can't hear sounds being modified in the Editor when using the MIDI Processor, Keyboard or Mixer.

Cause: The Processor, Keyboard and Mixer load sounds from disk but the Editor sound is in RAM.

Fix: Select Editor from the Bank and Program pull down menus in the Retro AS-1 applications.

Symptom: MIDI program change commands select the wrong sounds when the MIDI Processor is active.

Cause: When the MIDI Processor is active, program change commands select Setups instead of programs.

Fix: Quit the MIDI Processor or disable the "MIDI Program Change Selects Setup" option in the MIDI Processor Preferences window.

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Appendix D: Using Digidesign Direct IO

This appendix applies to the Mac OS only. It explains how Retro AS-1 works with Digidesign's Direct IO v2.1 software interface.

Overview

Direct IO is Digidesign's software interface that allows third-party developers (such as BitHeadz) to develop drivers for accessing Digidesign audio hardware. Retro AS-1 output is normally sent to a disk file or the Sound Manager, where it is processed to match the Sound/Monitors and Sound control panels settings then sent to the audio outputs. Using the Direct IO settings in the Retro AS-1 control panel, the Sound Manager can be bypassed altogether if a Digidesign audio card is installed.

> Note: any digital audio card can be used for Retro AS-1 output if the card is supplied with a Sound Manager driver.

One advantage of using Direct IO is separate Retro AS-1 MIDI channels can be routed to individual audio outputs!

Components Required for Direct IO support

1. Digidesign PCI digital audio card (Nubus is not supported)
2. Digisystem INIT extension version 3.3 or higher
3. Retro AS-1 version 1.11 or higher

Configuring Retro AS-1 for use with Direct IO

1. Verify the Digidesign hardware is working correctly before configuring Retro AS-1. Consult the documentation that came with the hardware.

2. Open the Retro AS-1 control panel.

3. Select Direct IO from the Audio Output pull-down menu.

The Direct IO menu and Setup button appear If Direct IO is grey and unavailable for selection, verify the audio card and Digisystem Init version 3.3 or higher are properly installed.
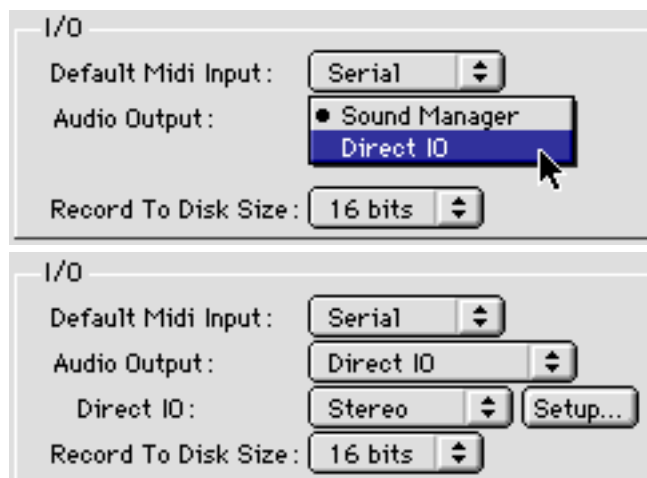
Figure D1. After selecting Direct IO in the Retro AS-1 control panel, the Direct IO parameters appear.

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**4. Click the Direct IO Setup...
button.**

The Digidesign Hardware Setup
dialog appears.

**5. Confirm your hardware
settings (modify if necessary),
then click Done.**

**6. Select Stereo or Individual
mode from the Direct IO
menu.**

See details in the next section.

**7. Close the Retro AS-1 control
panel, saving the new
settings.**

Retro AS-1 is now configured to bypass the Sound Manager and
use the Digidesign hardware for output instead.
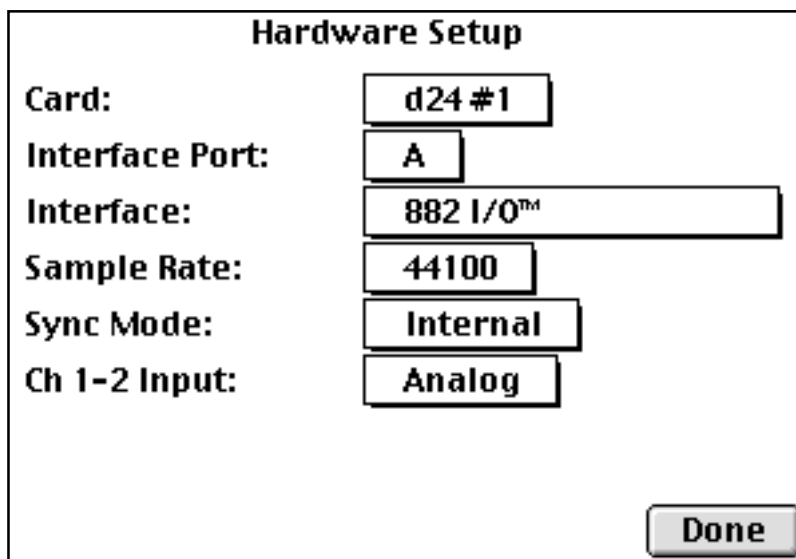
Figure D3. The Direct IO
Hardware Setup window.

How It Works

Retro AS-1 has two modes of operation when used with Direct IO:
Stereo and Individual. The mode used is determined by the Direct IO
Stereo/Individual menu in the Retro AS-1 control panel. Each mode is
described below.

Stereo Mode

When Stereo mode is selected, the Retro AS-1 stereo output is sent to
all stereo pairs, including digital outputs, simultaneously. On
Audiomedia III cards, the analog and digital outputs carry the same
signal. On 8-channel audio interfaces, outputs $1+2$, $3+4$, $5+6$, $7+8$,
and the digital outs act as stereo pairs. They all carry the same signal.

Using stereo mode maintains the ability to use MIDI Pan commands
per MIDI channel and the stereo Global Effects processors.

Individual Mode

When Individual mode is selected, Retro AS-1
MIDI channels are "hard wired" to the
corresponding Digidesign audio outputs. For
example, if you have an 8-channel audio
interface, Retro AS-1 MIDI channel 1 output is
sent to audio output 1; MIDI channel 2 is sent to
audio output 2, and so forth.
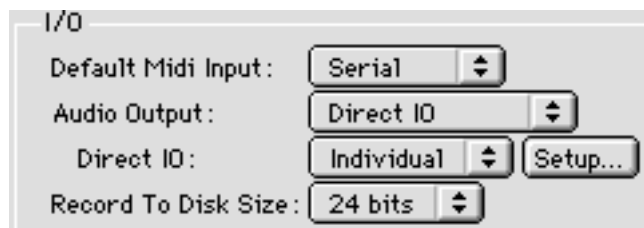
Figure D4. When Individual
mode selected, each MIDI
channel is routed to a separate
audio output.

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When using Individual mode with an Audiomedia III card, the analog outputs correspond to MIDI channels 1 and 2; the digital outputs correspond to MIDI channels 3 and 4.

When using Individual mode with an 8-channel audio interface, the analog outputs correspond to MIDI channels 1 through 8; the AES/EBU digital outputs also correspond to MIDI channels 1 through 8. If you have an 882 or similar audio interface that has only 2 channels of SP/DIF digital output, MIDI channels 1 + 2 are sent to the digital output.

When using individual mode, only MIDI channels 1-8 are supported. Channels 9-16 will have no output. Additionally, the stereo Global Effects processors cannot be heard in individual mode. This is due to architectural limitations. When in individual mode, we recommend disabling the Global Effects processors in the Retro AS-1 control panel to conserve CPU processing.

Another Important Note

"Live play" response time (latency) may actually be greater when using Direct IO. This is because the note-on to sound-out latency is partially determined by the buffer length, which is (in simple terms) how often Retro AS-1 sound is passed to the output. The buffer length is variable in the Sound Manager, and the Buffer Length setting in the Retro AS-1 control panel can be set to as little as 32, meaning that the synth output is passed to the Sound Manager every 32 samples (smaller buffer length = less latency). However, Digidesign has a locked buffer length value in Direct IO that is fixed at 512 samples. As of this writing, Digisystem Init version 3.4 is in testing. Version 3.4 has a buffer length of 256, effectively halving the latency. Check Digidesign's web site at www.digidesign.com for the latest versions of their software.

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Appendix E: Analog Synthesis Demystified

This appendix explains some analog synthesis basics. It is intended for people just getting started with synthesizers and electronic music.

Concepts

The humble beginnings of analog synthesis began with huge systems consisting of dozens of various components. Each component "module" performed a different electronic function (such as oscillator, filter, amplifier, etc.) and had a signal input and output ("I/O") jack. Using dozens of individual signal cables, the synthesist would manually connect ("patch") multiple modules together then tweak the module settings to produce a particular audio result. Thus modular analog synthesis was born. To this day, a modern synthesizer program is still referred to as a patch.

While the quality and variety of sounds these systems could produce was truly mind-boggling, they were not embraced by the typical musician because they were expensive, non-portable, and it was difficult to coax a usable sound out of them without an advanced knowledge of audio acoustics theory.

Then Bob Moog realized that if he selected the most common modules, "hard wired" the most common signal routings, and put it all in a rugged, portable enclosure with a voltage controller that acted like a piano keyboard, musicians would be able to bring electronic music to the masses. Thus the MiniMoog was born.

These early machines all relied on a process called subtractive synthesis. Since those times, synthesis has evolved to include many types of sound creation and manipulation including additive, frequency modulation ("FM"), sample playback ("wavetable"), physical modeling, granular, various combinations thereof, and more.

Subtractive synthesis came to be known as "analog" synthesis because the signals in the modules used analog (as opposed to digital) electrical components. Retro AS-1 uses analog synthesis as its model for sound creation. The following sections provide some details about this process.

The Building Blocks

Explanation of signal flow in the subtractive synthesis model is more easily digested if broken down into explanations of the basic modular components.

Oscillators

The primary building block of analog synthesis is the oscillator. An oscillator is the only part of the process that actually generates a sound. The purpose of all the other modules is to modify the signal from the oscillator.

Retro AS-1 produces five primary waveforms shapes: sawtooth, pulse, triangle, sine, and noise. However, an extremely wide range of waveform shape variations can be generated. The Symmetry control modifies the basic shape. By modulating an oscillator with itself or another oscillator using Sync (forcing a waveform to begin its cycle prematurely) and FM emulation (modulating the frequency of a waveform with a different frequency), more complex shapes can be generated. Each waveform has its own sound due to its unique harmonic overtone structure.

Retro AS-1 allows up to three oscillators to be used per program. Each can have its own shape, modulation(s), filter routings, etc.

Filters

Filters are a major building block in synthesis, and arguably affect the sound quality more than any other process. Filters work by removing (subtracting) harmonic content from a waveform, resulting in a different shape and therefore a different sound. This is how subtractive synthesis got its name.

