SunRize
INDUSTRIES

User's Guide

STUDIO 16™

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User's Guide

STUDIO 16™

Credits

Studio 16 Software

Todd Modjeski
Anthony J. Wood
Ben Fuller

AD516 Hardware

Anthony J. Wood

AD1012 Hardware

Robert L. Hubertus
Anthony J. Wood

Manual

Susan D. Bruner
Jamie Krutz

Fourth Edition

First Printing

Your AD516 or AD1012 hardware is warranted to the original purchaser for a period of one (1) year from the original purchase date--under normal use and service--against defective materials or workmanship. ANY IMPLIED WARRANTIES ARE ALSO LIMITED TO THE ONE YEAR PERIOD FROM THE ORIGINAL PURCHASE DATE. This warranty is void if the AD516 or AD1012 has been damaged by accident or unreasonable use, neglect, improper service or other causes not arising out of defects in material or workmanship.

SUNRIZE INDUSTRIES SHALL NOT BE LIABLE FOR LOSS OF USE OF STUDIO 16 / AD516 OR STUDIO 16 / AD1012 OR OTHER INCIDENTAL OR CONSEQUENTIAL COSTS, EXPENSE OR DAMAGES INCURRED BY THE PURCHASER.

During the above one-year period, defective parts will be repaired, adjusted and/or replaced (at Manufacturer's option) without charge to the purchaser when the AD516 or AD1012 is returned, prepaid and insured, with proof-of-purchase date, to SunRize Industries customer service listed below. UNITS RETURNED WITHOUT PROOF-OF-PURCHASE DATE OR REPAIR FEE WILL NOT BE REPAIRED.

Before returning your AD516 or AD1012 for service, please review the service instructions in this manual.

SunRize Industries
2959 Winchester Blvd., 2nd Floor
Campbell, CA 95008 USA
Tel: (408) 374-4962
Fax: (408) 374-4963

FCC Regulations

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

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

Note: Use of shielded audio cables is required to comply with the class B limits in Part 15 of FCC Rules.

Table of Contents

Introduction

Studio 16 software, when combined with either the AD516 or AD1012 audio card, becomes an advanced hard disk recording system. Both the AD516 and the AD1012 audio cards plug into your Amiga 2000/3000 and add audio in, audio out, and SMPTE in to your computer. They both include a sound coprocessor (a DSP) as well as high fidelity recording and playback circuitry. The AD516 and AD1012 will record direct to disk and play back multiple channels direct from disk.

The AD516 is a 16 bit stereo card that is suitable for professional video and CD mastering. Its advanced circuitry enables it to playback up to eight channels simultaneously. And the internal SMPTE time code reader allows it to create extensive Cue Lists of samples to trigger to a video tape. The more economical AD1012 is a 12 bit mono board that includes the same SMPTE support as the 16 bit card and is ideal for video applications. See Appendix B for complete specifications for the AD516 and AD1012.

Included with both the AD516 and AD1012 is the Studio 16 recording and editing software. When combined with an audio card, Studio 16 allows you to record very long sounds directly to your hard disk. Studio 16 allows you to edit and mix sounds.

About This Manual

This manual provides information for installing and using Studio 16. This manual is divided into nine Chapters and a detailed Reference Section. Appendices and an Index are also included.

Chapter 1 ..... **Introduction to Digital Audio** describes the digital sampling process and explains the difference between 8, 12, and 16 bit audio.

Chapter 2 ..... **Installation** explains how to install an AD516 and AD1012 in a computer and install Studio 16 on a hard drive.

Chapter 3 ..... **Getting Started** includes a brief introduction to sampling, playing, editing, and an overview of common screen elements.

Chapter 4 ..... **Hard Disk Drives** provides information on required hard disk specifications, and optional storage devices.

Introduction to Digital Audio

In recent years, digital audio has become increasingly popular. The most common uses of digital audio are currently Compact Discs and Digital Audio Tapes. DATs are replacing analog tapes for professional audio use, just like CDs have replaced LPs for personal use.

Digital vs. Analog

Both CDs and DATs record numbers instead of analog signals. For example, a standard cassette tape records sound by magnetizing a tape. When the sound being recorded gets louder, the tape recorder writes a stronger magnetic field to the tape. When the sound gets softer, the tape player writes a softer magnetic field onto the tape. A DAT recorder, on the other hand, records numbers. For loud sounds, it writes a large number; for soft sounds, it writes a smaller number.

There are several reasons why numbers are better to record than analog signals (such as the magnetic signal on cassette tapes). For starters, it is much simpler to edit digital sound. Using a computer program like Studio 16, it is easy to move parts of sound around or insert one sound into the middle of another. In the analog world this is accomplished by cutting and splicing tape. Another advantage, and the reason the music industry is concerned about DAT, is that when you copy digital audio you always get a perfect copy. Remember that digital sound is just numbers and is manipulated like any other data in your computer. When you copy a disk with your computer, you get an exact copy of the data. On the other hand, every time you copy a magnetic tape, you add a little distortion or "tape hiss".

Converting Analog to Digital

So how do you turn natural analog sound into numbers? You need a sound digitizer like the AD516 or AD1012. The AD516 and AD1012 measure and record the amplitude of a sound. Amplitude is the loudness of a sound signal at an exact moment in time. The process of measuring and recording is referred to as "taking a sample". To digitize a sound, the AD516 (or AD1012) takes a series of samples. It takes a sample, allows a certain amount of time pass, takes another sample, allows the same amount of time pass, takes a sample, etc. As the samples are taken, loud sounds are recorded as larger numbers and quiet sounds are represented by smaller numbers. The amount of time that passes between samples is referred to as the period. Assume the period is 1/44,100 of a second. By inverting the period you can calculate the resulting sampling rate. The inverse of 1/44,100 is 44,100. The sampling rate is 44,100Hz.

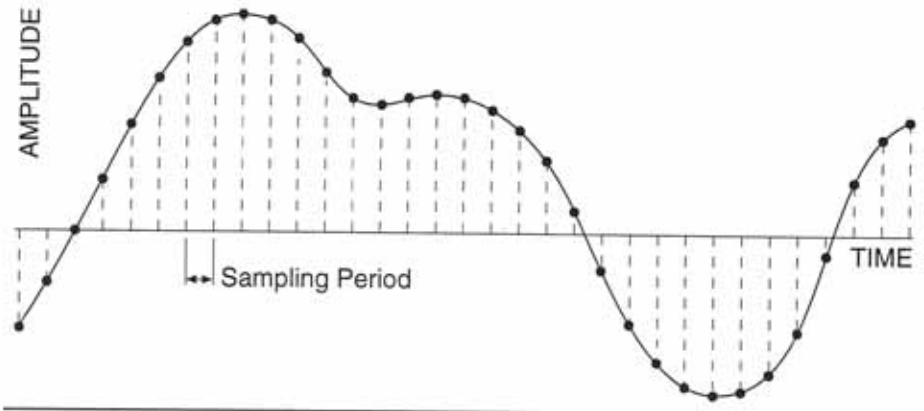

Figure 1-1. Digital Audio Diagram

There is a direct relationship between sampling rate and the maximum frequency you can record. This relationship, called the "Nyquist theorem", states that the maximum frequency you can record is equal to half the sampling rate. So, if you sample at 10,000Hz, all frequencies up to 5,000Hz are recorded accurately. Frequencies over 5,000Hz will introduce distortion into the sound. This distortion is called "aliasing".

Compact Discs always play back at 44,100Hz. This gives CDs a maximum frequency range of 22,000Hz which is outside or on the limits of most people's hearing ability.

The second parameter that determines digital sound quality is the maximum sample value. If we let silence be recorded as zero, what value does the loudest possible sound have? This value is the maximum sample value. Sound will oscillate above and below zero by this amount. Using the Amiga's internal 8 bit sound, the maximum sample value is 127. Thus all sounds are recorded as numbers between 127 and -127, with zero being silence. For comparison, the AD1012 has a range of +2,048 to -2,048, Obviously this gives the AD1012 much better sound quality than the Amiga's internal sound. Note that the sixteen bit AD516 has an even larger range of +32,767 to -32,767.

The final thing to notice about digital sound is that it uses quite a bit of memory. Since each AD516 and AD1012 sample takes two bytes, a sampling rate of 44,100 samples per second means that every second of sound is going to take exactly 88,200 bytes. This works out to 5.05 megabytes per minute or 12 seconds per megabyte.

Differences Between 8,12 and 16 Bit Audio

Digital sound systems generally fall into three different categories: 8, 12, and 16 bit. A small discussion of each class follows. A common reference is given (i.e., "8 bit sounds like an AM radio") as well as the theoretical Signal-to-Noise Ratio (SNR). Keep in mind that the SNR given is the theoretical maximum for a pure sine wave. Practical systems never match this number. However, one aspect of the quality of a real world system is how closely its SNR comes to the theoretical maximum.

8 Bit

The Amiga's internal sound format and SunRize's 'Perfect Sound' are 8 bit. A common use for 8 bit digital audio is long distance phone calls. Phone calls are often digitized with 8 bits of resolution at the switching station for broadcast via satellite or fiber optic cable. Eight bit audio has a theoretical maximum SNR of -48dBs and its sound quality is often compared to AM Radio.

12 Bit

The AD1012 card is 12 bit. Twelve bit audio is also used in many popular music synthesizers. It has a theoretical maximum SNR of -72dBs. Its quality is comparable to a high quality reel-to-reel tape deck or FM radio.

16 Bit

The AD516 card from SunRize is 16 bit. Compact Disk players and DATs are also 16 bits. Sixteen bit digital audio has a theoretical maximum SNR of -96dBs. Its quality is equivalent to a CD player.

Decibels

In audio systems the common measurement of volume is the Decibel (dB). Studio 16 volumes are also specified in dBs. Decibels are a logarithmic scale used to more accurately represent how the ear hears volume changes. Zero dB means no gain. Attenuation are negative, and amplifications are positive.

For example:

-12dB is equivalent to 25% volume
-6dB is equivalent to 50% volume
0dB is equivalent to 100% volume
+6dB is equivalent to 200% volume

These ratios are determined by the following equation:

dB = -20 log (gain)
example: -6 = -20 log (0.5)

Installation

Hardware Installation

The following installation instructions are the same for the AD516 and the AD1012. Both audio cards plug into a free Zorro slot in an Amiga 2000, 3000 or 4000. Installing the card is relatively easy. However, if you prefer, your local Amiga dealer can install it for you.

Install the Card

1. Turn off your computer.
2. Unplug the mouse, keyboard, monitor and power cables.
3. Remove the screws securing the case. On the A4000 there are 2 screws in the back, top-left and top-right corners. For the A2000 and A3000, look for 2 screws on each side and 1 in the back, top-center.
4. Carefully slide the case off the computer. For more information on removing your Amiga's case, see your Amiga's Manual.
5. Identify the Zorro slots in your computer by referring to your Amiga's Manual. Zorro slots are also referred to as "Amiga 100 pin expansion slots". (Note that any slot in the computer that the AD516 or AD1012 will fit into is a Zorro slot.)
6. Choose a Zorro slot to receive the card and remove its cover plate (back bracket).
7. Ground yourself by touching your Amiga's metal power supply case. This will remove any static charge built up on your body.
8. Remove the AD516 or AD1012 card from its anti-static bag and plug it into the free Zorro slot.

NOTE When the card is installed properly, only a small amount of the gold connector will show. If the slot has never been used, it may take a lot of effort to push the card in. A gentle rocking motion is usually best.

9. Screw the card's bracket into the Amiga with the screw you removed from the cover plate.
10. Replace the case and secure it with the screws removed earlier.

Setting Jumpers

AD516 has one jumper. It is indicated by JP1 on the pc board. The AD1012 has two jumpers - indicated by JP1 and JP2. All jumpers are set at the factory and shouldn't need changing.

AD516	JP1 should be set to 6. It selects interrupt 2 or 6.
AD1012	JP1 should be set to 6. It selects interrupt 2 or 6.
	JP2 should be in place for normal operation.

Connecting Audio and SMPTE

All five jacks are "consumer line level" unbalanced connections. They should be connected to an appropriate source using standard RCA patch cables. For example, connect the left and right "Line Out" on your CD player to the "L - IN" and "R- IN" on the AD516.

Many professional Video Tape Recorders (VTRs) use "balanced" type connections. These will typically have the three pin XLR connectors. If your equipment uses these connectors, you will need to use XLR-to-RCA adapters. These are available at electronics stores.

The notations on the AD516's and AD1012's brackets follow:

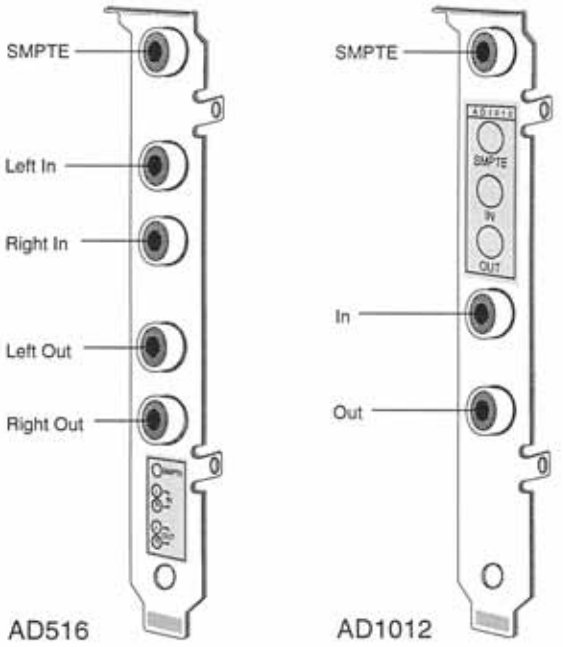

Figure 2-1. Bracket Labels

AD516

The AD516 card has five RCA jacks: SMPTE (LTC) In, Left and Right Audio In, and Left and Right Audio Out.

AD1012

The AD1012, a monophonic card, has the same SMPTE LTC input as the AD516. Its Audio In and Out are standard unbalanced RCA connectors.

SMPTE Sources

Although Studio 16 doesn't require an external SMPTE source to run, it is enhanced by its addition. If your deck has a dedicated LTC SMPTE track, simply connect it to the AD516's or AD1012's SMPTE In. If your VTR does not have a dedicated SMPTE track, you should record LTC time code to an unused audio track on video tape. This process is referred to as "striping a tape". This will allow you to use one of the Audio output jacks on your deck as a source for SMPTE time code. For more information on time code and striping tapes, see Chapter 5 -SMPTE.

If your deck uses VITC SMPTE, the SMPTE out on your deck may require a VITC-to-LTC translator. The AD516 and AD1012 do not read "vertical interval time code" (VITC) directly. See Appendix C - Third Party Sources for a supplier of VITC-to-LTC translators. For information on time code see Chapter 5 - SMPTE.

The AD516 and AD1012 SMPTE reader is designed to handle normal speed variations due to tape motor variance. It is not designed to read time code in fast forward modes.

Software Installation

Install Studio 16 On a Hard Drive

1. Turn on your computer and wait for WorkBench to finish loading.
2. Insert the Studio 16 **Disk 1** into a floppy drive.
3. Double click the **Studio16_1** disk icon.
4. Double click the **Read_Me** icon. The Read_Me file contains updated information that is not included in this manual. It may contain information related to installation. You can close the Read_Me file after reading it. The Installation Utility will copy it onto your hard disk for future reference.

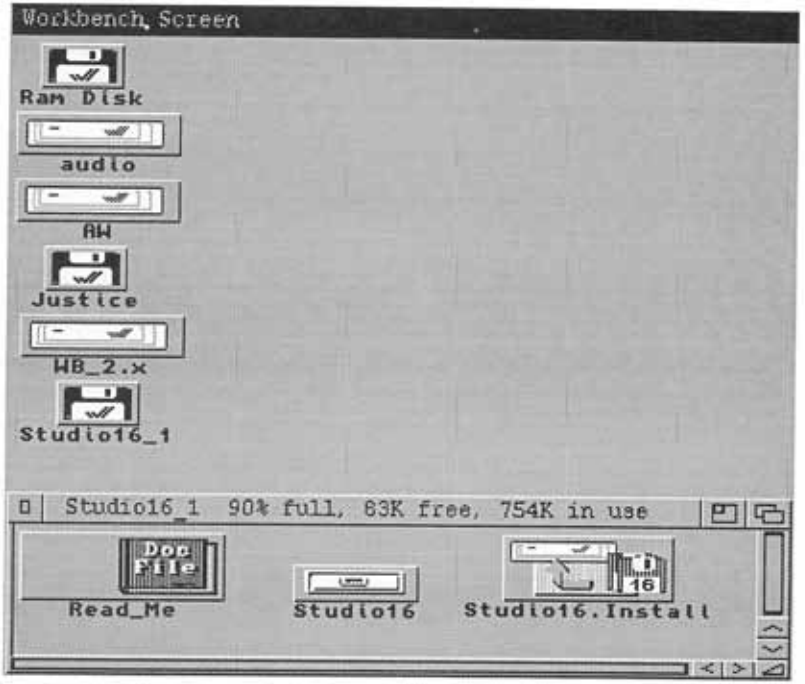

Figure 2-2. Studio 16 Disk 1

5. Double click the **Studio16. Install** icon.
6. The installation utility will run.

NOTE The installation utility is equipped with on line help for your convenience.

7. Before the installation begins, it requests your level of Amiga knowledge. Select your level of knowledge, then click **Proceed**.

   Novice Users are only required to select a directory on which to install Studio 16, all other actions are automatic. **Intermediate Users** have the added option of selecting that a log file be sent to a printer, or file. **Experienced Users** must indicate the preceding as well as having to confirm an assign statement.

8. A notice will appear with the following statement "I have found 1 AD516, is this correct?" Click **Yes** to proceed. However, if the system does not locate your AD516 or AD1012, exit the install utility by clicking **No**. Then, turn off your computer and re-seat the audio card in its slot or in a different slot, before trying the installation utility again. Refer to the preceding Hardware Installation section for more information on installing the hardware.

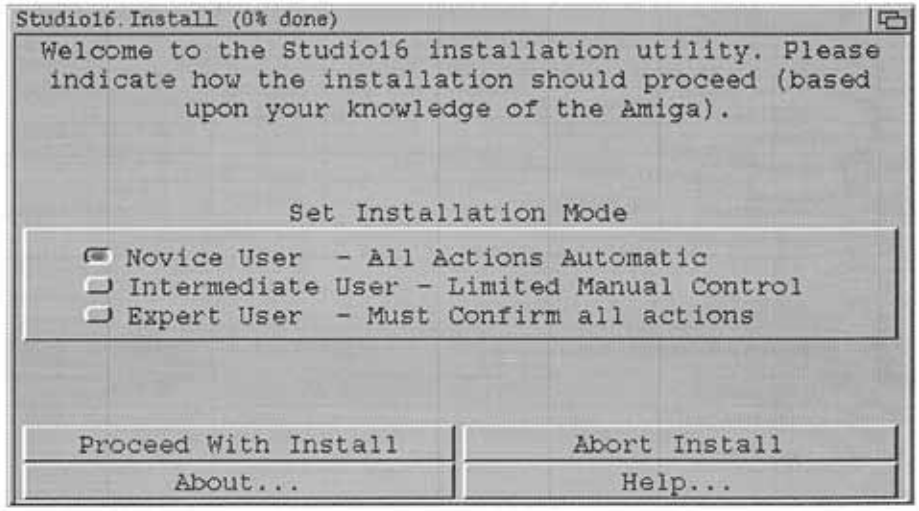

Figure 2-3. Studio 16's Installation Utility

9. Select the hard drive or partition to put the Studio 16 program on. Your available Amiga DOS devices will appear in the upper window. Click one of the names to select the device, then click **Proceed.** (You do not have to use the same path that you intend to use for your audio files.) For more information on the file requester click the **Help...** button.
10. The installation utility will create a directory called 'Studio16_3' and copy the appropriate files into it. In addition, your s: and libs: directories will be altered. And a log file will be created unless you have indicated otherwise. The log file contains all the actions that the installation utility completed during installation.
11. Insert the Studio 16 **Disk 2** when indicated.
12. When the installation is complete a Installation Complete notice will appear, click **Proceed** to close the installation window.
13. Now is a good time too fill out and mail your registration card. The card must be returned to SunRize in order to receive technical support, and software update notices.

Load Studio 16

Studio 16 will run under WorkBench 2.0 and greater. You can load Studio 16 from WorkBench or the Shell.

From WorkBench	Double click the **Studio16_3** directory icon. Double click the **Studio16** program icon.
From the Shell	Change the current directory to **Studio16_3.** Type **Studio16.**

Running Studio 16 Before Partitioning Your Hard Drive

Because Studio 16 is very hard disk read/write intensive, it is very important to create a partition on your hard drive dedicated to your working audio files. If you've just received your AD516 or AD1012, and would like to try it out before you backup and partition your hard drive, you can safely run Studio 16 by recording into memory. When Studio 16 was first installed it set your record path to RAM:. This means that all recordings will be made directly to your memory - not to your hard drive. Check the Sample List for your record path. It is indicated by a ☒ next to a path name. Make sure RAM: is the selected record path if you have not partitioned your hard drive.

Partitioning Your Hard Disk

Studio 16 can use any Amiga DOS device to record and playback from, (i.e. DF0:, DH0:, RAM:, etc.). And, unless you are recording to RAM:, Studio 16 is very hard disk read/write intensive. Therefore, it is very strongly recommended that you create a separate partition on your hard disk for your audio files you are recording, editing, and playing. If your Amiga crashes while a write is in progress, you may have to reformat your hard disk. If you have partitioned your hard disk and a crash occurs, you will only lose your "working" audio partition. You will not lose anything valuable, i.e. programs and archived samples.

When naming your Audio partition, do not name it Studio16 or Studio16_3. This will confuse the system since there is a Studio 16 assign. Tutorials in this manual refer to the partition as if it were named "Audio". You may want to name your partition "Audio" as well.

NOTE SunRize is not responsible for lost data. Partition your hard drive!

Reselection

If you are working with a single hard disk, turn "Reselection" OFF. If you are using more than one Hard Disk, you should have "Reselection" ON. Your version of WorkBench, the controller your using will determine how to turn Reselection OFF.

Commodore Controller - WB 2.0

1. Insert the WorkBench 2.0 Install disk into your floppy drive.
2. Select the Tools drawer
3. Select Turn Reselection OFF if you have just one hard disk.

Commodore Controller - WB 3.0

1. Insert the WorkBench 3.0 Install disk into your floppy drive.
2. Select the Tools drawer.
3. Select English.
4. Select Turn Reselection OFF if you have just one hard disk.

Third Party Hard Disk Controller

1. Refer to your hard disk controller manual for instructions.

Set Your Record Path

A Record Path is the assigned location for your new audio recordings. The default path is RAM:. Once you have partitioned your hard disk, you will want to change the record path to a directory on the hard disk. Your record path should be located on your Audio partition.

The following changes the record path from RAM: to a directory on the hard disk.

1. Select Sample List from the Applications Menu (^O).
2. The Sample List appears with RAM selected as the record path, note the selection box next to the path name.
3. To add another path to Sample List, select Add New Path from the Sample List menu. Select your new path from the requester and click OK.
4. Sample List will update and display the two directories. You can continue adding paths (up to eight) to suit your setup. Remove the RAM: path by selecting Remove Path from the Sample List menu and selecting it in the requester.
5. Once you have all your paths listed, choose one for the record path by clicking the active box next to its name. You can change this selection at any time.
6. To save the Sample List setup, select SaveSetup from Project menu. This will also save the positions of the windows on the screen. If you don't want Sample List showing every time you run Studio 16, close Sample List before you SaveSetup.

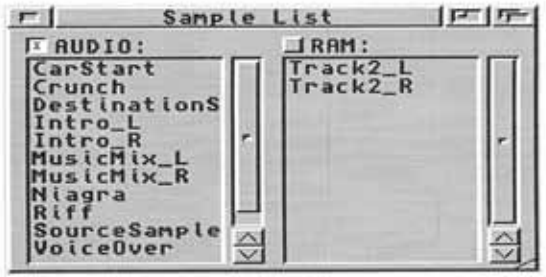

Figure 2-4. Sample List

Studio 16 File Structure

Studio 16 requires the following directories of files to operate. They are automatically copied by the installation utility into a Studio16 directory.

- Apps
- Drivers
- Utilities
- ProjectMenu
- Fonts
- Libs

Studio 16 should have an assign called "Studio16_3:" that points to the created Studio 16 directory. The installation utility will add this assignment to your User-Startup. If you move the Studio 16 directory later, be sure to update the assignment in your User-Startup file.

Getting Started

This chapter is a brief tutorial on using basic Studio 16 options. Included is a description of common screen elements and short tutorials on recording, editing and playing a sample. Detailed information on all modules is provided in Chapter 8, the Reference Section of this manual.

It is recommend that you open and read the **Read_Me** file in the Studio 16 directory before loading Studio 16. This file includes updated information not found in this manual.

Load Studio 16

1. Double click the **Studio16** icon in the **Studio16** drawer. For more detailed instructions see Chapter 2 - Installation.
2. An About window appears listing the amount of disk space available in your default record path. It also displays the amount of chip and fast RAM installed in your system. Click **OK** to close it.

Menus and Keyboard Shortcuts

Studio 16 Modules can be launched from the Applications Menu or from the keyboard. To select a module from a menu, click the right mouse button and hold it down. Move the mouse pointer over a menu option and release the mouse button to select it.

Keyboard shortcuts are identified in the menu to the right of the option name. Module shortcuts use the control (Ctrl) key, indicated by(^). All other keyboard shortcuts will use the Right Amiga Key(*A*-). To use a keyboard shortcut, hold down either the Control key or the Right Amiga key, and type the letter indicated.

The key to using software efficiently is to memorize the keyboard shortcuts for your most common applications.

Once a Module is launched it may add more menus to the menu bar. For a module's menu options to be available and to use its keyboard shortcuts, you must first make the window active by clicking on it. The title bar of a window will be highlighted when it is active.

NOTE OK requesters can generally be accepted or rejected with the standard keyboard shortcuts. For OK, Left *A*-V. For Cancel, Left *A*-B.

Common Screen Elements

Most screen elements are common to the Amiga Intuition standard; however, there are a few gadgets that you may not be familiar with.

Drop List

Indicated by a ⇩ , allows you access to available choices for an option. Click the ⇩ button for a list to appear below the current selection. Use the familiar scroll bar and arrow buttons to locate a new selection. Click on an item to select it.

Active Boxes

Many options can be turned on by activating them. Click the active box next to the option's label. Deactivate it by clicking the button a second time or by selecting another option.

Window Zoom

The Window Zoom gadget provides a quick way to switch between two different window size/position settings It is a toggle that ,when selected, makes a large window small and a small window large.

Depth

Located in the top right corner of all windows, the Depth button allows you to bring a window to the front or move it to the back. Click the button once to move it to the front. If the window is already in front, the single click will move it to the back or underneath all other windows. Also selecting a module from the Applications Menu will bring it to the front. If ClicktoFront is selected in Preferences, this button will not appear. Windows are brought to the front by clicking anywhere on them when the ClicktoFront option is selected.

Resize

In the lower right side of most windows is a small triangle. Click and drag this triangle to resize a window. As windows are reduced in size, text in the window and title bar will truncate.

Record and Play

Once you have installed and loaded Studio 16 you are almost ready to record.

Before you can record, you need to connect your audio source. Any audio source with a "Line Out" may be used, preferably a CD player. Use a short RCA patch cable to hook up the CD's Line Out to the AD516's or the AD1012's Audio IN jack(s). If your audio input is from a microphone, you will need an external device, like a mixer, to convert the mic output into an RCA Line Out. The card's Audio OUT jack(s) can be hooked up to a receiver or an amplifier system's CD/AUX Line In. If you have a LTC SMPTE time code source, plug it into the top jack: SMPTE IN.

Now that you are ready to record, there are two methods of recording. One uses the Recorder module and the other records from the Cue List. For this brief demonstration of recording, the Recorder module is used.

Record with Recorder

1. Load Recorder, Sample List and Meters from the Applications Menu. Close any other modules that are open.
2. Check your record path in Sample List. If you have not partitioned your hard drive, it should be set to RAM:. (The record path is identified by a x.)
3. Turn on your audio source.
4. Click **Monitor** in the Recorder window. You should hear the audio playing through your output device.
5. **AD516 ONLY** - To make a stereo recording, select the L and R channel from the Recorder Menu so that both channels have a check next to them. To make selections from the Recorder Menu, make sure the Recorder window is highlighted. You should have audio connected to both of the AD516's audio inputs when recording in stereo.
6. Activate Meters by clicking on the window. From the Meter's Channels Menu, select Input, Output and Play 1. These are easily selecting by holding down the right mouse button, and clicking the channels with the left mouse button. You will now see activity on the input and output meters.

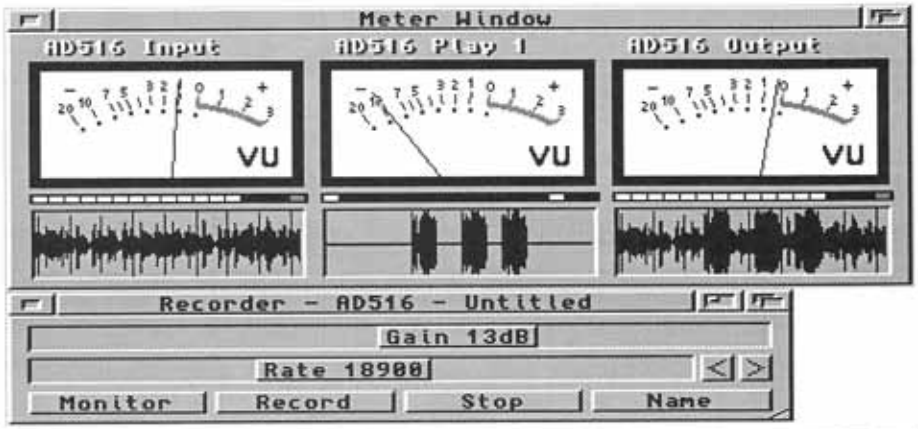

Figure 3-1. Meters and Recorder

7. Set the proper **Gain** in the Recorder setting by watching the meters for clipping. Clipping results from the gain being set too high. It is indicated on the meters by the VU meter going into the (+) section, the LED meter flashing on the far right side, and the scrolling graph meter peaking off the top and bottom. Adjust the

Gain so that clipping rarely, if ever, occurs. See the Meter Reference Section for more information.

8. **AD516 ONLY** - Stereo samples will be shown in the scrolling meter by channel. The input from the left channel will be graphed on the top of the graph, and the input from the right channel will be graphed on the bottom of the graph. Disconnect one of the inputs to see the effect on the scrolling graph.
9. **AD1012 ONLY** - AD1012 owners have the option of setting a variable lowpass filter. Activate **Auto Filter** to set an appropriate cutoff filter for your sampling rate. (The AD516 has a digital filter. It's automatically activated whenever you record.)
10. Select a sampling **Rate**. Keep in mind that 44.1KHz is the CD standard and 48KHz is the standard rate for DAT players. Anything more than that does not have an audible effect. For video purposes you may want to record at about 32KHz. This gives a 16KHz frequency response, more than adequate for narration and sound effects. (The nearest available sampling rate for the AD1012 is 30,120Hz.)
11. Click the **Name** button and type in a name for your sample. The default is Untitled.

NOTE You can name the sound before you start recording, or you can rename the sample in the Sample List later.

12. To begin recording, click **Record**. A window will appear in the middle of the screen indicating that recording is in progress. Also displayed is the name(s), the size of the sample recorded so far, and the remaining disk space. These numbers will change as the record proceeds. And, unless you're recording to RAM, your hard disk light will flash.

Figure 3-2. Recorder's Progress Indicator

If you have SMPTE time code plugged into the AD516 or AD1012, the recorder will show the time your recording began. Later, if this sample is loaded into the Editor or the Cue List, this SMPTE time code will enter itself with the sample.

13. To stop recording, click the **Stop** button. If you continue to hear sound, it is the monitoring of the audio source. Click the **Monitor** button to stop monitoring. The "monitor" and "record" functions are independent. Also, your hard disk light may continue to flash for a few seconds after selecting stop. This is normal.

Play from Sample List

There are a few ways to play back a sample. To play back from Sample List:

1. Launch Sample List from the Applications Menu, (^ O). (You can close any other modules that are open.)
2. Select the sample you recorded earlier by clicking on its name. It will be in the active directory. The active directory, or record path, is indicated by .
3. **AD516 ONLY** - To playback a stereo sample, you need to select both the samples that were recorded, (e.g. Untitled_L and Untitled_R). Select both samples by shift-clicking. (Holding down the shift key while clicking on multiple sample names.)
4. Play the sample(s) by selecting **Play Sample** from the Sample List menu or by typing *A*-P.
5. To stop the playback early, select **Stop Playback**, *A*-S.

NOTE When playing back multiple samples, all samples must have the same sampling rate.

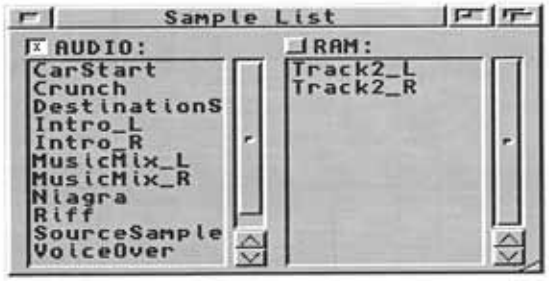

Figure 3-3: Sample List

Edit a Sample

To make changes to a sample, it must be loaded into an editor. This part of the tutorial covers basic navigation within the editor and use of the non-destructive cut, copy and paste.

Load a Sample Editor

1. Load Sample List from the Applications Menu (^ O).
2. Select the sample you want to edit and select **Edit Sample** from the Sample List Menu or type *A*-E.
3. **AD516 ONLY** - To edit a stereo sample, select two samples in the Sample List (ending in _L and _R) by shift-clicking and then select Edit Sample (*A*-E)
4. An Edit window will appear with your sample(s) graphed.

5. Select **Play All** from the Editor Menu to hear the sample (*A*-P). The keyboard shortcut *A*-P is one the most useful short cuts, it causes samples to play in many of the modules.

Copy a Range and Duplicate It Within the Sample

1. Mark a range over the area of the graph you want to duplicate. To mark a range, click on the graph and drag the pointer to the left or right. To alter the size of an existing range, click on one edge of the range and drag it to a new location.
2. Select **Play Range** from the Editor Menu (*A*-L) to hear the marked range.

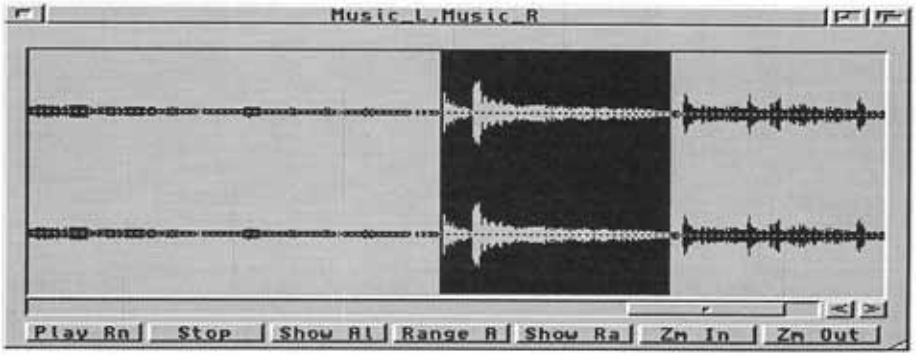

Figure 3-4. Edit Window

3. Select Non-Destructive Copy from the Edit Menu.
4. Click on the graph to select an insertion point for the copied range.
5. Select Non-Destructive Paste, and Insert at Start, (*A*-V). (Start refers the beginning of the marked range. When you just click on the graph, you create a very small range.)
6. Click **Play All** to hear the new version of the sample. **Undo Last** will return the sample to its previous state.

NOTE Because the previous copy and paste were Non-Destructive edits, **Undo Last** is able to cancel the change. Destructive edits are not reversible. Having a choice between destructive and non-destructive editing allows you to have more control over your samples. Destructive editing actually changes the data on your hard drive as you alter a sample in the editor. However, Non-destructive edits do not destroy data on your hard drive. It just remembers which edits you want to perform on the sample. Non-destructive edits can be made permanent and free hard disk space by selecting Make Permanent. See the Reference Section on the Editor for more information.

Delete a Range

1. Mark a range to delete using the previous technique.
2. Select Non Destructive Delete from the Edit Menu, (A-D). Since the delete is non-destructive, it will not erase data from your hard disk. To free hard disk space, use the destructive delete or select Make Permanent after doing the non-destructive delete.

Create a Region

Regions are named ranges within samples. Once created in the Editor, they can be dragged and dropped into the Cue List for playback.

1. In the Editor, select a range to be named as a region. For details on marking ranges refer to the technique mentioned previously in this section.
2. From the Editor's Options Menu, activate Show Regions. An Editor Regions List will appear.
3. With Editor Regions List active, a Region Menu is available in the Menu bar.
4. Select Add Region from the Region Menu to create a region from the marked range in the Editor.

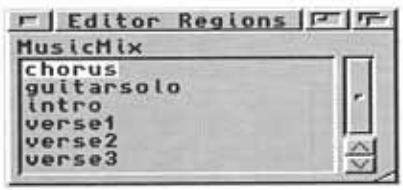

Figure 3-5. Editor Regions List

5. When prompted, enter a name for the region.
6. You can now drag this region into Cue List for playback. (Regions can also be dragged from the Sample List. Show Regions must be activated from the Sample List menu for regions to be displayed there.)