There are lots of different filter types, and each creates a different tone ("timbre"). Although the filter types behave differently, they all share two characteristics called the filter cutoff frequency and slope.

Slope determines how "steep" a filter is, or in other words, how much harmonic content is removed in relation to the cutoff frequency. The cutoff frequency is the point in the frequency spectrum where filtering begins to take affect. In a lowpass filter, frequencies above the cutoff frequency are "rolled off" at a rate determined by the slope. A higher cutoff frequency will provide a brighter sound because higher frequencies are allowed to pass. The terms 1 Pole, 2 Pole, and 4 Pole are referring to different filter slopes.

Some filter types have resonance, where the filter output is routed back to the filter input. This changes the shape of the frequency response curve, and therefore the resulting waveform output. Resonance is what enables the whistling, chirpy quality common in so many analog programs.

Retro AS-1 provides seven filter types to enable a wide range of sonic possibilities. Up to two filters can be used per program. One, two, or all three oscillators can be routed through one or both filters. Each filter can accept input from the other filter, allowing for serial or parallel filtering effects. This can effectively double the available filter slope, for up to 48 decibels (db) per octave of filter roll-off. Our filters can be overdriven for distortion, and be made to self-oscillate with resonance. And all filter controls are available as a modulation destination for dynamic timbre changes over time. You will find many new ways to create rich new textures with the Retro AS-1 filters.

Modulation

Modulation is the "juice" of creative sound design in synthesis. Modulation is what makes a static, unchanging sound come to life by modifying the timbre and amplitude (volume) of a sound dynamically over time or with MIDI performance controls such as the Mod wheel or aftertouch.

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Modulation begins with a modulation source. A modulation source can be a low frequency oscillator ("LFO"), contour control ("envelope"), MIDI controllers such as velocity, mod wheel, aftertouch, and breath control, or even another parameter's output such as an oscillator or filter.

After choosing a modulation source, a modulation destination is selected. A modulation destination can be almost any other parameter, such as volume, filter cutoff, oscillator pitch, or whatever. This process completes the modulation routing ("patch") that connects the source to the destination.

The modulation routing will not have any effect until the modulation amount is set. The modulation amount determines just how much modulation will take place. For example: In a routing with LFO to pitch, a small modulation amount produces a bit of vibrato with a range close to the original pitch. A large modulation amount produces wild pitch sweeps that could range over an octave or more.

Modulation Amount Interaction

Modulation amounts are a bit more complicated (or flexible, depending on your perspective!). How a modulation amount responds depends upon the initial parameter setting. The modulation amount value is in most cases summed (added) to the existing value of the modulation destination.

Here is an example. In Retro AS-1, let's say the filter 1 cutoff value on the Editor main page is set to 50 (this is known as the "initial amount"). If a modulation routing destination is set to filter 1 cutoff with a modulation amount of 50, the resulting filter cutoff would be 100 (initial amount of 50 + destination amount of 50 = 100). If the initial filter cutoff amount on the main page is set to 75 and the modulation amount is set to -50, the resulting filter cutoff would be 25 (75–50 = 25). Therefore, for a modulation routing to have any effect, the initial amount of the modulation destination (in this example the filter 1 cutoff value on the main page) must be less than its maximum possible setting (100) for a positive modulation amount value. Conversely, the initial amount of the modulation destination must be more than its minimum possible setting (0) for a negative modulation amount value.

The total resulting parameter value (initial amount plus modulation amount) can never exceed the maximum possible initial amount for a parameter. For example, if the initial filter 1 cutoff amount on the main page is set to 50 and a modulation routing destination is set to filter 1 cutoff with an amount of 75, the resulting filter 1 cutoff value would only be 100 (not 125) because 100 is the maximum possible setting for filter 1 cutoff.

Modulation Recapitulation

To make modulation happen there must be:

1. A modulation source.
2. A modulation destination.
3. A modulation amount.

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The modulation rules:

1. The initial amount of the modulation destination must be less than its maximum possible setting for a positive modulation amount, or more than its minimum possible setting for a negative modulation amount.

2. The total parameter amount (initial amount plus modulation amount) can never exceed the maximum possible initial amount for the parameter.

In Retro AS-1, we call modulation sources Modulators, and they are created and modified in the Modulators section on the right hand side of the Editor modulation page. Modulation destinations and amounts are set in the Routings section on the left hand side of the Editor modulation page.

Retro AS-1 allows extremely powerful and flexible modulations. You can have one modulator go to multiple destinations, one destination can have multiple modulators, and a modulator can modulate another modulators' amount. The number of modulators and routings is limited only by CPU processing capability.

Effects

Effects processing can have a profound result on a sound, often becoming critical to the character of the program. In the early years, effects were limited to signal routing and filtering tricks. With today's fancy computers, complex equalizers and time-based effects such as delay and reverb have become the norm.

Retro AS-1 features four effects processors. The two monophonic insert processors are placed in series (one after the other) after the filter but before the output. Each program can have two different serial effects active, and if the synth is used multi-timbrally (different programs on different MIDI channels concurrently), each program maintains its own settings.

The two Global processors are placed in parallel at the stereo mixer. If the synth is used multi-timbrally, the parallel effects process all the programs on different MIDI channels with the same effect settings. This is how effects processors are typically used with a mixing console. In Retro AS-1, the global effects processors are true stereo, with stereo inputs and outputs.

Output

Finally, the synthesizer signals output signals are summed by a mixer and sent to the output. In Retro AS-1, the stereo output is routed to the Sound Manager, Direct IO (Mac OS only), or a disk file.

The Sound Manager is the component of the Mac OS that controls the audio output hardware. The Sound Manager delivers the digital signal to the digital-to-analog converters ("DAC") then to the audio output jack, where you connect your audio inputs such as headphones or a stereo system.

Direct IO is a software "middleman" system made by Digidesign (a manufacturer of digital audio hardware and software) that allows third-party software companies (such as BitHeadz) to communicate with Digidesign hardware. With a Digidesign digital audio card and Direct IO, the Sound Manager is bypassed altogether, and the higher-fidelity analog and digital outputs of the audio card are used instead.

Using Record To Disk, the synthesizer output goes straight to a disk file in the Audio Interchange File Format, which can then be used for audio CD's or loaded into digital audio and multimedia applications for additional processing without ever being converted to the analog domain.

Hang In There!

Synthesis is complex and can be complicated at first. However, the reward of mastering the fundamental concepts is the ability to create a desired sound by knowing what controls to tweak instead of just trial and error. You can learn a lot by experimentation and examining the settings of the factory programs.

A synthesizer is unique for its ability to manifest sounds that can create a powerful mood with just one note. We hope Retro AS-1 will help you define your own sonic signature!

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Appendix F: MIDI Implementation

I. The Official MIDI Implementation Chart

Product Name:	Retro AS-1	by BitHeadz, Inc.	Version 1.10	Date: 6/12/98
FUNCTION		**TRANSMITTED**	**RECOGNIZED**	**REMARKS**
Basic Channel	Default	X	1-16	Always in Mode 3
	Changed	X	1-16	(Omni Off, Poly)
Mode	Default	X	Mode 3	
	Messages	X	X	
	Altered	N/A	X	
Note Number		X	0-127	
	True Voice	N/A	0-127	
Velocity	Note On	X	O	
	Note Off	X	X	
Aftertouch	Key's (poly)	X	O	
	Channel (mono)	X	O	
Pitch Bend		X	O	
Control Change		X	O	Full listing in this section
Program Change		X	O	MIDI Bank Change
	True Number	N/A	0-127	Commands are supported
System Exclusive		X	O	Full listing in this section
System Common	Song Position	X	X	
	Song Select	X	X	
	Tune Request	X	X	
System Realtime	Clock	X	O	Delay FX, LFO, &
	Commands	X	X	arppegiator times can sync to MIDI Clock
Aux Messages	Local On/Off	X	X	
	All Notes Off	X	O	Also All Sound Off,
	Active Sensing	X	X	Controller 120
	System Reset	X	O	
Notes:	O = Yes X = No N/A = Not Applicable	BitHeadz SysEx ID Number: 278 (Decimal) 0120 (Hex)		Full control of all voicing parameters via MIDI Non-Registered Parameter Numbers ("NRPN's")

II. Supported MIDI Control Numbers

Advanced MIDI knowledge is not required to use the MIDI Controller implementation; this is a "decimal situation." There are no fancy tricks here, just basic controller commands that are implemented in most modern MIDI controllers and software.

Example MIDI Control commands

• First, send the controller number of the parameter you want to change.

• Second, send the controller value. That's it!

Two Real-World Examples

Change Master Volume

• Send controller number 7 with value of 0-127. Done!

Change Oscillator 1 Volume

• Send controller number 70 with value of 0-127. Done!

The MIDI Controllers

Value Parameter

0	bank select high	85	open sound in Editor	**Assignable Pedal**	
6	data entry high	91	effects 1 depth	64	sustain pedal
7	volume	92	effects 2 depth	65	portamento on/off
10	pan	96	data increment	66	sostenuto
16	Controller A	97	data decrement	67	soft pedal
17	Controller B	98	non-registered parameter lsb	68	legato footswitch
18	Controller C	99	non-registered parameter msb	69	hold 2
19	Controller D	120	all sound off		
20	mute	121	reset controllers		
21	solo	123	all notes off		
32	bank select low				
38	data entry low	**Assignable Controllers A/B/C/D**			
64	sustain pedal	1	modulation wheel		
70	osc 1 volume	2	breath control		
71	osc 2 volume	4	foot control		
72	osc 3 volume	11	expression controller		
73	filter 1 cutoff				
74	filter 1 resonance				
75	filter 2 cutoff				
76	filter 2 resonance				
77	envelope 1 attack				
78	envelope 1 decay				
79	envelope 1 release				

NOTES:
1. Assignments for Controllers A/B/C/D and Pedal are set in the Retro AS-1 control panel.
2. For Pedal controller numbers 64 through 69, a value of 0-64 = off. A value of 65-127 = on.

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III. System Exclusive Commands

Master Volume	($F0 $7F $00 $04 $01 $VL $VH $F7)
Master Balance	($F0 $7F $00 $04 $02 $VL $VH $F7)
Master Global 1	($F0 $00 $01 $20 $00 $00 $00 $VL $VH $F7)
Master Global 2	($F0 $00 $01 $20 $00 $00 $01 $VL $VH $F7)
Master Left	($F0 $00 $01 $20 $00 $01 $00 $VL $VH $F7)
Master Right	($F0 $00 $01 $20 $00 $01 $01 $VL $VH $f7)

VL = Value Low (lsb)
VH = Value High (msb)

IV. Non-Registered Parameter Numbers ("NRPNs")

This is the serious "low level" MIDI section. If you can understand and implement NRPNs, consider yourself graduated with Honors from DSEMH, the Distinquished School of Electronic Music Hacks!

We chose to implement extensive MIDI control with NRPNs as opposed to MIDI System Exclusive because NRPN commands are MIDI channel-specific. Using NRPNs enable you to control the programs on each separate MIDI channel simultaneously.

Notes about NRPN control

• Parameter number selections are divided into two 7-bit controller values, msb and lsb.
NRPN Controller 99 value is the PARAMETER NUMBER MSB.
NRPN Controller 98 value is the PARAMETER NUMBER LSB.

• Parameter value selections are divided into two 7-bit controller values, msb and lsb.
NRPN Controller 06 value is the PARAMETER VALUE MSB.
NRPN Controller 38 value is the PARAMETER VALUE LSB.

• On/Off parameters are controlled as value 0 ($00 $00) = Off,and value 1 ($00 $01) = On
Examples: Oscillator and Filter On/Off buttons.

• Pop-up menus and radio buttons with more than one value are controlled as value 0 ($00 $00) = 0, value 1($00 $01) = 1, and so forth.
Examples: Waveform shapes, filter types, modulator types, etc.

• Slider values can be positive, or positive and negative in the case of modulation routing amounts.
Positive slider values range from 0 ($00 $00) to 100 ($7F $7F).
Bipolar slider values range from -100 ($00 $00) to100 ($7F $7F); a zero value is ($40 $00).
($40) = 64 decimal
NOTE: User interface values range from -100 to 100. The synth engine internally uses floating point values from –1.0 to +1.0

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NRPNs, continued

Example MIDI Byte Command Strings

4 MIDI command strings of 3 bytes each are required.

First, send the "parameter number" hex commands:

($B0 $63 $PH)   Controller 99 (nrpn msb), then parameter number msb

($B0 $62 $PL)   Controller 98 (nrpn lsb), then parameter number lsb

Then, send the "parameter value" hex commands:

($B0 $06 $VH)   Controller 6 (data slider msb), then parameter value msb

($B0 $26 $VL)   Controller 38 (data slider lsb), then parameter value lsb

Some definitions

hex = hexadecimal

PH = parameter high (msb) in hex

VH = value high (msb) in hex

PL = parameter low (lsb) in hex

VL = value low (lsb) in hex

($B0 $63) = controller 99 (nrpn msb) in hex

($B0 $62) = controller 98(nrpn lsb) in hex

($B0 $06) = controller 6 (data slider msb) in hex

($B0 $26) = controller 38 (data lsb) in hex

msb = most significant bit

lsb = least significant bit

($B0 $63 $00) = standard hex nomenclature for 3 bytes (Leave out $ in the actual byte transmission)

Some "Real-World" NRPN Examples

SET FILTER 1 RESONANCE TO 50

In Hex:

($B0 $63 $00)   Controller 99 (nrpn msb), then Filter 1 Resonance msb (from Table 1)

($B0 $62 $2C)   Controller 98 (nrpn lsb), then Filter 1 Resonance lsb (from Table 1)

($B0 $06 $40)   Controller 6 (data slider msb), then msb of value 64

($B0 $26 $00)   Controller 38 (data slider lsb), then lsb of value 0

In decimal:

First, send controller 99, value = 0 (the nrpn msb from Table 1)

Next, send controller 98, value = 44 (the nrpn lsb from Table 1)

Next, send controller 6, value = 64 (the value msb)

Next, send controller 38, value = 0 (the value lsb)

CHANGE OSCILLATOR THREE WAVEFORM TO PULSE

In Hex:

($B0 $63 $00)   Controller 99 (nrpn msb), then Oscillator 3 Type msb from Table 1
($B0 $62 $19)   Controller 98 (nrpn lsb), then Oscillator 3 Type lsb from Table 1
($B0 $06 $00)   Controller 6 (data slider msb), then msb of value 2 from Table 2
($B0 $26 $02)   Controller 38 (data slider lsb), then lsb of value 2 from Table 2

In decimal:

First, send controller 99, value = 0 (the nrpn msb) from Table 1
Next, send controller 98, value = 25 (the nrpn lsb) from Table 1
Next, send controller 6, value = 0 (the value from Table 2 msb)
Next, send controller 38, value = 2 (the value from Table 2 lsb)

CHANGE MODULATION ROUTING #4 AMOUNT TO -75

In Hex:

($B0 $63 $18)   Controller 99 (nrpn msb), then Routing Amount msb from Table 13
($B0 $62 $3C)   Controller 98 (nrpn lsb), then Routing Amount lsb from Table 1
($B0 $06 $10)   Controller 6 (data slider msb), then msb of value -75
($B0 $26 $00)   Controller 38 (data slider lsb), then lsb of value -75

In decimal:

First, send controller 99, value = 24 (the nrpn msb) from Table 13
Next, send controller 98, value = 60 (the nrpn lsb) from Table 1
Next, send controller 6, value = 16 (the value msb)
Next, send controller 38, value = 0 (the value lsb)

The NRPN Tables

The NRPN reference tables begin on the next page. The first column is the parameter number or value in decimal. The second column (in parenthesis) contains the msb and lsb of the parameter or value in decimal. The third column (in paranthesis, with dollar sign) contains the msb and lsb parameter or value number in hexadecimal. The fourth column is the name of the parameter or value.

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TABLE 1
PARAMETER NUMBER VALUES

00   (000 000)   ($00 $00)   None

-

[OSCILLATORS]
01   (000 001)   ($00 $01)   Osc 1 Enable, 0 = off, 1 = on
02   (000 002)   ($00 $02)   Osc 1 Keyboard Track, 0 = off, 1 = on
03   (000 003)   ($00 $03)   Osc 1 Type, value from Table 2
04   (000 004)   ($00 $04)   Osc 1 Sync Source, value from Table 3
05   (000 005)   ($00 $05)   Osc 1 FM Source, value from Table 3
06   (000 006)   ($00 $06)   Osc 1 Coarse Tune
07   (000 007)   ($00 $07)   Osc 1 Fine Tune
08   (000 008)   ($00 $08)   Osc 1 Random
09   (000 009)   ($00 $09)   Osc 1 Symmetry
10   (000 010)   ($00 $0A)   Osc 1 FM Amount
11   (000 011)   ($00 $0B)   Osc 1 Volume

-

12   (000 012)   ($00 $0C)   Osc 2 Enable, 0 = off, 1 = on
13   (000 013)   ($00 $0D)   Osc 2 Keyboard Track, 0 = off, 1 = on
14   (000 014)   ($00 $0E)   Osc 2 Type, value from Table 2
15   (000 015)   ($00 $0F)   Osc 2 Sync Source, value from Table 3
16   (000 016)   ($00 $10)   Osc 2 FM Source, value from Table 3
17   (000 017)   ($00 $11)   Osc 2 Coarse Tune
18   (000 018)   ($00 $12)   Osc 2 Fine Tune
19   (000 019)   ($00 $13)   Osc 2 Random
20   (000 020)   ($00 $14)   Osc 2 Symmetry
21   (000 021)   ($00 $15)   Osc 2 FM Amount
22   (000 022)   ($00 $16)   Osc 2 Volume

-

23   (000 023)   ($00 $17)   Osc 3 Enable, 0 = off, 1 = on
24   (000 024)   ($00 $18)   Osc 3 Keyboard Track, 0 = off, 1 = on
25   (000 025)   ($00 $19)   Osc 3 Type, value from Table 2
26   (000 026)   ($00 $1A)   Osc 3 Sync Source, value from Table 3
27   (000 027)   ($00 $1B)   Osc 3 FM Source, value from Table 3
28   (000 028)   ($00 $1C)   Osc 3 Coarse Tune
29   (000 029)   ($00 $1D)   Osc 3 Fine Tune
30   (000 030)   ($00 $1E)   Osc 3 Random
31   (000 031)   ($00 $1F)   Osc 3 Symmetry
32   (000 032)   ($00 $20)   Osc 3 FM Amount
33   (000 033)   ($00 $21)   Osc 3 Volume

[FILTERS]
Note: Depending on Filter Type selection, some parameters will not be active.

34   (000 034)   ($00 $22)   Filter 1 Enable, 0 = off, 1 = on
35   (000 035)   ($00 $23)   Filter 1 Type, value from Table 4
36   (000 036)   ($00 $24)   Filter 1 CM Source, value from Table 3
37   (000 037)   ($00 $25)   Filter 1 Input Osc 1, 0 = off, 1 = on
38   (000 038)   ($00 $26)   Filter 1 Input Osc 2, 0 = off, 1 = on
39   (000 039)   ($00 $27)   Filter 1 Input Osc 3, 0 = off, 1 = on
40   (000 040)   ($00 $28)   Filter 1 Input Filter 2, 0 = off, 1 = on
41   (000 041)   ($00 $29)   Filter 1 Cutoff
42   (000 042)   ($00 $2A)   Filter 1 Spread

43   (000 043)   ($00 $2B)   Filter 1 CM Amount
44   (000 044)   ($00 $2C)   Filter 1 Resonance
45   (000 045)   ($00 $2D)   Filter 1 Overdrive

-

46   (000 046)   ($00 $2E)   Filter 2 Enable, 0 = off, 1 = on
47   (000 047)   ($00 $2F)   Filter 2 Type, value from Table 4
48   (000 048)   ($00 $30)   Filter 2 CM Source, value from Table 3
49   (000 049)   ($00 $31)   Filter 2 Input Osc 1, 0 = off, 1 = on
50   (000 050)   ($00 $32)   Filter 2 Input Osc 2, 0 = off, 1 = on
51   (000 051)   ($00 $33)   Filter 2 Input Osc 3, 0 = off, 1 = on
52   (000 052)   ($00 $34)   Filter 2 Input Filter 1, 0 = off, 1 = on
53   (000 053)   ($00 $35)   Filter 2 Cutoff
54   (000 054)   ($00 $36)   Filter 2 Spread
55   (000 055)   ($00 $37)   Filter 2 CM Amount
56   (000 056)   ($00 $38)   Filter 2 Resonance
57   (000 057)   ($00 $39)   Filter 2 Overdrive

-

[ROUTINGS]
58   (XXX 058)   ($XX $3A)   Routing Source,
            XX = index from Table 13, value from Table 14
59   (XXX 059)   ($XX $3B)   Routing Destination,
            XX = index from Table 13, value from Table 15
60   (XXX 060)   ($XX $3C)   Routing Amount,
            XX = index from Table 13, value -100 to 100

[MODULATORS]
61   (XXX 061)   ($XX $3D)   Modulator Trigger,
            XX = index from Table 13, value from Table 5