Convert a Sample

When a sample is recorded it is usually stored in the Studio16_2.0 file format. This default format is selected in Preferences from the Project Menu. Studio16_2.0, like AIFF, is a 16 bit format. It includes special data that keeps track of non-destructive edits and marked regions. To export a sample to another audio program you will probably have to convert to another file format. Studio 16 will convert to: Studio16_1.0. AIFF 16bit, IFF_8SVX, AIFF 8bit, and RAW. Below are the steps to convert a sample to an IFF_8SVX format.

1. Load Sample List from the Applications Menu (^O).

2. Select a Sample to Convert.
3. Select Convert from the Sample List Menu (*A*-C).
4. Select **IFF_8SVX** for the file format.
5. Click **OK.**
6. A Save File Requester will appear. Enter a directory and file name for the new 8 bit sample.
7. Click **OK**.

Figure 3-6. Convert Sample

8. The original 16 bit sample remains on disk. To delete it, use Sample List.
9. You can now load the new 8 bit file into other programs. You can even load in back into Studio 16, but because converting a 16 bit sample to an 8 bit format drops bits, the sample won't sound as good as it did before the conversion.

NOTE See the Reference Section on Sample List for a description of the available file formats and more detailed instructions on converting.

Converting files to IFF 8SVX can be useful if you need to conserve disk space and you're working with samples that don't require a high SNR (Signal-to-Noise Ratio). Sound effects like explosions will likely sound the same whether they're 8 bit or 16 bit files. Both 8 and 16 bit files can play simultaneously, if they have the same sampling rate. Plus, the 8 bit file will only take up half of the disk space it did when it was a 16 bit file. (Note that this is true for both the AD516 and the AD1012, because samples recorded with the 12 bit AD1012 are stored in a 16 bit format.)

Quit Studio 16

To quit Studio 16, select **Quit** from the Project Menu. Before clicking OK, you should check the Sample List for any samples in the RAM: directory. These samples should be moved to a directory on your hard disk before turning off your Amiga; otherwise, they will be lost.

To save the position of all the open windows and their settings select SaveSetup from the Project Menu before selecting **Quit**.

Hard Disk Drives

Studio 16 usually uses a hard disk to store audio files. Although it is possible to use RAM for sample storage (add RAM: path to Sample List), this is not common. Hard disks are preferred because they can store large amounts of data relatively cheaply.

About Hard Drive Specifications

Hard disks are primarily rated by their "average seek time". This is the average time it takes the read/write head to move between two random tracks. For example, the hard drive in an Amiga 3000 is often an "11 ms, 105 MB SCSI Quantum." This translates to a drive that holds 105 megabytes of data, is manufactured by Quantum, and has an average seek time on reads of 11 milliseconds. This is a little deceiving because the Quantum drive has a track buffer that makes reads appear faster than writes. The average write seek time on the same drive is 19 ms.

A second parameter of drives is the "data transfer rate" from the drive once the seek is completed. The hard disk controller you use can affect this as much as the drive itself. In general, slow data transfer rates are only important on optical drives. For example, a fast drive with an A3000 hard disk controller may run at 1.9 MB per second. However, a typical Magneto-optical drive runs at 100K per second for writes, and 300K per second for reads.

How Fast Does My Hard Drive Need To Be?

Studio 16 will work with almost any drive you can buy these days. However, the faster the better. For example, the A3000 105 MB Quantum with an average seek time on reads of 11ms and 19ms on writes is fast enough for about 6 tracks at a 44.1KHz sampling rate using the AD516.

But even slower drives will work. For example, the "SyQuest" removable media drive has an average seek time of 26ms. It is possible to do multiple tracks with this drive. However, you may have to reduce your sampling rate or the number of tracks you are playing back. Note that the AD516 is much more efficient than the AD1012. As a rule you can play more tracks at faster rates with the AD516.

Removable Media Drives

SyQuest and Bernoulli make popular removable media disk drives. In testing, we found that you can play multiple tracks off these drives, although you may have to reduce the sampling rate or the number of simultaneous tracks. You may also need to increase the "Channel Buffer" in Preferences.

Optical Drives

Although we haven't tested it in house, we have reports from AD1012 owners recording and playing one channel of audio with a Ricoh 600MB magneto-optical drive. This drive has an average seek time of 33.7ms with read and write rates of 300K/second and 100K/second respectively. In order to work, the "Channel Buffers" in Preferences were increased to 1MB. Note that performance will be improved with the AD516.

Other users report to playback 2 tracks with a Maxtor Tahiti II - 1 GB magneto-optical drive using the AD1012 in an A3000. Access time for this drive is 90-120 ms.

For more information on the above drives, contact the manufacturers, listed in Appendix C.

Hard Drive Space Requirements

Memory usage is entirely based on the sampling rate of a sample. The following chart provides a Meg per Minute guide for common sampling rates when recording 16 bits. The formula used to derive the chart is: MB = Sampling Rate × 2 × 60 sec/min ÷ 1024byte/k ÷ 1024k/MB. Or, more simply, 1 second of sound = 2 × Sampling Rate.

When recording in stereo, double the space requirements listed below.

Sampling Rate	**Space for 1 minute** (1 track - 60 seconds)	**Space for 30 minutes** (1 track - 1800 seconds)
11,000	1.3 MB	37.8 MB
22,000	2.5 MB	75.5 MB
32,000	3.7 MB	109.8 MB
44,100	5.0 MB	151.4 MB
50,000	5.7 MB	171.6 MB

Fragmented Hard Drives

As drives are used, they tend to become cluttered. The operating system starts to spread files out across tracks that are not close to each other. As a result, it takes longer to read the files because the hard drive must seek farther between tracks. This is called "fragmentation" and becomes a particular problem as the hard disk becomes full. If your hard disk or audio partition is fragmented, you may have trouble playing sounds. You can purchase programs that will "optimize" or "de-fragment" your hard disk. They scan your hard disk and rearrange the data so that all the data for a particular file is near each other.

Disk Errors

Hard drives aren't fool proof, and it is almost inevitable that you will at some point encounter a disk error. This can manifest itself as a "Read" or "Write" error. Or, occasionally as a "Can't Validate Drive" error. Sometimes clicking "retry" or "cancel" on the DOS requester presenting the error will cause the error to disappear. However, if this happens you should start to worry because the error will probably reappear later, and can mean a failing hard drive.

Of course your best advice is to backup your hard drives. They can be backed up to a SCSI tape drive or a SCSI optical drive. However, due to the time and expense involved, many people don't bother. Just be warned that a hard disk "crash" is more than a possibility, it is very likely that it will happen to you eventually. For more information on preventing disk errors, and recovering data after a disk error, refer to Chapter 7 - Troubleshooting.

If your hard drive crashes, and you're not sure what to do, take your Amiga to your Amiga dealer. Their service department should be experienced in attempting to restore data from corrupt hard drives.

SMPTE

Introduction to SMPTE Time Code

SMPTE (Society of Motion Pictures Television Engineers) time code is a standard way to keep track of time or position on tape. SMPTE (pronounced "simp-tee") time code is most common in video production, but is also used in film and music production. In general, SMPTE time code specifies position and timing information in terms of frames. The format is:

HH:MM:SS:FF (HOURS:MINUTES:SECONDS:FRAMES)

(01:12:06:02 refers to 1 hour, 12 minutes, 6 seconds, and 2 frames)

Time code is used to synchronize events. With Studio 16 you can specify a sound to trigger at a specific time code. For example, you may find that a door begins to open at exactly 1 minute, 2 seconds, and 15 frames into your tape. You can set up Studio 16 to trigger an opening door sound effect at 00:01:02:15 with the Cue List.

In Studio 16 you have the added benefit of working with what we call SMPTE Plus. If activated in the Cue List, a fraction of a frame can be used, as in 00:01:02:15.50. This would be 1 minute, 2 seconds, and 15½ frames.

SMPTE time code is used to synchronize events in music and video production. For example, a musician with a multi-track tape recorder may want to synchronize it with a MIDI sequencer. This can be accomplished by "striping" time code onto the multi-track, and then running the time code out of the multi-track, and into the computer. The computer can then run a MIDI sequencer capable of "slaving" to the tape by following the time code. Studio 16 and the Bars&Pipes sequencer allow you to accomplish this without an external multi-track. Studio 16 can act as a digital multi-track tape deck, and it will sync to Bars&Pipes through "internal" time code.

VITC or LTC SMPTE

There are two types of SMPTE time code: LTC (Longitudinal Time Code) and VITC (Vertical Interval Time Code, pronounced "vit-see"). LTC is written on the audio track of the tape deck, and VITC is embedded into the video signal. VITC has the advantage of being available constantly, even when the video deck is paused. Whereas, LTC requires that the deck be playing for time code to be available. However, LTC time code is less expensive, and works on any audio tape recorder--not just video decks. Both LTC and VITC store the same basic information--the

frame number that specifies where the tape decks record/play heads are currently located.

Both the AD516 and AD1012 include a LTC SMPTE reader. If your deck outputs VITC, there are translators available that will convert the time to LTC which is read by the AD516 or AD1012. See Appendix C for a supplier.

Frame Rate

One final aspect that needs to be specified when selecting a time code format is the frame rate, or number of frames per second. SMPTE supports the following:

24 fps	Motion Pictures
25 fps	European Video
29.97 fps, non-drop frame	USA color video
30 fps, non-drop frame	USA B&W video or music
30 fps, drop frame	USA color video

When SMPTE was first introduced in 1967, it was at 30 frames per second and used for black and white TV. However, when NTSC color TV was introduced, it used the slightly slower rate of 29.97 frames per second. This is approximated in "drop frame" SMPTE by dropping 108 frames every hour. Drop frame is used so "real time" or "clock time" will match the time code marked on the tape. But because drop frame can cause problems because of the missing frames 29.97 non-drop is often used.

Striping Time Code

In order to use time code, you must first "stripe" your tape. That is, you record time code onto the entire tape area you are planning to use. Depending on the camera or video deck you use, this may be automatic or manual. Or, you may have a dedicated "Time Code Out" jack on your deck.

Studio 16's internal SMPTE generator does not output time code for striping.

To stripe LTC onto your tape, you will need an LTC generator. Time code generators can be part of a video cameras or a video deck. Or, they can be dedicated generating boxes, or software programs, namely the SunRize SMPTE Output module. Appendix C lists manufacturers of LTC generators.

Contact your dealer or SunRize for more information on SunRize's SMPTE Output module that outputs LTC time code for striping tapes.

SMPTE for Video Applications

Time code is essential in any kind of professional video production. It allows precise specification of video and audio edits. With Studio 16, you use SMPTE time code in conjunction with the Cue List to synchronize audio effects, music, and narration with

the video tape. These audio clips reside on your hard disk until you create the final master tape. During your edit sessions, the Cue List will track your tape's time code and trigger sound effects as specified. You will be able to listen to the audio coming off the computer as you watch the video.

SMPTE for Music Applications

SMPTE time code was originally designed for video applications but with the success of MIDI (Musical Instrument Digital Interface) it became apparent that it would be useful to use SMPTE time code to time MIDI sequencers and to communicate with other MIDI devices. MIDI quickly adopted a MIDI Time Code format. MIDI Time Code is easily converted to SMPTE Time Code and vice versa. To drive external MIDI equipment you may need a SMPTE to MIDI time code converter. Appendix C lists a source for such a device. MIDI time code is used as a timing source for sequencers, to sync two tape decks together or to sync a tape deck with a MIDI sequencer among other things. When Studio 16 is used along with Bars&Pipes Professional, you get complete sequencing capabilities as well as hard disk recording. Your MIDI sequences can have vocal tracks and guitar solos without having to use an expensive multi-track tape deck that tracks MIDI time code.

Cue List Tutorial

The Time Line Cue List is a fast, flexible tool you can use to arrange sounds for a variety of projects. To introduce you to some of the Time Line Cue List's capabilities, we'll walk through two different projects:

- Adding sound effects to a cartoon
- Recording a multitrack session

As you work through the tutorials just relax, have fun, and experiment.

Cartoon Soundtrack

For our first tutorial we'll be doing the soundtrack for the last scene of an imaginary cartoon. In this scene there are three characters: a bird, a cat and a dog. They are performing a play in front of an audience.

In the play, the cat has been chasing the bird. The bird is now inside the house where the dog lives. This is where our tutorial soundtrack begins.

- In an attempt to get the bird, the cat has disguised himself as a traveling salesman and he knocks on the door. (DoorKnock)
- The dog growls at the sound of the knocking. (Dog)
- The cat opens the door. (OpenDoor)
- The bird, seeing his chance to expose the cat while the dog is right there, flies past the cat, (FlyBy) knocking off part of the disguise (Ricochet).
- The dog, now recognizing the cat, punches the cat (Punch).
- The cat's tongue goes in and out like a cuckoo clock as he recoils from the blow (Cuckoo).
- Silly music kicks in (CartoonMusic).
- The curtain falls with a crash (Crash).
- The audience applauds (Applause).
- The bird pops his head through the curtain and smiles (SqueakPop). The picture freezes and fades to black.

OK, that's the scene. It actually goes by pretty quickly. Keep in mind that the samples included for the tutorial were sampled at a sampling frequency of 9600Hz in 8 bits. This is very low quality but it lets us fit more samples on the distribution floppy disk, and it gets the idea across.

In a typical soundtrack project you will either log the sound effects and music times yourself or get a list from a producer. Here are the times our imaginary producer has given us for the start of each sound element used in our cartoon scene:

Sample Name	Start Time
DoorKnock	01:00:06:07
Dog	01:00:07:03
OpenDoor	01:00:08:21
FlyBy	01:00:09:10
Ricochet	01:00:10:02
Punch	01:00:10:25
Cuckoo	01:00:11:07
CartoonMusic	01:00:13:28
Crash	01:00:16:16
Applause	01:00:18:07
SqueakPop	01:00:24:26

NOTE For cartoons it's also common to produce a sound track first and then create the animation to match. Even if you don't work that way, using the Time Line Cue List is a great idea. The Time Line Cue List makes it easy to make changes in your sound track at any point in the production, including after the animation is finished.

Record the Samples

The first thing you would do for a project like this is create sounds, record sounds on location, or find suitable sounds in a sound effects library. Then you would record the sounds to your hard drive with Studio 16's Recorder, and clean them up with the Editor. For more on using the Recorder and Editor, see their respective reference sections in Chapter 8.

For expediency's sake, we've already recorded the sounds for this project. Some of them came from the Hollywood Edge sound effects library demo CD. The sounds are in the Samples drawer, which is inside your Studio16 drawer. To save disk space they were sampled as low quality 8 bit samples, but they'll work for this exercise.

Prepare the Cue List

Open the Cue List and Set Fade and Drag Options

1. Use the Cue List menu item in the Applications menu to open the Time Line Cue List, if it's not already open.
2. If an existing Cue List loads in the Time Line, select New from the Cue List menu to load the default Cue List. The default Cue List contains four empty audio tracks.
3. Turn Any Direction drag mode on, if it's not already on. This will allow you to drag flags and Audio entries freely later on. (Figure 6-1.)

4. Turn Unlimited Cross Fade mode on, if it's not already on. To do this click the Unlimited Cross Fade button on the top of the Time Line Cue List window. This will allow you to create real time cross fades of any duration. (Figure 6-1.)
5. Turn the Cue List ON. Click the ON/OFF button on the left side of the Time Line Cue List window. The Cue List will not play if this button is OFF.

Figure 6-1. An Empty Time Line Cue List

Set Cue List Preferences and SMPTE Rate

1. Use the Cue List Preferences menu item in the Options menu to open the Cue List Preferences requester and set the following parameters.
2. For this project we'll want the Time Line Cue List to display all times using SMPTE time, so click the SMPTE button in the Time Options area of the requester. This way the times we use will match the times used by our imaginary producer, and if this was a real cartoon, the Time Line Cue List would synchronize to it.
3. Type a time in the Start Time field that's 15 seconds or so before the beginning of the scene. The Start Time field is at the bottom of the Cue List Preferences Requester. Simply type in the preferred start time. In this case we want to be ahead of the start time of the first sound effect, the Door Knock, which starts at 01:00:06:07. So enter a time that's roughly 15 seconds ahead of that, like 00:59:50:00.

   There's nothing sacred about starting the Time Line Cue List's view 15 seconds before the scene starts; you could start 5 seconds ahead or 30 seconds ahead or whatever works for you. You will want to start far enough ahead so that your system has time to preload samples before they have to play. Fifteen seconds gives you some room to work with, but you may be able to start playback within 5 seconds of the start of the scene and still have the first samples loaded in time to play.
4. Type a time in the End Time field that's 15 seconds or so after the end of the scene. The End Time field is at the bottom of the Cue List Preferences Requester. Simply type in the preferred end time. In this case we want to be after of the end time of the last sound effect, the SqueakPop, which starts at 01:00:24:26. So we want to allow for the sample to play and enter a time that's

about 15 seconds past when it ends. SqueakPop lasts about 1 second, so enter 01:00:41:00.

The range of time you choose to view in the Time Line Cue List does not affect when playback will start and end. Playback starts wherever the Position flag happens to be and ends when you click the Stop button. There is a special flag that makes it easy to set a start time for playback, called the Start flag (see the following sections).

5. When you're done entering the start and end times for the Display Boundaries, close the Cue List Preferences requester by clicking the close gadget in the upper left corner of the requester. Keep all Display Options and Undo Levels at their defaults.

Figure 6-2. Cue List Preferences

6. Use the Preferences command in the Project menu to open the Preferences requester. In the upper right corner of the requester is a section labeled "SMPTE". Click the one labeled 29.97, if it's not already selected.

   Since we're using SMPTE time code in this tutorial project, we'll want to make sure that we are using the same SMPTE time code type as our imaginary producer.

   There are 4 commonly used SMPTE time code types:

   - 29.97 frames/second for NTSC video
   - 30 frame drop frame for NTSC, which keeps more accurate real time by skipping frame numbers periodically
   - 25 frames/second for PAL video
   - 24 frames/second for film.

   For this Tutorial we've assumed our producer is using 29.97 frames/second SMPTE time code.

7. In Preferences you select the Studio16 Interface Colors. To follow along with this tutorial you select the Default color option. Close Preferences after you make the selection.

Figure 6-3. Studio 16 Preferences

Set the Start Flag

1. Set the start time for the cartoon's Cue List by dragging the Blue Start flag about 5 seconds before the start of the first entry. Since the first entry begins at 01:00:06:07, lets put the blue start flag at 00:59:57:00. To move the Blue Start flag, just grab its banner and drag it left or right in time. If you drag past the left or right edge of the Time Line Cue List, the Time Line Cue List will scroll. As you move it, you'll see its start time displayed in the upper right area of the Time Line Cue List window, called the Text area.

   Flags are handy visual markers that you can move with the mouse. You can use the flags to see where you are in the Time Line Cue List, to mark places in the Time Line Cue List, and to define the start and end times for recording. The Blue Start flag is a special flag you can use to mark the beginning of your Cue List. The "banner" part of the Start flag looks like an arrow pointing to the right:

   The "banners" of the flags float just above the Time Line Cue List and just below the transport buttons, drag buttons, edit buttons, and the text area. The "flag poles" of the flags are vertical lines drawn over the Time Line Cue List to show the exact location of each flag in time.

2. Another way to move the Blue Start flag is by entering a time in the Flag Parameters requester. Double click the Blue Start flag to open the Flag Parameters requester. In the requester's time field you can type the time where you want the flag to be. To get a feel for moving the flag, try both methods. Drag the flag left and right, and then double click the flag and try typing the start time into the requester.

Add and Name the Audio Tracks

1. With our Time Line Cue List boundaries set and our start flag set, the next step is to name our Audio tracks. Knowing that we have three characters, plus some music, lets create four tracks.

NOTE The fact that the Time Line Cue List allows up to 100 tracks means you can create plenty of tracks to keep your sound track organized. The amount of samples that you can actually play at one time depends on the SunRize cards you have in your Amiga.

2. Use the Add Audio Track in the Track menu to add audio tracks if you don't see four audio tracks. Tracks are horizontal strips on the Time Line Cue List. They begin with a series of buttons. The first button in each track, when selected, looks like a speaker.

   If you can't see all four tracks, drag the resize gadget down. The resize gadget is in the lower left corner of the Time Line Cue List window.

3. The third button from the left on each track shows the track's name. Right now all your tracks say "Audio". Let's change them so that one says "Bird", one says "Cat", one says "Dog" and one says "Music". Click on the Name button for the top track. This will open the Audio Track Parameters requester.

Figure 6-4. Audio - Track Parameters

4. At the top of the requester is a Name field. Click in the Name field and delete the word "Audio". You can use the delete key, the backspace key, or just type *A*-X to clear the field.

5. Now type the word "Bird" and hit return. The track's Name button should now say "Bird".

6. Below the Name field is the Sampling Rate slider. The sampling rate on all the tracks playing on a single SunRize card must be the same. The cartoon tutorial samples were sampled at 9600Hz, so set the sampling rate by dragging the Sampling Rate slider until it says "Rate 9600".

7. Now do the same for the other three tracks, except type "Cat" for track 2, "Dog", for track 3, and "Music" for track 4. Each time you click a different track's Name button, the requester will change to show information for that track.

8. Change the sampling rate for each track to "9600". Leave all other Track Parameters at their defaults.

9. When you're done, close the Audio Track Parameters requester by clicking the close gadget in the upper left corner of the requester.

Your Time Line Cue List window should now look something like the following:

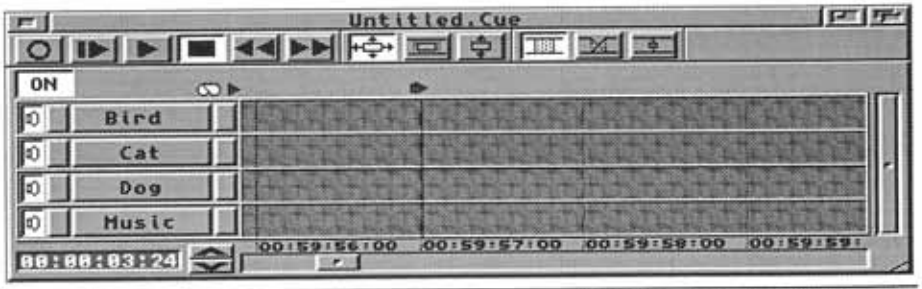

Figure 6-5. Four Tracks Named for Tutorial

Save the Cue List

1. The work you do on your Cue List in the Time Line Cue List is kept in your Amiga's volatile memory. If you turn off your Amiga your Cue List will vanish forever unless you have saved it to a hard disk or floppy disk.

NOTE It's extremely important to save your Cue List often. That way if you have a power interruption, a system failure, or turn off your computer, you won't lose hours of work.

2. Save your Cue List now by using the Save As command in the Cue List menu. When you use the Save As command it will bring up the Cue List Save File requester. Unless you change the default directory, it will be looking in the Studio16_3:CueLists/ drawer.
3. Type "Cartoon" in the File field and click the OK button. The Cue List will be saved as "Cartoon.cue".
4. So far our Cartoon Cue List just contains information about the four tracks, the Start flag, and the start and end time boundaries for the Time Line Cue List. Now comes the fun part -- adding Audio Entries!

Add Audio Entries

It's important to know that Cue Lists do not contain any sound samples. While finished Cue Lists do contain information about when to play samples, the sample data is stored separately on your hard drive. The Time Line Cue List represents samples with rectangular Audio entries. Audio entries store:

- Location of the samples on your hard drive
- Time to trigger samples
- Instructions to non-destructively crop or fade samples

Adding Audio entries is a breeze. All you have to do is drag samples from Sample List onto Audio tracks.

Dragging and Dropping Entries

1. Open Sample List by choosing the SampleList command in the Applications menu. Sample List shows multiple directories from which you can drag sounds. For this tutorial we'll access the Samples directory as shown.

Figure 6-6. Sample List

2. If the Samples directory is not showing in Sample List, make Sample List the active window by clicking its title bar. Then choose the Add New Path command from the Sample List menu to open the Select New Path requester.
3. Select the Samples directory, located in the Studio 16 drawer, and then click the OK button. Now Sample List should show the Samples directory, as shown above.
4. Lets start by dragging the Applause sample from the Samples directory in the Sample List. Click Applause (in Sample List) with the left mouse button. Keep the left mouse button down and move the mouse. The sample name will attach itself to your mouse pointer. Move the mouse pointer to the right of the Blue Start Flag anywhere over the Bird track and release the mouse button. Applause will appear on the track.

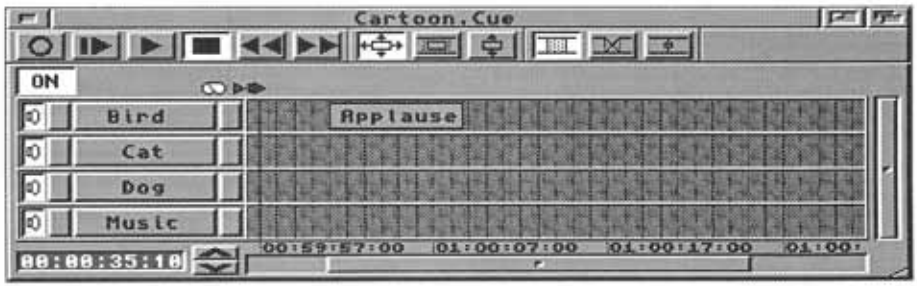

Figure 6-7. Time Line Cue List with Applause Entry On Bird Track

5. Now drag the rest of the samples from Sample List onto the Time Line Cue List as follows. Drop them anywhere on the track to the right of the Blue Start Flag, but try not to overlap them. If they overlap, just click and drag them down the time line, or delete them and drag and drop them in again.

Track 1	Bird	Applause, FlyBy, SqueakPop
Track 2	Cat	DoorKnock, OpenDoor, Cuckoo
Track 3	Dog	Dog, Punch
Track 4	Music	Ricochet, CartoonMusic, Crash .

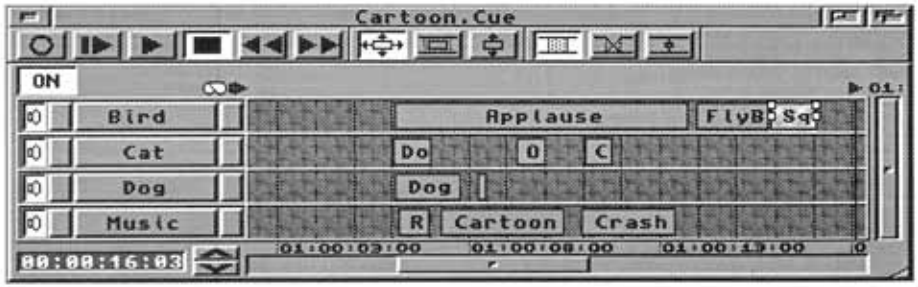

Figure 6-8. Time Line Cue List with All Entries Added

Just to demonstrate something, we have a minor problem. The Applause entry is on the wrong track. It should really be on track 4. Not to worry. Not only can you drag samples from Sample List onto Audio tracks in the Time Line Cue List, but you can also drag Audio entries between Audio tracks on the Time Line Cue List.

6. Drag the Applause Audio entry from track 1 to track 4 with the mouse.
7. Use the *A*-W shortcut to save the Cue List. It's a good idea to save often.

Listen to the Cue List

Let's see what all these Audio Entries sound like.

1. Click the Play-From-Start button. It's the second transport from the left in the upper left corner. You should hear some kind of cacophony. A glorious racket. Don't worry, we're not done yet.
2. Click the Stop button. It's the fourth from the left in the upper left corner.

NOTE If you do not hear the samples play, drag the samples along the time line, to the right of the Blue Start Flag by 8 seconds.

3. If you can't see any of the Audio entries any more, scroll or zoom the Time Line Cue List. There's a horizontal slider at the bottom of the Time Line Cue List window. Slide it to the left or right until you can see all the entries.

   You can also click the Zoom buttons to zoom in and out on the Time Line Cue List view. The Zoom buttons are just left of the horizontal scroll bar.

Move the Entries

Now that you have all of your audio entries in the Cue List you need to move them to the start times our imaginary producer gave us. Here are those times again:

Sample Name	Start Time
DoorKnock	01:00:06:07
Dog	01:00:07:03
OpenDoor	01:00:08:21
FlyBy	01:00:09:10
Ricochet	01:00:10:02
Punch	01:00:10:25
Cuckoo	01:00:11:07
CartoonMusic	01:00:13:28
Crash	01:00:16:16
Applause	01:00:18:07
SqueakPop	01:00:24:26

To move an Audio entry in time, just drag it left or right. If you drag past the left or right edge of the Time Line Cue List, the Time Line Cue List will scroll. As you move it, you'll see its start time displayed in the upper right area of the Time Line Cue List window, called the Text area. Try dragging an Audio Entry left and right just to get a feel for it.

Another way to move an Audio entry is by entering a time in the Audio Event Parameters requester. Since we have exact times from our imaginary producer, this is the method we'll use.

1. Double-click the DoorKnock Audio entry to open its Audio Event Parameters.
2. Enter the time from the Producer's list, 01:00:06:07, into the Start Time field.

Figure 6-9. DoorKnock - Audio Event Parameters

3. Hit return on your keyboard, then click OK. The DoorKnock Audio entry now begins where it should.

NOTE An "Overlap Contention Requester" will appear if you cause one sample to be moved on top of another. If this occurs, click the Undo Last Edit option and then move the sample out of the way.

4. Now change the start times for each of the other Audio entries in the same way. Double click each of the other Audio entries and enter their start times from the list before. When you're done, close the Audio Track Parameters requesters by clicking OK.

NOTE You can skip the above step, by opening the Tutorial_A.cue file from the Studio16_3:CueLists\ drawer. Tutorial_A includes all the tutorial samples at their correct start times. You can then continue with the Crops, Fades and Edits section of this tutorial.

5. Now save the Cue List again. It's a good idea to save every time you make major changes.

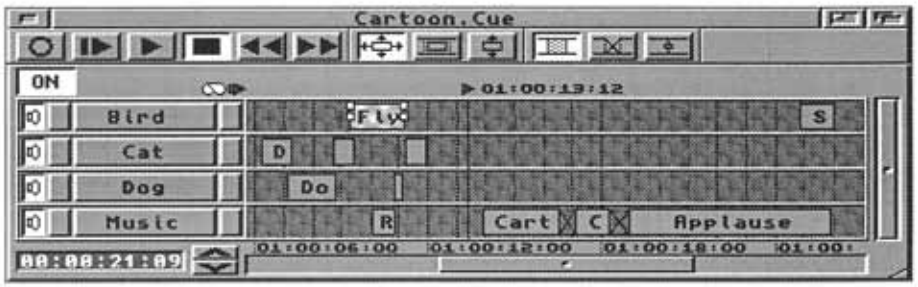

Figure 6-10. Time Line Cue List with Moved Entries

You might notice that some of the Entries overlap. Where CartoonMusic and Crash overlap you'll see that their color has changed and there is an "X" shape. The "X" signifies a real time cross fade. A cross fade is where the end of one Audio Entry fades out while the beginning of the next Audio Entry fades in.

Any time you move one Audio entry over another on the same track, the Time Line Cue List automatically creates a cross fade between the two Audio entries. Making cross fades is so easy in the Time Line Cue List that you just made some without even trying.

Crops, Fades and Edits

Go ahead and use the Play-From-Start button again to listen to the Cue List. It should now sound close to the soundtrack we want for the cartoon scene.

But there are still a few refinements we need to make. Some of the entries need to be shortened, some of the cross fades need to be changed, we need to add more Cuckoo entries, and we need to fade the end of the Applause entry.

Information contained in this chapter is only an illustration of Cue List features. For complete documentation on the Cue List including fades and crossfades, please refer to Cue List Reference Section in Chapter 8.

Crop and Fade Out FlyBy

1. Crop and fade the FlyBy entry by clicking the FlyBy entry on track 1 to select it. It should change color and you should see four white squares. These squares are handles you can drag with the mouse.
2. The middle squares on the ends are the Crop gadgets. They let you crop the entry. Crop FlyBy to end at 01:00:10:14 by clicking and dragging the gadgets on the end. Notice that the Text area in the upper right part of the window shows the start time when you drag the left Crop gadget and the end time when you drag the right Crop gadget.

   The squares in the top corners are the Fade gadgets. They let you add real time fades. Try dragging the Fade gadgets. Notice that the Text area in the upper right part of the window shows the fade time for the Fade gadget you are dragging.

   Adding real time fades and cropping entries is completely non-destructive. They do not change the sample on your hard drive. They only affect how the sample plays back. You can change the fade times and crop amounts whenever you want without losing any data or affecting other Audio entries that use the same sample. You can use the Undo command in the Options menu to get back to a previous crop or fade setting.
3. You can listen to how the Audio entry sounds with your crop and fade changes at any time by using the Play Selected command in the Entry menu. Try it.
4. Now let's set up the fades we need for our cartoon. But instead of dragging, this is a good opportunity to check out another way to crop or fade an entry.
5. Double-click the FlyBy Audio entry to open the Audio Event Parameters.

Figure 6-11. FlyBy Audio Event Parameters

6. Type 0:00:22 in the Fade Out field to create a fade at the end of the entry.
7. When you're done, close the requester by clicking OK.

Crossfade Ricochet with FlyBy

1. It turns out the Ricochet entry on track 4 needs to be moved. It really belongs on track 1. Since you've already moved the entry to where it belongs in time, it would be nice to be able to move it straight up to track 1 without losing the start time.
2. There is a way. There are three buttons on the top of the window that control how dragging works.

Figure 6-12. Drag Mode Buttons

3. We selected the first button earlier in the Tutorial. It's the Any-Direction button. When it's selected you can freely drag entries both horizontally and vertically. The middle button is the Lock-To-Grid button that snaps flags and the beginnings of entries to the nearest grid mark when you move them. The third button is the Vertical-Only button, and that's what we need here.
4. Click the Vertical-Only button. Now drag the Ricochet entry from track 4 up to track 1. Notice that you can't move it left or right. In Vertical-Only mode you can only move entries between tracks. This lets you move them from one track to another without losing their start times. (This step overrides the fade placed on Flyby in the previous section.)
5. After you move the entry, click the Any-Direction drag mode button again.
6. Notice that the Time Line Cue List created a cross fade between the FlyBy entry and the Ricochet entry. We want the FlyBy entry to fade out, but we want the Ricochet entry to start with no fade.
7. Click the cross fade area between the two entries to open the Cross Fade Type requester.

Figure 6-13. Cross Fade Requester for FlyBy and Ricochet

8. Here you see four curve buttons for Fade Out and Fade In. The Fade Out button on the left, which selects a linear curve, is already selected and that's what we want. For the Fade In, click the button on the right. That's the Instant In button, which will start the Ricochet entry immediately.
9. When you're done, click the close gadget in the upper left corner of the requester to close it.

Fade Between Cartoon Music and Crash

1. Click the Cross Fade area between the CartoonMusic entry and the Crash entry on the Music track. This brings up the Cross Fade Type requester again.
2. This time, click the second buttons for both Fade Out and Fade In. Close the requester.

Figure 6-14. Cross Fades for CartoonMusic and Crash

Change the Fade Between Crash and Applause

1. Click on the cross fade area between the Crash entry and the Applause entry. This changes the Cross Fade Type requester so it shows the curve types for that cross fade area.

Figure 6-15. Cross Fades for Crash and Applause

2. What we want to do here is a linear fade out of the crash at the very end, and a linear fade in of the applause at the very beginning, for a basic cross fade effect.
3. To accomplish what we want, select the first Fade Out button and the first Fade In button. When you're done, click the close gadget in the upper left corner of the requester to close it.

Fade Out Applause

1. Click on the Applause entry and use the Play Selected command in the Entry menu to hear it. Notice how it cuts off at the end. Let's fix that.
2. Grab the Fade gadget on the right and drag it to the left to add a real time fade to the entry. Play it again to hear the change.

Figure 6-16. Applause - Audio Event Parameters

3. Now double click the Applause entry to open the Audio Event Parameters requester and lets choose a different fade curve.

4. In the requester you see the same four curve buttons for Fade In and Fade Out. In the Fade Out area, click the third button from the left. This selects an exponential curve, which fades fast at first, and slows down the fade as it gets to the end. This is a nice effect for applause.

5. Click OK and play the entry again to hear how the exponential fade out sounds.

6. Use the Play-From-Start button again to listen to the whole Cue List. We're getting there.

Copy Cuckoo Four Times and Butt Edit Copies

1. Notice that we have only one Cuckoo sample. We can take that sample and make the clock strike four without taking up any more hard drive space. We will reuse the same sample over and over.
2. Hold down the control key and drag the Cuckoo entry to the right. When you hold down the control key and drag, instead of moving the entry you will move a COPY of the entry. The original entry will not move.
3. Do this two more times so you have four Cuckoo entries on the Cat track.
4. Your Time Line Cue List should look something like this:

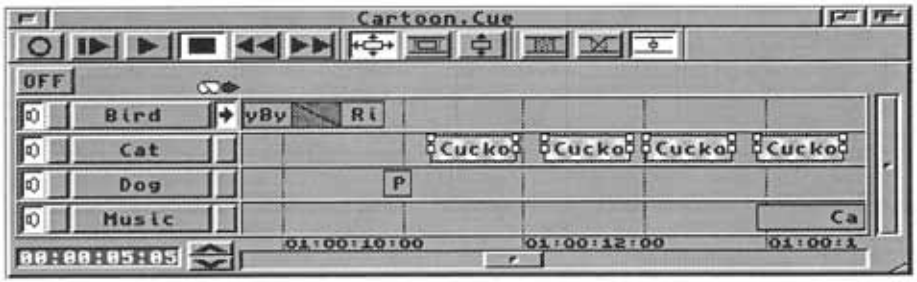

Figure 6-17. Time Line Cue List with Four Cuckoo Entries

5. Next we'll create perfect butt edits between the four entries. To do this we'll change the Edit Mode. The Edit Mode buttons are at the top of the Time Line Cue List window, to the right of the Drag Mode buttons.
6. So far we've had the first button selected, which puts us in the Unlimited Cross Fade mode. In this mode we can overlap entries and the Time Line Cue List will create real time cross fades. The second button is the Limited Cross Fade button. In this mode you can restrict the maximum cross fade time. The third button is the Butt Edit button, which does not let you overlap entries. That's the one we want.