-

62   (XXX 062)   ($XX $3E)   Envelope Attack,
            XX = index from Table 13
63   (XXX 063)   ($XX $3F)   Envelope Decay,
            XX = index from Table 13
64   (XXX 064)   ($XX $40)   Envelope Sustain Level,
            XX = index from Table 13
65   (XXX 065)   ($XX $41)   Envelope Sustain Decay,
            XX = index from Table 13
66   (XXX 066)   ($XX $42)   Envelope Release,
            XX = index from Table 13

-

67   (XXX 067)   ($XX $43)   LFO Type,
            XX = index from Table 13, value from Table 6
68   (XXX 068)   ($XX $44)   LFO Random,
            XX = index from Table 13
69   (XXX 069)   ($XX $45)   LFO Delay, XX = index from Table 13
70   (XXX 070)   ($XX $46)   LFO Speed, XX = index from Table 13
71   (XXX 071)   ($XX $47)   LFO Sync, XX = index from Table 13
72   (XXX 072)   ($XX $48)   LFO Division,
            XX = index from Table 13, value from Table 16

-

73   (XXX 073)   ($XX $49)   Random Filter,
            XX = index from Table 13

-

74   (XXX 074)   ($XX $4A)   Ramp Delay,
            XX = index from Table 13
75   (XXX 075)   ($XX $4B)   Ramp Speed,
            XX = index from Table 13

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[INSERT EFFECTS]
76 (000 076) ($00 $4C) Insert 1 Enable, 0 = off, 1 = on
-
77 (000 077) ($00 $4D) Parametric EQ 1 Frequency
78 (000 078) ($00 $4E) Parametric EQ 1 Q
79 (000 079) ($00 $4F) Parametric EQ 1 Gain
-
80 (000 080) ($00 $50) Shelf EQ 1 Low Frequency
81 (000 081) ($00 $51) Shelf EQ 1 Low Gain
82 (000 082) ($00 $52) Shelf EQ 1 High Frequency
83 (000 083) ($00 $53) Shelf EQ 1 High Gain
-
84 (000 084) ($00 $54) Flange 1 Delay
85 (000 085) ($00 $55) Flange 1 Feedback
86 (000 086) ($00 $56) Flange 1 Speed
87 (000 087) ($00 $57) Flange 1 Depth
88 (000 088) ($00 $58) Flange 1 Mix
-
89 (000 089) ($00 $59) Chorus 1 Delay
90 (000 090) ($00 $5A) Chorus 1 Feedback
91 (000 091) ($00 $5B) Chorus 1 Speed
92 (000 092) ($00 $5C) Chorus 1 Depth
93 (000 093) ($00 $5D) Chorus 1 Mix
-
94 (000 094) ($00 $5E) Phaser 1 Delay
95 (000 095) ($00 $5F) Phaser 1 Amount
96 (000 096) ($00 $60) Phaser 1 Speed
97 (000 097) ($00 $61) Phaser 1 Depth
98 (000 098) ($00 $62) Phaser 1 Mix
-
99 (000 099) ($00 $63) Insert Delay 1 Delay 1
100 (000 100) ($00 $64) Insert Delay 1 Division 1,
    value from Table 16
101 (000 101) ($00 $65) Insert Delay 1 Feedback 1
102 (000 102) ($00 $66) Insert Delay 1 Delay 2
103 (000 103) ($00 $67) Insert Delay 1 Division 2,
    value from Table 16
104 (000 104) ($00 $68) Insert Delay 1 Feedback 2
105 (000 105) ($00 $69) Insert Delay 1 Mix
106 (000 106) ($00 $6A) Insert Delay 1 MIDI Sync,
    0 = off, 1 = on
-
107 (000 107) ($00 $6B) Overdrive 1 Gain
108 (000 108) ($00 $6C) Overdrive 1 Threshold
109 (000 109) ($00 $6D) Overdrive 1 Amount
110 (000 110) ($00 $6E) Overdrive 1 Filter
111 (000 111) ($00 $6F) Overdrive 1 Mix
-
112 (000 112) ($00 $70) Distortion 1 Threshold
113 (000 113) ($00 $71) Distortion 1 Hysterisis
114 (000 114) ($00 $72) Distortion 1 Tone
115 (000 115) ($00 $73) Distortion 1 Mix
-
116 (000 116) ($00 $74) Insert 2 Enable, 0 = off, 1 = on
-
117 (000 117) ($00 $75) Parametric EQ 2 Frequency

118 (000 118) ($00 $76) Parametric EQ 2 Q
119 (000 119) ($00 $77) Parametric EQ 2 Gain
-
120 (000 120) ($00 $78) Shelf EQ 2 Low Frequency
121 (000 121) ($00 $79) Shelf EQ 2 Low Gain
122 (000 122) ($00 $7A) Shelf EQ 2 High Frequency
123 (000 123) ($00 $7B) Shelf EQ 2 High Gain
-
124 (000 124) ($00 $7C) Flange 2 Delay
125 (000 125) ($00 $7D) Flange 2 Feedback
126 (000 126) ($00 $7E) Flange 2 Speed
127 (000 127) ($00 $7F) Flange 2 Depth
128 (001 000) ($01 $00) Flange 2 Mix
-
129 (001 001) ($01 $01) Chorus 2 Delay
130 (001 002) ($01 $02) Chorus 2 Feedback
131 (001 003) ($01 $03) Chorus 2 Speed
132 (001 004) ($01 $04) Chorus 2 Depth
133 (001 005) ($01 $05) Chorus 2 Mix
-
134 (001 006) ($01 $06) Phaser 2 Delay
135 (001 007) ($01 $07) Phaser 2 Amount
136 (001 008) ($01 $08) Phaser 2 Speed
137 (001 009) ($01 $09) Phaser 2 Depth
138 (001 010) ($01 $0A) Phaser 2 Mix
-
139 (001 011) ($01 $0B) Insert Delay 2 Delay 1
140 (001 012) ($01 $0C) Insert Delay 2 Division 1,
    value from Table 16
141 (001 013) ($01 $0D) Insert Delay 2 Feedback 1
142 (001 014) ($01 $0E) Insert Delay 2 Delay 2
143 (001 015) ($01 $0F) Insert Delay 2 Division 2,
    value from Table 16
144 (001 016) ($01 $10) Insert Delay 2 Feedback 2
145 (001 017) ($01 $11) Insert Delay 2 Mix
146 (001 018) ($01 $12) Insert Delay 2 MIDI Sync,
    0 = off, 1 = on
-
147 (001 019) ($01 $13) Overdrive 2 Gain
148 (001 020) ($01 $14) Overdrive 2 Threshold
149 (001 021) ($01 $15) Overdrive 2 Amount
150 (001 022) ($01 $16) Overdrive 2 Filter
151 (001 023) ($01 $17) Overdrive 2 Mix
-
152 (001 024) ($01 $18) Distortion 2 Threshold
153 (001 025) ($01 $19) Distortion 2 Hysterisis
154 (001 026) ($01 $1A) Distortion 2 Tone
155 (001 027) ($01 $1B) Distortion 2 Mix
-
[GLOBAL EFFECTS]
156 (001 028) ($01 $1C) Global 1 Enable, 0 = off, 1 = on
157 (001 029) ($01 $1D) Global 1 Send
-
158 (001 030) ($01 $1E) Global Delay 1 Delay 1
159 (001 031) ($01 $1F) Global Delay 1 Division 1
160 (001 032) ($01 $20) Global Delay 1 Feedback 1

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161 (001 033) ($01 $21) Global Delay 1 Delay 2
162 (001 034) ($01 $22) Global Delay 1 Division 2
163 (001 035) ($01 $23) Global Delay 1 Feedback 2
164 (001 036) ($01 $24) Global Delay 1 Filter
165 (001 037) ($01 $25) Global Delay 1 MIDI Sync,
    0 = off, 1 = on
-
166 (001 038) ($01 $26) Reflection 1 Type, value from Table 7
167 (001 039) ($01 $27) Reflection 1 Predelay
168 (001 040) ($01 $28) Reflection 1 Brightness
169 (001 041) ($01 $29) Reflection 1 Length
-
170 (001 042) ($01 $2A) Reverb 1 Type, value from Table 8
171 (001 043) ($01 $2B) Reverb 1 Predelay
172 (001 044) ($01 $2C) Reverb 1 Brightness
173 (001 045) ($01 $2D) Reverb 1 Decay
-
174 (001 046) ($01 $2E) Global 2 Enabled, 0 = off, 1 = on
175 (001 047) ($01 $2F) Global 2 Send
-
176 (001 048) ($01 $30) Global Delay 2 Delay 1
177 (001 049) ($01 $31) Global Delay 2 Division 1
178 (001 050) ($01 $32) Global Delay 2 Feedback 1
179 (001 051) ($01 $33) Global Delay 2 Delay 2
180 (001 052) ($01 $34) Global Delay 2 Division 2
181 (001 053) ($01 $35) Global Delay 2 Feedback 2
182 (001 054) ($01 $36) Global Delay 2 Filter
183 (001 055) ($01 $37) Global Delay 2 MIDI Sync,
    0 = off, 1 = on
-
184 (001 056) ($01 $38) Reflection 2 Type, value from Table 7
185 (001 057) ($01 $39) Reflection 2 Predelay
186 (001 058) ($01 $3A) Reflection 2 Brightness
187 (001 059) ($01 $3B) Reflection 2 Length
-
188 (001 060) ($01 $3C) Reverb 2 Type, value from Table 8
189 (001 061) ($01 $3D) Reverb 2 Predelay
190 (001 062) ($01 $3E) Reverb 2 Brightness
191 (001 063) ($01 $3F) Reverb 2 Decay
-
[GLOBALS]
192 (001 064) ($01 $40) Voice Trigger, value from Table 9
193 (001 065) ($01 $41) Number Of Voices,
    value from Table 10
194 (001 066) ($01 $42) Pitchbend Range
195 (001 067) ($01 $43) Transpose, value from Table 11
196 (001 068) ($01 $44) Pan
197 (001 069) ($01 $45) Volume
198 (001 070) ($01 $46) Portamento Type, value from Table 12
199 (001 071) ($01 $47) Portamento Fingered, 0 = off, 1 = on
200 (001 072) ($01 $48) Portamento Up
201 (001 073) ($01 $49) Portamento Down

TABLE 2
Waveform menu values

0 (000 000) ($00 $00) Sawtooth
1 (000 001) ($00 $01) Triangle
2 (000 002) ($00 $02) Pulse
3 (000 003) ($00 $03) Sine
4 (000 004) ($00 $04) Sine Squared
5 (000 005) ($00 $05) Glottal
6 (000 006) ($00 $06) White Noise
7 (000 007) ($00 $07) Pink Noise
8 (000 008) ($00 $08) Red Noise

TABLE 3
Sync, FM, & CM menu values

0 (000 000) ($00 $00) None
1 (000 001) ($00 $01) Osc 1
2 (000 002) ($00 $02) Osc 2
3 (000 003) ($00 $03) Osc 3
4 (000 004) ($00 $04) Filter 1 In
5 (000 005) ($00 $05) Filter 1 Out
6 (000 006) ($00 $06) Filter 2 In
7 (000 007) ($00 $07) Filter 2 Out

TABLE 4
Filter Type menu values

0 (000 000) ($00 $00) 1 Pole LP
1 (000 001) ($00 $01) 2 Pole LP
2 (000 002) ($00 $02) 4 Pole LP Resonant
3 (000 003) ($00 $03) 1 Pole HP
4 (000 004) ($00 $04) 2 Pole HP
5 (000 005) ($00 $05) 4 Pole HP Resonant
6 (000 006) ($00 $06) 1 Pole AP Resonant
7 (000 007) ($00 $07) 2 Pole AP Resonant
8 (000 008) ($00 $08) 4 Pole AP Resonant
9 (000 009) ($00 $09) State Variable LP
10 (000 010) ($00 $0A) State Variable BP
11 (000 011) ($00 $0B) State Variable BS
12 (000 012) ($00 $0C) State Variable HP

TABLE 5
Trigger menu values

0 (000 000) ($00 $00) Multiple
1 (000 001) ($00 $01) Single
2 (000 002) ($00 $02) Pedal Down
3 (000 003) ($00 $03) Pedal Up
4 (000 004) ($00 $04) Key Up

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TABLE 6
LFO Type menu values

```
0   (000 000)   ($00 $00)   Sine
1   (000 001)   ($00 $01)   Triangle
2   (000 002)   ($00 $02)   Square
3   (000 003)   ($00 $03)   Sawtooth Up
4   (000 004)   ($00 $04)   Sawtooth Down
5   (000 005)   ($00 $05)   Random
```

TABLE 7
Reflection Type values

```
0   (000 000)   ($00 $00)   Sparse
1   (000 001)   ($00 $01)   Diffuse
2   (000 002)   ($00 $02)   Random
3   (000 003)   ($00 $03)   Reverse
```

TABLE 8
Reverb Type values

```
0   (000 000)   ($00 $00)   Room
1   (000 001)   ($00 $01)   Chamber
2   (000 002)   ($00 $02)   Small Hall
3   (000 003)   ($00 $03)   Large Hall
```

TABLE 9
Trigger Mode values

```
0   (000 000)   ($00 $00)   Polyphonic
1   (000 001)   ($00 $01)   Legato Last
2   (000 002)   ($00 $02)   Legato Low
3   (000 003)   ($00 $03)   Legato High
```

TABLE 10
Number of Voices value

```
0   (000 000)   ($00 $00)   Unlimited
1   (000 001)   ($00 $01)   1
2   (000 002)   ($00 $02)   2
3   (000 003)   ($00 $03)   3
4   (000 004)   ($00 $04)   4
5   (000 005)   ($00 $05)   5
6   (000 006)   ($00 $06)   6
7   (000 007)   ($00 $07)   7
8   (000 008)   ($00 $08)   8
```

TABLE 11
Transpose Range values

```
-12   (063 116)   ($3F $74)   -12
-11   (063 117)   ($3F $75)   -11
-10   (063 118)   ($3F $76)   -10
-9    (063 119)   ($3F $77)   -9
-8    (063 120)   ($3F $78)   -8
-7    (063 121)   ($3F $79)   -7
-6    (063 122)   ($3F $7A)   -6
-5    (063 123)   ($3F $7B)   -5
-4    (063 124)   ($3F $7C)   -4
-3    (063 125)   ($3F $7D)   -3
-2    (063 126)   ($3F $7E)   -2
-1    (063 127)   ($3F $7F)   -1
0     (064 000)   ($40 $00)   0 (None)
1     (064 001)   ($40 $01)   1
2     (064 002)   ($40 $02)   2
3     (064 003)   ($40 $03)   3
4     (064 004)   ($40 $04)   4
5     (064 005)   ($40 $05)   5
6     (064 006)   ($40 $06)   6
7     (064 007)   ($40 $07)   7
8     (064 008)   ($40 $08)   8
9     (064 009)   ($40 $05)   9
10    (064 010)   ($40 $06)   10
11    (064 011)   ($40 $07)   11
12    (064 012)   ($40 $08)   12
```

TABLE 12
Portamento values

```
0   (000 000)   ($00 $00)   Off
1   (000 001)   ($00 $01)   Up
2   (000 002)   ($00 $02)   Down
3   (000 003)   ($00 $03)   Up & Down
```

TABLE 13
Modulation Routings List and Modulators List selections

0 = first item in list, 1 = second list item, etc. This is an offset to the MSB of the parameter. The first 16 Routings are supported.

```
INDEX   (XXX)   ($XX)
0       (000)   ($00)
1       (008)   ($08)
2       (016)   ($10)
3       (024)   ($18)
4       (032)   ($20)
5       (040)   ($28)
6       (048)   ($30)
```

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7	(056)	($38)	
8	(064)	($40)	
9	(072)	($48)	
10	(080)	($50)	
11	(088)	($58)	
12	(096)	($60)	
13	(104)	($68)	
14	(112)	($70)	
15	(120)	($78)	

TABLE 14
Modulation Routing Source values

0	(000 000)	($00 $00)	Note
1	(000 001)	($00 $01)	Velocity
2	(000 002)	($00 $02)	Mono Pressure
3	(000 003)	($00 $03)	Poly Pressure
4	(000 004)	($00 $04)	Controller A
5	(000 005)	($00 $05)	Controller B
6	(000 006)	($00 $06)	Controller C
7	(000 007)	($00 $07)	Controller D
8	(000 008)	($00 $08)	Modulator 1
9	(000 009)	($00 $09)	Modulator 2
10	(000 010)	($00 $0A)	Modulator 3
11	(000 011)	($00 $0B)	Modulator 4
12	(000 012)	($00 $0C)	Modulator 5
13	(000 013)	($00 $0B)	Modulator 6
14	(000 014)	($00 $0E)	Modulator 7
15	(000 015)	($00 $0F)	Modulator 8

TABLE 15
Modulation Routing Destinations

0	(000 000)	($00 $00)	Pitch
1	(000 001)	($00 $01)	Volume
2	(000 002)	($00 $02)	Pan
100	(000 100)	($00 $64)	Oscillator 1 Frequency
101	(000 101)	($00 $65)	Oscillator 1 Random
102	(000 102)	($00 $66)	Oscillator 1 Symmetry
103	(000 103)	($00 $67)	Oscillator 1 FM Amount
104	(000 104)	($00 $68)	Oscillator 1 Volume
105	(000 105)	($00 $69)	Oscillator 2 Frequency
106	(000 106)	($00 $6A)	Oscillator 2 Random
107	(000 107)	($00 $6B)	Oscillator 2 Symmetry
108	(000 108)	($00 $6C)	Oscillator 2 FM Amount
109	(000 109)	($00 $6D)	Oscillator 2 Volume
110	(000 110)	($00 $6E)	Oscillator 3 Frequency
111	(000 111)	($00 $6F)	Oscillator 3 Random
112	(000 112)	($00 $70)	Oscillator 3 Symmetry
113	(000 113)	($00 $71)	Oscillator 3 FM Amount
114	(000 114)	($00 $72)	Oscillator 3 Volume
200	(001 072)	($01 $48)	Filter 1 Cutoff
201	(001 073)	($01 $49)	Filter 1 Spread
202	(001 074)	($01 $4A)	Filter 1 CM Amount

203	(001 075)	($01 $4B)	Filter 1 Resonance
204	(001 076)	($01 $4C)	Filter 1 Overdrive
205	(001 077)	($01 $4D)	Filter 2 Cutoff
206	(001 078)	($01 $4E)	Filter 2 Spread
207	(001 079)	($01 $4F)	Filter 2 CM Amount
208	(001 080)	($01 $50)	Filter 2 Resonance
209	(001 081)	($01 $51)	Filter 2 Overdrive
300	(002 044)	($02 $2C)	Modulator 1 Amount
301	(002 045)	($02 $2D)	Modulator 1 Parameter 1
302	(002 046)	($02 $2E)	Modulator 1 Parameter 2
303	(002 047)	($02 $2F)	Modulator 1 Parameter 3
304	(002 048)	($02 $30)	Modulator 2 Amount
305	(002 049)	($02 $31)	Modulator 2 Parameter 1
306	(002 050)	($02 $32)	Modulator 2 Parameter 2
307	(002 051)	($02 $33)	Modulator 2 Parameter 3
308	(002 052)	($02 $34)	Modulator 3 Amount
309	(002 053)	($02 $35)	Modulator 3 Parameter 1
310	(002 054)	($02 $36)	Modulator 3 Parameter 2
311	(002 055)	($02 $37)	Modulator 3 Parameter 3
312	(002 056)	($02 $38)	Modulator 4 Amount
313	(002 057)	($02 $39)	Modulator 4 Parameter 1
314	(002 058)	($02 $3A)	Modulator 4 Parameter 2
315	(002 059)	($02 $3B)	Modulator 4 Parameter 3
316	(002 060)	($02 $3C)	Modulator 5 Amount
317	(002 061)	($02 $3D)	Modulator 5 Parameter 1
318	(002 062)	($02 $3E)	Modulator 5 Parameter 2
319	(002 063)	($02 $3F)	Modulator 5 Parameter 3
320	(002 064)	($02 $40)	Modulator 6 Amount
321	(002 065)	($02 $41)	Modulator 6 Parameter 1
322	(002 066)	($02 $42)	Modulator 6 Parameter 2
323	(002 067)	($02 $43)	Modulator 6 Parameter 3
324	(002 068)	($02 $44)	Modulator 7 Amount
325	(002 069)	($02 $45)	Modulator 7 Parameter 1
326	(002 070)	($02 $46)	Modulator 7 Parameter 2
327	(002 071)	($02 $47)	Modulator 7 Parameter 3
328	(002 072)	($02 $48)	Modulator 8 Amount
329	(002 073)	($02 $49)	Modulator 8 Parameter 1
330	(002 074)	($02 $4A)	Modulator 8 Parameter 2
331	(002 075)	($02 $4B)	Modulator 8 Parameter 3
400	(003 016)	($03 $10)	Global 1 Send
401	(003 017)	($03 $11)	Global 2 Send

TABLE 16
Time Division Table (MIDI Sync)

0	(000 000)	($00 $00)	Whole
1	(000 001)	($00 $01)	Half
2	(000 002)	($00 $02)	Quarter
3	(000 003)	($00 $03)	Eighth
4	(000 004)	($00 $04)	Eighth Triplet
5	(000 005)	($00 $05)	Sixteenth
6	(000 006)	($00 $06)	Sixteenth Triplet
7	(000 007)	($00 $07)	ThirtySecond

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Appendix G: Record To Disk

Record To Disk Overview

Retro AS-1 contains a powerful multimedia feature: Record To Disk. The Record To Disk function writes the stereo output of the synthesizer to your hard drive as an audio file. Whatever the synthesizer engine is playing (notes, chords, riffs, arpeggiations, etc, on all MIDI channels, including effects) is written to disk. The audio file can then be opened in any audio application that supports AIFF (Audio Interchange File Format-Mac OS) or .WAV (Windows 95), common file formats used in digital audio applications.