Figure 6-18. Edit Mode Buttons

7. Click the Butt Edit button. Now drag the second Cuckoo over until it pushes into the original Cuckoo entry. When you touch them you should see what looks like a little piece of colored splicing tape holding them together.
8. When you see the tape, you've created a perfect butt edit. The entries do not overlap, nor is there any space between them.
9. Go ahead and drag the third and fourth Cuckoos into the others.

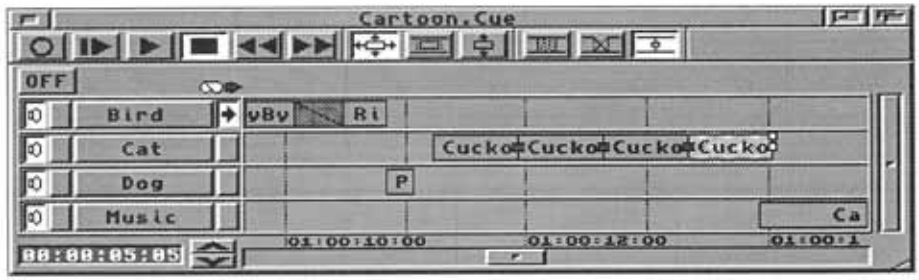

Figure 6-19. Time Line Cue List with Four Cuckoo Entries Butted Together

10. Now play the Time Line Cue List and pay attention as the Cuckoo clock sounds play. With one sample you've created a four o'clock effect!

NOTE This technique is also useful for tape loop and ambient sound effects. For those use a cross fade between copies instead of a butt edit.

11. Now use the *A*-W shortcut to save the Cue List again. It's a good idea to save every time you make major changes.

Adjust Volume and Pan

Play back the Time Line Cue List a few more times. What do you think? If there are any entries that sound too loud or soft, you can change their volumes.

1. Double click on the offending entry to open the Audio Event Parameters requester.

2. Notice the volume slider on the right. Raise or lower the slider to change the volume for that entry.

Figure 6-20. FlyBy Audio Event Parameters

3. If you have an AD516 card you can also change the Pan setting for the entry. Just slide the pan slider (at the bottom of the Audio Event Parameters requester) to the left, right, or anywhere in between.

4. Now use the Amiga-W keyboard shortcut to save the Cue List again. You should always save after you finish working on a Cue List! Then, next time you want to bring the Cue List into the Time Line Cue List, use the Open command in the Cue List menu and you'll be able to work with the Cue List again.

Congratulations on completing the Cartoon Scene tutorial! Notice how using multiple tracks helped us keep the project organized. Many of the techniques you used in this tutorial will be useful for other video and film soundtrack work.

If you would like to compare your final Cue List with ours. Load Tutorial_B.cue using the Open menu item in the Cue List menu. This is the Cue List file we created. This Cue List should look and sound very much like yours.

Multitrack Recording

Next up is a tutorial that goes through a typical multitrack recording session. This tutorial is a typical application for musicians. And although videographers will not generally use every function discussed here, they will find many useful features described.

For the purposes of this tutorial, choose four musical parts you want to record. They can be any combination of vocals and instruments. A few lines in four part harmony from a barber shop quartet arrangement would do nicely. If you don't sing or play an instrument, try doing a simple rap or just reading some lines from this manual. Try to pick a short segment of music or speech to experiment with. Twenty to thirty seconds will be enough for this tutorial.

NOTE Samples and Cue List files relating to this tutorial are not provided on disk. Experiment with this tutorial by creating your own.

Preparation

Connect Your Hardware Mixer to Your AD516 (AD1012)

1. If you have an AD516, connect the left and right outputs of your external mixer to the left and right input jacks on the AD516.
2. If you don't have a mixer, you can plug certain instruments directly into the audio inputs of your SunRize card, including most synthesizers and samplers. But you'll need a mixer, or at least a microphone preamp, to connect electric guitars and microphones.
3. If you have an AD1012, connect the monophonic output of your mixer to the input of the AD1012. If your mixer doesn't have a monophonic output, use the left channel output and pan all your mixer's input channels to the left.
4. Now connect the instruments or microphones you want to use for recording directly to your mixer. Consult your mixer's manual for more information.
5. You can connect the outputs of your SunRize card either directly to an amplifier driving monitor speakers, or if your mixer has a monitor bus, back to the mixer.

   In the latter case, use the mixer's monitor bus to feed a power amplifier driving monitor speakers so you can listen to your SunRize card. Keep the main faders for the SunRize channels down or you may run into feedback. Using your SunRize card for multitrack recording is a lot like using a tape deck, so consult your mixer's manual for information on connecting and monitoring a tape deck.

Create Four Tracks On the Time Line

1. Just as you did in the first tutorial, create four audio tracks. Name them for the instruments you want to use. For example, you might call them "Bass", "Guitar", "Vocal" and "Solo".

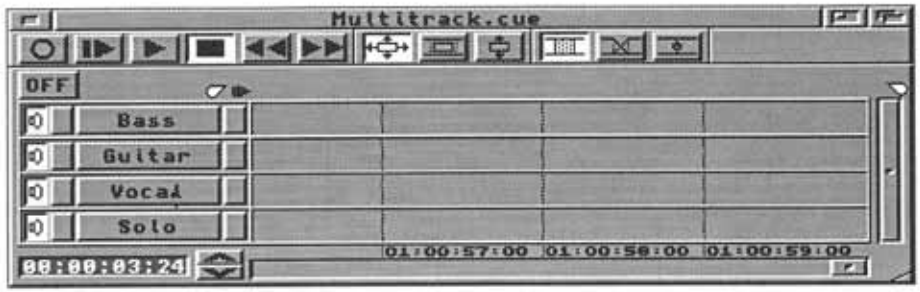

Figure 6-21. Empty Multitrack Cue List

2. Set the Time Line Cue List boundaries and time display type. Since we're just going to do 20 or 30 seconds of music, set the Time Line Cue List Boundaries in the Cue List Preferences requester so that the Time Line Cue List starts at 01:00:00:00 and ends at 01:01:00:00.

Figure 6-22. Cue List Preferences

NOTE It's better to start recording at one hour than at zero hours. That way if you ever need to add parts before the beginning of your project, you have an hour to work with.

3. Set the Time Options in the Cue List Preferences requester to SMPTE.

Set the Start Flag and the Punch-In/Punch-Out Flags

1. Move the Blue Start flag to 01:00:00:00.
2. The Punch-In flag lets you specify where recording will begin. The Punch-Out flag lets you specify where recording will end. The two flags together are like an under appreciated, under paid, dead accurate, assistant engineer. They will work long hours for the sheer glory of helping you produce your music. They will be there for you, take after take, no complaints, no overtime.

Figure 6-23. Punch-In and Punch-Out Flags

As you learned from moving the Start flag in the first tutorial, there are several ways to move flags. You can drag them, or you can double click a flag and type an exact time in the Time field of the Flag requester.

3. Drag the Punch-In flag to 01:00:10:00. Notice that it turns into the Punch-Out flag. Don't worry, that's normal. The first of the two will always be the Punch-In flag and the last will always be the Punch-Out flag.
4. Now double click what has now become the Punch-in flag and type 01:01:00:00 in the Time field of the Flag requester. Notice that the first of the two flags has now become the Punch-In flag again.

Figure 6-24. Multitrack Cue List with Punch In/Out Flags Set

5. Move the Time Line Cue List's view to the Punch-Out flag by clicking the Show button in the Flag requester. Another way to jump to the Punch-Out flag is to type the) key on the numeric keypad. Type the (key on the numeric keypad to jump to the Punch-in flag.
6. Turn ON the Activation button. The Time Line Cue List will not play back unless the Activation button is ON.

Choose the Track Playback and Record Settings

1. Click on the first track's Name button to open the Audio Track Parameters requester.
2. Click on the Playback drop list and select "Play 1".
3. Click on the Record drop list and select "Input" (if you have an AD1012) or "Input L" (if you have an AD516).

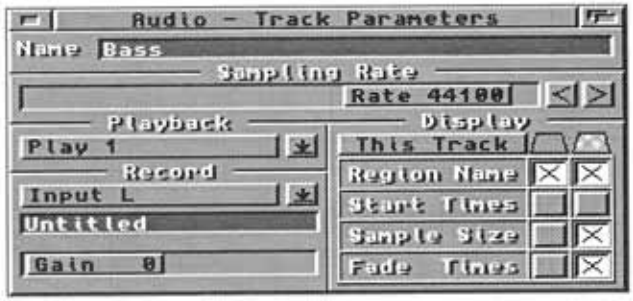

Figure 6-25. Bass - Audio Track Parameters

4. Set the sampling rate to 44100 by dragging the sampling rate slider until it says "Rate 44100".
5. Click on the second track's Name button (Guitar) so the Audio Track Parameters requester reflects the information for track 2. Click on the Playback drop list and select "Play 2". Click on the Record drop list and select the same input you did for the first track (Input L).
6. Do the same for the third and fourth tracks (Vocal and Solo), except set them to play back on "Play 3" and "Play 4" respectively.
7. Choose the record path for your samples by launching Sample List from the Applications Menu. In Sample List, click on the small button next to the name of the directory where you want to record your samples. If the directory is not showing, use the Add New Path command in the Sample List menu, as you did in the first tutorial.
8. Open SMPTE Monitor from the Application Menu. SMPTE Monitor lets you see where you are on the Time Line Cue List. Think of it as a very accurate tape counter. For more on SMPTE Monitor see the SMPTE Monitor Reference Section in Chapter 8.

Save the Cue List

1. Save the Cue List as "Multitrack.cue".

It pays to save often. From now on save after every major change you make to the Cue List. No more reminders...

Now might also be a good time to use the Save Default command in the Cue List. This will save the current Time Line Cue List setup as the default Time Line Cue List.

For example, if you use the Save Default command now, the next time you start the Time Line Cue List or select the New command in the Cue List you'll get a blank Time Line Cue List setup just like this one is now. This can save you time when you work on your next project.

If you later change your mind about how you want your default Time Line Cue List to be set up, just change the Time Line Cue List to what you want and use the Save Default command again.

Record A Track

Select the Track

1. Click the Track Select button on the first track. The Track Select button is to the right of the track's Name button, and it looks like an arrow when it's selected. A track will turn dark blue when it is selected. Only the selected track will be used for recording.

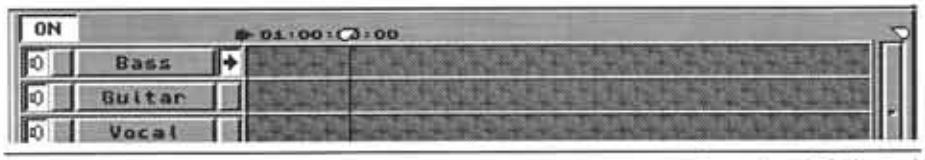

Figure 6-26. Bass Track Selected

NOTE AD516 Only - Record stereo samples by shift-clicking multiple tracks. Set one track to record "Input L" and the other to record "Input R".

Set the Input Levels

1. It's important to set your levels carefully before you record a sample. To monitor levels, select the Meters command in the Applications menu to open the Meters.

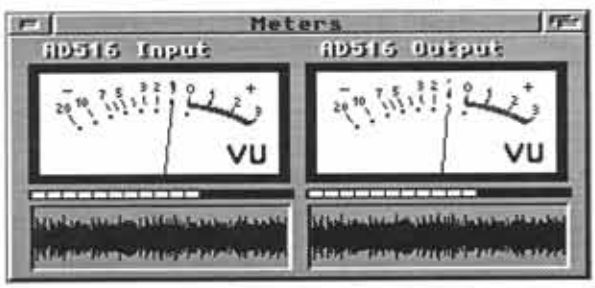

Figure 6-27. Meters

2. Click the Meters to select it, then look at the Channels menu and select "Input". Other selections can also be selected. Then move the Meters window so it doesn't obstruct the Time Line Cue List.
3. Now in the Cue List, click on the Name button for Track 1 to open the Audio Track Parameters. At the bottom left of the requester is a Gain slider. This slider lets you increase the input gain into your SunRize card. When you click on the slider and hold down the left mouse button, you will be able to see your SunRize card's input level displayed on the Input meter in Meter.

4. Click the Gain slider, play or sing your loudest note, and watch the Input meter.
5. If you can't play and click on the Gain slider at the same time, there's another way to see the input level. Open the Mixer and drag the Input level slider up to +00 dB. Then you don't have to hold down the left mouse button over the Gain slider.
6. As you watch the Input meter, adjust the gain on your hardware mixer so that the loudest note is as high as possible without going into the overload area of the Studio 16 Input meter on your screen.
7. The overload area is above +00 dB. It's marked in a different color than the rest of the meter. Going into the overload area will cause clipping, which creates an annoying distortion. On the other hand, recording at a low average level can add noise to the signal. Also, low average signals don't take full advantage of the dynamic range of your SunRize card. The key is to record at as high a level as you can without clipping.
8. Meters lets you watch three types of metering. The LED-style metering is the most responsive to watch for setting input gain. Different color "LEDs" on the right show overload. The scrolling graph shows a history of the last few moments of the input and you can see overload when the graph touches the edge on the top and bottom. The analog-style metering shows overload as a different colored area of the meter on the right just past 0 dB.

NOTE Always set your hardware mixer's input gain, channel gains and output gains for best performance. Any noise or distortion you add with your mixer before the SunRize card's input will be faithfully recorded by your SunRize card. Consult your hardware mixer's manual for instructions on setting the levels there.

9. If you have your hardware mixer set up correctly and you still can't get enough level showing on the Studio 16 Meter, adjust the Gain slider in Audio Track Parameters until you have a good level. With proper input level settings your SunRize card will make excellent digital recordings.

Record a Take

1. Click the Record button.

Figure 6-28. Record Button

2. Turning on the record button prepares the Time Line Cue List for recording. Now when you play the Time Line Cue List, and the Position flag passes the Punch-In flag you will be recording on the selected track. The selected track is now red. This indicates where the recording will take place.

3. Click the Play-From-Start button.

Figure 6-29. Play-From-Start Button

4. You now have 10 seconds to get ready to play, sing or talk your way through your first take. When the Position flag passes the Punch-In flag, you're recording.
5. When you're done with your performance, click the Stop button right away to stop recording.

Figure 6-30. Stop Button

6. If you don't hit the stop button right away, the recording will continue until the position lines passes the Punch Out flag. You will be recording and eating up hard drive space even if you've stopped singing or playing.
7. Listen to the take by clicking the Record button to turn it off.
8. Then click the Play-From-Start button again to hear your performance. When it's done, hit the Stop button.

Get Rid of a Bad Take, if Necessary

1. If you don't like your performance, click on the new sample to select it. Then choose the Delete Selected command in the Entry menu. This will delete the sample from your hard disk forever.

NOTE Delete erases the take from hard disk. There is no Undo for Delete.

2. Once the old take is gone, repeat the Record a Take section of this tutorial.
3. Record two more tracks.
4. Once you have a take you like, repeat the above procedure for the second and third tracks. Where it says Track 1, use Track 2 and then Track 3. Have fun recording more parts to your masterpiece of experimentation.

Add a Solo

1. OK, you now have three tracks recorded, you've saved your Cue List, and you're ready to add a solo on your fourth track.
2. Move the Punch-In and Punch-Out flags. Let's not add the solo to the beginning of the piece. Instead let's add it a few measures in. You decide where the solo should start, and move the Punch-In flag to that time. If the Punch-In flag is a few seconds before the actual time you want to start the solo, that's fine.

3. Then decide where the solo should end and move the Punch-Out flag to that time. That way recording will stop when the Position flag passes the Punch-Out flag, and you won't have to jump to hit the Stop button so quickly. You'll still need to hit the Stop button to stop playback of the other tracks.
4. By the way, the Period key . on the numeric keypad will always stop the Time Line Cue List. The keypad's Enter key will stop the Time Line Cue List if it's playing, or start it from where the Position flag is if it's not playing.
5. Select the fourth track.
6. Add a Locate flag. There are 10 locate flags, tied to the function keys on your keyboard. Lets add one now to mark a spot before the Punch-In flag where we want to start the Time Line Cue List Playing. That way you'll have a few measures to hear the other tracks before you start performing the solo.
7. Move the Red Position flag about five seconds before the Punch-In flag.
8. Now hold down the shift key and hit the F1 function key at the top of your keyboard. You've just added a F1 locate flag right where the Red Position flag is.
9. Let's name the locate flag. Double click the F1 flag to open the Flag requester. Type the word "Solo" in the comment field and hit the return key on your keyboard. Now the word "Solo" is next to the F1 Locate flag on the Cue List.

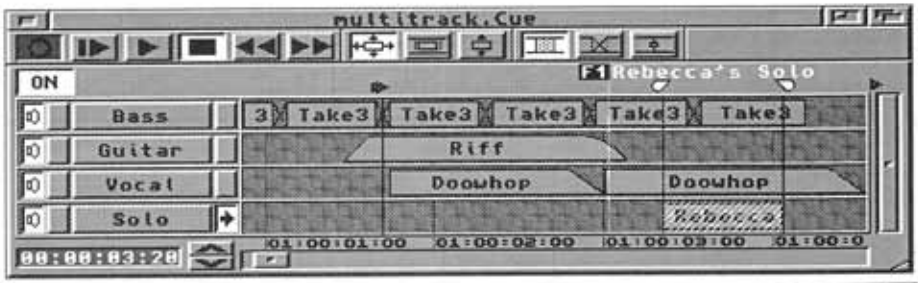

Figure 6-31. Multitrack Cue List with F1 Flag Set

10. Type the (key on the numeric keypad so the Position flag jumps to the Punch-In flag location. Now type the F1 key. The Position flag jumps back to the F1 locate flag.
11. With the position flag at F1, record the solo by turning on the Record button, and clicking the Play button. Do not use the Play-From-Start button this time.

Figure 6-32. Record and Play Button Selected

12. When you click the Play button the Time Line Cue List plays from the Red Position flag. Since we moved the Red Position flag to the F1 Locate flag, the Time Line Cue List plays from there.
13. When the Position flag passes the Punch-In flag, you're recording.
14. When it passes the Punch-Out flag, you're done. Click the stop button and playback your performance. Don't forget to turn the Record button off before you listen.
15. If you don't like your solo, delete it and do another one.

Punch In To Fix a Mistake

1. Lets pretend you made a mistake in the middle of Track 3. What we're going to do is replace the middle of your take in track 3.
2. Move the Punch-In and Punch-Out flags. Just pick a short section that you can replace by punching in and out. Move the Punch-In flag to where you want to start recording. Then move the Punch-Out flag to where you want to stop recording.
3. Add another Locate flag. Add the F2 Locate flag about 5 seconds before the Punch-In flag. Remember how you added the F1 flag above? Just move the Position flag to about 5 seconds before the Punch-In flag. Then hold down the shift key and type the F2 function key on the top of your keyboard.
4. Just for fun, type F1. Notice how the Time Line Cue List view and the Position flag jump to the F1 Locate flag. Now type F2. The Time Line Cue List view and the Position flag jump to the F2 Locate flag. Locate flags are very useful for moving around in a project, and it's much faster than shuttling tape!
5. Name the F2 Locate flag "Punch". Double click the F2 Locate flag, and type "Punch" into the Comment field of the Flag requester.
6. Select track 3 by clicking the Track Select button on the third track.
7. Turn on the Record button.

Figure 6-33. Multitrack Cue List Ready for Punch In and Punch Out

8. Type the F2 key to set the Position flag on the F2 "Punch" locate flag.
9. Click the Play button (or hit the Enter key on the numeric keypad).

10. You now have about 5 seconds to get ready to play, sing or talk your way through the punch. When the Position flag passes the Punch-In flag, you're recording.
11. When it passes the Punch-Out flag, you're done recording.
12. Since you're adding a new Audio entry on top of an existing Audio entry, the Overlap Contention requester will appear.

Figure 6-34. Overlap Contention

13. Click the stop button to stop the Time Line Cue List. You'll have to use the mouse since the Cue List is not the active window.
14. Now choose how you want the new Audio entry to integrate with the existing Audio entry by clicking either of the top buttons on the Overlap Contention requester. (Left & Right Butt or Left & Right Crossfade)

    If you want the punch to start immediately at the punch-in point and end immediately at the punch-out point, with no overlap between the old Audio entry and the new one, select Left & Right Butt. This is how punching works on many tape decks.

    If you want to cross fade from the old Audio entry to the new Audio entry at the start of the punch, and then cross fade back from the new Audio entry to the old one at the end of the punch, select Left & Right Cross Fade. Some tape decks automatically create a slight cross fade at the edit points to smooth over the punch.
15. In either case, no matter which you select, your choice is non-destructive. You can change the edit type, cross fade length and curve later if you wish.
16. After you click a button on the Overlap Contention requester, you will see the new Audio entry appear on the track. What has happened is that there are now two copies of the old Audio entry, one before the punch and one after. Both have been automatically cropped so that they are still playing your first performance exactly where they should. The new Audio entry has been inserted between them for a perfect punch.
17. Turn off the Record button and listen to your punch by typing the F2 key on your keyboard and hitting the keypad's Enter key.
18. If you don't like the performance, click the punch entry and use the Delete Selected command in the Entry menu to delete it forever. Then use the Undo

command in the Options menu to remove the second copy of the old entry and stretch the first copy back to its full length. Then you can record the punch again.

Change Volumes and Pans

You can change volumes and pans for your multitrack masterpiece the same way you did with the Audio entries in the first tutorial. Or you can use the Mixer to use a set of sliders like a standard mixer.

For instructions on using the Mixer, see the Mixer Reference Section in Chapter 8. Here are some important guidelines when using the Time Line Cue List and the Mixer together:

- Activate Use Mixer Levels in the Options menu. If it is not activated the Cue List will ignore the Mixer and use the Volumes and Pans set for each entry in Audio Entry Parameters.
- Set the output of each track to play on a specific channel like we did in this tutorial. If each track is set to play on "Any" in the Audio Track Parameters requester your tracks will jump around from channel to channel, and your Mixer fader settings will not have an effect.

Slide a Track In Time (Using Group)

Here's a cool technique. You can select all the Audio entries on a track and slide them all earlier or later in time together. This can be very useful for moving a rhythm track's entries so that they're pushing the beat (slide them earlier) or so they have a laid back feel (slide them later).

To try this out, and to learn how to select two tracks at once, lets move the entries on tracks 3 and 4 together. You'll also learn how to group entries in this exercise.

1. Click the Track Selection button for track 3. (It's the one that turns into the arrow, just right of the Track Name button.)
2. Hold down the shift key on your keyboard and click the Track Selection button on track 4. The Track Selection buttons for both track 3 and track 4 should now be selected (they should look like arrows). Let go of the shift key.
3. Click on any track in the Time Line Cue List, in a place where there are no entries. This deselects all entries. Choose the Select All On Track(s) menu item in the Entry menu. Now all the entries on tracks 3 and 4 are selected.
4. Choose the Group command in the Entry menu. Now when you move any of the entries on tracks 3 or 4, all the entries will move together.
5. Move the entries. You guessed it. Drag any entry with the mouse and all the entries in the group will follow.

   If you move them to the left, you'll cause them to push the beat. If you move them to the right, you'll cause them to be laid back. Minor moves can make a big difference. Major moves can really screw things up.

Don't worry, play around with it, listen to how it sounds each time you drag them, and then use Undo to get them back to where they were before. If you move them more times than you have undo steps, just reload the Cue List from your hard drive. (You have been saving frequently, haven't you?)

NOTE You can set the number of Undo steps in Cue List Preferences.

6. If you decide to move any one of the entries in the group by itself, click any member of the group. Then use the Ungroup command in the Entry menu. Now all the entries are individually movable again.

Edit a Sample

Studio 16 has a graphic Editor that gives you a powerful set of tools for editing your samples. You can access the Editor directly from the Time Line Cue List.

1. Choose an entry in the Cue List by clicking the Audio entry you want to edit.
2. Use the Edit Selected command in the Entry menu to open an Editor. The sample used by the Audio entry will load into the Editor. For more on using the Editor, see its Reference Section in Chapter 8.

Keep in mind that if any other Audio entries in this or another Cue List use the same sample, any changes you make to the sample in the Editor will show up in those Audio entries also. In the case of this tutorial you don't have to worry about that, so go ahead and experiment.

Mute and Solo a Track

You can use the Time Line Cue List's muting and soloing abilities to hear only the tracks you want to hear.

1. Click the Sound buttons on track 1, track 2 and track 3. The Sound buttons are the first buttons on the left for each track. When they're on they look like speakers. Turn them off.

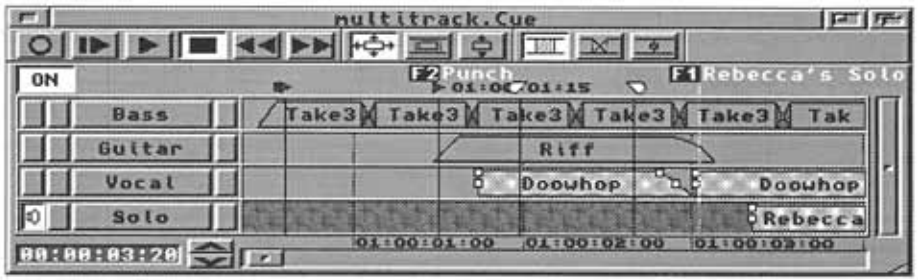

Figure 6-35. Multitrack Cue List with Track 4's Sound Button ON

2. Now Play the Time Line Cue List. Only track 4 will sound.
3. Now do the same thing with a Solo button. Turn on all the Sound buttons again.

4. Click the Solo button for track 4. When a Solo button is on it looks like headphones.

Figure 6-36. Multitrack Cue List with Track 4's Solo Button ON

5. Now Play the Time Line Cue List. Only track 4 will sound, just like before. But it's much easier to click a single Solo button than to turn off three Sound buttons.
6. Any time you have one or more Solo buttons on, the Sound buttons are overridden and make no difference. Put another way, the Sound buttons only have an effect when all Solo buttons are off.
7. This lets you set up the tracks you want to hear by selecting their Sound buttons, but you can at any time listen to one track alone by clicking its Solo button. Then, when you turn off the Solo button, you'll again hear just the tracks that have their Sound buttons on.
8. Solo buttons work with the shift key to let you solo several tracks at once.
9. Click the Solo button on track 1.
10. Hold down the shift key on your keyboard and click the Solo button on track 2, then let go of the shift key.
11. Now Play the Time Line Cue List. Only track 1 and 2 will sound.

To turn off the Solo buttons on both tracks, turn the Solo button off on either track.

NOTE Muting and soloing are especially useful when you arrange similar entries on the same tracks. For example, if you're working on a movie, put all the dialog for each actor on their own tracks. Then you can solo one track to listen to one actor's lines.

Congratulations on completing the Multitrack Recording tutorial. Many of the techniques you learned here will also apply to other kinds of projects.

Don't forget to save your masterpiece for posterity (or destroy it quickly before it has a chance to reproduce, depending on how it sounds). Seriously, do keep it around for further experimentation if you have the hard drive space to store the samples. One of the best ways to learn the Time Line Cue List and other parts of Studio 16 is to experiment, and your two tutorial projects are perfect for further experimentation.

Troubleshooting

The following symptoms and their solutions are covered in this chapter.

- Not being able to hear input
- Not being able to hear playback
- Can't select correct sampling rate in Editor
- Card communication errors
- Cue List won't trigger
- Samples loosing sync in Cue List
- Flashing screens, "overload errors", or skipping, missing or repeating sound
- Flickering screen on an A4000
- Full hard disk
- Gain won't adjust
- Graph doesn't match sound
- Hard disk read/write errors
- Installation problems
- Modules don't open when selected

If the following recommendations do not solve your problem, call SunRize technical support for more information.

Not Being Able to Hear Input

A. Problem Mixer level is set too low.
Solution Open the Mixer from the Applications Menu, and set the Input and Output Channels' volume level to +00 dB.

B. Problem Input cables are not connected correctly. (You know this is the problem if you don't see Meter activity on the Input channels.)
Solution The audio In jack(s) must be connected with an RCA patch cable to the line out of an audio source. Turn your audio source on.

C. Problem Gain chip is malfunctioning -- only a possibility on the AD1012.
Solution If you do not see activity on the input channel of the Mixer, and you're sure your audio source is connected properly, the Digital Pot on the Gain circuit may be bad. Especially if you can barely hear the playback, or changing the gain level has no effect on the volume. Call SunRize technical support if you suspect this problem.

Not Being Able to Hear Playback

A. Problem Mixer level is set too low.
Solution Open the Mixer from the Applications Menu, and set the Input and Output Channels' volume level to +00dB.

B. Problem Output cables are not connected correctly. (You know this is the problem if you can see Meter activity on the Output channel.)
Solution The audio Out jack(s) must be connected with an RCA patch cable to a mixer or the CD/AUX input of a receiver or amplifier. Set the receiver to CD input and turn it on, also check the speaker connections.

Can't Select Correct Sampling Rate in Editor

A. Problem The Set Sample Parms display will not show all the rates available by dragging the selector knob.
Solution Use the arrow buttons next to the slider or click in the slider to the left or right of the knob to see all the available increments.

B. Problem Sample was recorded with a different type card.
Solution If the sample was recorded with the AD1012 the same sampling rates will not be available for the AD516, and vice versa. Use the resample option in the Editor to change sampling rates or re-record the sample.

Card Communication Errors

A. Problem This very rare error usually means a hardware problem-either with your Amiga or the card. Card communication errors include: Comm Error #2, GetW Error, SendW Error, and DSP Init. Failed.
Solution Try resetting your Amiga, or turning it off and then back on. If this doesn't help, try re-seating the card in another expansion slot. If this still doesn't solve the problem, call SunRize technical support for more information.

Cue List Won't Trigger

A. Problem Most often, the Cue List is just turned **OFF**.
Solution For the Cue List to listen for time code and preload samples, it must be turned on. Simply click the ON/OFF button at the top left of the window to turn Cue List **ON.**

B. Problem Samples are not where the Cue List thinks they are.

Solution When a sample is entered in the Cue List, a box with the sample's name inside will be created on one of the Cue List tracks. The Cue List knows the complete path to the sample: the directory and file name. If you later delete, move or rename the sample while the Cue List is closed, the Cue List won't be able to find the sample. It will display an empty box in the track where the sample used to be.

You need to tell the Cue List where to find the sample. This can be done as follows: Click on the empty sample box to open the Audio - Event Parameters. Next select a sample from Sample List, and drag it over to the "Sample" field. Drop the sample in to assign the sample to the Cue List event.

C. Problem The SMPTE source may not be set correctly.

Solution If you are using an external SMPTE source, like a VTR, close the internal SMPTE generator. Also check the SMPTE source in Preferences. It should be set to AD516#1 or AD1012#1. If you are triggering from the internal SMPTE generator, set the source to Internal.

D. Problem Too many errors in the incoming SMPTE time code. (Studio 16's internal generator will not cause this problem.)

Solution Bad time code can be caused by a bad cable, tape drop out, bleed through from audio tracks, or bad levels on the SMPTE track.

SMPTE errors can be verified by opening SMPTE monitor and watching for flashing squares in the upper left corner. These may signify time code errors. If SMPTE errors are causing the Cue List to intermittently halt audio playback, SMPTE error detection in the Cue List can be turned off with the "Ignore SMPTE Errors" in the Options menu. See the Reference Section on Cue List for details.

E. Problem Not enough preload time for samples.

Solution Move the position flag farther from the first sample to give the sample time to be preloaded. The flag should be between 5 and 15 seconds before the first sample.

Samples Loosing Sync In Cue List

A. Problem Samples have different sampling rates.

Solution Multiple samples that playback simultaneously must have the same sampling rate. You can alter the sampling rate of a sample in the Editor. From the Effects Menu select the Resample option.

B. Problem SMPTE lock is off.
Solution Open Preferences window and activate Lock On in the SMPTE section.

Flashing Screens, Overload Errors, or Skipping, Missing or Repeating Sound

Playback stutter or skipping occurs when your Amiga can't access the hard disk's data fast enough, or doesn't have enough CPU time to service the sounds that are currently being played or recorded. When Studio 16 detects this problem, it will flash your screen or give an "overload" error message. The following are common causes and solutions for "skipping" audio. Although the causes are listed individually, "skipping" is often caused by multiple problems compounding one another rather than just one cause.

A. Problem Your DMA mask setting on your hard disk may be incorrect. If your hard disk is abnormally slow or has an inability to playback at least 3 or 4 tracks, you may need to change the DMA mask for your hard disk.

1. Solution If you have a CBM controller, use 'HDToolBox' in your 'Tools' drawer. Once HDToolBox is running, select "Partition Drive" then "Advanced Options". Then select your partition from the "bar", and select "Change file system for partition". Make a note of the original MASK then change the MASK to: `0x7FFFFFFE`. save the changes, select "OK", "OK", "Save changes to drive". You will need to re-boot your Amiga for the changes to take effect.

2. Solution If you are using a GVP hard disk controller, use "FastPrep" in manual mode, instead of HDToolBox. See your GVP manual for more information. The correct DMA MASK for GVP controllers varies--call GVP. However, on newer controllers the above mask should work.

B. Problem You are not working with WorkBench version 3.1.
Solution Keep an eye out for WorkBench release 3.1 from Commodore. This new version of the Amiga operating system supports much faster seeks than previous versions. This greatly improves the speed of Studio 16 disk operations such as playing ranges in the editor or playing regions in the cue list. To take advantage of this speed increase, you must install WorkBench 3.1, then increase the FastFileSystem block size using HDToolBox/Partition/AdvancedOptions. The larger the block size, the quicker the seeks.

C. Problem Your Amiga doesn't have enough CPU time to complete all the tasks required by Studio 16 to play the requested sounds.

1. Solution Turn off CPU intensive Studio 16 modules, such as Meters, and SMPTE Monitor. Substitute Tiny Mixer instead of Mixer.

2. Solution Upgrade your Amiga to a faster processor. If you have an Amiga 2000, install a 68030 accelerator card with fast RAM. For example, a stock A2000HD with the AD516 doesn't have enough CPU power to play 8 tracks at a 44K sampling rate. It can handle three or four tracks at 44K or six tracks at lower rates, such as 15K. (The AD1012 will play 2 tracks without an accelerator.)

3. Solution Using Cue List, combine samples to be played back simultaneously into one sample. See Cue List Reference Section on ping-ponging for more details.

4. Solution Minimize the length or number of crossfades in your Cue List.

5. Solution Upgrade your hard disk controller to a more efficient controller. The amount of bus resources required to transfer the same data to or from your hard disk can vary considerably between controller manufacturers. By switching to a more efficient hard disk controller, you leave more time for the CPU to work. Probably the most efficient hard disk controller currently available for Amiga 4000s is the A4091 or the FastLane. These are Zorro III controllers that write data at a high speed and 32 bits at a time. This results in a significant performance increase.

6. Solution Upgrade from an AD1012 to an AD516. SunRize's 16 bit card includes extra circuitry that makes it more efficient at transferring data than the AD1012.

D. Problem The hard disk is too slow for the number of samples playing.

1. Solution Reduce the number of simultaneously playing samples. If you can reduce the number of tracks playing simultaneously, you will reduce the data transfer rate and fix the problem.

2. Solution Lower the Sampling Rate. If you lower your sampling rate, you will reduce the amount of data that must be transferred and improve over all system performance.

3. Solution Increase the Channel Buffer size in Preferences. By increasing the playback buffer sizes, you will eliminate skipping in many cases. However, the improvement will be less as you keep increasing the buffer sizes. That is, increasing the Channel Buffers from 256K to 512K will have much more of an improvement that increasing the buffers from 512K to 1024K. Keep in mind that one channel buffer is allocated for each playing sample, and each track in the Cue List. Make sure that you have enough system RAM to cover your requested buffers. For example, if you play four simultaneous tracks with the channel buffer set to 4096K, you will need 16,384K (or 16 MB) of free RAM just for buffers. For more about RAM requirements, see the Preferences Reference Section.

4. Solution Buy a faster hard disk, or a better hard disk controller.

E. Problem The hard disk is fragmented.
Solution Fragmented hard disks are discussed in Chapter 4. The solution is to buy a program that will de-fragment your hard disk. Talk to your Amiga dealer for a recommendation.

F. Problem The 'Use Extended Memory' option in the Preference Menu is set incorrectly.
Solution Try the 'Use Extended Memory' option both on and off to determine which way your system works best. However, in general terms select this button if your hard disk controller and 030/040 card are on the same pc board. (e.g. You have a stock A3000, A4000, or you have a GVP 030 card with built in hard disk controller.)

Do NOT select this button if you have an 030 or 040, but your hard disk is on a stand alone Autoconfig card. (e.g. You have a GVP series II DMA hard disk controller and a PP&S 040 card with 32 bit RAM.) See the Preference Reference Section for details.

G. Problem There are too many or too large of a non-destructive edit in a sample.
Solution Select Make Permanent from the Editor Menu. When Studio 16 is playing a sample and encounters a non-destructive edit, it must seek over the edit. For large edits, this can take a long time and causes skipping. This problem can also be largely eliminated by installing WorkBench 3.1 and increasing the block size on your audio partitions.

Flickering Screen On an A4000

A. Problem WorkBench Preferences are set incorrectly.
Solution Set the 'Avoid Flicker' and 'Mode Promotion' flags in the 'IControl Preferences' program. The program is found in the WorkBench Preferences drawer.

Full Hard Disk

A. Problem Running out of hard disk space is a problem for everyone eventually, some sooner than others.
1. Solution Delete unnecessary data.