This feature is convenient when you want to use your synthesizer creations "stand-alone" in other digital audio applications without having to use the Retro AS-1 synthesizer engine at the same time. Another advantage is there are no digital-to-analog conversions involved in getting the audio file onto your disk, allowing for the highest possible fidelity for Audio Compact Disks or multimedia CD-Roms.

The sample rate of the audio file is determined by the Sample Rate parameter in the Retro AS-1 control panel configuration settings (see chapter 5.2). For example, if the control panel is set to a sample rate of 44100, then the resolution of the audio file will be 44.1kHz. The file always records in stereo. In Windows 95, the bit depth of the audio file is 16 bits; in Mac OS, the bit depth (8, 16, or 24 bit) is specified by the Record To Disk Size parameter in the Retro AS-1 control panel I/O settings (see chapter 5.5).

Figure G1. Record To Disk is accessed from the Synthesizer menu in the Editor, MIDI Processor, Mixer, and Keyboard applications.
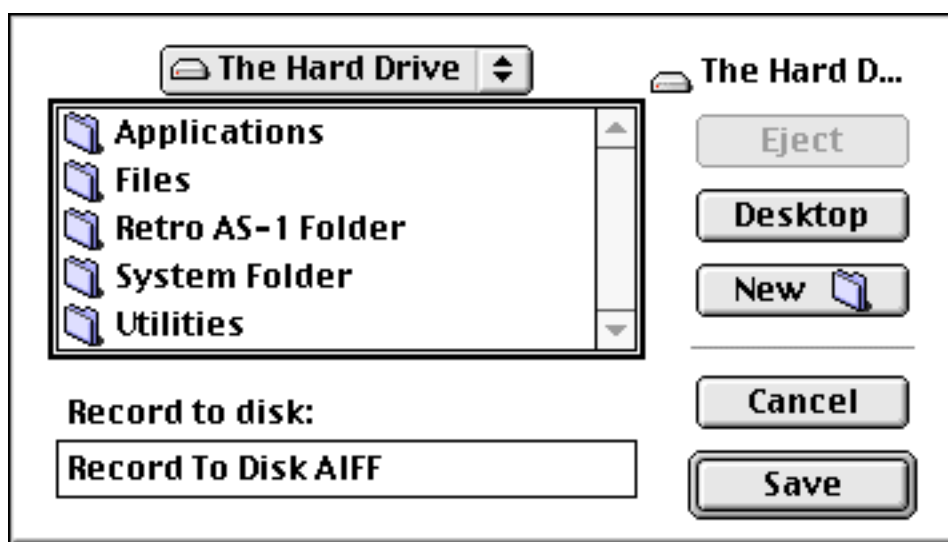
Figure G2. The Record To Disk save file dialog, where you type a name and select a destination for the audio file.

Using Record To Disk

To use the Record To Disk feature, select Start Record To Disk... from the Synthesizer menu from within the Editor, MIDI Processor, Mixer, or Keyboard applications. A standard Save File dialog will appear (figure G2). Type a name for the file and select a destination location.

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After clicking Save, the audio file starts continuously writing to disk. All synthesizer output, including silence, is written to disk in a linear fashion until the Stop Record To Disk command is executed.

(Mac OS only) The Apple Menu icon will flash with the Retro AS-1 icon (figure G3), indicating Record To Disk is active.

 File **Edit** **Synthesizer**

Figure G3. The Retro AS-1 icon blinks in the Apple Menu when Record To Disk is active (Mac OS only).

To end the Record To Disk process, select the Stop Record To Disk command from the Synthesizer menu. This command will be unavailable unless the Record To Disk function is active.

IMPORTANT! Digital audio files can be extremely large. 16-bit stereo audio files at a 44.1kHz sample rate will require 10 megabytes of disk space per minute. Make sure you have enough disk space for the file or you may get a "Disk full" error.

Record To Disk AIFF

Figure G4. (Mac OS) The output of Record To Disk is a digital audio file with the SimpleSound icon.

Previewing the Audio File

The audio file is now on hard disk (figure G4) and can be opened and played in any digital audio application that supports AIFF (Mac OS) or .WAV (Windows 95).

SimpleSound

Figure G5. The SimpleSound application icon. SimpleSound is installed in the Apple Menu by the Mac OS.

(Mac OS only) Retro AS-1 AIFF files are saved with the SimpleSound creator code which allows you to hear the audio file without 3rd-party digital audio applications. SimpleSound (figure G5) is a stock component of the Mac OS that allows you to play and record AIFF files. So, to quickly hear the Retro AS-1 audio file, just double-click the file icon to launch SimpleSound. Then, select Play from the Sound menu (figure G7) within the SimpleSound application to hear the file. Make sure 'CD Quality' is selected from the Sound menu if you are auditioning a high resolution file.

Sound

Play	⌘P
Stop	⌘.
✓ **CD Quality**	
Music Quality	
Speech Quality	
Phone Quality	
Alert Sounds	

Figure G7. (Mac OS) The SimpleSound Play menu. Make sure CD Quality is selected when auditioning high resolution files.

Record To Disk AIFF

Format: 16 bit, stereo, 44.100 kHz

Length: 1 minute, 14 seconds

Figure G6. The SimpleSound file information window.

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Appendix H: QuickTime™ Driver

This appendix applies to the Mac OS only. It explains how to install, configure, and use the Retro AS-1 QuickTime™ Driver.

QuickTime Driver Overview

QuickTime movies can contain a variety of multimedia formats such as video, graphics, text, sound (digital audio files), and MIDI tracks. When a QuickTime movie contains MIDI tracks (called music tracks in QuickTime language), the wavetable-based software music synthesizer built in to QuickTime (the QuickTime Musical Instruments extension) will play the music tracks.

The QuickTime architecture allows third-party developers (such as BitHeadz) to develop alternate software synthesizers for use by QuickTime that are activated by installing QuickTime drivers. Once the Retro AS-1 QuickTime Driver is properly installed (instructions below), QuickTime can be configured to use the Retro AS-1 synthesizer engine to play music tracks instead of, or in conjunction with, QuickTime Musical Instruments.

The Retro AS-1 QuickTime Driver allows you to play Retro AS-1 programs via MIDI with MoviePlayer and other applications that playback QuickTime movies. Using the Retro AS-1 QuickTime driver offers these benefits:

- QuickTime movies can play the great sounds of Retro AS-1 by themselves or in conjunction with QuickTime Musical Instruments.
- Using MIDI instead of digital audio files keeps your movies smaller.
- You can play Retro AS-1 MIDI sequences using MoviePlayer which is smaller, simpler, and less of a CPU hog than the high-end sequencers like Performer and Vision. Great for demos.
- QuickTime and MoviePlayer are free, downloadable at www.apple.com/quicktime.

System Requirements

- Retro AS-1 version 1.02 or higher
- QuickTime version 3.0 or higher

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Installing the driver

To install the driver, drag the Retro AS-1 QuickTime Driver extension (located inside the Goodies folder) onto the closed active System Folder icon. The driver will be automatically placed into the Extensions folder. You will need to reboot in order for QuickTime to recognize the driver installation.

Retro AS-1 QuickTime™ Driver

Figure H1. The QuickTime Driver is installed into the Extensions folder.

Configuring the QuickTIme driver

Retro AS-1 version 1.02 and QuickTime 3.0 must already be properly installed and configured before proceeding.

> NOTE: QuickTime continuously issues launch and quit commands to alternate synthesizers during configuration and use. For this reason, we recommend launching the Retro AS-1 synthesizer engine before and during use of the Retro AS-1 QuickTime Driver. To launch the synthesizer, open any of the Retro AS-1 applications such as Retro AS-1 Status (inside the Retro AS-1 Utilities folder). This will keep the Retro AS-1 engine open, saving time during configuration and use of the Retro AS-1 QuickTime driver.

Configuring the QuickTime™ Settings control panel

Figure H2. The QuickTime Settings control panel Music menu.

1. **Open the QuickTime Settings control panel.**

2. **Select Music from the pull down menu.**

3. **Click the Edit List... button.**

   The QuickTime Synthesizer window appears, with one line item showing the QuickTime Music Synthesizer.

QuickTime™ Settings

Music ⬍

QuickTime uses a music synthesizer to play music and MIDI files. Click a button in the list to select a default synthesizer if more than one is available.

⊙ QuickTime Music Synthesizer

Edit List... Add, remove, or modify the synthesizer list.

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4. Click the Add button in the QuickTime Synthesizer window.

A new line item appears. The new line item Synthesizer pull-down menu says "(No Synthesizer)."

5. Select "Retro AS-1" from the new line item Synthesizer pull-down menu.

6. Click OK to close the QuickTime Synthesizer window.

The Retro AS-1 QuickTime Driver is now properly configured.

The QuickTime™ Settings control panel Music window should now appear as shown in figure H4. We recommend leaving QuickTime Music Synthesizer selected as the default music synthesizer so all QuickTime movies with MIDI tracks will play correctly. In this case, only movies with MIDI tracks specifically assigned to Retro AS-1 programs will use the Retro AS-1 engine.
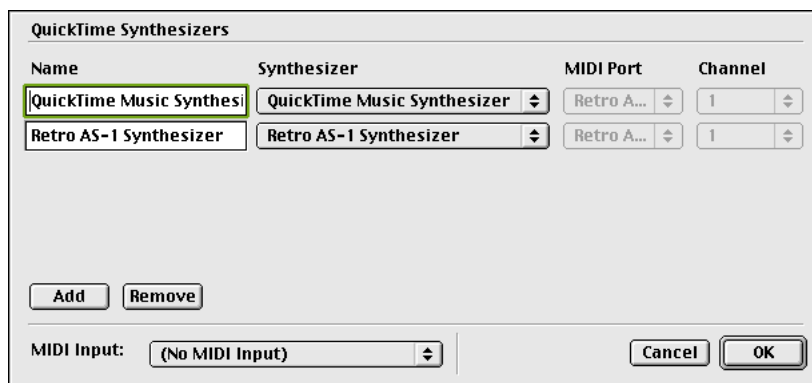
Figure H3. The QuickTime Settings control panel Edit Synthesizers window.

Figure H4. The QuickTime driver properly installed and configured.

Using the QuickTime Driver

When QuickTime 3.0, the Retro AS-1 synthesizer, and the Retro AS-1 QuickTime Driver are all installed and configured correctly, QuickTime movies that have MIDI tracks assigned to Retro AS-1 Programs will use the Retro AS-1 engine for playback.

For the movie to sound as created by the author, the Retro AS-1 Programs used by the movie must be installed on the playback system. If the QuickTime movie using Retro AS-1 tracks plays on a system different than the one that created it, the correct programs may or may not play, depending on the following conditions. The QuickTime driver searches for Retro AS-1 programs by name. If the program name is not found (if it is not installed in the Retro AS-1 Programs folder), it loads the program number. If there is no program at that number location, it loads program zero, bank zero.

If you want Retro AS-1 sounds in your QuickTime movie but cannot rely on the destination system to have Retro AS-1 and its QuickTime Driver installed and configured, use the Retro AS-1 Record To Disk function to produce AIFF files of the synthesizer output then import these digital audio files into your QuickTime movie instead of using MIDI.

Unless the Retro AS-1 engine is already in use by a Retro AS-1 application, each time a QuickTime movie is played containing MIDI tracks assigned to Retro AS-1 programs, the Retro AS-1 engine is launched. There will be a delay while the engine launches before sound is heard. When the movie is closed, the engine is quit. Again, for this reason we recommend forcing the engine to remain open by launching a Retro AS-1 application such as Retro AS-1 Status before and during use of the QuickTime application.

Assigning Retro AS-1 Programs in MoviePlayer

QuickTime 3.0 includes MoviePlayer, an application that plays QuickTime movies. MoviePlayer allows you to playback QuickTime movies that have MIDI tracks assigned to Retro AS-1 programs. You cannot modify MIDI track instrument assignments using the free version of QuickTime 3.0, but you can play movies that already have Retro AS-1 assignments. The QuickTIme 3.0 "Pro" upgrade ($29.99 from Apple at http://www.apple.com/quicktime) allows you modify the MIDI track instrument assignments and select Retro AS-1 programs from within MoviePlayer.

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To view or modify instrument assignments within MoviePlayer:

1. **Open a QuickTime file containing MIDI tracks in MoviePlayer.**

   You can open Standard MIDI Files in MoviePlayer using the Import... command in the MoviePlayer File menu.

2. **Select "Get Info" (Command-I) from the Movie menu.**

   The movie Info window appears.

3. **Select "Music Track" from the pull-down menu at the upper left of the Info window.**

4. **Select "Instruments" from the pull-down menu at the upper right of the Info window.**

5. **The current instrument assignments for the movie are now visible.**

   Each item in the list corresponds to a unique MIDI channel (figure H5).

6. **Double-click and instrument name to open the instrument assignment window for the MIDI channel.**
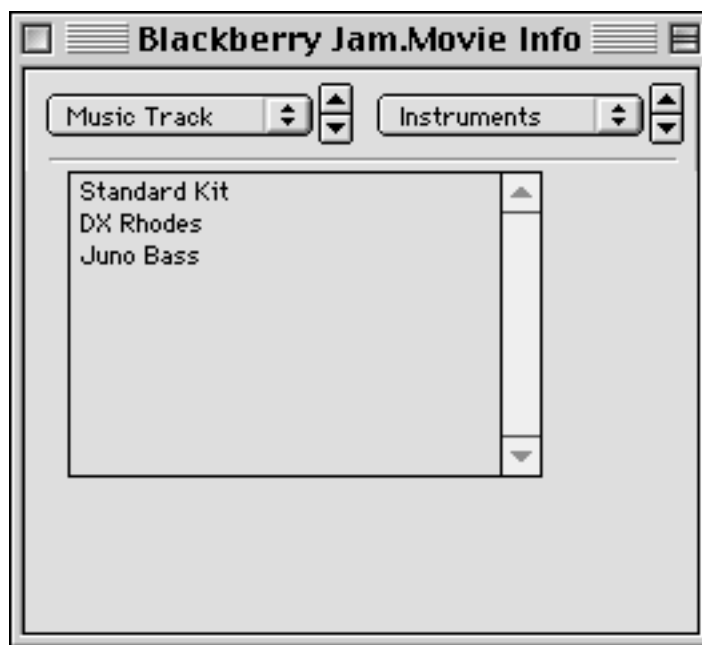
Figure H5. The MoviePlayer movie information window, with music track instruments displayed.
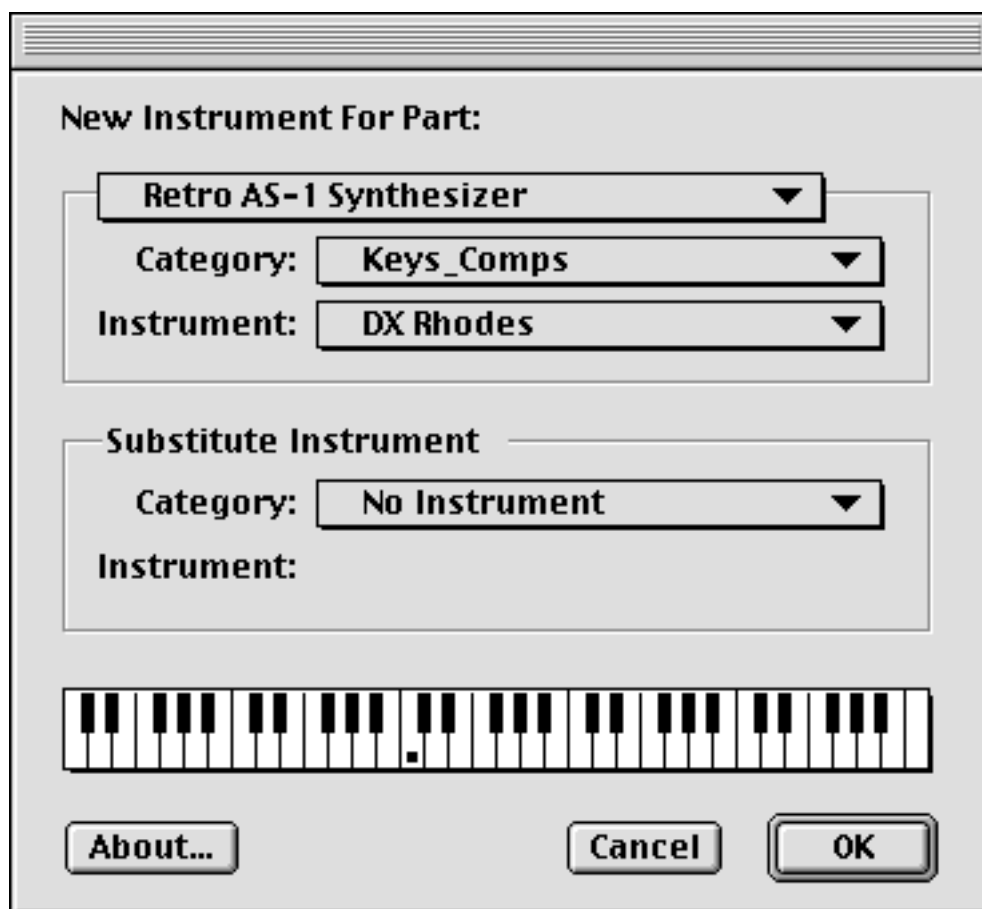
Figure H6. The MoviePlayer instrument assignment window.

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7. Select an instrument for the part.

The "Category" and "Instrument" menus correspond to Retro AS-1 Banks and Programs. The items available for selection from these menus depends on the state of the Retro AS-1 Programs folder when the Retro AS-1 engine was launched. You can hear the sound by clicking on the mini keyboard at the bottom of the window.

8. Click OK to close the instrument assignment window.

The track will reflect the change the next time you start the movie.

9. Select Preload from the pull-down menu at the upper right of the Info window.

Preload and Cache Hint optimize playback on small files. Both boxes should be checked if your movie contains only MIDI tracks.

10. Remember to save the changes to your movie if desired.

Done! The QuickTime movie will now use Retro AS-1 for the MIDI tracks assigned to it.
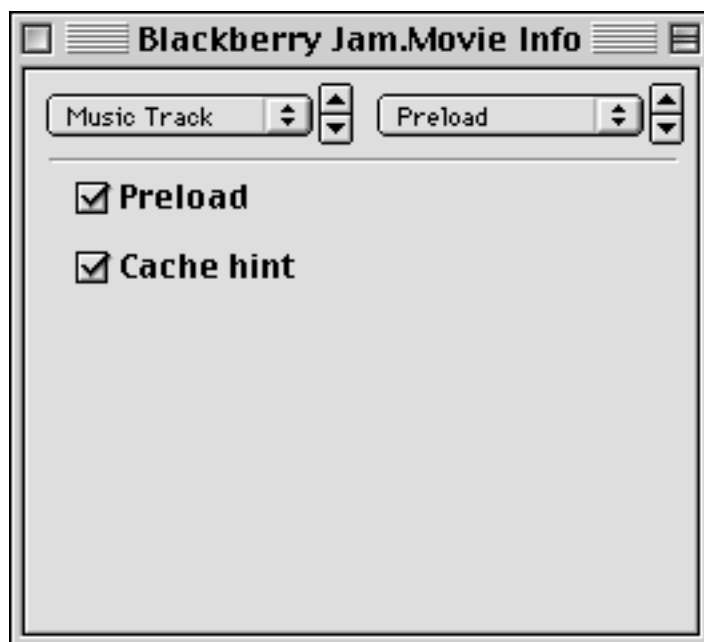
Figure H7. Make sure the Preload option is checked for MIDI-based movies.

Apple has more detailed information about MoviePlayer and QuickTime online at www.apple.com/quicktime/information/macmovieplayer.

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Appendix I: OMS Names

This appendix applies to the Mac OS platform only. It explains how to setup OMS applications to view Retro AS-1 programs by name.

About Retro AS-1 OMS Names

Retro AS-1 OMS Names is a utility application that assists you in viewing Retro AS-1 Programs by name within OMS applications. The application is located inside the Goodies folder. After running the utility, a text file containing the current state of the Retro AS-1 Programs folder, both banks and programs, is generated. The text file can then be pasted into a Patch Names list within an OMS application.

How To Use It

To use Retro AS-1 OMS Names, double-click the application icon. The Retro AS-1 Programs folder is evaluated and a text file is generated with the bank and programs names. The file is placed in the same folder as the Retro AS-1 OMS Names application.

Open the text file, select all, and copy. The names can then be pasted into an OMS Patch Names document that have the banks defined. We have provided a Retro AS-1 OMS Patch Names document that contains the factory banks and programs. If new banks are added or original banks are deleted, the banks within this Names document will have to be manually updated by pasting the newly generated names text into the document from within the OMS application.