2. Solution Make non-destructive edits permanent on samples that you have performed non-destructive cuts. Note that Make Permanent temporarily requires disk space equal to the file being made permanent. And, do NOT make permanent samples with non-destructive paste-inserts, unless you're prepared to tie up more disk space.

3. Solution Buy another or a larger hard disk.

4. Solution Reduce your sampling rate or resample your audio with a new rate in the Editor.

5. Solution Record or Convert samples that don't require a high SNR, like explosions, to an 8 bit file (IFF-8SVX).

6. Solution Archive your samples on a tape backup or an alternate backup device and then delete them from the hard disk.

Gain Won't Adjust

A. Problem Gain chip is malfunctioning on AD1012.
Solution The Digital Pot in the input gain circuit may be bad. Suspect this if you can barely hear the input source or changing the gain level has no effect on the input volume. Call SunRize technical support if you suspect this problem.

Graph Does Not Match Sound

A. Problem Graph file has been corrupted.
Solution Delete the sample's **.graph** file from the audio directory that contains the problem sample. You can delete files with WorkBench or Shell.

Hard Disk Read/Write Errors

Hard drives aren't fool proof, and it is inevitable that you will at some point encounter a disk error. This can manifest itself as a "Read" or "Write" error. Or, occasionally as a "Can't Validate Drive" or "Checksum" error. Sometimes clicking "retry" or "cancel" on the DOS requester presenting the error will cause the error to disappear. However, if this happens you should start to worry because the error will probably reappear later, and can mean a failing hard drive.

Of course your best advice is to backup your hard drives. They can be backed up to a SCSI tape drive, a SCSI optical drive, or to and audio DAT tape drive with SunRize's DD524 interface. However, due to the time and expense involved, many people don't bother. Just be warned that a hard disk "crash" is not just a possibility, it is very likely that it will happen to you eventually.

A. Problem The hard disk gets intermittent read/write errors.
1. Solution Upgrade your hard drive controller's ROMs to the latest version--call your hard drive controller manufacture.

2. Solution Your hard drive could be failing. Replace it.

B. Problem The hard disk has crashed.

1. Solution Take your Amiga to your Amiga dealer. Their service department should be experienced in attempting to restore data from corrupt hard drives.

2. Solution Use a hard disk utility program to try and fix the errors on the hard disk. This may or may not work, but if you have any amount of time invested in the data on the bad partition, it's worth a try.

3. Solution Use a program like "DiskSalv" to recover the files from the corrupt partition. "DiskSalv" is a public domain program that will copy files off a partition with errors onto a good partition. Once the operation is completed, you can re-format the bad partition and copy the files back over. However, DiskSalv requires a good partition or drive with enough free space to hold the copied files.

4. Solution Re-format the partition that the error occurred on. This unfortunately deletes all data on the partition being formatted. You can do this with the WorkBench "Initialize" option. Hopefully, you have a backup. If you do, restore the backup after formatting the partition.

5. Solution If you don't have a backup, you can attempt to copy the data from the bad partition to another partition using WorkBench, DiskMaster/Opus, or the Shell copy command BEFORE re-formatting the bad partition. This will probably recover some of the files, if not all. However, it does require a good partition or drive with enough free space to hold the copied files.

Installation Problems

A. Problem Does not recognize the AD516 or AD1012 audio card.

Solution Re-seat the audio card in the same slot or a different slot. Refer to Chapter 2 - Installation for instructions on installing the hardware.

B. Problem Installation utility was aborted

Solution Begin the installation utility again, or inspect the Studio 16 Installation log file for problems.

Some Modules Don't Open When Selected

A. Problem This is usually caused by a missing system library in the libs: directory. If a Studio 16 library is missing, you will get a warning (e.g. "Can't Open Studio.library"). However, if certain operating system libraries are missing (e.g. a math library) programs will simply not run.

Solution Copy the libs directory from your master WorkBench floppy into your libs: directory on your hard disk. Insert you WorkBench Master disk into DF0: and from shell, type:

```
copy DF0:libs libs:
```

Module Reference

- AD516Handler
- AD1012Handler
- AREXX Commands
- Cue List
- Editor
- Instance
- Message Monitor
- Meters
- Mixer
- Module List
- Preferences
- Quit
- Recorder
- Sample List
- SMPTE Generator
- SMPTE Monitor
- Shell Commands
- Time
- Tiny Mixer
- Utility

AD516Handler

Class: Device Driver

Description: The AD516Handler is responsible for handling data transfer to and from the AD516 card. There should be one AD516Handler resident for each card you have installed in your Amiga. In general, you don't need to access the AD516Handler.

Procedures

Check Hardware Revision Numbers & Statistics

1. Select Instance from the Applications Menu (^ I).

NOTE You will need to move Instance from the Dormant drawer to the Applications drawer before for it to be available in Applications Menu.

2. Select **Show Utilities** from the Instance Menu. The Instance List will update showing all the drivers and utility modules.
3. Double click the **AD516Handler** entry in the Instance List. An AD516Handler display window will open with various version numbers and the amount of static RAM installed in your AD516 card.

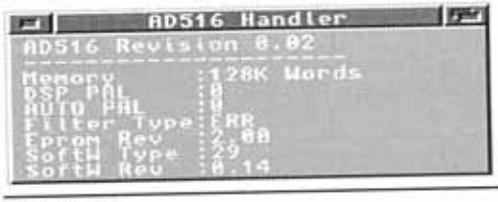

Figure 8-1. Typical AD516 Handler

AD1012Handler

Class: Device Driver

Description: The AD1012Handler is responsible for handling data transfer to and from the AD1012 card. There should be one AD1012Handler resident for each card you have installed in your Amiga. Installing more than one AD1012 is not recommended.

Procedures

Check Hardware Revision Numbers & Statistics

1. Select Instance from the Applications Menu (^ I).

NOTE You will need to move Instance from the Dormant drawer to the Applications drawer before for it to be available in Applications Menu.

2. Select **Show Utilities** from the Instance Menu. The Instance List will update showing all the drivers and utility modules.
3. Double click the **AD1012Handler** entry in the Instance List. An AD1012Handler display window will open with various version numbers and the amount of static RAM installed in your AD1012 card.

AREXX Commands

The following AREXX commands are available in Studio 16. Along with each command, a description and an example are provided. Parameters and results are also provided if applicable. In addition, a list of possible error codes and a list of constants are included. The Studio 16 AREXX message port is called `Studio16.1`. For more information, view the file S16Examp.rx for a working example program.

- S16ChanVol - Changing Channel Volume
- S16Close - Close a Previously Opened Sample
- S16Exit - Exit Studio 16 Program
- S16Filter - Changing Filter Cutoff
- S16Gain - Changing Input Gain
- S16Open - Open a Sample File
- S16OpenRecord - Open a Sample for Record
- S16OpenWithAutoClose - Open a Sample With Automated Closing
- S16Pan - Changing a Channel Pan
- S16Play - Play Sample
- S16QuerySmpteTime - Current SMPTE Time
- S16Rate - Changing Sampling Rate
- S16SmpteSet - Set internal SMPTE Tme
- S16SmpteStart - Start SMPTE Tme
- S16SmpteStop - Stop SMPTE Time
- S16StopAllPlayback - Stop All Playback
- S16ToBack - Studio Screen To Back
- S16ToFront - Studio Screen To Front
- S16Trigger - Begin the IO of a Previously Opened Sample
- S16Version - Studio 16/AREXX Version
- S16WaitGPI - Studio Wait GPI
- S16WaitTimeCode - Wait For Time Code

S16ChanVol

Description: This function alters the volume of a sample that is already playing back. Notice that 0 = Off, 100 = 0dBs, 106 = 6dBs, 94 = -6dBs, and param - 100 = Actual dBs.

Parameters: Type Of Channel (E.g., 'CHAN_INPUT' 'CHAN_PLAY' or 'CHAN_OUTPUT')
Channel Number
Channel Value (dBs) - 100

Results: Actual Volume (dBs)

Example:

```
S16ChanVol CHAN_OUTPUT 1 100
say'Actual Channel Volume: ' result 'dBs'
S16ChanVol CHAN_PLAY 1 106    ! 6dBs
S16ChanVol CHAN_INPUT 1 100   ! 0dBs
S16ChanVol CHAN_PLAY 2 94     ! -6dBs
S16ChanVol CHAN_PLAY 3 88     ! -12dBs
S16ChanVol CHAN_PLAY 4 00     ! -00dBs
```

S16Close

Description: This command closes a previously opened sample. If you are closing a playback sample, S16Close will wait for the sample to finish playing back. If you are closing a record sample then the close will stop the record and close the file.

Parameters: One 'Key' value (supplied by an Open)

Results: None

Example:

```
S16Open 'Audio:Sample'
key=result
S16Trigger key
S16Close key
```

S16Exit

Description: Always use this as the last Studio 16 AREXX command.

Parameters: None

Results: None

Example:

```
S16Exit
```

S16Filter

Description: This command alters the filter cutoff value of cards with this capability (currently just the AD1012).

Parameters: Desired Filter Cutoff (Hz)

Results: Actual Filter Cutoff (Hz)

Example 1:

```
S16Filter 20000
say 'Actual Filter Cutoff: ' result 'Hz'
```

Example 2: (Try every filter)

```
filt=100000
S16Filter filt
Lastfilt=result
do while (filt > Lastfilt)
filt=Lastfilt-1
S16Filter filt
Lastfilt=result
end
```

S16Gain

Description: This command alters a cards input gain, provided the card supports this kind of parameter. Notice that 106 = 6dB, 100 = 0dB and 75 = -25dB. See the S16ChanVol example for details.

Parameters: Desired Gain (dBs)

Results: Actual Gain String (dBs)

Example:

```
S16Gain 106
say 'Actual Gain: ' result 'dBs'
```

S16Open

Description: This command opens a sample for playback, and preloads the sample. A sample must still be triggered to start playback, and closed.

Parameters: Complete Sample FileName String.

Results: key - a unique value used to identify the sample

Example:

```
S16Open 'Audio:Sample'
key=result
S16Trigger key
S16Close key
```

S16OpenRecord

Description: This command opens a sample for recording. The samples must then be triggered, to start the record, and then closed, to stop the recording.

Parameters: Complete Sample FileName String.

Results: key - a unique value used to identify the sample

Example:

```
S16OpenRecord 'Ram:Number9'
key=result
S16Trigger key
S16WaitGPI
S16Close key
```

S16OpenWithAutoClose

Description: This command is used for playing back samples without having to close them, this is done automatically when the sample ends. You still must trigger the sample.

Parameters: Complete Sample FileName String.

Results: key - a unique value used to identify the sample

Example:

```
S16OpenWithAutoClose 'Audio:Sample'
key=result
S16Trigger key
```

S16Pan

Description: This function alters the pan of a sample that is already playing back. Notice that 0 = Pan full Left, 100 = Center and 200 = Pan full Right.

Parameters: Type Of Channel (E.g., 'CHAN_INPUT' 'CHAN_PLAY' or 'CHAN_OUTPUT')
Channel Number
Desired Pan (dBs)

Results: Actual Pan (dBs)

Example:

```
S16Pan CHAN_PLAY 1 000 ! Full Left
say 'Actual Pan: ' result 'dBs'
S16Pan CHAN_PLAY 2 100 ! Center
S16Pan CHAN_PLAY 3 200 ! Full Right
S16Pan CHAN_PLAY 4 106 ! 6dBs to Right
```

S16Play

Description: A simple way of playing back audio from a Studio 16 card. No opens, closes or triggers are needed. Notice that this command returns after the sample has finished playing.

Parameters: Complete Sample Path string

Results: None

Example:

```
S16Play 'toddaudio:11_Intro'
```

S16QuerySmpteTime

Description: This command returns the current SMPTE time in string format.

Parameters: None

Results: TimeCodeString

Example:

```
S16QuerySmpteTime
say 'Current Smpte Time is: ' result
```

S16SmpteStart

Description: This command starts the internal timecode generator.

Parameters: None

Results: None

Example:

```
S16SmpteStart
```

S16SmpteStop

Description: This command stops internal timecode generation. This command does not effect external timecode.

Parameter None

Results: None

Example:

```
S16SmpteStop
```

S16SmpteSet

Description: This command sets the internal SMPTE time.

Parameters : SMPTE Timecode String

Results: None

Example:

```
S16SmpteSet 00:02:30:00
S16SmpteStart
```

S16Rate

Description: This command alters the sampling rate. It should be used before you record a sample, since you are not assured of a particular startup sampling rate.

Parameters: Desired Sampling Rate (samp/sec)

Results: Actual Rate (samp/sec)

Example 1:

```
S16Rate 44100
say 'Actual Sampling Rate: ' result
'samps/sec'
```

Example 2: (try all rates)

```
rate=100000
S16Rate rate
LastRate=result
do while (rate > LastRate)
rate=LastRate-1
S16Rate rate
LastRate=result
end
```

S16StopAllPlayback

Description: This command stops all audio Playback. S16Closes are still required for all samples that are S16Opened.

Parameters: None

Results: None

Example:
```
S16StopAllPlayback
```

S16ToBack

Description: This command places the Studio 16 screen behind all others. It performs the same function as the screen's depth gadget.

Parameters: None

Results: None

Example:
```
S16ToBack
```

S16ToFront

Description: This command places the Studio 16 screen on top of all others. It performs the same function as the screen's depth gadget.

Parameters: None

Results: None

Example:
```
S16ToFront
```

S16Trigger

Description: This command starts a sample's record or playback. Multiple 'Keys' may be passed to start and stop stereo sample playback and record. Up to eight keys may be passed at one time.

Parameters: One or more 'Key' values (supplied by an Open)

Results: None

Example:

```
S16OpenWithAutoClose 'Audio:Sample_Left'
key1=result
S16OpenWithAutoClose 'Audio:Sample_Right'
key2=result
S16Trigger key1 key2
```

S16Version

Description: This command is used to determine the version of Studio 16 and the version of the Studio 16 AREXX port.

Parameters: None

Results: Version String 'Studio 16 Vers X.XX, AREXX Port Vers X.XX'

Example:

```
options results
S16Version
say 'You are using ' result
```

S16WaitGPI

Description: This command waits until a GPI Trigger occurs. GPI is the joystick button (as used by the Video Toaster).

Parameters: None

Results: None

Example:

```
S16WaitGPI
S16Play 'Audio:Sample'
```

S16WaitTimeCode

Description: This command waits for a particular SMPTE Time Code. When the time is reached or exceeded, execution continues on the next AREXX command.

Parameters: TimeCode String

Results: 0 if time found
6 (RX_ER_TIME_CODE_PAST) if time code past

Example:

```
S16WaitTimeCode '00:00:10:00'
S16Play 'Audio:Sample'
```

ARREX Errors Codes

6	Time Code Past
11	Unsupported Parameter
12	Could not Allocate Key
13	Could not Find Sample
14	Invalid Parameter
21	No Handler
22	Invalid Channel Type
23	Could not Open Sample

ARREX Constants

1	CHAN_INPUT
2	CHAN_PLAY
3	CHAN_OUTPUT

Cue List

Keyboard Shortcut: ^C

Class: Application Module

Description: The Time Line Cue List is a SMPTE synchronizable audio recorder and time line editor that lets you visually work with Cue Lists. It lets you easily import, create and visually arrange time based entries in your Cue Lists. Entry types currently supported are Audio Entries and AREXX Entries.

The Time Line combines standard tape deck style transport controls with a multiple track visual interface. The transport controls let you record and play Audio Entries. The multitrack interface lets you arrange your samples with much finer control than allowed by tape decks. AREXX Entries let you control other programs directly from the time line.

You can easily move Entries in time or from track to track using your mouse. By simply dragging one Audio Entry over another you can cross fade between samples. Choose between fixed or variable overlap intervals, with your choice of cross fade curves.

You can visually crop Audio Entries and adjust fade-in and fade-out times with the mouse. Movable flags let you control automated punch-in and punch-out recording and set commented auto-locate points.

You can synchronize the Time Line to SMPTE time code for accurate music production, audio-for-video, and motion picture soundtrack work.

The Time Line replaces both the Cue List and Transport modules used by previous versions of Studio 16.

Figure 8-2. Time Line Cue List

Cue List Overview

What Is the Time Line?

The Time Line is a where you work on Cue Lists in a visual way. The Time Line is not itself a Cue List.

Think of the Time Line as a window on time. You can set its starting time and ending time boundaries to choose what range of time it can view. Within that range of time you can zoom in and out, and when you're zoomed in you can scroll forward and backward in time.

What Is a Cue List?

A Cue List is a file that holds information about Audio and AREXX Entries. For Audio Entries, a Cue List file stores when they start and end, the location of the samples (but not the sample data), the tracks, cross fades, volume settings, pan settings, and more. For AREXX Entries a Cue List stores the tracks, commands and start times for each entry.

A Cue List file also stores Time Line settings for start time, end time, and zoom amount.

Matching the Time Line to a Cue List

Usually you'll set your Time Line so it shows all the entries in a Cue List. There are two ways to do this:

- automatic
- manual

Automatically Size Time Line

The Auto Size Cue List command lets you quickly adjust the boundaries of the Time Line to fit the entries in any Cue List.

1. Open a Cue List.
2. Select the Auto Size Cue List command in the Options menu, (*A*-A).

Now the Time Line is automatically resized to start thirty seconds before the first entry begins, and end thirty seconds after the last entry ends.

3. Save the Cue List with the Save command in the Cue List menu and the Time Line's boundaries will be saved with the Cue List. The Time Line will then be properly sized the next time you open that Cue List.

Manually Size Time Line

To manually adjust the start and end time boundaries of the Time Line to include all the entries in a Cue List:

1. Open a Cue List
2. Choose the Cue List Preferences command in the Options menu.
3. In the Display Boundaries area in Cue List Preferences, type a time in the Start Time field that is before the first entry's start time, and hit the return key.
4. Type a time in the End Time field that is after the last entry, and hit the return key.

   This will set the Time Line's Display Boundaries to include all the entries in the Cue List. You can also use this method to make the Time Line's Boundaries larger than the current Cue List needs so you have room to add new entries.

NOTE The Start Time and End Time fields will accept the type of time code selected in the Time Options section of the same requester.

---

5. Save the Cue List with the Save command in the Cue List menu and the Time Line's boundaries will be saved with the Cue List. The Time Line will then be properly sized the next time you open that Cue List.

Using Zoom With the Time Line

Once you've set the Time Line's boundaries, the Zoom field and buttons in the lower left corner of the time line let you zoom in and out.

Zoom Field

To use the Zoom field, type the amount of time you want to see at one time.

Zoom Buttons

To use the Zoom buttons, click the Up Arrow button to zoom out and the Down Arrow button to zoom in. You can also see more or less of the Time Line's view by using the sizing gadget of the window to make the window larger or smaller.

As you zoom in the smallest unit you'll actually see depends on the time option you've chosen in Cue List Preferences. For example, if you've chosen SMPTE in the Time Options, the smallest displayed unit is 1/30th of a second (1 video frame). If you choose the SMPTE Plus option the smallest unit you'll see is 1/100th of a frame. The displayed unit is rounded up from the actual resolution of Studio 16.

Resolution refers to the degree of detail that can be seen and edited. Studio 16 has an actual resolution of a single sample for Audio tracks, which at a sampling rate of 48KHz is 1/48,000th of a second. The resolution is even greater for AREXX tracks.

Scrolling With the Time Line

When you're zoomed in on the Time Line's view, you can use the horizontal scroll bar at the bottom of the time line to scroll forward or backward in time between the start time and end time boundaries. To move backward drag the scroll bar to the left. To move forward drag the scroll bar to the right. If the Time Line is zoomed out so that the scroll bar is a solid bar, you are seeing the entire view of the Time Line and the horizontal scroll bar will not have an effect.

When there are more tracks in the window than you can see in the Time Line window, the scroll bar on the right side of the Time Line lets you scroll up and down through a Cue List's tracks.

Procedures

Adding an Existing Sample to the Cue List

There are two ways to add recorded samples to the current Cue List:

- Drag & drop them into the Time Line from Sample List
- Use the Timecode Add command in the Entry menu.

Timecode Add allows you create a blank Audio Entry on the fly that you can later change to trigger an existing sample.

Drag & Drop From Sample List

The most direct way to add a new sample to the Time Line is to drag it from Sample List with the mouse and drop it onto an audio track on the Time Line. The Sample will appear as an Audio Entry on the audio track where you dropped it. If there are no Audio tracks in the Time Line, you can create one using the Add Track command in the Track menu. You can't drop a sample onto an AREXX track.

Drag Mode Buttons

The Drag Mode setting for the Time Line will also affect where the new Audio entry will start on the Time Line when you drag a sample from the Sample List. You can set the Drag Mode using the Drag Mode buttons at the top of the Time Line window. You can select only one at a time.

Figure 8-3. Drag Mode Buttons

From left to right, the Drag Mode buttons are:

- Any Direction
- Lock-To-Grid
- Vertical Only

If you are in Lock-To-Grid mode when you drag a sample from Sample List onto an Audio track in the Time Line, the Audio Entry will snap to the nearest grid line.

If you are in Any Direction or Vertical Only mode when you drag a sample from the Sample List onto an Audio track in the Time Line, the Audio Entry will start at the position of your mouse pointer.

The state of the Keep Original Time menu in Options will determine where the dropped sample is placed on the track. If Keep Original Time is activated, and the sample was recorded when SMPTE was running, the sample will drop to the recorded SMPTE spot. If Keep Original Time is not active, the sample will drop under your cursor.

An example of Drag & Drop with Keep Original Time

1. Record samples from a video tape while feeding time code to your SunRize card's time code reader.
2. Each sample you record will remember where it starts in relation to the video.
3. Activate Keep Original Time.
4. Drag the samples from the Sample List and drop them onto an Audio track in the Time Line.

   The samples will automatically appear in time where they should in relation to the video. If you then turn ON the Time Line and play the video with its time code fed to your SunRize card's SMPTE reader input, the Audio Entries will stay in sync with the video.

NOTE Depending on how the start and end time boundaries are set in the Time Line, you may not be able to see the sample you just dropped onto a Time Line audio track if you're in Keep Original Time mode. If that happens, use the Auto Size Cue List command in the Options menu to change the boundaries of the Time Line to include the new Audio Entry.

Using the Timecode Add Command

The Timecode Add command lets you add blank entries to the time line on the fly. This is great for dropping in sound effects while you watch the picture.

Use the Timecode Add command

1. Connect the time code output from your video deck to the time code input jack on your AD516 or AD1012.

2. Select a Time Line track onto which to create a blank Audio Entry, by clicking the arrow buttonn.
3. Turn the Cue List ON.
4. Start the video, and use the Timecode Add command's *A*-T shortcut to mark where sound effects should go while you watch the picture. Each time you type *A*-T, you will insert a blank Audio Entry onto the track.

NOTE Blank Audio Entries are represented on the Time Line as a different colored rectangle than normal Audio Entries. If you are using the Default color scheme, blank entries are blue.

---

5. After you've added blank Audio Entries, add samples to them by double clicking the blank entry to bring up Audio Event Parameters.
6. Drag a sample from the Sample List, and drop it into the Sample field at the top of the requester.
7. Close the requester.

Now the sample you dragged from the Sample List has replaced the blank Audio Entry. The Audio Entry still starts where you added it using the Timecode Add command above, so your sound effect starts right where you wanted it to. Of course if your reaction time was off you can just move the sound effect by dragging it along the Time Line.

Recording a New Audio Entry

Here are the typical steps you can use to record a sample from the Time Line. The setups depend on the source of your audio signal.

- For a video tape deck, audio tape deck, CD player, or synthesizer - connect their outputs directly to the AD516 or AD1012's inputs.
- For microphones, or electric guitars - connect them to an external mixer, and then connect the output of the mixer to the AD516 or AD1012.
- For the output of the Time Line itself (mix downs), don't connect anything to your AD516's inputs.

Record a Sample From the Time Line

1. Select the record path in the Sample List (the ☒ box). The record path is where the new samples you record are stored. If you don't have the correct path showing in Sample List, add the path and then select it as the record path.
2. Select New from the Cue List Menu to open an empty Cue List.
3. Select a Time Line track onto which to record. If you want to record a monophonic source, click the track select button on one track. To record a stereo source, shift-click the track select buttons on two audio tracks.
4. Select the input source you want for each track. To do so, click the track name button and select the input source using the Record drop list in Audio Track

Parameters. For each track, you can choose an input on either the AD516 or AD1012 installed in your system.

You can also choose to record the left or right output of the Time Line itself. This is a very handy way to bounce multiple tracks together into either a single monophonic sample or a stereo mix, using several tracks. It's also an easy way to combine the samples that overlap during a real time cross fade into a single sample.

5. While you're in Audio Track Parameters change the name of the track to reflect the recording you're about to make. You can do this by typing a new name in the Name field at the top of the requester, and hitting the return key on your keyboard.
6. Name the new sample you're about to record, by typing a new name in the Record field below the Record drop list. The default sample name is "Untitled".
7. If you are going to record the output of the Time Line, mute (no speaker) the playback of any tracks you don't want to record. And, turn on the Sound button (speaker showing) to enable the playback of a tracks you do want to mix down.
8. Drag the Punch-In flag to where you want the recording to start.
9. Drag the Position flag five seconds or so before the punch-in flag.
10. Drag the Punch-Out flag to where you want the recording to stop.
11. Click the Record button to enable recording.
12. When you're ready to record, click the Play button.
13. The time line will play from the Position flag. It will automatically begin recording at the Punch-In flag, and it will stop recording at the Punch-Out flag or when you click the Stop button.

    By leaving the punch-in flag at the same location, you can easily record a series of samples that start at the same time. Record each sample on a different track and the time line becomes a very flexible digital multitrack recorder.

Grouping/Ungrouping Entries

The Time Line has a powerful grouping feature that works much like the object grouping in a drawing program.

To group entries together:

1. Shift-click each entry
2. Select the Group command from the Entry menu.

When entries are grouped, if you select one entry you will select all entries in the group. If you move one entry you will move all the entries in the group, which is great for keeping entries in sync with each other. If you remove one entry you will remove all entries in the group.

If you did something to a whole group that you meant to do to one entry, simply:

1. Use the Undo Edit (*A*-Z) to restore where you were.
2. Select Ungroup to separate all the entries in the group.
3. Select and change individual entries again.

To remove all entries from all groups in the Cue List, use the Ungroup All command in the entry menu.

Cropping an Entry

The Time Line makes it very easy to non-destructively crop the beginning or end of any sample.

1. Click an Audio entry to select it. You'll see the entry change color, and you'll see four small boxes appear. The two boxes on each end of the entry (not the ones on the top corners) are called the Crop Gadgets.
2. Drag the Crop gadget on the left edge of the entry to crop the beginning of the sample.
3. Drag the Crop gadget on the right edge of the entry to crop the end of a sample.

You can not use Crop to extend a sample beyond the length of the original entry. You can only shorten the sample by cropping off the beginning or end, or restoring what you've cropped. Cropping can be very useful for removing unwanted noise at the beginning or end of a sample.

Cropping in the Time Line is non-destructive. It does nothing to the original sample data on your hard drive, so you can experiment and make changes as often as you want. If you change your mind, simply move the Crop gadgets again until you're satisfied with the result.

Fading an Entry

The Time Line makes it very easy to non-destructively fade the beginning or end of any sample.

1. Click an Audio entry to select it. You'll see the entry change color, and you'll see four small boxes appear. The two boxes on the top corners are called the Fade Gadgets.
2. Fade in the beginning of the sample by dragging the fade gadget on the left edge of the entry.
3. Fade out the end of a sample by dragging the Fade gadget on the right edge of the entry.

You can only drag a Fade gadget inward, toward the entry. When you do so you will be adjusting the fade in time for the beginning or the fade out time for the end.

Fading done in the Time Line is non-destructive. It does nothing to the original sample data on your hard drive, so you can experiment and make changes as often as you want. If you change your mind, simply move the Fade gadgets again until you're satisfied with the result.

Cross Fading Entries

Cross fading entries is very simple on the Time Line. All you have to do is slide one sample over into another on the same Audio track. The cross fading is automatic and non-destructive. If you don't like the cross fade, simply move either sample again until you're satisfied with the result.

Looping Entries

Loops are processed by duplicating a sample and repeating it many times. By using the limited cross fade edit mode, you can get a seamless looping action out of any sample.

Loop an Entry

1. Click the entry to be looped.
2. Select the limited crossfade edit mode. If required, edit the crossfade overlap in Cross Fade Preferences.
3. Control drag a copy of the entry to the right of the original sample. Leaving them crossfaded.
4. Control drag another copy to the right. Continue the control drag technique until you have duplicated the sample as many times as required.

Editing an Entry

Load an Audio Entry Into an Editor

1. Click the entry to select it.
2. Choose the Edit Selected command in the Entry menu (A-E). An Editor will open for the sample.

   This will not work if the entry is part of a group.

Ungroup an Audio Entry and Load It Into an Editor

1. Select the entry.
2. Choose the Ungroup command from the Entry menu.
3. Click anywhere on a track outside the entries to deselect all entries.
4. Select the entry again and choose the Edit Selected command in the Entry menu (A-E). An Editor will open for the sample.

Load a Grouped Audio Entry Into an Editor

1. Double click the entry to bring up Audio Event Parameters.

2. Click the Edit button in the requester and an Editor will open for the sample.

WARNING Edits made in the Editor will change the actual sample. If the same sample is used in other Audio Entries, in the same Cue List or other Cue Lists, the edits you make will affect those other Audio Entries.

You should consider making a copy of a sample under another name in the Sample List. Then you can import the copy into the Audio Entry, by dragging it from the Sample List onto the Sample field at the top of the Audio Event Parameters requester. This will insure that you have a unique sample for that entry and you can edit it without worrying about affecting other Audio Entries.

Playing an Entry

Play a Single Audio Entry

1. Click the entry to select it.
2. Choose the Play Selected command in the Entry menu (*A*-P).

   This will not work if the entry is part of a group.

Ungroup an Audio Entry and Play It

1. Select the entry.
2. Choose the Ungroup command from the Entry menu.
3. Click anywhere on a track outside the entries to deselect all entries.
4. Select the entry again and choose Play Selected in the Entry menu (*A*-P).

Play a Grouped Audio Without Ungrouping

1. Double click the entry to bring up Audio Event Parameters.
2. Click the Play button in the requester.

Changing Volumes and Pans

To change volume and pan settings for an Audio Entry, double click the entry to bring up Audio Event Parameters. In that requester you can move the Pan slider left or right to pan the sample between the left and right outputs (this is only available if you have an AD516) and move the Volume slider up and down to raise and lower the sample's volume.

You will not be able to hear the results of these settings if the Use Mixer Levels command is activated in the Options menu. Use Mixer Levels should not be activated when you want to use the Audio Event Parameters settings to control volumes and pans from within the Time Line. Activate Use Mixer Levels when you want to do an automated mix with the Mixer module.

Removing an Entry

To remove an entry, click it once to select it, then use the Remove Selected command in the Entry menu, or just hit the Delete key.

Remove more than one entry by shift-clicking the entries you want to remove then using the Remove Selected command.

Removing entries from the Cue List in the Time Line will not delete the actual sample data from your hard drive. If you change your mind you can drag the samples back from the Sample List into the Time Line, or simply use the Undo command in the Time Line.

Replacing an Entry

A simple way to replace an entry or to try different sound effects at the same position is to use the Drag & Drop capabilities of Audio Event Parameters. This can replace the sample in an Audio Entry with another sample from the Sample List.

Replace One Sample With Another

1. Double click the Audio Entry to bring up Audio Event Parameters.
2. Drag a sample from the Sample List and drop it in the Sample field at the top of the requester.
3. The sample you dragged from the Sample List has replaced the sample that was in the Audio Entry.

Using AREXX

You can send messages to other programs directly from the Time Line. Use AREXX commands to:

- Show pictures
- Play animations
- Start video decks
- Run video disk players
- Control a light show
- Trigger the NewTek Video Toaster (Toaster Handler required)
- Dial a phone number

Before you can use AREXX, you must run the RexxMast program that came with your Amiga (WorkBench 2.04 and higher). This program listens to AREXX messages sent by all programs and routes them to the specific program for which they're intended. To run it, double click the RexxMast icon (check your Amiga's documentation for the location of the RexxMast icon). It's a good idea to put the RexxMast icon into your WorkBench Startup Drawer. Then it will run automatically whenever you boot your Amiga, and you won't have to start it up manually every time you use AREXX.

To send AREXX messages from the Time Line you need an AREXX track.

Create an AREXX Track

1. Choose the Add Track command from the Track menu.
2. Click the word "AREXX" in the requester to add an AREXX track. An AREXX track will appear on the Time Line. The Track Name button on the left edge of the track will say "AREXX".

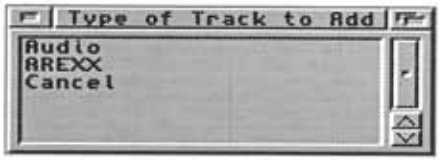

Figure 8-4. Track Types

Next you specify the AREXX port to be addressed. An AREXX port is the name that tells the RexxMast program to which other program you're sending messages.

Specify an AREXX Port

1. Find out the name of the AREXX port for the program to addressed by looking in that program's manual.
2. Run the program to be addressed. This step is optional, but it makes it possible to test if the AREXX communication is working.
3. Click the Name button on the AREXX track to open AREXX Track Parameters.
4. Type the AREXX port name in the Port field and hit the return key on your keyboard.
5. The bottom of the AREXX Track Parameters requester should now say "Port Found". If it doesn't, you either don't have your AREXX program or RexxMast running, or you typed the Port name incorrectly.
6. It's important that you type it precisely the way it's shown in the manual of the AREXX program. AREXX is case sensitive, so match upper and lower case letters exactly.

While you're in AREXX Track Parameters, you can change the name of the track from "AREXX" to something else, like the name of the program you're addressing. There's room for up to nine characters in the track name button.

Change the Name of a Track

1. Click the Name field and erase the name "AREXX" by typing *A*-X.

NOTE This is the standard Amiga keyboard shortcut for erasing the contents of fields. You can also use the delete key or the backspace key. When a field is not activated, the Time Line uses *A*-X to cut selected tracks into the Paste buffer.

2. Type the new name for the track and hit return.

   The new name will appear in the Track Name button for the track. You can change the name at any time.

3. When you're done with the name change, close AREXX Track Parameters by clicking the close gadget in the upper left corner.

Now that you've set up the track to address another program's AREXX port, the next thing to do is add an AREXX Entry to the track. AREXX Entries let you send a list of commands to the program the track is addressing. The commands will be sent at an exact time on the Time Line.

Add an AREXX Entry to an AREXX track

1. Select the AREXX track or tracks on which to add an entry.
2. Drag the Position flag to the point in time where the entry will be added.
3. Choose the Timecode Add command in the Entry menu.

   This will add an AREXX Entry at the time of the Position flag on any selected AREXX tracks. An AREXX entry looks like a vertical line with a small box in the center of the line.

NOTE Time Code Add command is the only way to add AREXX entries.

If the Time Line is playing, the Position flag will be moving and you can add entries on-the-fly with the *A*-T shortcut for the Timecode Add command.

If you feed SMPTE time code from a video deck to the SMPTE input of your SunRize card, you can use *A*-T to add AREXX Entries where you want them in relation to the video, while you watch the video.

4. Double click the entry to open the AREXX Event Parameters.
5. Specify the commands you want the AREXX Entry to send by typing them in the Cmd1 through Cmd9 fields. The commands will be sent in order starting with Cmd1.

Figure 8-5. AREXX Event Parameters

To learn the AREXX commands available for the program you are addressing, refer to the program's manual.

Test the AREXX Commands

1. Make sure the program to be addressed is running.
2. Click the Test CMD button. The commands will be sent to the program.

Type a name in the Name field. This name will appear next to the AREXX Entry in the Time Line. You can give it a name appropriate to its function, like "Picture", "Animation", or whatever.

You can also type in an exact time in the Time field, if you need it to sync to a specific time. If there is a delay between the time set in the Time field and the time the program you are addressing actually responds, you can move the AREXX Entry back in time to compensate. To move it, either enter a new time in the Time field, or drag the entry with the mouse.

Moving an Entry

To move an entry, just drag it with the mouse. You can drag an entry:

- left - to move it earlier in time
- right - to move it later in time
- up/down - to move it from one track to another

If you drag an Audio entry into another Audio entry on the same track, they will automatically cross fade.

If you hold down the Control key and drag an Entry, the original entry will remain and you will drag a duplicate entry.

You can only drag Audio entries onto Audio tracks and AREXX entries onto AREXX tracks.

How you can move an entry depends on the Drag Mode you've selected. You can set the Drag Mode using the Drag Mode buttons at the top of the Time Line window.

Figure 8-6. Drag Mode Buttons

From left to right, the Drag Mode buttons select:

- Any Direction
- Lock-To-Grid
- Vertical Only

Any Direction

To drag entries with no restrictions, click the Any Direction button.

To move more than one entry at the same time:

1. Shift-click the entries to move.
2. Then when you drag any one of the grouped entries, you'll drag them all.

Lock-To-Grid

To drag entries so that they lock to the nearest grid lines, click the Lock-To-Grid button. You can use this to align entries to the same start time or match sound effects to musical beats.

Vertical Only

To drag entries so that they only move between tracks, click the Vertical Only button. Use this when you already have entries synchronized and don't want to lose their positions in time.

Auto-Locating Flags

The Time Line has 10 locate flags. You can put them wherever you want along the Time Line to mark a location and you can then jump to that location with a single keystroke. You can add a comment that will be displayed next to a Locate flag.

Add a Locate Flag

1. Drag the Position flag to where you want the Locate flag to be.
2. Hold down the shift key and type a function key.
3. A Location flag corresponding to the number you typed will appear at the Position flag. For example, if you typed F1, the "banner" of the flag says "F1".

   If you've already created a particular Locate flag and you do the above steps, the Locate flag will relocate to the new position. You can also move Locate flags by dragging them left or right. If the Lock-To-Grid editing mode is on when you move a Locate flag, it will move in grid increments.
4. Once you've added a Locate flag, move the Time Line to that flag by typing the function key or the number on the numeric keypad that corresponds to that flag.

   The Time Line will scroll to show the flag, and the Position flag will move to the Locate flag. If you click the Play button, the Time Line will begin to play from the Locate flag.

It can be useful to put a comment next to a Locate flag to remind yourself what it's marking. For example, you could put "Verse", "Chorus", or "Chase Scene".

Comment a Locate Flag

1. Double click the flag's banner to open Flag Parameters .

2. Type a comment in the Comment field and hit the return key on your keyboard.

   The comment will appear to the right of the flag's banner, above the Time Line.

Figure 8-7. Flag Parameters

Remove a Locate Flag

1. Double click the flag's banner to open the Flag Parameters.
2. Click the Remove button.

The flag will be removed from the Time Line.

Opening and Saving Cue Lists

You can Open Cue Lists into the Time Line by using the Open command in the Cue List menu. A file requester will let you select a Cue List file to open. You can save the Time Line to a Cue List file by using the Save As or Save command. See Chapter 6 - Cue List Tutorial for step by step instructions.

NOTE A Cue List does not contain samples. It is a file that contains the descriptions of events to be triggered and when every entry should be triggered.

Triggering Entries From the Time Line

The Time Line can trigger Audio and AREXX entries when its Activation button is turned ON and the Time line has been triggered. There are three ways to trigger the Time Line:

- Click the Play button
- Click the Play from Start Button
- Start the SMPTE generator, either internal or external

Internal sources include the SMPTE Generator or SMPTE Output in the Studio 16 software. External sources include the SMPTE output of a video tape deck or multitrack audio recorder connected to the SMPTE input of your AD516.

It may take the Time Line several seconds to find the correct position to start playback, especially if the computer is busy, or if you are triggering near the end of a long sample.

Selecting SMPTE Frame Rate and Source

Studio 16 supports SMPTE frame rates of 24, 25, and 29.97 frames per second, and 30 frame per second drop frame (DF). The Time Line will expect whatever frame rate set in Studio 16 Preferences.

Select a Frame Rate

1. Use the Preferences command in the Project menu to open the Preferences.
2. Choose the frame rate clicking the appropriate button in the SMPTE section in the upper right corner.
3. You can use the SaveSetup command in the Project menu to save your choice as the default frame rate.

NOTE The SaveSetup command also saves other information about your initial setup, including the windows you have open, their locations, default file requester paths, screen colors, and more.

Setting Cue List Defaults

When you first open the Time Line, it will open a Cue List called "Untitled.cue". The same file is opened when you select the New command in the Cue List menu.

You can customize the layout and design of this default file by creating Cue List format of your choice and then choosing the Save Default command in the Cue List menu. Your customized Time Line will then be saved as Default.cue.

Cue List Reference

Transport Buttons

Figure 8-8. Transport Buttons

You'll find the transport buttons in the upper left corner of the Time Line window. You can click them with the left mouse button or use their keyboard shortcuts. They function much like the buttons on a standard multitrack tape recorder.

There are six transport buttons:

- Record
- Play From Start
- Play
- Stop
- Rewind
- Fast Forward

Figure 8-9. Record Button

Record Button The Record Button lets you put the time line into record mode. In record mode, you can record a sample onto one or more tracks. However, clicking the Record Button will not immediately cause the time line to begin recording.

Keyboard Shortcut: + -

On the numeric keypad, you can use the + key to turn the record button on, and the - key to turn the record button off.

Record From the Cue List

1. Click the Record Button. This puts the Time Line into record mode.
2. Select one or more tracks by clicking the Track Select button for each track you intend to record onto. The Track Select button is to the right of the Track Name button. It displays an arrow when selected. Typically you'll select one track for a monophonic recording, or two tracks for a stereo recording.
3. Open the Audio Track Parameters by clicking the Track Name button. There you'll see the Record drop list in the Track Parameters . Choose from the inputs on any SunRize boards installed in your system.

   You can also choose to record the output of the Time Line. This lets you combine multiple tracks into a single sample.
4. Move the Punch-In and Punch-Out flags to define the start and end times of the recording.
5. Move the Position flag to the left of the Punch-In flag so that playback begins before the start time of the recording.
6. Click the Play button.

   Or, you can also use the Play-From-Start Button, if the Start Flag is to the left of the Punch-In Flag. Recording always begins at the Punch-In Flag. Recording stops at the Punch-Out Flag or when you click the stop button.

NOTE The + and - keyboard shortcut for the Record button means you can go in and out of record mode without looking at the monitor to see what mode you're in. This can be helpful if you're recording an instrument that picks up hum from the monitor, like an electric guitar. Using keyboard shortcuts, you can do your recording with the monitor off, if necessary.

Figure 8-10. Play From Start Button

Play-From-Start Button

Click the Play-From-Start Button when you want the Time Line to begin playing from the Start Flag, rather than from the Position Flag location.

Keyboard Shortcut: You can use the 0 key on numeric keypad to activate the Play From Start Button.

If the Record Button is enabled, the Time Line will automatically start recording onto selected tracks when the Location Flag passes the Punch-In Flag.

NOTE You can move the Start Flag to any location by dragging it, but typically you'll put it about five seconds before the beginning of your soundtrack or song. You can use the ten Locate Flags to set other locate points within your soundtrack or song.

Figure 8-11. Play Button

Play Button

Click the play button when you want the Time Line to start playing from the Position Flag.

Keyboard Shortcut: Enter (keypad)

You can use the Enter key on the numeric keypad to toggle playback on and off. The Enter key will also stop rewind and fast forward operations.

The Position Flag marks your current playback location on the time line. When you're not playing, rewinding or fast forwarding, the Position Flag will be wherever you last stopped playback, unless you drag it somewhere else or move it to a Locate flag position using one of the function keys.

If the Record Button is enabled, the Time Line will automatically start recording onto selected tracks when the Position Flag passes the punch-in flag.

Figure 8-12. Stop Button

Stop Button Click the Stop button to stop any playback, recording, fast-forward or rewind operation.

Keyboard Shortcut: . Enter (keypad)

You can use the Decimal Point key or the Enter key on the numeric keypad to stop playback, rewind and fast forward operations. The Decimal Point key will always stop the current transport operation. The Enter key toggles between the Play and Stop buttons.

Figure 8-13. Rewind Button

Rewind Button Click the rewind button to move the Position Flag rapidly backward in time. Click the stop button when you want the Position Flag to stop.

Keyboard Shortcut: Left arrow key

You can use the left arrow key to scroll the Time Line to the left while keeping the Position flag at about a third of the way from the left edge of the Time Line. This is not exactly what the Rewind button does, but it's similar enough that you can often just use the left arrow key to rewind.

If the Grid Snap button is turned on, the Position Flag will move in grid increments. Otherwise it will move in seconds.

NOTE You'll see the changing SMPTE location of the Position Flag if you open the SMPTE Monitor.

Figure 8-14. Fast Forward Button

Fast Forward Button Click the fast-forward button to move the Position Flag rapidly forward in time. Click the stop button when you want the Position Flag to stop.

Keyboard Shortcut: Right arrow key

You can use the right arrow key to scroll the Time Line to the right while keeping the Position flag at about a third of the way from the left edge of the Time Line. This is not exactly what the Fast Forward button does, but it's similar enough that you can often just use the right arrow key to fast forward.

If the Grid Snap button is turned on, the Position Flag will move in grid increments. Otherwise it will move in seconds.

NOTE You'll see the changing SMPTE location of the Position Flag if you open the SMPTE Monitor.

Drag Mode Buttons

The Drag Mode buttons are at the top of the Time Line window to the right of the Transport Control buttons. You can click them with the left mouse button or use their keyboard shortcuts. They let you determine how freely you can drag entries and flags with the mouse.

Figure 8-15. Drag Mode Buttons

There are three Drag Mode buttons. Only one button can be active at a time.

- Any Direction
- Lock-To-Grid
- Vertical Only

Dragging Entries

You can drag an entry in the time line by clicking it with the left mouse button, and while still holding the left mouse button down, moving the mouse. The entry will follow the mouse. It can be dropped on any audio track.

Dragging Grouped Entries

You can drag grouped entries together by dragging any member of the group. Select and group multiple entries by clicking each entry while holding down the shift key, and then select the Group command in the Entry menu.

Dragging Flags

You can drag a flag by clicking it with the left mouse button, and while still holding the left mouse button down, moving the mouse left or right. The flag will follow the mouse.

If you drag a flag or entry beyond the right or left edge of the Time Line window, the Time Line will scroll.

You can move entries and flags freely in time, but there's another issue to be aware of. There are only so many pixels on the computer screen to represent all the resolution available in the Time Line. If you are zoomed out and you move a flag, you may notice that in order to represent the amount of time you're viewing, each time you move the flag by a single pixel it may jump several frames, or even several seconds depending on the time the Time Line needs to display.

The larger the amount of time you show in the Time Line by zooming out to see more of the Time Line, the more time each pixel has to represent. Zoom in for more resolution.

NOTE Pixel is short for Picture Element. A Pixel is a single tiny rectangle on the screen that combines with other pixels to create what you see on your computer screen. On a normal, (non-overscan) Amiga high-res interlaced screen there are 640 pixels from the left side of the monitor to the right side of the monitor.

For example, in Any Direction Mode, with SMPTE selected in the Time Options area of Cue List Preferences. If dragging an entry or flag by single pixel moves it more than a thirtieth of a second, and you need finer control, zoom in to display a smaller portion of the Time Line using the Zoom Arrow Buttons to the left of the Horizontal Scroll Bar. You can also make your Time Line window wider using the sizing gadget in the lower right corner.

Figure 8-16. Any Direction Button

Any Direction Button Use the Any Direction button to select the Any Direction mode. This mode lets you drag entries forward or backward in time, at the current resolution of the Time Line. It also lets you drag entries up or down, from one track to another.

Keyboard Shortcut: Tab or ~

Let go of either the tab or tilde key to turn on the Any Direction Button.

If you are in Any Direction mode when you drag a sample from Sample List in the Time Line, the Audio Entry will start where your mouse pointer was when you dropped the entry. However, if Keep Original Time activated, the sample will be added at the correct SMPTE frame.

The Any Direction Mode also lets you move flags forward or backward at the current display resolution of the Time Line.

NOTE For speedy keyboard access to all modes, select the Any Direction button. Then hold down the tilde key ~ (above the Tab key) on your keyboard when to temporarily select Vertical Only, or the Tab key to select the Lock-To-Grid button. Releasing the tilde key or Tab key will reselect the Any Direction button.

Figure 8-17. Lock-To-Grid Button

Lock-To-Grid Button In Lock-To-Grid mode, when you drag entries in time they snap to the nearest grid increment. You can drag entries between tracks.

Keyboard Shortcut: Tab key

Press and hold the tab key to turn on Lock-To-Grid. Release the tab key to turn it off.

Use this mode when you want entries to start exactly at a predefined interval. Also, snapping left and right stereo samples to the same grid increment is a quick way to synchronize them exactly. If you then group them, you can then drag them anywhere, in Any Direction Mode, without losing stereo sync.

You can also set a custom grid increment to match the tempo of a musical sample, and then drag sound effect samples to lock to the grid so they follow the beat.

If you are in Lock-To-Grid mode when you drag a sample from Sample List onto an Audio track in the Time Line, the audio entry will start at the nearest grid line.

Flags will also snap to the nearest grid increment when you move them. Use the "Set Grid Spacing" command in the Options menu to change the increment.

Figure 8-18. Vertical Only Button

Vertical Only Button In Vertical Only mode, you can prevent any time changes when moving entries between tracks. In this mode you will not be able to move entries forward or backward in time.

Keyboard Shortcut: ~

Press and hold the ~ tilde key (above the Tab key) to turn the Vertical Only button on. Release it to turn it off.

This is handy when you have a sound effect placed exactly at the time you want, but you need move it to another track. Another use is to record a second take on a separate track, then "punch in" to the original track.

Since flags can only be moved horizontally, they are not restricted by this mode. Just like the Any Direction mode, Vertical Only mode lets you move flags forward or backward in time at the current display resolution of the Time Line.

NOTE For speedy keyboard access to all modes, select the Any Direction button. Then hold down the tilde key ~ (above the Tab key) on your keyboard when to temporarily select Vertical Only, or the Tab key to select the Lock-To-Grid button. Releasing the tilde key or Tab key will reselect the Any Direction button.

Edit Mode Buttons

You'll find the Edit Mode buttons at the top of the Time Line window to the right of the Drag Mode buttons. You can click them with the left mouse button or use their keyboard shortcuts. They let you determine how freely you can overlap entries that are on the same track.

Figure 8-19. Edit Mode Buttons

There are three Edit Mode buttons. Only one of these buttons can be active at a time.

- Unlimited Cross fade
- Limited Cross fade
- Butt Edit

What Is Cross Fading?

If you have two sounds that overlap in time on the same track, the Time Line will automatically cross fade them. Cross fading is the process of turning down the first sound while simultaneously turning up the second sound. This gives you a smooth transition from one sound to the next.

Cross fading is amazingly easy in the Time Line. Just drag one Audio Entry over another on the same track, and you're done. Change the cross fade time by either dragging the Entry to the left or right. Or, change the crossfade times without actually moving the Entries by dragging either Entry's crop gadgets. Note that Crossfades are CPU intensive, too many crossfades may decrease your number of playback tracks.

You can also select from a variety of cross fade curves that determine how the volume fades on each of the overlapping samples. Just change the cross fade types by clicking the cross fade area and bring up the Cross Fade Type Requester.

Figure 8-20. Unlimited Crossfade Button

Unlimited Cross Fade Button

Select the Unlimited Cross Fade button to turn on Unlimited Cross Fade mode. In this mode you can automatically create any length cross fade by dragging part of one sample over part of another sample on the same track. You can see the cross fade area as you are dragging one sample over another.

Figure 8-21. Limited Cross Fade Button

Limited Cross Fade Button

In Limited Cross Fade mode, if you drag any sample over any other sample, the overlap area is restricted to be no greater than the default cross fade time set in Cross Fade Preferences. In other words, you can create a cross fade that is less than or equal to the default cross fade time. Create a cross fade of exactly the default time by dragging until the cross fade area stops growing.

Change the default or maximum cross fade time by moving the slider at the bottom of the Cross Fade Preferences requester. You can bring up Cross Fade Preferences from the Options menu. Save your new cross fade time as the default cross fade time with the SaveSetup command in the Project menu.

Figure 8-22. Butt Edit Button

What Is A Butt Edit?

A butt edit is when one sample starts exactly when another stops. The two samples will not overlap, nor will there be a gap between them. Precise butt edits are easy to do. Just drag one sample against another while in Butt Edit mode.

Butt Edit Button Use Butt Edit mode to create perfect butt edits. When you drag one sample into another on the same track, they will butt up against each other exactly. They will not overlap, nor will there by a gap between them.

Cross Fade Curve Types

When you create a real time cross fade, it will initially adopt the types set in Cross Fade Preferences. Note that Crossfades are CPU intensive, too many crossfades may decrease your number of playback tracks.

Figure 8-23. Default Cross Fade Preferences

If you change the settings in Cross Fade Preferences, your chosen fade types will be used for any new real time cross fades you create from then on.

Your default cross fade time will be used by any cross fades you create while in Limited Cross Fade mode. To change this default cross fade time, drag the slider at the bottom of the requester left or right. Dragging it left will decrease the default cross fade time while dragging it right will increase the default cross fade time.

NOTE Use SaveSetup to save these settings so they'll be there next time you run Studio 16.

Use the curve types to choose how the first sample will fade out and how the second sample will fade in. There are four fade types:

- Linear
- Logarithmic
- Exponential
- Instant

Figure 8-24. Linear In and Linear Out

A linear fade changes the volume of the sample at a constant rate.

Figure 8-25. Logarithmic In and Logarithmic Out

A Logarithmic fade at the end of a sample changes the volume only a little at first, but it changes it at an increasing rate, losing more than half the volume in the last third of the overlap area.

Use this for the fade out curve type when you want the first sample in a cross fade to slowly become less prominent during the cross fade.

A Logarithmic fade at the beginning of a sample changes the volume quickly at first, but it changes it at a decreasing rate, easing into full volume. It gains more than half its volume in the first third of the overlap area. Use this for the fade in curve type when you want the second sample in a cross fade to become prominent quickly.

Figure 8-26. Exponential In and Exponential Out

An Exponential fade at the end of a sample changes the volume quickly at first, but it changes it at a decreasing rate, easing into the complete fade out. Use this for the fade out curve type when you want the first sample in a cross fade to quickly become less prominent during the cross fade.

An Exponential fade at the beginning of a sample changes the volume only a little at first, but it changes it at an increasing rate, gaining more than half its volume in the last third of the overlap area. Use this fade in curve when you want the second sample in a cross fade to slowly become prominent.

Figure 8-27. Instant In and Instant Out

An Instant fade at the end of a sample changes the volume of the sample instantly from full on to full off. Use this for the fade out curve type when you want the first sample in a cross fade to play at full volume to its end, with no fade.

An Instant fade at the beginning of a sample changes the volume of a sample instantly from full off to full on. Use this for the fade in curve type when you want the second sample in a cross fade to begin without a fade, at full volume.

One good use for using Instant In or Instant Out fades is when you have samples that already have linear, logarithmic, exponential, or other fade types as part of their data. In that case you wouldn't impose another long fade in or out type on top of the existing fade, but you might still overlap such samples. Choose Instant In or Instant Out when you overlap such samples, and their built-in fades can then make the cross fade.

Changing Curve Types On Existing Cross Fades

Even after you've created a real time cross fade it's easy to change the curve types. Just click the cross fade area, and then click the curve types you want in the Cross Fade Type requester that appears.

Figure 8-28. Cross Fade Type

The Cross Fade Type requester lets you choose from the same curve types as Cross Fade Preferences .

Overlap Contention

If you drag a smaller sample completely over a larger sample, the overlap contention requester appears so you can choose how you want the samples to be handled .

Figure 8-29. Overlap Contention

There are seven choices in the Overlap Contention requester.

- Insert the sample with butt edits or cross fades
- Insert and crop the either sample with a butt edit or cross fade
- Undo the sample move

When you choose an option that uses a cross fade, Studio 16 will normally use the default cross fade type and time as set in Cross Fade Preferences, unless you've chosen a different type in the Audio Event Parameters for each sample.

From top to bottom, and left to right the overlap options are:

- Left & Right Butt
- Left Butt
- Right Butt
- Left & Right Cross Fade
- Left Cross Fade
- Right Cross Fade
- Undo Last Edit

Left & Right Butt

Click this button to insert the new sample over the old sample. The old sample will be copied and cropped so that one copy of the old sample begins before the new sample, and the other copy of the old sample begins after the new sample. Both copies of the old sample will be butted up against the new sample. The data in the old sample will not be moved in time, but a section of the old sample's sound will be replaced by the new sample.

This is a non-destructive operation, so there's no risk of losing data. If you change your mind, use the Undo command in the Options menu.

Left Butt

Click this button to insert the new sample on the left of the old sample. The old sample will be cropped, and the two samples will be butted together.

This is a non-destructive operation, so there's no risk of losing data. If you change your mind, use the Undo command in the Options menu.

Right Butt

Click this button to insert the new sample on the right of the old sample. The old sample will be cropped, and the two samples will be butted together.

This is a non-destructive operation, so there's no risk of losing data. If you change your mind, use the Undo command in the Options menu.

Left & Right Cross Fade

Click this button to insert the new sample over the old sample. The old sample will be copied and cropped so that one copy of the old sample begins before the new sample, and the other copy of the old sample is begins after the new sample. Both copies of the old sample will be cross faded with the new sample.

This is a non-destructive operation, so there's no risk of losing data. If you change your mind, use the Undo command in the Options menu.

Change the default cross fade amount with the slider in Cross Fade Preferences. Save your new cross fade time as the default cross fade time with the SaveSetup command in the Project menu.

Left Cross Fade

Click this button to insert the new sample to the left of the old sample. The old sample will be cropped, and the two samples will be cross faded together.

This is a non-destructive operation, so there's no risk of losing data. If you change your mind, use the Undo command in the Options menu.

Right Cross Fade

Click this button to insert the new sample to the right of the old sample. The old sample will be cropped, and the two samples will be cross faded together.

This is a non-destructive operation, so there's no risk of losing data. If you change your mind, use the Undo command in the Options menu.

Undo Last Edit

Along the bottom is a big button labeled "UNDO Last Edit". If you didn't mean to drop one sample completely over another, click this button and your last sample move will be undone.

Same Start Time Contention

If you have two audio entries that are to begin at exactly the same time, the Same Start Time Contention requester will appear.

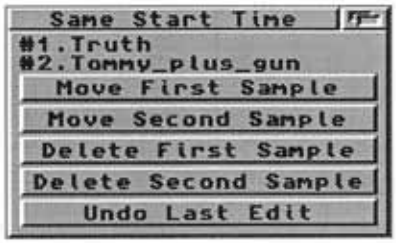

Figure 8-30. Same Start Time Requester

This can also happen if you drag a copy of one Audio Entry exactly over the original, or if you record one Audio Entry over another.

The Same Start Time Contention requester gives you five choices:

- Move First Sample
- Move Second Sample
- Delete First Sample
- Delete Second Sample
- Undo Last Edit

Move First Sample

Choose this to move the first Audio Entry over by one second.

Move Second Sample

Choose this to move the second Audio Entry over by one second.

Delete First Sample

Choose this to remove the first Audio Entry from the Time Line.

Delete Second Sample

Choose this to remove the second Audio Entry from the Time Line.

Undo

Choose this to remove the second Audio Entry if you recorded one over the other, or to move the second Audio Entry back where it was if you moved one Audio Entry over the other.

Performance Issues

The Time Line uses the powerful Digital Signal Processor (DSP) chip on your SunRize card to play audio. This frees your Amiga's Central Processing Unit (CPU) chip for other tasks. The Time Line takes advantage of this free CPU time to offer real time cross fades. Most of the time you probably won't need that CPU time for anything else while playing the Time Line.

If you do need to run other tasks while playing the Time Line, and find you are running short of CPU time, you can record tracks that have real time cross fades onto

other tracks. This will create new samples that sound the same but that have the cross fades fixed into the sample data. When you play these new tracks, no extra CPU time will be needed for cross fades.

For more information on how to record existing tracks into new samples, see the previous Procedures section.

Text Area

The Text Area in the upper right corner displays a variety of messages as you work.

Figure 8-31. Text Area

- The entry start time when you click an entry
- The entry start time as you drag an entry
- The entry start time or end time as you drag an entry's Crop gadgets
- The entry fade in or fade out time as you drag an entry's Fade gadgets
- The flag time as you drag a flag (except the Position flag)

Activation Button

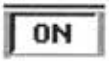

Figure 8-32. Activation Button

The Activation button toggles between ON and OFF. When it's ON, the Time Line will sync to whatever time code source is running. When it's OFF, the Time Line will ignore the sync source. This can be useful when you work on video editing without needing the Time Line playing.

NOTE When the Time Line is off, it will not play samples or send AREXX commands. If you are having trouble getting the Time Line to work, make sure the Cue List is ON.

Flags

Figure 8-33. Flag Area

Flags are handy visual markers that you can move with the mouse. You can use the flags to see where you are in the Time Line, to mark places in the Time Line, and to define the start and end times for recording.

The banners of the flags float just above the time line and just below the transport buttons and the text area. The "flag poles" of the flags are vertical lines drawn over the time line to show the exact location of each flag in time.

To move a flag, just grab its banner and drag it left or right in time. If you drag past the left or right edge of the Time Line, the Time Line will scroll.

The Drag Mode buttons, at the top of the window between the Transport buttons and the Edit mode buttons, affect how you can drag the flags. If you're in Any Direction mode or Vertical Only mode, you can drag flags freely. If you are in Lock-To-Grid mode you can only drag flags in grid increments. The latter is useful for aligning flags with exact times or beats.

NOTE You can set the grid increment time in Set Grid Spacing from the Options menu.

There are 14 flags:

- 1- Start Flag
- 1- Punch-In Flag
- 1- Punch-Out Flag
- 1 - Position Flag
- 10 - Locate Flags

The flags have keyboard shortcuts. If you type a flag's keyboard shortcut on your Amiga keyboard, the Position flag will go to the location of that flag. The Time Line will also scroll to show that flag.

If you hold down the shift key and type a flag's keyboard shortcut, the flag will be relocated to the same location as the Position flag.

Figure 8-34. Start Flag

Start Flag

The Play-From-Start button plays from the Start Flag's location. Think of the Start Flag as a special locate flag that you would normally use to mark the start of a video, the start of a song, or the beginning of any sound effects project.

Keyboard Shortcut: / (keypad)

You can use the / key (slash) on numeric keypad to put the Start flag on top of the Position flag, or shift / to move the Position flag to the Start flag.

You may find it handy to temporarily move the Start Flag to the start of any section in your project while you're working.

Figure 8-35. Punch-In Flag

Punch-In Flag Use the punch-in flag to specify where recording will start. You can drag the Punch-In flag to any time on the Time Line.

Keyboard Shortcut: ((keypad)

You can use the (key on the numeric keypad to put the Punch-In flag on top of the Position flag, or shift (to move the Position flag to the Punch-In flag.

If you drag the Punch-In flag to a point in time after the Punch-Out flag, the flags will swap positions so that the Punch-In flag is before the Punch-Out flag.

A common use of Punch in and out follows:

1. Set the Position flag to a location five seconds or so before the punch-in flag.
2. Select the audio track or tracks onto which you want to record.
3. Click the record button.
4. Click the play button.

   The time line will begin to play, and when the Location flag reaches the punch-in flag, the time line will start recording.

   The recording will end when the position flag reaches the Punch-Out flag or when you click the stop button on the Time Line's transport.

Figure 8-36. Punch-Out Flag

Punch-Out Flag Use the Punch-Out flag to specify where you want recording to stop. You can drag the Punch-Out flag to any time on the Time Line.

Keyboard Shortcut:) (keypad)

You can use the) key on numeric keypad to put the Punch-Out flag on top of the Position flag, or shift) to move the Position flag to the Punch-Out flag.

If you drag the Punch-Out flag to a point in time before the Punch-In flag, the flags will swap positions so that the Punch-Out flag is always after the Punch-In flag.

Figure 8-37. Position Flag

Position Flag

The Position flag shows where the Time Line will begin to play if you click the Play button in the Time Line's transport. When the Time Line is playing, you can watch the progress of the Position flag's vertical line as it moves through the Time Line.

When the Time Line is stopped, you can move the Position flag to another time by dragging it with the mouse. For example, to hear a section of the Time Line, drag the Position flag to a time just before the section begins. Then click the Play button in the Time Line's transport to hear the section.

Figure 8-38. Locate Flags

Locate flags

The Locate flags are useful for marking times in the Time Line. You can have up to 10 Locate flags, tied to your Amiga's function keys, F1 through F10 (F10 is shown as F0). You can also use the numeric keypad keys 1-9 for Locate flags F1-F9, and the * key for locate flag F10 (F0).

Keyboard Shortcut: F1 F2 F3 F4 F5 F6 F7 F8 F9 F0 (keypad) 1 2 3 4 5 6 7 8 9 *

You can use the F1 through F10 (F10 is shown as F0) or the numeric keypad keys 1-9 for Locate flags F1-F9, and the * key for locate flag F0 (F10).

You can use the function keys on your keyboard to:

- Create a Locate flag
- Go to a Locate flag
- Play from a Locate flag

Creating a Locate Flag

To create a Locate flag, hold down the shift key and press any function key on your Amiga keyboard. The Locate flag will then appear on top of the Position flag.

For example, if you type shift-F1, you'll see a flag marked "F1" appear on top of the Position flag.

NOTE If you've already created the F1 Locate flag, it will move to the Position flag when you type Shift-F1.

Moving a Locate Flag

Click and drag a Locate flag with the mouse to move it in time. If you drag past the edge of the Time Line window, the Time Line will scroll to reveal more of the time line in that direction. Another way to move a Locate flag is to double click the flag to bring up the Locate Flag Requester.

Change the time in the Time field and hit the return key. This is a quick way to move a Locate flag to an exact time. You can then click the Show button to scroll the Time Line to show the flag's new position.

Finally, you can move the Locate flag, by holding down the shift key on your Amiga keyboard, and then typing the function key for the Locate flag you want to move. The Locate flag will move to the Position flag.

Playing the Time Line From a Locate Flag's Position

Type the function key or numeric keypad number for an existing Locate flag and the Position flag will move to the Locate flag. The Time Line will also scroll to show the Locate flag. Then click the Play button in the Time Line's transport.

Putting a Comment by a Locate Flag

Double click a Locate Flag to bring up the Locate Flag Requester. In the Flag Requester you'll see a field called "comment". Type any comment into the field and hit the return key, and you'll see that comment tied to that Locate flag. For example, if you're working on a film soundtrack you might label a Locate flag with a scene name, like "scene 14". Or, if you're recording a song, you might use a song section name like "chorus" or "verse 2". You can use whatever comments are appropriate for the project you're creating.

Deleting a Locate Flag

Double click a Locate Flag to bring up the Locate Flag Requester. Click the Remove button in the Flag Requester. The Locate flag will be removed.

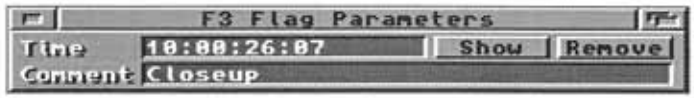

Figure 8-39. Flag Parameters

Flag Requesters

Double click any flag to open the Flag Requester for that flag. Depending on the flag type, the Flag Requester will have the following elements:

Time Field

The time field allows you adjust a flag's location from the keyboard. If you type a new time in the Time field and hit the return key, the flag will move to the new position. This is a quick way to move a flag to an exact time.

NOTE You can change the time unit from Cue List Preferences in the Options menu.

Show Button

The Show button lets you move the time line so that the flag is visible. Since it's usually more useful to see more of the time line to the right of the flag, the Show button puts the flag about 1/3 of the way from the left edge of the time line.

Comment Field

You can use the Comment field to store a comment for any flag. Locate (function key) flags will show their comments on the Time Line. Other flags won't show their comments on the Time Line.

It can be very useful to add a comments to Locate flags. You can create commented Locate flags to mark the beginnings of scenes in a video, or to mark the beginnings of sections, such as verses or choruses, in a song. As you work, the flag comments can help you keep track of where you are.

Remove Button

The Remove button is available only for Locate (function key) flags and the Punch in/Punch out flags. Use the remove button to remove the flag from the Time Line.

NOTE You can add Locate flags by holding down the shift key and typing any of the function keys or the numeric keys on the numeric keypad. This will create a Locate flag with the number you typed. The Locate flag is placed on top of the Position flag.

The Name Button

Each track has a Name button. It's on the left side of the Time Line, between the Solo button and the Selection button. When you first create a track, the Name button will indicate the type of track you created, either "Audio" or "AREXX".

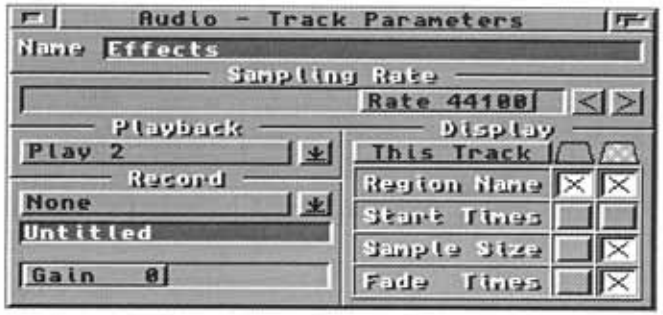

Figure 8-40. Audio Track Parameters

Audio Track Parameters

Click the Name button on any Audio track to open the Audio Track Parameters Requester. Here you can change the name, playback parameters, recording parameters and display parameters for the track.

Name Field

Use the Name field in the Audio Track Parameters to change the name shown on the track's Name button.

When you first create an audio track, the Name button will read "Audio". Use the Name field to change the name to anything you want. For example, you could choose names like "Dialog", "Music", "Sound Effects", "Lead Vocal", or whatever makes sense for each track.

Type a name into the Name field to name a track. When you hit the return key, the Name button for the track will be updated with your new name.

Sampling Rate Slider And Arrow Buttons

All samples on an audio track will be played back using one sampling rate for that track. Use the Sampling Rate slider and the left/right arrow buttons next to the slider to set the sampling rate for the track.

All tracks played back by the same SunRize card must also be set to the same sampling rate.

Playback Channel Drop List

The Playback Channel drop list lets you choose which channel the track will use to play back the audio entries on the track. When you click the down arrow, it will show you a list of all the possible playback channels you have available. The number of channels will depend on the number of SunRize cards installed in your Amiga.

The default choice is "Any". With this choice Studio 16 will use any available channel to play the audio entries on the track. Unless you want to force the track to play on a particular SunRize card, you will probably want to use the Any setting.

If you have multiple SunRize audio cards installed you can specify a channel on a specific card to force the track to use that card. For example, if you had two AD516 cards, to force the track to play on the second card you could select "AD516 #2 Play 1". That would select the second AD516's first track.

Multiple cards also allow you to use multiple sample rates. You can have different sampling rates for each card. With a one card system (the most common case), all tracks would have the same sampling rate.

Record Source Drop List

The Record Source drop list lets you choose which channel the track will listen to when recording the track. When you click the down arrow, it will show you a list of all the possible sources you can record. The number of sources will depend on the number of SunRize cards installed in your Amiga.

The default choice is "None". If you want to record on the track select an input.

If you have just one AD1012 card, you can choose from Input or Output. Input lets you record any source connected to the audio input of your AD1012. Output lets you record the output of the Time Line. Select Output to bounce tracks together.

If you have a single AD516 card, you can choose from Input L, Input R, Output L, and Output R. Choosing either input lets you record from any source connected to that input. To record a stereo source, select two tracks for recording and choose Input L for one and Input R for the other in each track's Audio Track Parameters.

If you have several SunRize cards installed, you can choose an input or output channel from any of the cards. Choosing an output channel of a card means that you will be recording any of the tracks that are set to play through that channel on that card. For example, if you choose the output of AD516 #2 Left, you will be setup to record all the left channel information being played by your second AD516 card.

Record Sample Name Field

Use the Record Sample Name field to type a name for a sample you are about to record. If you don't change the name, the sample will be named "Untitled".

NOTE You can change the name of any existing sample in Sample List.

Record Gain Slider

When recording, you can use the Record Gain slider to raise the level of the incoming signal, if needed.

The Gain slider adjusts the gain of the card's internal input amplifier. This is similar to a "record level" on a tape deck. Keep the gain as high as possible without causing clipping. Clipping occurs when the input signal exceeds the analog to digital converter's range.

Clipping is indicated in Meters and Mixer:

- Meters - the digital meter hits the right side and turns red at the end
- Meters - the scrolling waveform touches the top and bottom of its box
- Mixer - the peak indicator over the scrolling graph flashes

Clipping causes distortion in your recording. To avoid clipping, reduce the gain with the Gain slider. When you click the slider, the audio input for that channel will automatically be monitored, you'll see the input signal on the input VU meter, and you'll see the input signal on the mixer's metering. Try to feed the highest levels to the input that you'll be using when you record. As you do so, watch the meters and adjust the input gain for the highest level before clipping. Optionally, if your recording source has gain control, you can leave the Record Gain Slider at zero and instead adjust the output of your source for highest gain before clipping.

All Tracks/This Track Button

This button toggles between "All Tracks" and "This Track". When in the All Tracks position, any changes you make to the Display controls will affect all the tracks in the Time Line. When in the This Track position, any changes you make to the Display controls will only affect the track whose Audio Track Parameters you're editing. The default setting is This Track.

Selection Column Icon Headings

To the right of the All Tracks/This Track button are two icons. The gray icon represents unselected entries, while the highlighted icon represents selected entries. Any selections made in the Display area can be made to affect all entries or just the selected entries.

The buttons in the Display Area allow you to choose which information is displayed in entries. Having two options lets you choose to display different information in selected entries than in unselected entries. For example, you might want to choose to show more information in selected entries than unselected entries.

Region Name Buttons

Click the first Region Name button to show names in unselected entries. Click the second Region Name button to choose to show names in selected entries. By default both of these options are selected.

Start Times Buttons

Click the first Start Time button to show start times in unselected entries. Click the second Start Time button to choose to show start times in selected entries. Both of these options default to the deactivated position.

Sample Size Buttons

The third Display option lets you choose whether to show sample size. When you choose to show sample size, the actual size of the sample will be shown as an

outlined box even if you've cropped or faded the sample using the Crop or Fade gadgets. Click the first button to show sample size in unselected entries. Click the second button to choose to show sample size in selected entries. By default Sample Size is activated on selected samples only.

Fade Times Buttons

Click the first button to show fade times in unselected entries. Click the second button to choose to show fade times in selected entries. By default Fade Times is activated on selected samples only.

AREXX Track Parameters

The Time Line gives you AREXX control of other programs through AREXX tracks. An AREXX track is just like an Audio track except that instead of holding samples, the AREXX track holds AREXX commands. AREXX is the Amiga's interprocess communications language.

When you click the Track Name button of an AREXX track, you will see the AREXX Track Parameters.

Figure 8-41. AREXX Track Parameters

This requester lets you name the track and specify the AREXX port name for the program you want to address from that track.

NOTE You can learn more about AREXX by reading the AREXX chapter of the AmigaDOS manual that comes with all versions of AmigaDOS from 2.04 and up. AREXX is not a part of AmigaDOS versions 1.3 or below. If you have an older version of AmigaDOS you can buy AREXX separately, but it would be better to upgrade to the latest version of AmigaDOS since many other improvements have been made.