OMS patch name documents require carriage returns for each of the 128 programs in a bank, even if the bank contains less than 128 programs. Retro AS-1 OMS Names automatically generates these carriage returns in the correct places. If you open the output file in SimpleText (by double-clicking the document), you will not be able to see all the programs in all the banks. This is due to a bug in SimpleText, which will not scroll below the empty carriage returns. However, the text you can't see in SimpleText is actually in the file. If you select all and copy, then paste into an OMS names document, all the data will be inserted. If you open the OMS Names output file in a different word processor, you will see all the data.

The OMS Patch Names are static, not dynamic, meaning the names or the bank/program ordering is not updated when the Retro AS-1 Programs folder changes. Therefore, the utility should be used each time the naming hierarchy of the Retro AS-1 Programs folder changes. We hope to implement support for the OMS Names Manager in a future version in order to fully support dynamic name changes.

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Step by Step Instructions

To install Retro AS-1 factory names into Vision:

1. **Install and configure the Retro AS-1 OMS Driver.**

   Follow the instructions in chapter 2 of this manual.

Figure I.1. The Retro AS-1 factory patch names file for OMS.

2. **From within the Vision/StudioVision application, select Names from the Windows menu.**

   The Patch Names from OMS window (figure I3) appears. (The Retro AS-1 Patch Name Document will not be displayed until after step 6.)

3. **Select Retro AS-1 icon.**

   Single-click the Retro AS-1 icon to select it..

4. **Select Subscribe... from the Names menu.**

   See figure I.2 . A standard Open File dialog appears.

5. **Navigate to the factory Retro AS-1 OMS Patch Names file (figure I.1).**

   The Retro AS-1 Installer placed it in the OMS folder in the Goodies folder, inside the Retro AS-1 Folder. You can move it to any location.

6. **Select the Retro AS-1 OMS Patch Names file and click Subscribe.**

   The Retro AS-1 names list now contains the factory program names.

7. **Close the Patch Names from OMS window.**

   Done! Retro AS-1 factory programs can now be viewed by name from within Vision (figure I.7).

Figure I.2. The Names menu within Vision.

Figure I.3. The Patch Names from OMS window correctly configured with the Retro AS-1 factory names file.

Retro AS-1 Manual
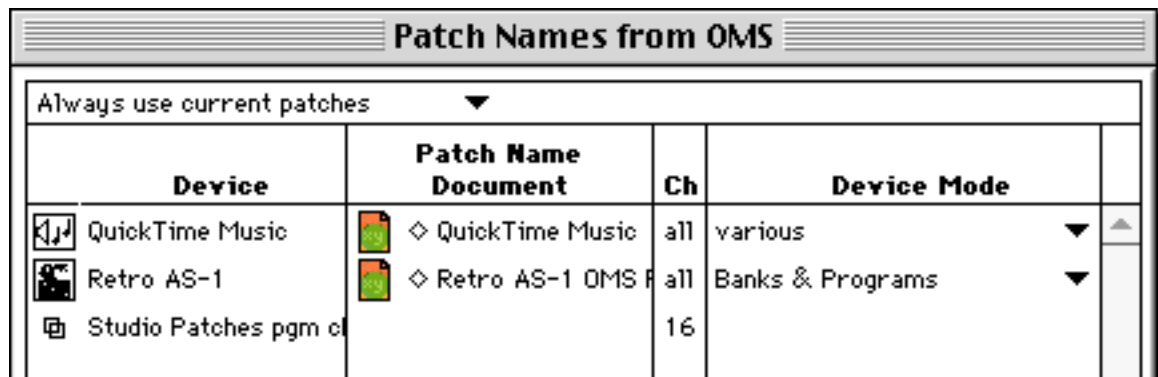
To update program names when the bank hierarchy has NOT CHANGED:

1. **Install the factory OMS names file into Vision.**

   Follow the instructions from the previous section.

2. **Run the Retro AS-1 OMS Names application.**

   A new text file containing the current bank/program names is generated.

3. **Open the newly generated Retro AS-1 OMS Names Text file.**

   It is placed in the same folder as the Retro AS-1 OMS Names application. If you open it with SimpleText, you will not see the entire contents of the file, but the data is there. This is a bug in SimpleText.

4. **Select All, then copy the contents of the file.**

   The data is copied to the Clipboard.

5. **From within the Vision/StudioVision application, select Names from the Windows menu.**

   The Patch Names from OMS window (figure I.3) appears.

6. **Double-click the Retro AS-1 OMS Patch Names icon.**

   The Retro AS-1 OMS Patch Names window appears (figure I.4).

7. **Select Paste Patch Names from the Patches menu (figure I.5).**

   The contents of the Clipboard is pasted into the Retro AS-1 Names window, replacing the previous names.

8. **Close the Retro AS-1 Names window and save the changes.**

9. **Close the Patch Names from OMS window..**

   Done! Retro AS-1 custom programs can now be viewed by name from within Vision (figure I.7)
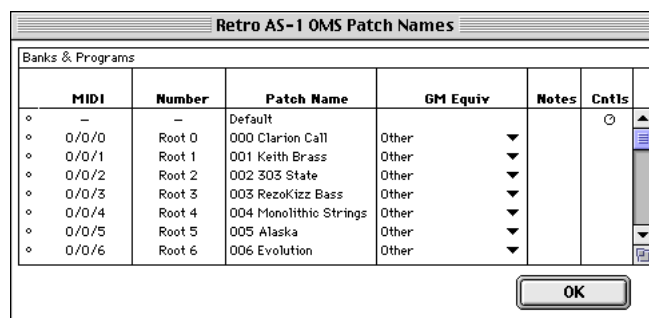
Figure I.4. The Retro AS-1 OMS Patch Names window appears when you double click the AS-1 icon in the Patch Names from OMS window.

Figure I.5. The Patches menu is visible when a device patch list is open.

To create a custom OMS Names file from scratch:

1. Run the Retro AS-1 OMS Names application.

A new text file containing the current bank/program names is generated.

2. Count how many sub-folders are in your Retro AS-1 Programs Folder.

This is the number of installed banks. You will need this number later.

3. From within the Vision/StudioVision application, select Names from the Windows menu.

The Patch Names from OMS window appears (figure I.3).

4. Double-click the Patch Name column in the Retro AS-1 row.

The Retro AS-1 OMS Patch Names window appears (figure I.4).

5. From the Names menu, add a new bank to the Names document using Controller 0=0 and Controller 32=0.

See figure I.6.

6. Highlight the FIRST entry after "default" and then select DELETE BANK.

Now the 0/0/0 Bank should be the only one showing.

7. Close and save this new OMS Patch file.

8. Open the newly generated Retro AS-1 OMS Names Text file.

It is placed in the same folder as the Retro AS-1 OMS Names application. If you open it with SimpleText, you will not see the entire contents of the file, but the data is there. This is a bug in SimpleText.

Figure I.6. The Add Bank window.

9. Select All, then copy the contents of the file.

The data is copied to the Clipboard.

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10.From within the Vision/StudioVision application, select Names from the Windows menu.

The Patch Names from OMS window appears (figure I.3).

11.Double-click the Retro AS-1 OMS Patch Names icon.

The Retro AS-1 OMS Patch Names window appears (figure I.4).

12.Add Banks to the list (Names menu) using Ctl 0=0 and Ctl 32=1 through X, where X is the number of bank subfolders you counted in step 2.

If you counted 11 subfolders, you will need to create 12 Banks because the root level is also a bank (Bank 0).

13.Select Paste Patch Names from the Patches menu (figure I.5).

The contents of the Clipboard is pasted into the Retro AS-1 OMS Patch Names window (figure I.5).

14.Close the Retro AS-1 Names window and save the changes.

15.Close the Patch Names from OMS window..

Done! Retro AS-1 custom banks and programs can now be viewed by name from within Vision (figure I.7).

Figure I.7. The result of configuring OMS Names: You can view Retro AS-1 programs by name within OMS applications.
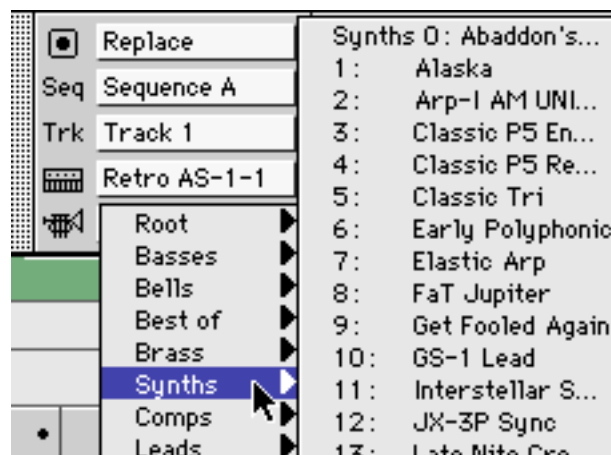
To create an OMS Name List for Steinberg Cubase:

1. **Run the Retro AS-1 OMS Names application.**

   A new text file containing the current bank/program names is generated.

2. **Count how many sub-folders are in your Retro AS-1 Programs Folder.**

   This is the number of installed banks. You will need this number later.

3. **From within Cubase, select Options>Setup OMS>OMS Patch Names....**

   The OMS Patch Names window appears.

4. **Double-click the Patch Name column in the Retro AS-1 row.**

   The Retro AS-1 names window appears.

5. **From the Names menu, add a new bank to the Names document using Controller 0=0 and Controller 32=0.**

6. **Highlight the FIRST entry after "default" and then select DELETE BANK.**

   Now the 0/0/0 Bank should be the only one showing.

7. **Close and save this new OMS Patch file.**

8. **Open the newly generated Retro AS-1 OMS Names Text file.**

   It is placed in the same folder as the Retro AS-1 OMS Names application. If you open it with SimpleText, you will not see the entire contents of the file, but the data is there. This is a bug in SimpleText.

9. **Select All, then copy the contents of the file.**

   The data is copied to the Clipboard.

10. **From within the Vision/StudioVision application, select Names from the Windows menu.**

    The Patch Names from OMS window appears.

11. **Double-click the Retro AS-1 OMS Patch Names icon.**

    The Retro AS-1 names window appears.

12. **Add Banks to the list (Names menu) using Ctl 0=0 and Ctl 32=1 through X, where X is the number of bank subfolders you counted in step 2.**

    If you counted 11 subfolders, you will need to create 12 Banks because the root level is also a bank (Bank 0).

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13. Select Paste Patch Names from the Names menu.

The contents of the Clipboard is pasted into the Retro AS-1 Names window.

14. Close the Retro AS-1 Names window and save the changes.

15. Close the Patch Names from OMS window..

Done! Retro AS-1 custom banks and programs can now be viewed by name from within Cubase by selecting Retro AS-1 as an instrument and choosing Open Up Patch.

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