Name Field

Use the Name field to name the track. When you first create a track, the Name button will indicate the type of track you created: "Audio" or "AREXX". Use the Name field to change the name to anything you want. For example, you could choose names like "Trigger1", "Scene1", or whatever makes sense for what you'll be playing from each track.

Type a name into the Name field to name a track. When you hit the return key, the Name button for the track will be updated with your new name.

Port Field

The Port field lets you specify the name of an AREXX port for the commands in any entries on the AREXX track to address.

To specify the port name, type it in the Port field and hit return. If the program you want to address is running, and you entered its port name correctly, the bottom of the AREXX Track Parameters requester will say "Port Found".

If it says "Could Not Find Port" at the bottom of the AREXX Track Parameters requester, and the program you want to address isn't running, run the program you want to address. Then, to test if you can address it, click in the Port field where you already typed its port name, and hit return. Now it should say "Port Found". If not, you've entered the port name incorrectly.

NOTE AREXX port names are CASE SENSITIVE! Type the name of the AREXX port just as it's listed in the manual of the program you are trying to address. Match the upper and lower case letters exactly. Otherwise the AREXX control from the Time Line will not work.

An AREXX port is kind of like an ear listening to another program that is also running on your Amiga. All AREXX commands you trigger from that track will be sent to the program that listens to the port you specify. If the other program is running, it will hear your commands. You can use commands that control that program and share data with it. By specifying different AREXX port names for different AREXX tracks, you can control and share data with multiple programs, all running at the same time as Studio 16.

NOTE The programs to be addressed must be running, or they won't be there to respond to your commands. Start the other programs before you play the Time Line.

Figure 8-42. Sound Button

Sound Button

At the beginning of each track is the Sound button. When it's on, it looks like a speaker. For audio tracks, when the Sound button is on (speaker showing), the track's samples will sound when you play the Time Line. For AREXX tracks, when the Sound button is on and the track is playing, the commands in the track's AREXX entries will be sent to the program you specified.

When the Sound button is off (no speaker showing), the entire track will be muted. A muted audio track's samples will not sound, nor will a muted AREXX track send commands when the time line is played.

The Sound button is great for temporarily turning a track off. For example, you might copy a track, paste it to create a new track, and then experiment with the new track. While you experiment you would turn the original track's Sound button off so you hear only the new track. After trying some things on the new track, you can decide if you like the new version or the original version of the track, and turn the sound button on for the track you like best and off for the other one. You can then either remove the track you don't like, or keep it around just in case.

Another example is if you are producing a video in several languages. When making your final video submasters for each language, you can turn the sound button on for the track that has the language you need for each submaster, and off for the other languages.

Yet another example is if you are recording a song. You can record a number of takes for vocals and instrumental performances. Use the Sound buttons to turn off tracks with takes that you are not currently using but might want to keep around as possible options for later use.

Finally, you might want to temporarily turn off an AREXX track to keep from triggering multimedia actions, like picture viewing, video disk playing or animations, while working on the soundtrack.

To turn a track's Sound button on and off, click it with the mouse. When you create a new track, the Sound button will be turned on.

NOTE If you run into a situation where you want to hear only one track, or only a few tracks, and where it would be time consuming to click all the Sound buttons to set this up, consider using Solo buttons instead.

Figure 8-43. Solo Button

Solo Button

On the left of the Sound button on each track is the Solo button for that track. When it's on, it displays a pair of headphones.

When you turn it on for a track (headphones showing), only that track will sound when the time line is played. When you turn it off for a track, that track will sound if its Sound button is on and no other tracks have their Solo buttons turned on.

To solo a track, click the Solo button for that track. To solo several tracks at once, shift-click all the Solo buttons on the tracks you want to solo. If any Solo buttons are on, only those tracks that have their Solo buttons turned on will sound when the time line is played.

To turn all the Solo buttons off, let go of the shift key and turn any solo button off.

When any Solo button is on, the Time Line will ignore the settings of the Sound buttons. When all Solo buttons are off, the Time Line will play the tracks that have their Sound buttons on.

Solo works the same for AREXX tracks as it does for audio tracks. Soloing an AREXX track is a good way to test AREXX commands without the distraction of other tracks running.

Figure 8-44. Track Select Button

Track Select Button

The Track Select button looks like an arrow when it's on. It's the button just right of the Track Name button. Click the Track Select button when you want to select a track to cut, copy, paste, remove, duplicate, save or record.

If you want to do any of these things to more than one track at a time, shift-click the Track Select buttons on multiple tracks to select them all at once.

Track Display Area

The Track Display area is the main area of the Time Line.

Figure 8-45. Track Display Area

Here you can see all your entries. You can scroll left and right through time using the horizontal scroll bar at the bottom, and you can scroll up and down through tracks using the vertical scroll bar on the right. You can move entries with the mouse and visually see cross fading between Audio Entries overlapped on the same track. When you click on an entry to select it, it will change color.

Grid Markings

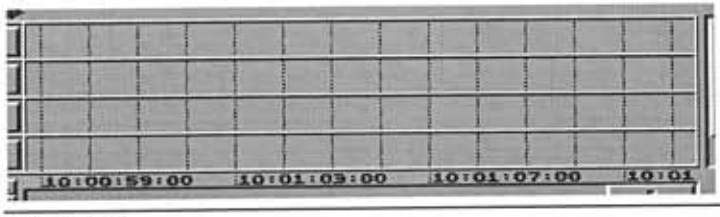

Figure 8-46. Grid Markings

Grid Markings are regular vertical lines marking a regular interval of time. They are used by the Lock-To-Grid Drag mode, which forces entries and flags to align with grid markings. They are also handy visual indicators of where you are.

Specify the grid interval with the Set Grid Spacing command in the Options menu. You can choose from preset grid intervals or specify your own custom grid spacing.

The custom grid spacing option will match the units you choose in the Time Options section of the Cue List Preferences.

To make a grid that works with Bars/Beats/Clocks:

1. Select the BPM option in the Cue List Preferences.
2. Enter a tempo and time signature.
3. Activate Set Grid Spacing to specify a custom grid.

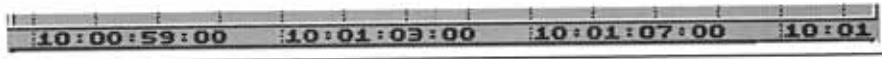

Figure 8-47. Time Code Markings

Time Code Markings

Along the bottom of the Time Line are numbers marking where you are in time. Think of them as your "time ruler". You can choose the units these numbers will use from the Time Options in the Cue List Preferences. Choose from:

- Hours/Minutes/Seconds
- SMPTE, (Hours/Minutes/Seconds/Frames)
- SMPTE Plus, (SMPTE with 1/100ths of a frame)
- BPM - Beats Per Minute, (Bars/Beats/Clocks)

Figure 8-48. Zoom Field

Zoom Field

You can use the Zoom field to type an exact amount of time you want to see in the visible width of the Time Line, without scrolling. You can't specify more time than is available between the Time Line's start time and end time. Set the start time and end time in the Cue List Preferences.

You can also choose the units the Zoom field will use from the Time Options in the Cue List Preferences. Choose from:

- Hours/Minutes/Seconds
- SMPTE, (Hours/Minutes/Seconds/Frames)
- SMPTE Plus, (SMPTE with 1/100ths of a frame)
- BPM - Beats Per Minute, (Bars/Beats/Clocks)

Open Cue List Preferences from the Options menu.

Figure 4-49. Zoom Arrows

Zoom Arrows

Keyboard Shortcut: Up and down arrow keys

The Zoom Arrows let you show less time (zoom in) or more time (zoom out) in the visible width of the Time Line, without scrolling. Click the Up Arrow button to zoom out and the Down Arrow button to zoom in.

In the Time Line the smallest unit you'll actually see depends on the time option you've chosen in Cue List Preferences . For example, if you've chosen SMPTE in the Time Options, the smallest displayed unit is 1/30th of a second (1 video frame). If you choose the SMPTE Plus option the smallest unit you'll see is 1/100th of a frame. The displayed unit is rounded up from the actual resolution of Studio 16.

Resolution refers to the degree of detail that can be seen and edited. Studio 16 has an actual resolution of a single sample for Audio tracks, which at a sampling rate of 48KHz is 1/48,000th of a second. The resolution is even greater for AREXX tracks.

Figure 8-50. Scroll Bars

Scroll Bars

Keyboard Shortcut: Left and Right arrow keys

Use the left arrow on the keyboard to scroll to the left, and the right arrow to scroll to the right. Unlike just moving the scroll bar, these keyboard shortcuts also move the Position flag so it stays about a third of the way from the left edge of the Time Line.

When you're zoomed in on the Time Line's view, you can use the horizontal scroll bar at the bottom of the time line to scroll forward or backward in time between the start time and end time boundaries.

- Move forward - drag the scroll bar to the right (right arrow key)
- Move backward - drag the scroll bar to the left (left arrow key)

If the Time Line is zoomed clear out so the scroll bar is a solid bar, you are seeing the entire view of the Time Line and the horizontal scroll bar will not have an effect.

Entry Features

One of the key concepts in the Time Line is that of "entries". An entry is a visual element representing either a sample, called an Audio Entry, or a list of AREXX commands, called an AREXX Entry.

Audio Entries

Audio Entries are rectangular, but they can change their shapes to indicate fade-ins, fade-outs or cross fades. You can drag an Audio Entry, either forward or backward in time, or up and down to move it from one Audio track to another. If you hold down the Control key and drag an Audio Entry, the original entry will remain and you will drag a duplicate entry.

NOTE Control-drag an entry to duplicate it.

If you drag one Audio Entry over another on the same track they will automatically cross fade. When they cross fade you will see a visual indication of the cross fade area. If you click a cross fade area you can change its curve types in the Cross fade Type requester.

When you click an Audio Entry to select it, you'll see four small rectangles appear. The ones that are on each end, but not in the corners, are the Crop gadgets. You can drag them to crop the beginning or end of the sample. The squares at the upper corners of an Audio Entry are the Fade gadgets. You can drag them to quickly create fade-ins or fade-outs. The actions of the Crop and Fade gadgets are non-destructive!

You can choose to have Audio Entries display their start and end times, fade times, sample size outlines, and sample or sample region names by setting the display controls in the Audio Track Parameters. Click the Track Name button for a track to see its Audio Track Parameters.

Audio Entry gadgets

Figure 8-51. Crop Gadgets

Crop Gadgets

Click an Audio entry to select it. You'll see the entry change color, and you'll see four small boxes appear. The two boxes on each end of the entry (not the ones on the top corners) are called the Crop Gadgets.

To crop the beginning of a sample drag the Crop gadget on the left edge of the entry. To crop the end of a sample, drag the Crop gadget on the right edge of the entry.

You can't drag a Crop gadget beyond the length of the original entry. You can only shorten the sample to crop off the beginning or end, or restore what you've cropped. Cropping can be very useful for removing unwanted noise at the beginning or end of a sample.

Cropping done in the Time Line is non-destructive. It does not affect the original sample data on your hard drive, so you can experiment and make changes as often as you want. If you change your mind, simply move the Crop gadgets again until you're satisfied with the result.

Figure 8-52. Fade Gadgets

Fade Gadgets

Click an Audio entry to select it. You'll see the entry change color, and you'll see four small boxes appear. The two boxes on the top corners are called the Fade Gadgets.

To fade in the beginning of the sample, drag the Fade gadget on the left edge of the entry. To fade out the end of a sample, drag the Fade gadget on the right edge of the entry. You can only drag a Fade gadget inward, toward the entry. When you do so you will be adjusting the fade-in time for the beginning or the fade-out time for the end.

Fading done in the Time Line is non-destructive. It does nothing to the original sample data on your hard drive, so you can experiment and make changes as often as you want. If you change your mind, simply move the Fade gadgets again until you're satisfied with the result.

Audio Event Parameters Requester

Double click an Audio Entry to open the Audio Event Parameters for the entry. You can make many adjustments to an entry here.

- Replace the sample
- Change the start or end time
- Adjust the fade-in or fade-out times
- Change the fade-in or fade-out curve types
- Adjust the pan (if you have an AD516)
- Adjust the volume
- Play the sample
- Load the sample in an Editor

Figure 8-53. Audio Event Parameters

Sample Field The Sample field shows the path to the sample being used by the Audio Entry. A path is a description of the location of the sample file on your hard drive. The path will start with the name of the hard drive partition, which will end with a colon. Then you'll see the names of any drawers the sample is in, each separated by a slash. Finally, you'll see the name of the sample or sample region itself.

NOTE The Cue Lists you save from the Time Line do not store the actual sample data for samples used by Audio Entries. Cue Lists save the path to each sample, as shown in the Sample field.

If you want to change the sample being used by an Audio Entry, you can drag a different sample from Sample List and drop it onto the Sample field. The new sample will replace the old sample for that Audio Entry. This can be a quick way to try different sound effects at the same spot in your soundtrack.

Start Time Field

The Start Time field shows the time when the sample begins. It uses the units set in Cue List Preferences.

You can type a new time into this field to move the start time of the sample to an exact time. Since the sample length remains constant, when you change either the Start Time or the End Time, the other time will also change.

End Time Field

The End Time field shows the time where the sample finishes. Type a new time into this field to move the end time of the sample to an exact time. Since the sample length remains constant, when you change either the Start Time or the End Time, the other time will also change.

Fade In and Fade Out Fields

The Fade In and Fade Out fields show the fade time for the sample. It uses the units set in Cue List Preferences.

You can type a new time into Fade In to adjust the time it takes from the initial sample playback to where the sample is playing at full volume. Initial sample playback will begin at the start of the sample unless the sample has been cropped.

You can type a new time into Fade out to adjust the time it takes fade the sample from full volume to silence.

Fade In and Fade Out Curves

You can choose from any of four curve types. Choose a curve type to specify how the sample will fade in or out. There are four curve types:

- Linear
- Logarithmic
- Exponential
- Instant

Linear

A linear fade changes the volume of the sample at a constant rate.

Logarithmic

A Logarithmic fade in at the beginning of a sample changes the volume quickly at first, but it changes it at a decreasing rate, easing into full volume. It gains more than half its volume in the first third of the overlap area. Use this for the fade in curve type when you want the sample to become prominent quickly.

A Logarithmic fade at the end of a sample changes the volume only a little at first, but it changes it at an increasing rate, losing more than half the volume in the last third of the overlap area. Use the Logarithmic fade out curve type when you want the sample to slowly become less prominent during the fade

Exponential

An Exponential fade at the beginning of a sample changes the volume only a little at first, but it changes it at an increasing rate, gaining more than half its volume in the last third of the overlap area. Use this for the fade in curve type when you want the sample to become prominent slowly.

An Exponential fade at the end of a sample changes the volume quickly at first, but it changes it at a decreasing rate, easing into the complete fade out. Use this for the fade out curve type when you want the sample to quickly become less prominent during the fade.

Instant

An Instant fade at the beginning of a sample changes the volume of a sample instantly from full off to full on. This is the same as dragging the entry's left Fade gadget clear to the left. You can use this to temporarily turn a fade-in off without losing the position of the left Fade gadget.

An Instant fade at the end of a sample changes the volume of the sample instantly from full on to full off. Use this for the fade out curve type when you want the sample to play at full volume to its end, with no fade. This is the same as dragging the entry's right Fade gadget clear to the right. You can use this if to temporarily turn a fade-out off without losing the position of the right Fade gadget.

Pan Slider

If you have an AD516 card you can use the Pan slider, a horizontal slider near the bottom of the Audio Event Parameters requester, to select either left output, right output,

or anywhere in between for Audio Entry playback. The more you slide the slider to the left, the more the Audio Entry will be sent to the left output. The more you slide the slider to the right the more the Audio Entry will be sent to the right output. Sliding the slider Full Left or Full Right will send the Audio Entry out of only one output.

As you slide the slider it will read in dB increments. If you click on either side of the slider knob but within the slider area, the slider will move toward the mouse 1dB per click. The Pan slider for one Audio Entry will not affect the same sample when it's used in another Audio Entry, whether in the same Cue List or in other Cue Lists.

The Pan slider setting will have no effect if the Use Mixer Levels command is selected in the Options menu.

Volume Slider

You can use the Volume slider, a vertical slider on the right of the Audio Event Parameters requester, to raise or lower the volume of the Audio Entry when it's played back in the Time Line. The Volume slider for one Audio Entry will not affect the same sample when it's used in another Audio Entry, whether in the same Cue List or in other Cue Lists.

As you move the slider it will read in 1/2 dB increments. If you click above or below the slider knob but within the slider area, the slider will move toward the mouse 1/4 dB per click. Here are some dB examples:

+06 dBs = 200% volume
0 dBs = 100% volume
-06 dBs = 50% volume
-12 dBs = 25% volume

The Volume slider setting will have no effect if the Use Mixer Levels command is selected in the Options menu.

OK Button

Click the OK button to accept any changes made in Audio Event Parameters.

Play Button

Click the Play button to hear the Audio Entry.

Edit Button

Click the Edit button to open an Editor for precision editing of the Audio Entry's sample.

Edits made in an Editor will change the actual sample. If the same sample is used in other Audio Entries, in the same Cue List or other Cue Lists, the edits you make will affect those other Audio Entries.

You should consider making a copy of the sample under another name in the Sample List and importing the copy into the Audio Entry by dragging it from the Sample List onto the Sample field at the top of the Audio Event Parameters requester. That will insure that you have a unique sample for that entry and you can edit it without worrying about affecting other Audio Entries.

Cancel Button Click the Cancel button to reject any changes you made in Audio Event Parameters and revert the Audio Entry to its previous settings.

AREXX Entries

An AREXX Entry is shaped like a vertical line with a small square in the middle of the line. The line aligns with the time when the AREXX Entry's AREXX commands will be sent when you play the Time Line.

NOTE Using the Time Code Add command is the only way to add AREXX entries.

Double click the square to open AREXX Event Parameter, where you can type the AREXX commands for the Entry, type a new time, test the AREXX commands, and give the AREXX entry a name that will be visible in the Time Line.

You can also drag an AREXX Entry by the square, either forward or backward in time, or up and down to move it from one AREXX track to another. If you hold down the Control key and drag an AREXX Entry, the original entry will remain and you will drag a duplicate entry.

AREXX Entry Parameters

Double click an AREXX entry to open AREXX Event Parameters. Here you can:

- Name the AREXX entry
- Change the time
- Specify the AREXX commands for the entry
- Test the AREXX commands

Figure 8-54. AREXX Event Parameters

Name Field To have a name show up in the Time Line next to the AREXX entry, type that name here. This is optional.

Time Field The Time field shows the current location of the AREXX entry in time. You can type a new time here to specify an exact time for the entry.

The Time field uses whatever units are selected in Cue List Preferences. Open Cue List Preferences from the Options menu.

Test Cmd Button Click the Test Cmd button to test all the commands you've entered into the Cmd1 through Cmd9 fields. This is an easy way to see if they are doing what you want without having to play the Time Line.

NOTE The program you're sending the commands to must be running, and the track must be addressing that program's AREXX port. To specify the AREXX port for a track, type an AREXX port name in the Name field of AREXX Track Parameters. Click the track's Name button to bring up this requester.

Cmd1 through Cmd9 Fields In each of the Command fields, labeled Cmd1 through Cmd9, you can enter a separate AREXX command for the program you're addressing on the track. It doesn't matter if you leave some of them blank. However, because AREXX commands are case sensitive, you must type them in exactly as written in the program's manual.

The commands you can use depends on which program you're addressing. Look in the manual for the program you're addressing to find out which commands it responds to and how to use them.

When the Time Line plays and the Position flag passes the AREXX Entry, the commands in the Cmd1-Cmd9 fields will be sent to the program whose AREXX port specified for that track. The commands are sent in order, starting with Cmd-1.

Menus

Cue List Menu

New Use the New command to open your Default.cue file.

Keyboard Shortcut: *A*-N

You can save any setup into the Default.cue file by creating a blank Cue List then using Save Default.

Typically you'll save an empty Cue List, with perhaps a few blank audio and AREXX tracks, as your Default.cue file. Then when you use the New command, you'll have a blank Cue List that you can use to start a new project.

If you haven't saved your own default file, the Default.Cue supplied with Studio 16 is an empty list with four audio tracks set to a 44.1KHz sampling rate.

Open Use the Open command to open an existing Cue List file into the Time Line.

Keyboard Shortcut: *A*-O

When you use the Open command, a file requester will appear that allows you to choose a Cue List file to load. It defaults to the Studio16_3:CueLists/ drawer.

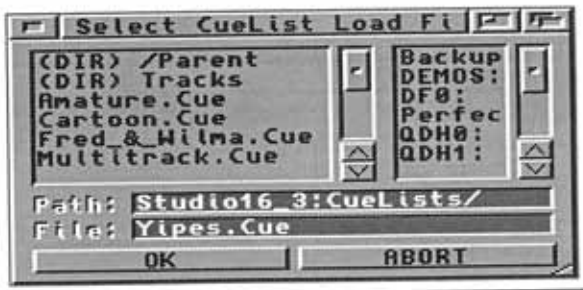

Figure 8-55. Cue List Load File Requester

NOTE You may want to create drawers within your Studio16_3:CueLists/ drawer for different projects. Remember that AmigaDOS lets you create drawers within drawers within drawers. For more information check your Amiga's manual.

If you store Cue Lists somewhere other than inside the Studio16_3:CueLists/ drawer, you can use the file requester and navigate to where your Cue Lists are and then choose the Cue List file to load.

Change the default drawer:

1. Select a new drawer for your Cue Lists in the requester.
2. Close the requester.
3. Select Save Setup from the Project menu. It's best to do this when you first start up Studio 16, before you've loaded any Cue Lists into the Time Line or made any other changes to your default setup. Otherwise you may inadvertently save changes to your custom setup.

Merge

Use the Merge command to combine two Cue Lists into one.

This lets you work on sections of large projects in separate Cue Lists that you can later combine for the final mix.

To Merge two Cue Lists:

1. Load one Cue List with the Open menu item.
2. Choose the Merge menu item. A Merge file requester will appear.
3. Choose a second Cue List to merge with the first.
4. Click the OK button. The two Cue Lists will be merged in the Time Line.
5. Select Auto Size Cue List (*A*-A)
6. Save the new Cue List, preferably under a new name.

To merge more than two Cue Lists, merge two lists as above, then continue to use the Merge command to add the additional lists to the Time Line. When you're done, save the new Cue List.

Save

Use the Save command when you want to save the current Cue List in the Time Line.

Keyboard Shortcut: *A*-W

If you haven't saved the list before, the Save command works like Save As and brings up a file requester where you can name the Cue List file. (See Save As below.)

Once you've named and saved the Cue List, using the Save command will save the current state of the Cue List over the same file, without bringing up the file requester.

Saving to your hard drive preserves your work so you can reload it later, the next time you want to use that Cue List. To open a Cue List file into the Time Line, use the Open command in the Cue List menu.

Save As

Use the Save As command to save a Cue List file under a new name. It will save all the information in your Cue List to a file, with the a ".cue" extender.

The Save As command saves a new Cue List. It will also let you save an existing Cue List under a different name. The latter can be very useful if you want to keep one version of a Cue List around while you experiment on another version.

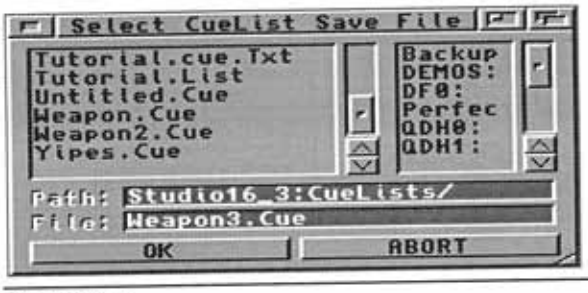

Figure 8-56. Cue List Save File Requester

Type a file name in the File field and click the OK button to save the Time Line to a Cue List file. If you decide not to save the Cue List, click the Abort button.

Once you've save a Time Line to a Cue List file, you can use the Open command in the Cue List menu to reload the Cue List at any time.

Unless you change the default directory, Studio 16 will look in the Studio16_3:CueLists/ drawer. You can change the default directory by selecting a different directory in the file requester and then using the Save Setup command in the Project menu. Be aware that the Save Setup command saves other startup information as well.

Save Default

Use the Save Default command to save your own Default.Cue file. The Default.Cue file is opened automatically when you select New from the Cue List menu.

Typically you'll want to save an empty Cue List, with a few blank Audio and AREXX tracks, as your Default.Cue Cue

List. Then when you use the New command, you'll have a blank Cue List that you can use to start a new project.

The Save Default command saves:

- Tracks
- Entries
- Sound, solo and track selection settings
- Drag mode
- Edit mode
- Cue List Preferences
- Locate flags

NOTE Cue Lists, including the Default.Cue, do not save window size and position. To save the initial size and position of any open Studio 16 windows, use the SaveSetup command in the Project menu.

Print To File

The Print To File command lets you save a reference list of your Cue List in ASCII text format. The file includes:

- Number
- Sample Name
- Track Name
- Start Time
- End Time

ASCII text is a standard format that can be loaded into word processors on any personal computer. If you send a floppy disk to someone who doesn't use an Amiga, use an IBM format disk. The ability to format a disk in IBM format is included in AmigaDOS 2.1 or greater.

Track Menu

The Time Line gives you the flexibility to add enough tracks to keep your projects organized. For example, you can have a track for an announcer, perhaps a pair of tracks for stereo music, several sound effects tracks, and other tracks as needed for wild sound, dialog, or whatever. It's handy to group similar types of sounds onto tracks. That way it's easy to mute or solo similar sounds using the Sound and Solo buttons that are available for each track.

For example, if you put all the final narrator samples for a video onto a single track, you can isolate the narrator with the solo button on that track. Then you will hear just the narration and you can insure there are no pops or noise problems that need editing.

It's also handy to copy tracks for backups while you experiment on the original tracks. You can keep adding tracks if you don't exceed the sample playback capabilities of your hardware.

NOTE You can combine multiple tracks by recording the output of the Time Line onto new tracks. Then mute the old tracks and play the new tracks instead. Keep the old tracks around, in case you need to make changes later.

Add Track

Use the Add Track command to add a track to the Time Line. You will be able to choose which type of track to add.

The track types currently supported are:

- Audio tracks
- AREXX tracks

When you use the Add Track command, you will see the Type Of Track To Add requester.

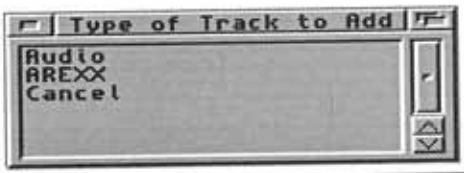

Figure 8-57. Type of Track to Add

Click Audio to add an audio track, AREXX to add an AREXX track, or Cancel.

You can add as many as 100 tracks to the Time Line. Keep in mind that you will only actually be able to play as many simultaneous samples as your SunRize hardware will support.

NOTE The AD1012 card can play up to four sounds simultaneously and the AD516 card can play up to eight sounds simultaneously depending on your system configuration. You can combine cards to play more simultaneous sounds.

AREXX Tracks

The Time Line can trigger actions in other programs via AREXX, the Amiga's flexible interprocess communications language. You can use AREXX to:

- Play animations
- Control the Video Toaster
- Control laser disk players
- Control video decks
- Display pictures

- Control lighting
- Trigger pyrotechnic effects

Multitasking and AREXX

Unlike some personal computers that use the Macintosh Operating System or Windows/MSDOS, the Amiga has an operating system that is preemptively multitasking. That means that programs made by different software companies will normally be able to run at the same time, without any extra effort on the part of the developers. The multitasking is managed transparently by the operating system itself. Like on a UNIX workstation, switching from one Amiga program to another will not normally cause the first program to stop running.

NOTE An exception is the Video Toaster, which takes over the Amiga for most transition effects. To use Studio 16 with the Toaster, consider using the Toaster Handler option from SunRize.

Because it's normal to have multiple programs running simultaneously on the Amiga, the AREXX language was added to the operating system to allow simultaneously running programs to talk to each other, share data, and control each other. AREXX is a version of the REXX language, a language that can be found on mainframe computers and has been more recently been supported by IBM's OS/2 operating system.

The Time Line gives you an open window to AREXX control of other programs through its AREXX tracks. An AREXX track is just like an Audio track except that instead of holding Audio entries, the AREXX track holds AREXX entries. An AREXX entry can hold up to nine commands.

Add AREXX entries to an AREXX track by selecting the track and using Timecode Add in the Entry menu. Timecode Add will add a blank entry at the location of the Position flag. If the Time Line is playing, the Position flag will be moving, so you can place entries on-the-fly.

NOTE Using the Time Code Add command is the only way to add AREXX entries.

Double click on an AREXX entry to open AREXX Event Parameters.

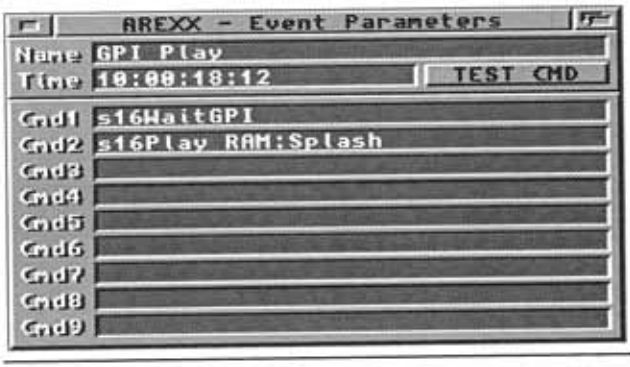

Figure 8-58. AREXX Event Parameters

Here you can type commands to be sent to the program that listens to the AREXX port you specified for that track. Each program you address will have its own set of AREXX commands. Check the documentation for each program you want to control to find out the commands it supports and how to use them.

You can specify the AREXX port name for an AREXX track by clicking the Track Name button and entering in the Port Name field in AREXX Track Parameters.

AREXX tracks can be muted by turning off their Sound buttons, and they can be isolated with their Solo buttons, just like audio tracks.

You can learn more about AREXX by reading the AREXX chapter of the AmigaDOS manual that comes with all versions of AmigaDOS from 2.04 and up. AREXX is not a part of AmigaDOS versions 1.3 or below. If you have an older version of AmigaDOS you can buy AREXX separately, but it would be better to upgrade to the latest version of AmigaDOS since many other improvements have been made.

Add Audio Track

You can use the Add Audio Track command to add an audio track to the Time Line. It's just like using the Add Track command, except that it doesn't ask you what kind of track to add. This is a very fast way to add audio tracks.

Keyboard Shortcut *A* - +

Remove Track(s)

Use the Remove Track command to remove any selected tracks from the Time Line. Use this to remove:

- Old backup tracks you no longer need

- Empty tracks you never used
- Experimental tracks you didn't like
- Any other track that you no longer want

Remove Track does not delete any of the samples used in the selected tracks. The samples will still be available in Sample List. If you want to delete actual sample data, use Delete in the Entry Menu or from Sample List.

To select a track for removal, click its Track Selection button, which is to the right of the Track Name button. The Track Selection button turns into an arrow when selected. To select more than one track, hold down the shift key and click the Track Selection buttons of all the tracks you want to select. Once you've selected the track or tracks you want to remove, select Remove Track.

Duplicate Track(s)

Use the Duplicate Track command to add copies of tracks to the Time Line. You can use this to make copies of tracks for experimentation. The original tracks then remain untouched in case you need them again.

Duplicate does not create any new copies of the actual samples. The new track or tracks will play the same samples as the original track or tracks.

To select a track, click its Track Selection button, which is to the right of the Track Name button. The Track Selection button turns into an arrow when selected. To select more than one track, hold down the shift key and click the Track Selection buttons of all the tracks you want to select.

Once you've selected the track or tracks you want to duplicate, use Duplicate Tracks to add the duplicate tracks to the Time Line.

Cut Track(s)

Cut Track temporarily removes any selected tracks from the Time Line. It works just like the Remove Track command with one exception. The Tracks you cut are kept in the Paste buffer, and you can use the Paste command to add them back to the Time Line. You can't see the contents of the Paste buffer, but it always holds the last set of cut or copied tracks.

Keyboard Shortcut: *A*-X

This can be handy for changing the order of tracks. To move a track, select it with the Track Select button, cut it into the

Paste buffer with the Cut Track command, select the track above where you want the cut track to be moved, and use the Paste Track command to paste the track back in.

The Cut Track command also lets you group tracks together. Suppose you had a bunch of guitar tracks scattered among other tracks in the Time Line. You can organize them with the following steps.

1. Shift-click to select all the guitar tracks.
2. Select Cut Track (*A*-X) to move them to the Paste buffer.
3. Select the track you'd like all the guitar tracks to be below.
4. Select Paste Track (*A*-V) to put them there. Now all the guitar tracks are together. You can do this with any similar audio or AREXX tracks in your projects to keep yourself organized.

Cut Track does not delete any of the samples used in the selected tracks. The samples are available in Sample List. If you want to delete actual samples, use Delete in the Entry Menu or in Sample List.

To select a track, click its Track Selection button, which is to the right of the Track Name button. The Track Selection button turns into an arrow when selected.

To select more than one track hold down the shift key and click the Track Selection buttons of all the tracks you want to select. Once you've selected the track or tracks you want to remove, use the Cut Tracks command to remove them from the Time Line and add them to the Paste buffer. Then you can use the Paste Track command to add the tracks back to the Time Line below the last selected track.

WARNING If you use the Cut or Copy Track command again before placing any tracks you previously cut, those tracks will be lost. The Paste buffer can hold only one set of cut or copied tracks at a time.

Copy Track(s)

Use the Copy Track command to put a copy of the selected tracks into the Paste buffer. Then you can use the Paste command to add the copies back into the Time Line.

Keyboard Shortcut: *A*-C

This can be handy for creating a copy of a track for experimentation. By experimenting on a copy, you'll still have

the original around if you don't like the changes you made to the copy.

You can't see the contents of the Paste buffer, but it always holds the last set of cut or copied tracks.

To copy a track, select it with the Track Select button, copy it into the Paste buffer with the Copy Track command, select the track above where you want the copy of the track to be placed, and use the Paste Track command to paste the copy into the Time Line.

Paste Track(s)

Use the Paste Track command to paste the contents of the Paste buffer back into the Time Line, just below the last selected track. You can't see the contents of the Paste buffer, but it always holds the last set of cut or copied tracks.

Keyboard Shortcut: *A*-V

This can be handy for changing the order of tracks. To move a track, select it with the Track Select button, cut it into the Paste buffer with the Cut Track command, select the track above where you want the cut track to be moved, and use the Paste Track command to paste the track back in.

The Paste Track command also lets you group tracks together. Suppose you had a bunch of guitar tracks scattered among other tracks in the Time Line. Organize the tracks with the following steps.

1. Shift-click to select all the guitar tracks.
2. Select Cut Track (*A*-X) to move them to the Paste buffer.
3. Select the track you'd like all the guitar tracks to be below.
4. Select Paste Track (*A*-V) to put them there. Now all the guitar tracks are together. You can do this with any similar audio or AREXX tracks in your projects to keep yourself organized.

To select a track, click its Track Selection button, which is to the right of the Track Name button. The Track Selection button turns into an arrow when selected.

Load Track(s)

The Save Track and Load Track commands give you a handy way to copy tracks from one Cue List to another.

Use the Load Track command to load tracks into the Time Line. This command loads track files you've saved using the Save Track command

When you use the Load Track command it will bring up the Load Track file requester. Select the file name of the track you want to load and click the OK button to load the track. If you decide not to load any tracks, click the Abort button.

Unless you change the default directory, the Load Track requester will be in the Studio16_3:CueLists/Tracks/ drawer. You can change this default directory by selecting a different directory in the file requester and then using the Save Setup command in the Project menu. Be aware that the Save Setup command also saves other startup information.

Save Track(s)

Save Track and Load Track give you a handy way to copy tracks from one Cue List to another. Select any tracks you want to save, and then use the Save Track command to save the selected tracks to a file. When you use the Save Track command it will bring up the Save Track file requester.

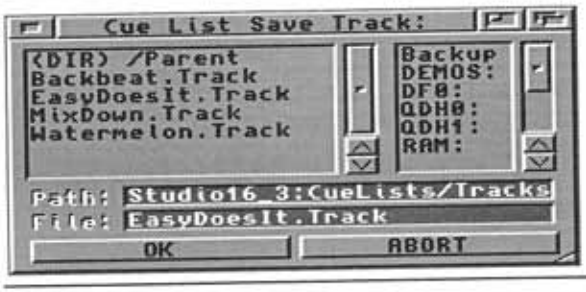

Figure 8-59. Save Track File Requester

Type a file name in the File field and click the OK button to save the selected tracks. This will save the file with the name you gave it plus an extender of ".Track". If you decide not to save the selected tracks, click the Abort button.

After you've opened another Cue List with the Open command in the Cue List menu, you can use the Load Track command to load saved tracks into that Cue List.

Unless you change the default directory, it will be looking in the Studio16_3:CueLists/Tracks/ drawer. You can change this default directory by selecting a different directory in the file requester and then using the Save Setup command in the Project menu. Be aware that the Save Setup command also

saves which windows are open and where they are, the screen colors, and other startup information.

Entry Menu

Select All

Use the Select All command to select each of the Audio Entries and AREXX Entries in the Time Line.

Select All and Offset Selected are often used to shift all entries in the Cue List.

Select All On Track

Use the Select All On Track command to select all the Audio Entries and AREXX Entries on any selected tracks.

Select a track by clicking its Track Selection button, which is on the right side of the Track Name button and looks like an arrow when it's selected. If you want to select more than one track, shift-click the Track Selection buttons on the tracks you want to select.

Deselect All

Use the Deselect command to instantly deselect all the Audio Entries and AREXX Entries in the Time Line.

Offset Selected

Use the Offset Selected command to move the start and end times of all the selected Audio Entries and AREXX Entries by a set amount.

1. Select the Entries to move.
2. Select the Offset Selected menu item.
3. Type a positive or negative number as an offset. The display units are set in Cue List Preferences.
4. Click the close gadget and the selected entries will move by the amount specified.

If you moved the entries out of the start time-end time range of the Time Line, use the Auto Size Cue List command in the Options menu and you'll be able to see the entries again. You may have to scroll or zoom to see them.

If you need to move everything in the Cue List to match the time code on a different master video tape:

1. Use the Select All command to select all the entries in the Cue List.
2. Use the Offset Selected command to add or subtract time from all of them in order to match the time code on the new master tape.

3. If you change your mind, use Undo Edit (*A*-Z) to revert the entries to their original times.

Time Code Add

Use the Time Code Add command to add blank entries at the Position flag.

Keyboard Shortcut: *A*-T

Audio Tracks

For example, if you select an Audio track, the Time Code Add command will add a blank Audio Entry that starts at the Position flag. If the Time Line is playing, you can add a series of blank Audio Entries by repeatedly using the Time Code Add command.

This turns out to be very useful if you're synchronized to video, with the SMPTE output of your video deck connected to the SMPTE input of your SunRize card. You can then watch the video, and use the Time Code Add command to put a blank Audio Entry at every place you want a sound effect. The keyboard shortcut (*A*-T) makes this easy. Then you can double click each blank entry to open Audio Event Parameters, and drag the sound effect you want for that entry onto the Sample field.

AREXX Track

If you select an AREXX track, the Time Code Add command will add a blank AREXX Entry where the Position flag is parked. This is the only way to add an AREXX entry. Then you can double click the AREXX Entry to open AREXX Event Parameters, where you can type the AREXX commands you want to send from that AREXX Entry.

NOTE Using the Time Code Add command is the only way to add AREXX entries.

Don't forget to specify the AREXX port for the AREXX track. Click the Track Name button to open Track Parameters, and then type the name of the AREXX port in the Port field. AREXX port names are case sensitive, so type the name of the AREXX port exactly the way it's written in the manual of the program you want to control. Otherwise the program will not respond.

You can shift-click multiple tracks before you use the Time Code Add command. Then when you use the Time Code Add command it will add blank entries at the position flag time on all the selected tracks at once. You can even add AREXX

Entries and Audio Entries at the same time by selecting both types of tracks before using the Time Code Add command.

Remove Selected Use the Remove Selected command to remove all selected Audio Entries and AREXX Entries from the Time Line.

Keyboard Shortcut: Delete key

The actual samples will NOT be deleted from your hard drive; they will still be available in Sample List.

If you change your mind, use the Undo Edit command in the Options menu and the entries will reappear in the Time Line.

To make a blank Cue List that has the track structure of the Cue List you started with use Select All and then Remove Selected. You can then use the Save Default command in the Cue List menu to save that blank Cue List as your default Cue List; the one that's loaded when you use the New command in the Cue List menu.

Delete Selected Use the Delete Selected command to permanently delete all selected Audio and AREXX Entries.

Keyboard Shortcut: *A*-D

WARNING Delete permanently removes samples from your hard drive. Undo does NOT reverse Delete Selected.

Group The Group command combines entries so when you select one entry, all the entries in the group will be selected.

Keyboard Shortcut: *A*-G

If you move one entry in a group, they will all move together. You can move entries by dragging them with the mouse or by using the Offset Selected command in the Entry menu.

This is very handy for keeping stereo pairs of Audio Entries in sync when you move them. It's also useful for keeping all the Audio Entries in a section synchronized if you have to move them to match editing changes made in a video.

Ungroup If you want to remove an entry from a group, click an entry of the group and use the Ungroup command. Now all the entries in the group are no longer grouped.

Keyboard Shortcut: *A*-U

This is useful when you want to click on one of the entries and use commands like Play Selected and Edit Selected in the Entry menu, commands that don't work with groups.

The Ungroup command is also necessary if you want to take some of the entries in one group and recombine them with other entries into a different group. In that case ungroup the first group before you create the second group.

Ungroup All

Use the Ungroup All command to take all entries in the entire Time Line out of any groups that may exist. Once you've used the Ungroup All command, there will be no groups in the Time Line.

Play Selected

If you want to hear a single Audio Entry, click it to select it and use the Play Selected command. The Entry will play. The Playback will include the effect of any cropping you may have done with the Crop gadgets and fades you may have set with the Fade gadgets.

Keyboard Shortcut: *A*-P

This is a good way to audition the effect of different crop amounts, fade times and curves.

Play Selected will not work if the Entry is part of a group.Use the Ungroup command in the Entry menu after you selected it, or double click the entry to open Audio Event Parameters and click the Play button.

Stop Playback

This option cancels the Play Selected option.

Keyboard Shortcut: *A*-S

Edit Selected

If you want to edit the sample in an Audio Entry, click the entry to select it and use the Edit Selected command. The sample will open into the Editor.

Keyboard Shortcut: *A*-E

Edit Selected will not work if the Entry is part of a group. If it is part of a group you can either use the Ungroup command in the Entry menu after you selected it, or double click the entry to open Audio Event Parameters and click the Edit button.

WARNING Edits you make in an Editor will change the actual sample. If the same sample is used in other Audio Entries, in the same Cue List or other Cue Lists, the edits you make will affect those other Audio Entries!

You should consider making a copy of the sample under another name in the Sample List and importing the copy into the Audio Entry by dragging it from the Sample List onto the Sample field at the top of the Audio Event Parameters requester. That will ensure that you have a unique sample for that entry and you can edit it without worrying about affecting other Audio Entries.

Options Menu

Cue List Preferences

The Cue List Preferences requester lets you change aspects of the appearance and behavior of the Time Line, including:

Figure 8-60. Cue List Preferences

- Displays warnings for certain actions
- Appearance of highlighted tracks
- Appearance of selected tracks
- How the Time Line scrolls
- Which time units are displayed
- Number of Undo levels
- Start and end time display boundaries

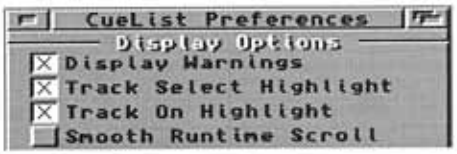

Figure 6-61. Display Options

Display Options

Display Warnings

If you have Display Warnings checked, the Time Line will warn you before it does certain actions.

For example, if you drag a sample between tracks that are set at a different sampling rate, you will get a warning that the sampling rate will be changed only if Display Warnings is checked. Otherwise the sampling rate will automatically be changed without notifying you.

As another example, if you change the Time Line's start time boundary so that it's larger than the end time boundary you will get a warning only if the Display Warnings is checked. Otherwise the values will automatically be swapped without notifying you.

It's a good idea to leave Display Warnings checked until you have worked with the Time Line long enough to feel like an expert. By default Display Warnings is activated.

Track Select Highlight

When you turn on the Track Select Highlight button, every time you click the Track Select button for a track, that track will be highlighted with a different background color. This helps make it obvious which tracks are selected. By default Track Select Highlight is activated.

Track On Highlight

When you turn on the Track On Highlight button, every track that has its Sound or Solo button on will be highlighted with a different background color. This helps make it obvious which tracks are active for playback or for AREXX triggering. By default Track On Highlight is activated.

Smooth Runtime Scroll

When you select the Smooth Runtime Scroll button, the Time Line will scroll the Time Line to try to keep the Position flag at about a third of the way in from the left.

With the Smooth Runtime Scroll button off, the Position flag will move across the Time Line window from left to right. When it reaches the end, the Time Line will jump to display the next chunk of time, with the Position flag starting from the left and moving right again, and so on. By default Smooth Runtime Scroll is not activated.

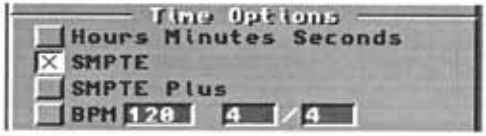

Figure 8-62. Time Options

Time Options

The Time Options let you choose the display units for all the time displays in the Time Line. The units you select here will also be available for creating custom grid increments in the Set Grid Spacing requester.

The display units do not affect the underlying resolution of the Time Line. Studio 16 has an actual resolution of a single sample for Audio tracks, which at a sampling rate of 48KHz is 1/48,000th of a second. The resolution is even greater for AREXX tracks. That resolution is rounded up, for display purposes, to the display units you choose.

Hours Minutes Seconds

Choose Hours Minutes Seconds to work with real time.

SMPTE

Choose SMPTE to work with hours, minutes, seconds and frames.

You can choose the SMPTE rate from the Project Menu in Perferences. Select between:

- 29.97 frames per second for color NTSC video
- 30 frames per second drop frame (DF) for NTSC video with frames dropped to stay accurate with real time
- 25 frames per second for PAL video
- 24 frames per second for film work

SMPTE Plus

SMPTE Plus is just the same as SMPTE, but it also shows extra resolution in the form of 1/100ths of a frame.

BPM

BPM stands for Beats Per Minute. If you select this, all the time displays in the Time Line will actually show bars, beats and clocks. This lets you view your time line against a musical time increment that corresponds to the one used by MIDI sequencing programs like Bars & Pipes Professional from The Blue Ribbon Soundworks.

If you select BPM, you can set the beats-per-minute tempo by typing the tempo in the Tempo field to the right of the BPM button. The default tempo is 120 beats per minute. You can specify the time signature by typing a numerator and a denominator in the Time Signature fields. The default time signature is 4/4.

The number of beats per bar (measure) depends on the time signature. A time signature of 4/4 means four quarter note beats per measure. A time signature of 3/4 means three quarter note beats per measure. There are 1000 clocks per quarter note.

Figure 8-63. Undo Levels

Undo Levels

Whenever you move anything you can undo it with the Undo command. When you undo an action, the Time Line will arrange itself to be just as it was before you did the action. For example, if you move a sample and then use the Undo command, the sample will be moved back to where it was before you moved it.

There are five different buttons for choosing the number of Undo Levels, ranging between 5 and 100. Each level stores one of your actions. For example, if you have 5 levels of undo and you move 5 samples, you can use the Undo command 5 times and they will each, in turn, be moved back to where they were before you moved them.

NOTE The amount of free RAM in your system determines the recommended number of Undo Levels.

The bigger the Cue List, the more memory Undo needs. If you have four megabytes of RAM or less, it's a good idea to use 10 levels of Undo or fewer. With more memory you can

generally use more levels of Undo. For the maximum Undo setting (100) you need at least 8MB of free RAM.

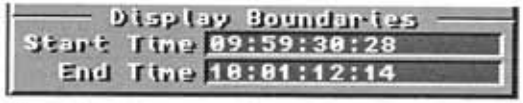

Figure 8-64. Display Boundaries

Display Boundaries Think of the Time Line as a window in time. You can set its starting time and ending time boundaries to choose what range of time it can view. Within that range of time you can zoom in and out, and when you're zoomed in you can scroll forward and backward in time.

Because is possible to have entries in a List that are not visible within the range of time displayed, Auto Size Cue List is a quick way to insure that all the entries are visible within a Time Line's boundaries. Auto Size Cue List changes the start time of the Time Line to be 30 seconds before the start of the first entry, and the end time of the Time Line to be 30 seconds after the end of the last entry.

Start Time field
The Start Time field shows where the Time Line begins. To change where the Time Line begins, type a new time. When you save the Cue List, the start time will also be saved.

End Time field
The End Time field shows where the Time Line ends. To change where the Time Line ends, type a new time. When you save the Cue List, the end time will also be saved.

Cross Fade Preferences

Choose the default curve types in Cross Fade Preferences. Your chosen curve types will be used for any new real time cross fades you create from then on. Note that Crossfades are CPU intensive, too many crossfades may decrease your number of playback tracks.

Figure 8-65. Default Cross Fade Preferences

To save these settings so they'll be there the next time you run Studio 16, use the SaveSetup command in the Project menu.

Use the curve types to choose how the first sample will fade out and how the second sample will fade in.

There are four curve types:

- Linear
- Logarithmic
- Exponential
- Instant

Figure 8-66. Linear In and Linear Out

Linear

A linear fade changes the volume of the sample at a constant rate.

Figure 8-67. Logarithmic In and Logarithmic Out

Logarithmic

A Logarithmic fade out changes the volume only a little at first, but it changes it at an increasing rate, losing more than half the volume in the last third of the overlap area. Use this for the fade out curve type when you want the first sample in a cross fade to slowly become less prominent during the cross fade.

A Logarithmic fade in changes the volume quickly at first, but it changes it at a decreasing rate, easing into full volume. It gains more than half its volume in the first third of the overlap area. Use this for the fade in curve type when you want the second sample in a cross fade to become prominent quickly.

Figure 8-68. Exponential In and Exponential Out

Exponential

An Exponential fade out changes the volume quickly at first, but it changes it at a decreasing rate, easing into the complete fade out. Use this for the fade out curve type when you want the first sample in a cross fade to quickly become less prominent during the cross fade.

An Exponential fade in changes the volume only a little at first, but it changes it at an increasing rate, gaining more than half its volume in the last third of the overlap area. Use this for the fade in curve type when you want the second sample in a cross fade to become prominent slowly.

Figure 8-69. Instant In and Instant Out

Instant

An Instant fade out changes the volume of the sample instantly from full on to full off. Use this for the fade out curve type when you want the first sample in a cross fade to play at full volume to its end, with no fade.

An Instant fade in changes the volume of a sample instantly from full off to full on. Use this for the fade in curve type when you want the second sample in a cross fade to begin without a fade, at full volume.

If you have a sample that already has a fade edited into the sample itself, use the Instant In or Instant Out.

Maximum Time

You can also choose a maximum cross fade time. Your chosen cross fade time will be used by any cross fades you create while in Limited Cross Fade mode. To change the default cross fade time, drag the slider at the bottom of the requester left or right. Dragging it left will decrease the default cross fade time while dragging it right will increase the default cross fade time.

Because loops are processed by the duplication of a sample many times on a track, you can set a Maximum Time to select a default crossfade time for the looping sample. By setting a specific Maximum Time and using the limited cross fade edit mode, you can get consistent seamless looping.

Set Grid Spacing

Use the Set Grid Spacing command to change the time interval used to space the vertical grid marks on the Time Line. The grid is a handy visual timing reference.

It's also used in the Snap-To-Grid mode. When you drag an entry or flag, they will jump to the nearest grid line. You can set a custom grid increment to match the tempo of a musical sample, and then drag sound effect samples to lock to the grid so they follow the beat.

NOTE Snapping left and right stereo samples to the same grid increment is a quick way to synchronize them exactly. Group them to maintain synchronization.

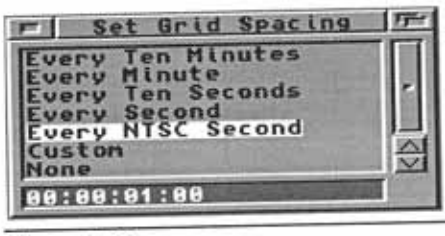

Figure 8-70. Set Grid Spacing

When you select the Set Grid Spacing command, you'll see the Set Grid Spacing requester. The requester gives you a scrolling list of options and a text field where you can enter your own grid interval.

Click an option on the list and the Time Line's grid spacing will change immediately.

The options are:

- Every Hour
- Every 10 Minutes
- Every Minute
- Every Ten Seconds
- Every Second
- Every NTSC Second (.997 of a second)
- Custom
- None

Click any of the first five options to set the grid to specific time intervals. Choose Custom when you want to specify your own interval. Change the interval used by the Custom option by typing a time in the Time field at the bottom of the requester.

Use the None option to remove all vertical grid marks from the Time Line.

Auto Size Cue List

Keyboard Shortcut: *A*-A

Think of the Time Line as a window on time. You can adjust the view of that window to be whatever you want. You can even set the boundaries so that they don't include all the entries in your Cue List, or so they include far more time than needed to show the entries in your Cue List.

Normally you want to see all the entries in your Cue List, and you don't usually want to see more time than your Cue List needs. The Auto Size Cue List command lets you quickly adjust the boundaries of the Time Line to fit the entries in any Cue List.

When you use Auto Size Cue List, it will automatically start the Time Line's view 30 seconds before the start of the first entry, and end the Time Line's view 30 seconds after the end of the last entry. This is handy to size the Time Line to fit your project.

You can also size the Time Line's view manually using the Display Boundaries section in Cue List Preferences. There you'll see a Start Time field where you can type a new beginning time for the Time Line, and an End Time field where you can type a new end time for the Time Line.

Undo Edit

Keyboard Shortcut: *A*-Z

Whenever you move anything you can undo it with the Undo Edit command. When you undo an action, the Time Line will arrange itself to be just as it was before you did the action. For example, if you move a sample and then use the Undo command, the sample will be moved back to where it was before you moved it.

You can choose between 5, 10, 25, 50 and 100 levels of undo in Cue List Preferences. Each level restores one action. For example, if you have 5 levels of undo and you move 5 samples, you can use the Undo Edit command 5 times and they will each, in turn, be moved back to where they were before you moved them.

NOTE The amount of free RAM in your system determines the recommended number of Undo Levels.

The bigger the Cue List, the more memory Undo will need. If you have 4MB of RAM or less, 5 or 10 levels of Undo is recommend. If you have more memory you can generally use more levels of Undo. For the the maximum Undo settings (100) you need at least 8MB of free RAM.

When you use the New or Open commands to load a different Cue List, you will no longer be able to undo anything you did on the previous list.

Redo Edit

Keyboard Shortcut: *A*-R

Use the Redo Edit command to again do the last command that you rescinded using the Undo command. Between the Undo command and the Redo command, you have the freedom to experiment and change your mind. The number of Redo levels is equivalent to the number of Undo levels set the in Cue List Preferences.

Keep Original Time

If SMPTE time code was running during the recording of a sample, that sample will have an associated SMPTE time code. In which case, you have the option of dragging that sample from Sample List and either dropping it at the precise SMPTE point where it was recorded, or dropping it anywhere on the time line.

Activate this option to enter a sample on it's recorded SMPTE time. Just click and drag the sample from Sample List and drop it on the preferred track. The sample will jump to its correct SMPTE time. Note that depending on the start and end time boundaries set in the Time Line, you may not be able to see the sample you've just dropped in. If this happens, use Auto Size Cue List (*A*-A) in the Options menu to change the boundaries of the Time Line to include the new Audio Entry.

To position your sample with your mouse pointer and not by SMPTE time code, deactivate Keep Original Time.

Use Mixer Levels

When you want to use automated Mixer control of volume and pan changes in real time, activate Use Mixer Levels. When it's activated, pan and volume settings in the Cue List will be ignored in favor of the real time changes you make using the Mixer.

If Use Mixer Levels is deactivated, the Time Line will use the volume and pan settings saved with your samples, or set in Audio Event Parameters.

Ignore SMPTE Errors

If you activate the Ignore SMPTE Errors command, the time code reader will skip past errors as it reads the time code. If you are having trouble reading the SMPTE time code on a particular tape, try selecting this command.

Editor

Keyboard Shortcut: ^E or *A*-E

^E Opens an empty Editor. *A*-E Opens an Editor with a sample loaded provided the sample is highlighted in the Sample List and the Sample List window is active.

Class: Application Module

Description: The **Editor** allows you to manipulate the data of sound files. It is accessed from **Applications Menu**, **Sample List** or from the **Cue List**. From the Applications Menu, load an empty editor by selecting Editor. To open an editor for a specific sample, highlight a sample in Sample List and select Edit Sample. Note that multiple select works to edit samples simultaneously.

Editing is accomplished in Studio 16 as it would be with a traditional 8 bit sample editor like Perfect Sound or Audition 4. An editor displays a graph of the sound being edited and allows you cut, copy, and paste sounds. You can move parts of a sound around, delete unwanted sections, fade in or out sections of sound, or even reverse sound. You can also use the "freehand" mode to draw with the mouse to remove pops. In addition, the editor also allows you to change a sample's default playback rate, volume, and filter setting and contains more advanced features like echo, FFT, and resample.

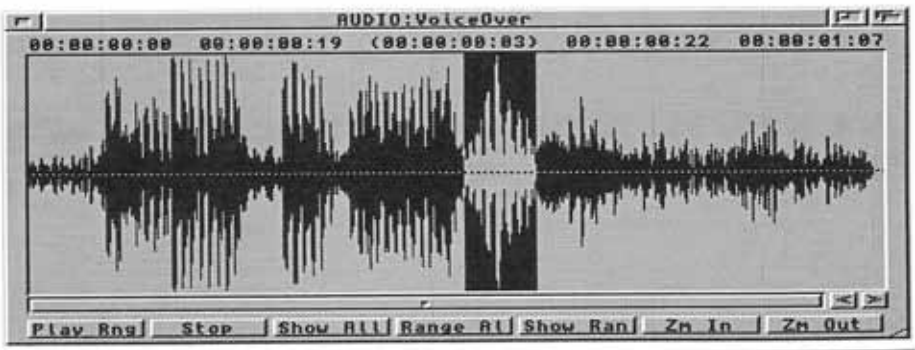

Figure 8-71. Editor Window

Layout:

Status Display

Along the top of the **Editor** is the status display. It includes numerical positions of the marked range and the current graph display. The numbers on the far left and right are the first and last positions for the entire display. The numbers toward the center of the window are the fist and last positions of the marked range. The range length is displayed in parentheses.

The status display is generally shown in SMPTE time code. It can be displayed in numbers of samples by activating Units in Samples in the Editor's Option Menu.

You also have the option of entering an offset for the status display. The offset is added from the Editor's Option Menu - Set Display Offset. An offset is often used with the Cue List. When editing a sound that is also entered in the Cue List, you can set the offset equal to the Cue List start time code. So when you drag ranges, the SMPTE display of the ranges in the editor window will match the sound's position on tape.

Graph

Most of the **Editor** window is occupied by a sound's graph. The vertical axis of the graph represents the amplitude of sound, and the horizontal axis represents time.

Because Studio 16 samples are hard disk based (they are not in RAM), the editor has a unique difficulty. How can a graphic representation of the digitized sound be displayed fast enough to be usable? Studio 16 solves this problem by building a graph in RAM from hard disk, and using this "graph buffer" to display the "on screen" graph.

When you first edit a sound, a window will appear and a graph will begin to form from the left to the right. Your hard disk light will also be quite active. Studio 16 is building its "graph buffer", a process that only has to be done once - when you first load the sample in the editor. For long samples, this can take a while. For example, a 3-4 minute sound (~14 MB) will take about 40 seconds to build the graph. This process can be sped up slightly by increasing the "Copy Buffer" in Preferences. Once the graph is built, the editor window will be redrawn with the graph displayed. For quicker graph updates, select the Fast Graph option in the Editor's Options Menu.

Editing is accomplished by dragging your mouse over the graph to mark a range, then selecting a editor menu option.

Buttons

The navigation buttons are located along the bottom of the graph. See the Buttons Reference for a detailed explanation of each button.

Procedures

Load a Sample In an Editor

1. Select Sample List from the Applications Menu. (^O)
2. Select a sample to edit.
3. Select Edit Sample from the Sample List Menu. (*A*-E)

Removing Leading Dead Space

1. Examine the beginning of the graph to note where the dead space, or silence appears.
2. Using the graph as a guide, use your mouse to drag a range highlighting the silence. This will be easiest if you click on the right side of the intended range and drag to the left. By dragging past the left edge of the graph, you will be sure your range includes the first sample.
3. Type *A*-L to play the marked range to listen to the area you have just highlighted (or select Play Range from the Editor Menu). You should not hear anything, except perhaps background noise.
4. On the basis of listening to the range, you may want to fine tune your marked range. You can use the mouse to grab the end of the marked range and adjust it. To get a closer view of your sample, click the Show Range button, and then click the Zoom Out button to zoom out a little.
5. Once the range is finalized, select Non-Destructive Cut from the Edit Menu. You have now performed a "non destructive cut." The data you have cut is still on your hard disk, but it will not be played when you access the sample. You can restore it by selecting **Undo Last**.
6. If you want to free the hard disk space currently being occupied by the silence, you need to make the non-destructive edit permanent. Select Make Permanent from the Edit Menu. This operation can take a while, depending on the length of your sample. Once it is complete, the graph will be regenerated.

Fading a Sound In

1. Examine the beginning of the graph to note where the fade should occur.
2. Using the graph as a guide, use your mouse to drag a range highlighting the section to fade. This will be easiest if you start on the right side of the intended range and drag to the left. By dragging past the left edge of the graph, you will be sure to start your fade on first sample.

3. Type *A*-L to listen to the area you've just highlighted.

NOTE Editor fades are permanent. Once done, they can not be undone. You may want to make a copy of the sound before doing a fade as a reserve. For non-destructive fades, use the Cue List.

4. On the basis of playing the range, you may want to fine tune your marked range. You can use the mouse to grab the end of the marked range and adjust it. Zoom In for a closer look of the waveform by clicking the Zoom In button.
5. Once the range is finalized, select Scale from the Effects Menu.
6. A Select Scale Requester will appear. To fade in, change **Start** to 0%, and End to 100%. To fade out you would set Start to 100% and **End** to 0%.

NOTE Use Cue List to perform non-destructive fades that can be undone.

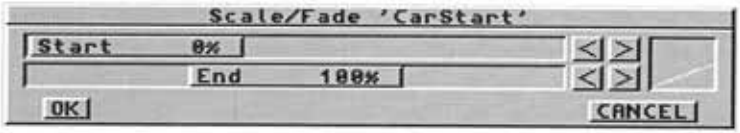

Figure 8-72. Scale Selector

7. Click **OK**.
8. The fade will now be performed. It may take a while, depending on the length of the marked range.

Creating a New Sample Out of a Marked Range

1. Highlight a range on the main graph. A new sample will be created out of this range. To duplicate an entire sample, click the Range All button.
2. Select Destructive Copy from the Edit Menu. A destructive copy will cause a new file to be created from the marked range called *CopyBuffer*.
3. Bring the Sample List module to the front by typing ^O, or by selecting it from the Applications Menu.
4. Select the sample *CopyBuffer* in Sample List.
5. Select **Rename** from the Sample List Menu and type in a new name for the sample and hit the **Enter** key.

Pasting a Range From One Sample Into Another

1. Before you begin this tutorial, close all modules except **Sample List.**
2. Pick two samples in the Sample List that have the same sampling rate. They will be referred to as *SourceSample* and *DestinationSample*.
3. Highlight one of the samples in the Sample List and type *A*-E, or select the Edit Option from the Sample List Menu.

4. Bring Sample List to the front (^O). Highlight the second sample and select Edit again to open a second Editor.
5. You now have 2 editors open. Resize and move the Editor windows so that you can view both of them on your screen at once.
6. Mark a range on the graph of the *SourceSample*. This will be pasted into *DestinationSample*.
7. From the *SourceSample* editor, select Destructive **Copy**. At this point, a new sample will be created called *CopyBuffer*.
8. Mark an insertion point for the range in the *DestinationSample*.
9. In the *DestinationSample* Editor, select Destructive Paste - Insert at Start. *CopyBuffer* is inserted now. The process can take a while if the files are large.

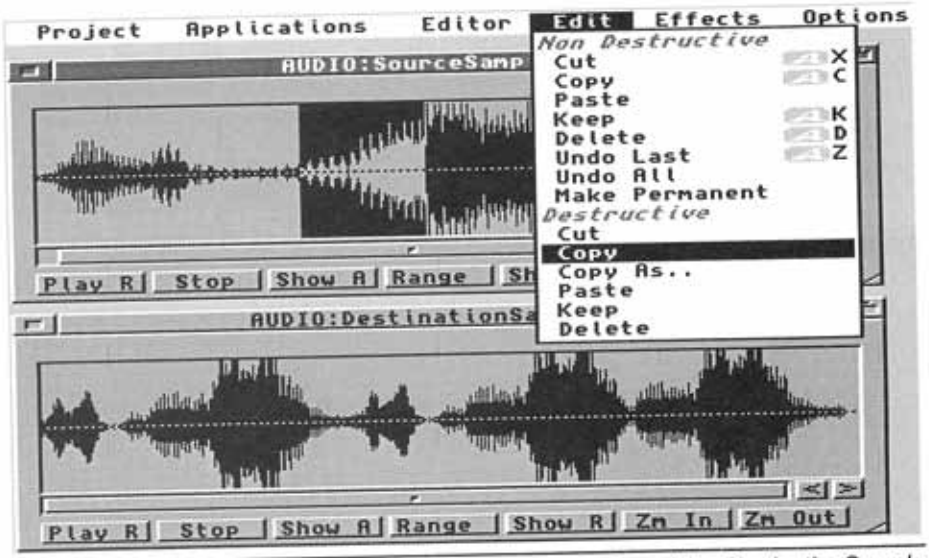

Figure 8-73. Moving a Range from *SourceSample* to *DestinationSample*

Buttons

Play Range This will play the marked range in the editor window.

Stop Any playing sound is stopped.

Show All Adjusts the zoom ratio so the entire sample is displayed on the graph.

Range All Will create a range over the entire sample. Will also Show All in the process.

Show Range This expands the marked range to fill the graph - changing the zoom ratio and the scroll as needed.

Zm In

To "Zoom in" on your sound's graph to see more detail, click this button. Successive clicks will zoom you in closer until you are zoomed all the way in. When zoomed all the way in, you will be viewing the sample on a scale where each horizontal screen pixel represents one sample.

Once you've zoomed in on a sample, you can use the scroll bar along the bottom of the graph to move around in the sample. Usually the graph is updated from the "graph buffer", so scrolling is a very quick process. However, if you zoom all the way in, the editor may access the hard disk. When this happens, the updates will become slower, and you will see the hard disk light flash. To speed things up, zoom out a little.

You can also zoom in on the sound by marking a range (use your mouse to drag a range on the graph) and then clicking the **Show Range** button. This will expand the marked range to fill the graph.

Zm Out

Reverses the zoom ratio, so you can see more of a sample. Click Show All to zoom all the way out of a sample quickly.

Editor Menu

New

Clears all samples from the Editor Window. The samples are not deleted, they are just removed from the Editor.

Open

Opens a file requester allowing the addition of a sample to the display. Up to 8 samples can be in the editor at once allowing synchronous edits.

Play All

Plays the entire sample in the editor. You can also play sounds from Sample List and Cue List.

Play Range

This will play the highlighted range on the graph.

Play Display

Plays the portion of the sample that is currently displayed in the graph.

Play to Start

Plays a small portion of a sample preceding the marked range.

Stop Playing

All playing sound is stopped.

Edit Menu

Non Destructive

A "non- destructive" edit will not alter your original sound. It just remembers which changes have been indicated. Since non-destructive edits don't alter your hard disk data, they can be "undone" at any time to restore your original data. Another

benefit of "non-destructive" edits is speed. Since hard disk access is not required, non-destructive edits are much faster to execute than destructive edits.

Non-destructive edits only work on one sample at a time. That is, you can't do a non-destructive copy, then paste the copied range into a different sample. The non-destructive paste must be into the same sample where the non-destructive copy was performed.

Cut — This is the same as selecting a non destructive **Copy** and **Delete**. If you want to delete a range while maintaining the sound after the cut in sync, use **zero**.

Copy — Non-Destructive Copy remembers the marked range for use in future pastes. No new sample is created.

Paste — Non-Destructive **Paste** has a submenu that determines where to paste:

- Insert at Start
- Insert at End
- Replace Range

Selecting Insert at Start or End will insert the copied range at the beginning or end of the marked range. Selecting **Replace** Range will replace the marked range with the last copied/cut range.

The non-destructive **Copy - Paste - Insert** action allows you to duplicate a section of sound repeatedly. You can insert multiple copies of a range into a sample without using more hard disk space (unless you select Make Permanent or do a destructive edit).

NOTE With Studio 16 version 3.0 there is a limit of 128 non-destructive edit clips.

Keep — This non-destructive edit is the inverse of **Delete**. It deletes all of the wave except what is highlighted in the marked range.

Delete — This non-destructively deletes a marked range (it can be reversed by **Undo**). To delete a range while maintaining sync, use **zero**. Note that Zero is destructive.

Undo Last — This will undo the last non-destructive edit. It does not have any effect on other types of edits or effects. Clicking **Undo** a second time will reverse the Undo.

Undo All

This option will undo all non-destructive edits. It has no effect on destructive edits or effects.

Make Permanent

Allows you to do non-destructive editing on a sample and then transform the results into a permanent sample with a single "destructive edit". This option will update the current sample's data taking non-destructive edits into account. Performing a destructive edit will also make all non-destructive edits permanent.

There are two reasons to make non-destructive edits permanent:

1. You have performed non-destructive cuts on a sample so that if the edits were made permanent only a fraction of the disk space would be required by the sample.

   Example
   You record a 20MB sound file, then edit the sample in the non destructive mode, doing cuts, copies and pastes. The resulting sound would fit in a much smaller 5MB space. However, since your edits were non-destructive, the original 20MB file is still on your hard disk. If you're confident you won't need the original unedited sample, by making the edits permanent you can create a new sample that contains just the 5MB of edited data, thus, freeing 15MB of hard disk space.

2. You are experiencing long delays between selecting **Play All** or **Play Range** and the sound actually playing. This happens when the computer must seek long distances from the beginning of the sound's data file to find the point where playback begins. AmigaDOS seeks can be quite slow. As a result, you may want to make the edits permanent to eliminate the delay.

NOTE Make Permanent will create a new file on your hard disk, then delete the old file. As a result, it will not work unless there is enough free space on your hard disk to temporarily hold both the original file and the new "compressed" file.

Make Permanent can make a file larger if you have performed many **Paste - Inserts**.

Destructive

An edit is "destructive" if it alters your sample's data on the hard disk. Destructive edits are generally used to transfer clips from one sample to another. (Non-destructive edits only work within a single sample.) For example, if you wanted to

cut part of sample and paste it into an another sample, you would have to use Destructive Copy and Paste.

Destructive edits are also used when you want to create a new sample from an existing sample.

As well as the destructive **Cut**, **Copy**, and **Paste**, effects are also destructive. These include **Resample**, **Scale**, **Invert**, and others.

Cut

A destructive cut will remove a marked range and place it in a sample called CopyBuffer. *CopyBuffer* is a normal sample in all respects, except that by convention it is used in Destructive **Paste**. CopyBuffer is created in the active directory.

Copy

Destructive copy will copy a marked range into a new sample called *CopyBuffer*.

Copy As

It is often useful to create a new sample out of a marked range. Destructive Copy As will bring up a file requester and prompt you for a name for the new sample.

Copy As will create the new file with the default file format set in Preferences. This allows you to easily create samples in different file formats from ranges of original samples.

Paste

Destructive **Paste**, like its non destructive counterpart, has a sub menu that allows you to select where to paste:

- Insert at Start
- Insert at End
- Replace Range

Selecting **Insert** at Start or End will insert any sample named *CopyBuffer* at the beginning or end of the marked range. Selecting **Replace** will replace the marked range with the contents of *CopyBuffer*.

To transfer a clip of sound between samples, do a Destructive **Copy** in the source sample followed by a Destructive **Paste** in the destination sample.

To append one sample to another, select Insert @ End. But make sure the destination sample's range includes the last sample of the sound.

Delete

Destructive delete will remove a range from the sample. A delete is similar to a cut, but it does not create a CopyBuffer,

and it is quicker to perform. It may be preferable to delete a range, if you are working with long samples and you are certain you do not require the marked range. There is no undo for non-destructive delete.

Keep

Keep is the reverse of delete. It will permanently remove all of the sample except for the marked range. It is safer to do a non-destructive keep and then make the edit permanent.

Effects Menu

Echo

This option brings up an echo range requester that allows you to set the Delay, Feedback and DLevel of an echo on accelerated Amigas.

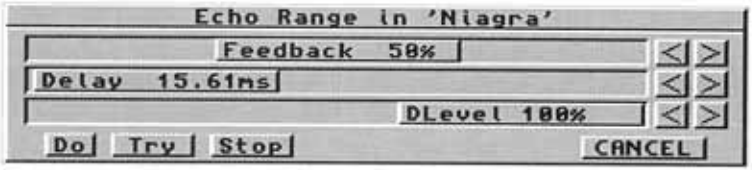

Figure 8-74. Echo Selector

Try
This will allow you to preview the effect.

Delay
This adjusts the length of time between repeats.

Feedback
Controls the number of echoes you hear. This is accomplished by adding a percentage of the delayed signal back into the original.

D Level
Controls the volume of the echoes, at 100%, the first echo and the original signal are the same volume. At 0% you will not hear an echo.

FFT

Fast Fourier Transform breaks down a waveform into its constituent sinusoidal parts. The "Fourier Transform" is a mathematical transform that translates time domain information (like sampled sound) into the frequency domain. The "FFT", or "Fast Fourier Transform" is a computationally efficient method of computing the Fourier Transform. Actually, Studio 16 implements the "DFT" or "Discrete Fourier Transform". However, many people use FFT and DFT interchangeably.

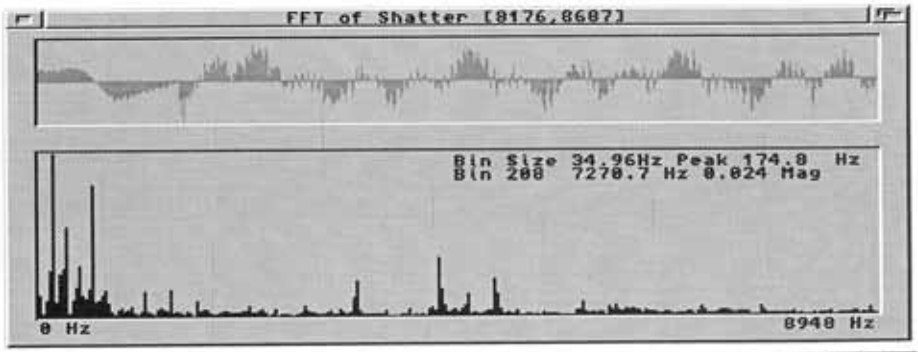

Figure 8-75. FFT Display

In any case, the FFT will produce a plot that shows you which frequency components are present in the samples analyzed. An FFT algorithm always processes a power of 2 samples. In Studio 16's case, it always processes 512 samples. It then produces 256 real "frequency samples". Each of these points is plotted by Studio 16 in a bar graph. Since there always 256 points, or "bins", these bins contain a range of frequencies. The center frequency in this range is displayed in the upper right hand corner as you move the cursor.

When selecting a range for an FFT keep in mind that only the first 512 samples will be used in the calculation. To mark a range that is exactly 512 samples in length, activate Units in Samples from the Option Menu in Editor. Then, watch the range's status display (the center most numbers along the top of the graph) as you adjust you range to 512 samples.

Invert

This option inverts the ranged waveform along the y-axis. The sample will not sound different.

Normalize

A variation of scale that first measures the peak value of the sample, and then scales the entire range by the percentage required to bring the peak to a maximum setting. The maximum level for 16 bit samples is 32,767. Refer to Chapter 1 for more information on maximum levels.

Normalize can also be used to find the maximum sample in a range since it is determined before scaling and you can always cancel the normalization before it alters your sample.

Reverse

This option will reverse a sound's data so that it plays backwards.

Scale

This option allows you to scale (attenuate or amplify) a sample. It also allows you to fade in or fade out a section of a sample by specifying a starting and ending percentage. When they are equal, a straight scale is performed. When the percentages differ a fade will be performed.

When using scale to increase the level of a range at an even rate, consider using Normalize.

Studio 16 Scales are linear. To produce a logarithmic scale in the Editor, scale the same range twice at the same setting.

NOTE Use Cue List to perform a variety of non-destructive fades.

Zero

Mark a range and select zero to silence the existing audio. This will allow you to remove sound from a track while maintaining sync throughout the entire track.

Resample

Allows you to adjust the sampling rate of a sample. The parameters will affect the quality of the sample and the amount of RAM required. Also, resampling is a complex operation, so it may take a while, especially if you are working with long samples.

Resample can also be used to "pitch shift". Resample a sound to a new rate, and then play it back at its original rate.

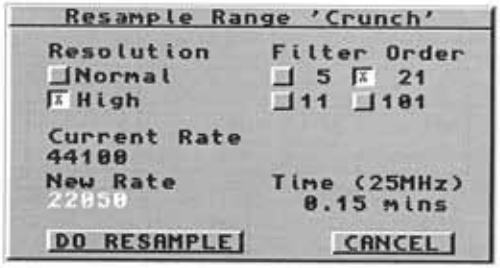

Figure 8-76. Resample Selector

Resolution

Because resampling is very calculation intensive, Studio 16 pre-computes a sinc table for speed. "Resolution" refers to the size of the sinc table. The normal table is provided for machines with small amounts of RAM. High Resolution requires more RAM, but may give slightly better results because it uses a larger table.

Filter Order

Resample is controlled by a digital filter. Digital filters allow you to set an order of the filter or the degree of accuracy. The larger the order of the filter, the more accurate the resample will be. However, high filter orders take longer to process. The Filter Orders that are available for resampling are 5, 11, 21, 101.

Current Rate

The default sampling/playback rate of a sample before resampling.

New Rate

A field for entering the new sampling rate. (Open the Recorder to see the available rates your AD516/AD1012 can playback.)

Time

The estimated time required to process the resample. Note the field will update as you select different filter orders. This estimated time is for an Amiga 3000 with a 25MHz processor. Stock Amiga 2000s will take much longer.

Gen Silence

This option will create silence in the CopyBuffer. A requester will appear allowing you to select the length of the silence and the sampling rate. Once the silence is in the CopyBuffer, you can select destructive edit and paste the silence into your working sample.

Sampling Rate

The default sampling rate is from your working sample. If you intend to copy the silence into another sample, you should use that sample's rate.

Seconds

The number of seconds silence to be generated. Fractions are okay (e.g. 1.25) Also, since sine waves are generated in RAM they are limited in length by available memory.

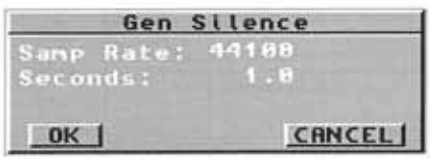

Figure 8-77. Generate Silence Selector

Gen Sine Wave This option will create a pure sine wave in the CopyBuffer. A requester will appear allowing you to select the length of the sine wave and the sampling rate. Once the sine wave is in the CopyBuffer, you can select destructive edit and paste the sine wave into your working samples. This option is well suited to creating a 1,000Hz sine wave that is often used in the beginning of an audio tape for reference purposes.

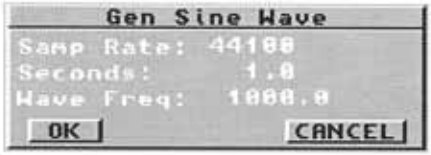

Figure 8-78. Generate Sine Wave Selector

Sampling Rate

The default sampling rate is from your working sample. If you intend to copy the sine wave into another sample, you should use that sample's rate. Note your Sampling Rate should be at least twice, preferably four times, the frequency of the sine wave.

Seconds

The duration of the sine wave. Note that the longer sine wave the longer it will take to process.

Wave Frequency

The frequency of the wave should be no more than 50% of the sampling rate and preferably no more than 25%.

Options Menu

Set Range Using this option, you can enter a range numerically. Instead of dragging a range with the mouse, you can use **Set Range** to set the range exactly in either number of frames or number of samples (set by the Units in Samples menu option).

Set Start This is an "on the fly" operation that allows you to set a range while a sample is playing. Select Play All for a sample and then use the keyboard shortcuts for Set Start (*A*-M) and then Set End (*A*-E).

Set End Used in conjunction with set start allows you to set ranges when listening to a sample play. *A*-E.

Set Sample Parms Use this to alter the sample's default volume, playback rate, as well as the filter rate for AD1012s, and the pan for AD516s.

The default volume is the level at which the sample plays. It will usually be +00dBs. The Mixer will automatically adjust itself to this level when the sample is played. However, if **Use Mixer Levels** is active in Cue List, the current mixer setting will be used.

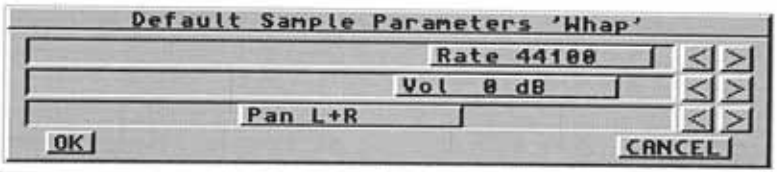

Figure 8-79. Sample Parameters Selector

See the Reference Section on Recorder for an explanation of sampling and filtering rates. If you have trouble selecting a sampling rate that is available in the Recorder, use the arrow buttons or click in the slider to the left or right of the knob. This will display all available increments. Just dragging the knob may not show them all.

The pan adjustment allows you to vary the level of audio playing on each channel. The AD516 has two output channels, and you can set a sample to play on either the left, right, or both output jacks. When the pan slider is in the center, the sample will play equally on both the left and right outputs. If the pan slider is all they way to the right, the sound will only play on the right output. If the slider is all the way to the left, the sample will play only on the left. You can also vary the levels on each output.

Stereo is accomplished by recording two tracks: one panned full left, and the other panned full right. You use pans that are not full left or full right when playing back mono tracks that you want to appear on both the left and right outputs.

Set Display Offset Prompts you for a time to offset either the display or the marked range. Changing either offset will effect the other. If you know the exact frame you want the sample to trigger on, set the display offset. On the other hand, if there is an embedded sound effect in the middle of the sample (marked by a range), and it is crucial that it play on a specific frame, set the range offset. The display offset will automatically calculate a new offset, to match the new range entry.

Loop Activate Loop to have the sample or marked range play continuously.

Freehand Draw When activated, you can use your mouse to alter a sound's data. Selecting freehand will automatically zoom all the way in. To edit normally, deactivate the option or zoom out.

OK Requesters When activated, OK Requesters will appear for all destructive edits and effects. It is recommended that users new to Studio 16 leave "OK Requesters" activated until they become more familiar with Studio 16's operation. Advanced Users will probably want to turn off this option. A few crucial requesters are not optional and will remain even when OK Requesters is deactivated.

NOTE OK requesters can generally be accepted or rejected with the standard keyboard shortcuts Left *A*-V and Left *A*-B for OK and cancel.

Units in Samples The graph and status display are generally displayed in SMPTE time code. If you prefer to work in numbers of samples, activate this option.

Show Regions Regions are marked ranges that have been given a name. Regions are like samples in that they can be dragged into the Cue List. Show Regions will bring up an "Editor Regions List" that lists all the regions in a samples. You can drag from this region List. The "Editor Regions List" has Menu Options of it own.

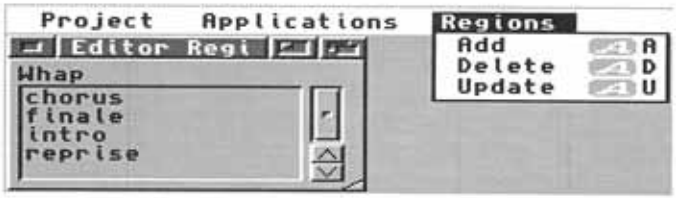

Figure 8-80. Editor Regions List and Regions Menu

Add Region

Brings up a name requester for the marked range. This range will then be converted to a region that can be dragged into the Cue List. Its name will appear in the Editor Regions List along with any other regions existing for that sample.

Delete Region

Highlight a region's name in the region list and select this option to forget the region. Note that no data will be lost, this is not a cut, nor a destructive delete.

Update Region
Allows you to adjust the region's length. Click on a region's name in the Editor Regions List, then click on the graph and move the start or end markers of the region. Next, make the Editor Regions List active by clicking on the title bar, then select Update Region to update the region with the new length.

Grid

Displays a vertical grid that indicates boundaries within a sample. The type of grid is set with the submenu. For example, you can request that a vertical line be drawn on one frame or one second boundaries.

Note that you may have to zoom in to see the grid lines. This is because the Editor will not draw grid lines when there would be "too many" drawn. In other words, if the editor thinks that you're going to have trouble seeing the waveform through all the grid lines, they will not be drawn.

Set the grid to one of the following settings, or turn it off. Note that the grid is a display only, it does not "snap".

Figure 8-81. Grid Settings

Fast Graph

When activated, the graph display update is quicker, but less representative of the actual sample.

Instance

Keyboard Shortcut: ^ I

Class: Application Module (Dormant)

Description: The Instance List can be used to launch Studio 16 modules just like the Applications Menu and Keyboard Equivalents. Instance is loaded from the Applications Menu. And once loaded, all other application or utility modules can always be on display rather than in the menu. Usually, due to limited screen space, it is preferable to use the Applications Menu and keyboard shortcuts.

This module does not generally require user access.

Instance Menu

Edit Brings up a requester giving you the option of renaming a module or making a module resident or non-resident. All Studio 16 modules reside on your disk in the Studio 16_3: Application, Drivers, and Utilities drawers. For each module, there is one program file in this directory. As with all programs, a Studio 16 module must be in RAM to run. However, when you are not using a module, the module's code can be removed from RAM. The resident/non-resident option lets you decide if you want to keep a particular module's code in RAM even when the module is not being used (Resident) or whether you want to free RAM for use by other programs and remove a module when it is not is use (Non-Resident).

The advantage of keeping a module resident is speed. A resident module's window will open immediately when you double click its name in the Instance List since it doesn't have to be loaded from disk. A non-resident module will take a second or so to load when you double click its entry in the Instance List. For this delay you save a small amount of memory. The amount of memory (RAM) saved is relatively small so it's advisable to keep commonly used modules resident.

The Utility and Driver modules should always be resident. Application modules may be made resident at your discretion.

Duplicate This option creates another Instance of a particular type of module. For example, select the **Meters** entry and click the **Duplicate** button. You now have two entries in the Instance List, Meters and Meters#2. This enables you to load two Meters modules simultaneously, allowing you to show eight meters at once. However, some Amigas will not have enough CPU time for this.

Remove This option removes an Instance from the list. For example, if you don't require that second meter module (added in above example), you can select Meters#2 and then click the **Remove** button. Once a module is completely removed from Instance, you will have to load Module List to add it back.

Show Sets Instance to display Applications, Utilities, or both. Utility Modules are used in the operation of Studio 16. They are not usually accessed by the user. However, you may be interested in selecting the AD516 or AD1012Handler. It displays statistics about your hardware.

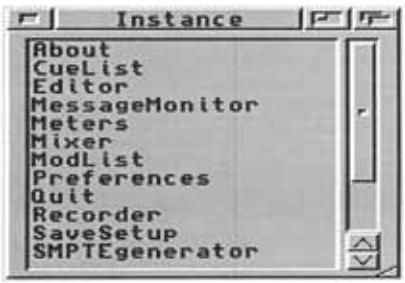

Figure 8-82. Instance List showing Application Modules

Procedure

To move Instance from the Dormant directory:

1. Quit Studio 16.
2. From WorkBench open the Dormant directory, by clicking its icon.
3. Drag the Instance icon on to the Application directory icon.
4. Delete the S:Studio16Instance.config file.
5. Load Studio 16, Instance will appear in the Applications Menu.

Message Monitor

Class: Application Module (Dormant)

Description: The Message Monitor is a handy debugging tool for Studio 16. This module is for programmers - most users will not require opening it. It displays all the messages passed between the different Studio 16 modules. It should be noted that message monitor can run at low task priorities, while most other Studio 16 modules run at higher priorities. This will cause a backlog of messages to be queued if the computer is fully loaded. These messages get processed by the higher priority Studio 16 modules before they are displayed by the message monitor.

Message Monitor is located in the dormant directory. This means that it is not available from the Applications Menu.

Procedure

To move Message Monitor from the Dormant directory:

1. Quit Studio 16.
2. From WorkBench open the Dormant directory, by clicking its icon.
3. Drag the Message Monitor icon on to the Application directory icon.
4. Delete the S:Studio16Instance.config file.
5. Load Studio 16, Message Monitor will appear in the Applications Menu.

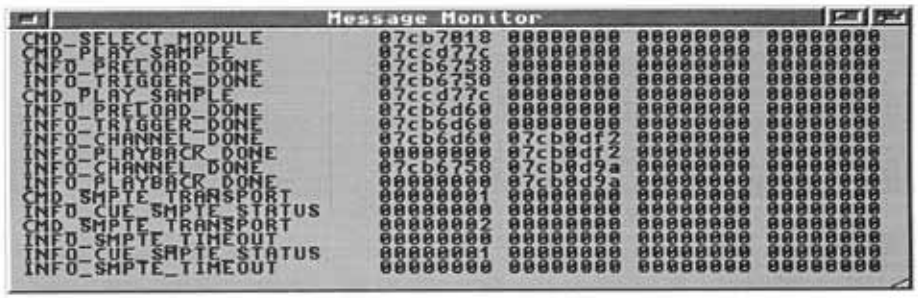

Figure 8-83. Message Monitor

Meters

Keyboard Shortcut: ^V

Class: Application Module

Description: This module displays sound levels in much the same manner as the meters on a cassette deck. Like a cassette deck, these meters are used in adjusting the input gain of incoming sound. They enable you to get the maximum volume without clipping. Whenever you adjust the input gain of a card you should open a meter window. This allows you to make an informed decision about where the input gain slider should be set.

Another use of the meters is the visual monitoring of the sound going through each of the Studio 16 channels. You can easily tell if a sample was recorded improperly by looking at the level of a channel to see if it is too low or too high. You may decide that a sample needs to be re-recorded.

Figure 8-84. Meters

Layout: The meter window can consist of an Analog Meter, a Digital Meter and a scrolling graph. Each meter is assigned to a specific channel using the Channel Menu option. Each meter takes up more blitter time, so slower systems should keep the number of meters to a minimum.

For most applications, the gain information required can be derived from the digital meters and the scrolling graph on the input channel. Other than setting the input gain, meters are optional. While they look nice, they also take up memory and a surprising amount of CPU and blitter time. It is possible that if you close down the Meter module you will be able to playback more channels.

Meters Menu

Allows you the flexibility to show only the types of meters you require. Each meter channel can display the volume information in up to three ways: an analog meter simulation, digital meter simulation with peak hold, and a scrolling graph.

Analog — The analog meters use a waited averaging technique to show the average sample amplitude. Large instantaneous peaks in a sample's volume will have only a small effect on an analog meter's needle position unless they occur frequently. It is difficult to decide if a sample is clipping using this type of meter, so it is more useful to use one of the other types of meters for adjusting the input gain of the card.

Digital — The digital meter shows the instantaneous peak of a sample's amplitude in a given period of time. If a sample has one large peak this type of meter will display the peak. If the right most LED is displayed, then clipping occurred. In most cases the input gain should be reduced to prevent this. The peak hold feature shows the largest amplitude of a sample for a longer period of time. This makes it easy to determine how loud the peaks of a sample are.

Graph — The scrolling graph meter is a type of meter unlike any analog world counterpart. It shows the instantaneous peak of a sample on one axis while showing time on the other axis. This type of meter is useful for determining the type of sound being played through a channel as well as its amplitude. With practice you can tell whether a channel is playing back a voice track, a sound effect or music just by looking at the shape of the graph.

Channels Menu

Allows you to assign meters to specific channels. Input should always be selected when monitoring the gain level before recording.

NOTE To select multiple options in a sub-menu click the left mouse button while holding down the right.

The maximum number of meters per meter module is four. To show more than four meters, you must first close the Meter Window and launch Instance. Because Instance is dormant, you will need to move Instance to the Applications drawer in order to access it. From Instance duplicate Meters. Then from the Applications Menu you can access Meters#2, this will provide four additional meters. For more meters, duplicate Meters in Instance a second time.

Mixer

Keyboard Shortcut: ^ M

Class: Application Module

Description: The mixer allows you to adjust the relative volumes of the playback channels and the input and output volume. If the AD516 is installed, a pan adjustment is included for each playback channel. The mixer uses the DSP chip to digitally adjust the volume and pan of each channel. You can use the mixer to adjust a sample that is playing back too loud or too soft or to make a sample playback on the left or right channel (or both). The volume and pan may be changed before, after or during sample playback. The mixer also displays the sample name currently playing from the Sample List.

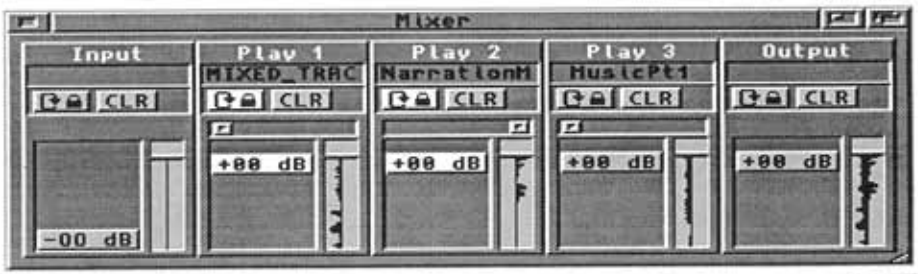

Figure 8-85. Mixer

Slider Control You can move the mixer sliders either with your mouse, or by using an external MIDI controller box. A MIDI controller box provides physical sliders. When those sliders are moved, MIDI messages are sent to your Amiga. Studio16's Mixer then receives those MIDI messages, and moves its mixer sliders to match the external control box. See "Enable MIDI" and "MIDI Preferences..." for more information.

Volume To adjust the volume of a channel simply move the appropriate slider. The mixer will display which sample is playing on which track. This makes it easy to identify which volume slider to adjust. In addition, the Mixer channel names match those used in the Cue List.

Use the output volume slider to adjust the volume of all the channels. This is useful for fading in or out entire soundtracks. The input volume is useful when you want to

mix the card's playback channels with an external audio source.

Since the mixer works in the digital realm it is almost distortion free; however, care should be taken to refrain from clipping a channel since clipping causes distortion. Digital distortion is somewhat harsher sounding than analog distortion.

NOTE Ideally, a channel should be maintained at +00dB where the dynamic range is maximized. When you reduce a channel's volume digitally (as the mixer does), you are also reducing the channel's dynamic range.

When recording from the Recorder or from the Cue List, the audio input will be digitized regardless of the Mixer setting. Note on the figure below, the Record Input Tap is before the volume adjustment on the Mixer. To record at the output tap you must use the Cue List and set the Record Channel to Output.

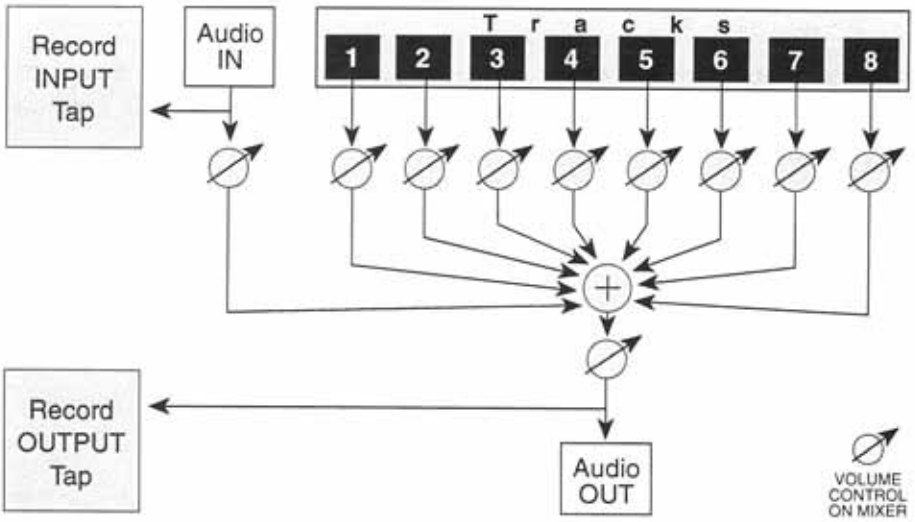

Figure 8-86. Mixer Diagram

Decibels

The Mixer specifies volumes in Decibels (dBs). Decibels are a logarithmic scale used to more accurately represent how the ear hears volume changes. Zero dB means no gain. Attenuation are negative, and amplifications are positive.

For example:
+6dB is equivalent to 200% volume
0dB is equivalent to 100% volume
-6dB is equivalent to 50% volume
-∞dB is equivalent to no volume

-∞, or negative infinity is represented by -00dB in Studio 16.

Pan

The pan adjustment allows you to vary the level of audio playing on each physical channel. The AD516 has two physical channels (Left and Right). You can set a sample to play on either the left, right, or both output jacks with the pan control. When the pan slider is in the center, the sample will play equally on both the left and right output. If the pan slider is all they way to the right, the sound will only play on the right output. If the slider is all the way to the left, the sample will play only on the left.

Stereo is accomplished by recording two tracks: one panned full left, and the other panned full right. You use pans that are not full left or full right when playing back mono tracks that you want to appear on both the left and right outputs.

NOTE The AD1012 is a mono card and does not have a pan option.

Clip Indicator

The clip indicator is similar to the peak hold on the digital meter. It indicates when the channel's volume clips. In addition, the color of the scrolling graph will turn red when clipping occurs.

Scrolling Graph

Similar to the Scrolling Graph in Meters. It is also possible that the mixer can load down the system. This is true for any of the windows that responds to real time events. If the system is too busy, Studio 16 may be limited in the number of simultaneously playing channels. Closing the mixer window may increase the number of channels you can play back. Or, you can try substituting Tiny Mixer instead.

Lock

Every channel has a lock button. This button allows you to lock sliders together so that when one slider is moved, the locked sliders move as well. For example, this is useful for a stereo pair. Lock the left and right channels together, to perform stereo volume adjustments with the mouse.

In addition to normal locking, the lock button allows you to perform a cross lock. In this mode, cross fades can be performed by using the mouse to move one slider.

To select normal lock mode, click on the lock button of the channels to lock together. The colors of the knobs will change to indicate that the sliders are locked together. By clicking on the lock button a second time, the slider will be in cross lock mode. Its color will change again, to indicate its a cross fade locked slider. Note that any number of sliders can be locked together. Either normally, or cross faded.

CLR

The CLR button will clear any recorded pans or volumes for the selected channel.

Automated Mixing

The Mixer can memorize a sequence of volume or pan changes, and play them back later. This is often useful when used in conjunction with the Cue List. For example, suppose you had music on Play Channel 1 and a voice over on Play Channel 2 in the Cue List. The music is a much longer segment than the voice over, and you want the volume of music to lower while the voice over plays. After the voice over completes, you want the music volume to raise again.

The above hypothetical case is easily accomplished with the mixer:

1. Load the Mixer and Cue List modules.
2. Select **Record Volume** in the Mixer Options menu to turn on mixer recording.
3. Select **Use Mixer Levels** in the Cue List Options menu.
4. Begin the Cue List by depressing the play button in the Cue List. This will begin internal time code generation.
5. The music will start playing.
6. Just before the voice over starts playing, lower the mixer volume level on the music channel. When the voice over finishes, raise the mixer volume on the music channel back to its normal level.
7. Press stop on the Cue List. At this point, the mixer has memorized the music volume changes.
8. You can replay the mix by turning off **Record Volume** and turning on **Playback Volume,** both in the Mixer Options menu. Start the Cue List as you do normally, and the mixer should now perform the volume changes automatically.

Mixer Menu

New

Clears all record volume and pan movements on all channels.

Open

Loads a previously saved mixer file from disk. All previously saved volume and pan movements are restored. The current pan and volume information is erased, and replaced by the information being loaded from disk.

Save

Same as **Save As...** except you don't need to specify a file name. The last file name specified will be used, or a file requester will open if no prior **Save As...** was performed.

The information saved in the last **Saved As...** is lost, and is replaced with the current volume and pan information.

Save As...

Allows you to saved the current volume and pan information for all channels into a file on disk. You will be prompted for the file name to use when saving.

After you have recorded a mix, you should save it. If you quit the mixer module or Studio 16 without saving your current volume and pan information, the information will be lost.

Options Menu

Record Volume

This menu is either activated (indicated by a check mark) or not. When activated, any volume changes are stamped with the current SMPTE time code and remembered.

You can perform "punch ins" and make changes to existing recorded volumes since any new volume changes replace existing volume changes with similar time codes.

Record Pans

Works the same as **Record Volume**, except pan movements are remembered.

Snapshot Levels

Records the current volume or pan slider positions at the current time code. You can use the SMPTE Generator module to set the current time code. Snapshot is often used to set the initial levels at the beginning of a long sequence.

Record Volume must be activated for snapshot to record the current volume levels. Similarly, **Record Pan** must be activated for snapshot to record the current pan states. Snapshot Levels is ghosted unless Record Volume or Record Pan is selected.

Playback Volume When activated, this will cause recorded volume levels to play back synchronized to SMPTE time code. Note that you can play and record slider positions simultaneously.

Playback Pan This menu operates the same as **Playback Volume,** except it replays pan changes.

Digital Meters When activated, this will change the scrolling graph to a digital bar meter.

Enable MIDI When activated, the mixer will monitor the Amiga's serial port for MIDI "control change" messages which it will use to move the volume and pan sliders.

To use this mode, you will need an external controller such as the JLCooper FaderMaster or Peavey PC 1600. When using the FaderMaster, use factory preset 1 to generate the correct control change messages. The PC 1600 works well with preset number 0 or 3.

When Enabled, the default mixer settings responds to MIDI "control change" events (0xBn) of types 7 (main volume) and 10 (pan controllers). However, these can be changed with **MIDI Preferences...**

MIDI Preferences... The MIDI Preferences menu will bring up a new window where you select which MIDI channel number and controller ID number each slider should respond to. The default IDs are 7 for volume, and 10 for pan. The default channels start at 0 and move up for each slider.

To alter a particular channel, select its name in the list. Once selected, the slider gadget will move to indicate the settings for that channel. You can then move the sliders to change which MIDI channel number and controller ID the mixer slider will respond to.

The MIDI Preferences requester also includes a string gadget where you can specify which Amiga exec device to use for MIDI information. If you change the device name, you should disable, then re-enable MIDI for the new device to take effect.

Channels Menu

Allows you to specify which channels the mixer will display. Select the channels required. Input should be selected to monitor incoming audio.

NOTE To select multiple options in a menu click the left mouse button while holding down the right button.

Module List

Class: Application Module (Dormant)

Description: The Module List, lets you load or unload code from disk and memory. You can load a module multiple times to create multiple instances. The **Module List** will not be used by most users. It is included for advanced users or for those rare occasions that require its use.

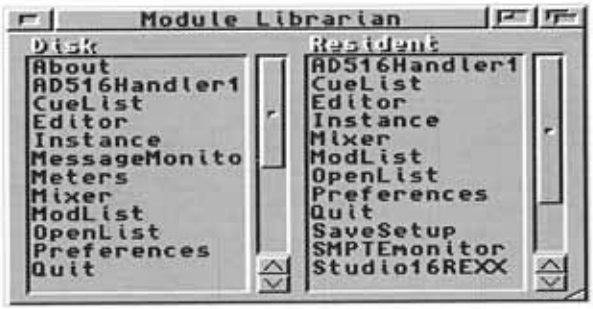

Figure 8-87. Module List (Librarian)

Layout: In the Module List, the left list contains modules on disk in your Applications, Utilities, or Drivers directories. The right list contains modules that are currently in RAM. Double clicking an entry in the left list (the "on disk" list) will cause the module to load into RAM. Generally the loaded window won't open unless you select it in the Instance List. Double clicking an entry in the right list (the "in RAM" or "Resident" list) will cause the module to unload itself. However, its "instance" will remain in the Instance List until removed.

Procedure

Move Module List From the Dormant Directory

1. Quit Studio 16.
2. From WorkBench open the Dormant directory, by clicking its icon.
3. Drag the Module List icon on to the Application directory icon.
4. Delete the S:Studio16Instance.config file.
5. Load Studio 16, Module List will appear in the Applications Menu.

Preferences

Keyboard Shortcut: ^P

Class: Application Module

Description: Preferences is located in the Project Menu. It is dedicated to customizing the appearance and performance of Studio 16. Included in Preferences are: Interface Options, SMPTE source, Memory Options, and the default Record Format.

Figure 8-88. Preferences

Layout: The Preferences window is divided into four sections: Interface, SMPTE, Memory and Record Format.

Interface

Color Boxes and Sliders Click on a Color Box to select which color to adjust. Slide the knob on the red, green and blue sliders to adjust the color. The affected areas will update as you adjust the slider. Click Save Setup in the Project Menu to have Studio 16 use the new colors on loading.

Preset Drop List Click on the ⇩ to view a list of preset screen colors. Use the scroll bar and arrow buttons to scroll through the options. Click a selection to make the Studio 16 screen update using the new colors.

Interlace When selecting Interlace, your screen will double in vertical resolution resulting in a larger work area. To activate the Interlace mode, you must select Interlace, select SaveSetup from the Project Menu, Quit Studio 16, and then restart the program.

On an Amiga 4000 you must also set the 'Avoid Flicker' and 'Mode Promotion' flags in the 'IControl Preferences' program found in the WorkBench preferences drawer.

An Amiga 2000 in Interlace mode requires a flicker fixer.

ClickToFront

Activating this button will allow you to bring windows to the front by simply clicking anywhere on them. If it is not selected, you bring a window to the front by clicking the Depth Gadget in the title bar of windows, or by calling them to the front with the keyboard shortcut.

SimpleTitleBar

This button will cause the Close, Minimize and Depth button to only show in the active window. All non-active windows will only display the module name.

SMPTE

SMPTE Source

Click on the droplist to select your default SMPTE source. The recommended setting is either AD516#1 or AD1012#1. This will set your default Source to your External SMPTE; however, it will be overridden to SMPTE gen when you open SMPTE Generator. Closing SMPTE Generator will cause Studio 16 to revert to your default setting, (e.g. AD516#1).

SMPTE Rate

By selecting 24, 25, 30DF or 29.97 Frames per Second, or you select which SMPTE Time code format to be used by the SMPTE Monitor and Generator, Sample Editor and Cue List Module.

The common applications for the available formats are:

24	Motion Pictures
25	European Video (PAL)
29.97	USA Color Video
30DF	USA Color Video

For more information on the various SMPTE formats see Chapter 5 - SMPTE.

Lock On/Lock Off

When selected, Lock On causes Studio 16 to continuously inspect SMPTE time being read and automatically adjusts the play and record speeds required to keep a sample in sync. This option is recommended if you are triggering long samples in the Cue List.

Memory Gadget

Use Extended Memory

This button controls which type of memory Studio 16 uses for its channel buffers. If selected, this button causes Studio 16 to try to allocated channel buffers in extended memory first, followed by 24 bit DMA memory, and lastly chip memory. If it is NOT selected, Studio 16 will not put channel buffers in extended memory.

You should select this button if your hard disk controller and '030/'040 processor are on the same PCB. (e.g. You have a stock A3000, or you have a GVP combo card.)

You should not select this button if you have an '030 or '040, but your hard disk is on a stand alone Zorro II card. (e.g. You have a GVP series II DMA hard disk controller and a PP&S 040 card with 32 bit RAM.)

Your Amiga has three types of memory:

Chip Memory
Memory that is directly accessible by the Amiga's custom chips.

24 Bit DMA Memory
Memory within the first 16MB of an address range. This kind of memory is directly accessible by Zorro II DMA hard disk controllers.

Extended Memory
Memory beyond the first 16MB of an address range. This type of memory is usually on an accelerator card, or on the motherboard of the A3000/A4000. This memory can not be directly accessed by Zorro II DMA hard disk controllers.

Studio 16 allocates "Channel Buffers" in RAM when playing a sound. Data is buffered there on its way to or from the hard disk. For efficient data transfer, DMA hard disk controllers need direct access to these buffers. This means that if you have a Zorro II AutoConfig DMA hard disk controller, your channel buffers can not reside in extended memory. This is because Zorro II cards can not DMA into extended memory.

Channel Buf

The Channel Buffer specifies how much RAM you want to use for buffering each sound that plays back. When playing back multiple sounds simultaneously, a channel buffer is allocated for each playing sound.

If you have less than 3 MB of RAM, reduce the default channel buffer size from 256K to about 64K. You may want to increase the default channel buffer size if you have a slow hard disk, or you encounter "skipping" while playing sounds. See the Chapter 7-Troubleshooting for information on skipping.

Keep in mind that one channel buffer is allocated for each playing sample. Make sure you have enough system RAM to cover your requested buffers. The chart below lists the RAM used by a specific number of playback samples. For example, if you plan to play four simultaneous tracks with the channel buffer set to 4096K, you will need 16,384K (or 16 MB) of free RAM just for buffers.

The default setting (256K) is adequate for most systems.

Channel Buf Size	RAM Usage by a Specific Number of Tracks Playing Simultaneously							
	1	2	3	4	5	6	7	8
128	0.1MB	0.3MB	0.4MB	0.5MB	0.6MB	0.8MB	0.9MB	1.0MB
256	0.3MB	0.5MB	0.8MB	1.0MB	1.3MB	1.5MB	1.8MB	2.0MB
512	0.5MB	1.0MB	1.5MB	2.0MB	2.5MB	3.0MB	3.5MB	4.0MB
1,024	1.0MB	2.0MB	3.0MB	4.0MB	5.0MB	6.0MB	7.0MB	8.0MB
2,048	2.0MB	4.0MB	6.0MB	8.0MB	10.0MB	12.0MB	14.0MB	16.0MB
4,096	4.0MB	8.0MB	12.0MB	16.0MB	20.0MB	24.0MB	28.0MB	32.0MB

Figure 8-89. Channel Buffer Size RAM Requirements

Copy Buffer Size The Copy Buffer specifies how much memory to use in many Edit, Save, and Load operations. The larger the CopyBuffer, the quicker these operations will occur. The default is 32K. (This setting is not related to the CopyBuffer sample created during destructive edits.)

Record Format

When a sample is recorded it is usually stored in the Studio16_2.0 file format. This is the default format selected in Preferences. If your file is to be exported to another sound program you can convert it to another file format in Sample List. You can also record it direct to disk in that format.

When converting files to eight bit formats, you will decrease the size of the file by half, and you will also lower its fidelity. However, if you are working with samples that don't require a high Signal-to-Noise Ratio, (e.g. explosions, crashes. etc.) converting them to an 8 bit format will save disk space and still allow you to play

them simultaneously with your 16 bit samples, assuming they were recorded at the same rate.

Available file formats are:

Studio 16_2.0 — Studio16_2.0 is a 16 bit format, similar to AIFF, but it appends special data that keeps track of non-destructive edits and regions. Note that even though the AD1012 records with 12 bits of resolution, it stores files using 16 bits. This format was not altered for the 3.0 release of Studio 16.

Studio16_1.0 Format — The original Studio 16 format, similar to Studio16_2.0 but does not support regions.

AIFF 16 bit Format — This is a standard file format for 16 bit files. Studio 16 edits, loads, and saves sounds with 16 bit files. AIFF is very common on the Macintosh, and is used by some Amiga software.

AIFF 8 bit Format — This is an AIFF format that only uses 8 bits. If you record in this format, you will lose sound quality since you are dropping bits. However, the file's size will be about 50% smaller.

IFF 8SVX Format — This is a very common Amiga 8 bit digital sound format. Files recorded in this format can be loaded into 8 bit sound editors, such as Perfect Sound or Audition 4. If you convert from 16 bits to this format, you will lose sound quality since you are dropping bits. However, the file size will be reduced by half.

RAW Format — This stores raw sample data in two's complement binary form. The first sample will be in the first word of the file (each sample is 16 bits), the second sample will be in the second word (third and fourth bytes), etc. This format is not generally recommended, except perhaps for use by programmers who want a simple file format to load.

Record Path — Is selected in the Sample List. A display is shown in Preferences.

Free — The displayed number next to Free: is the number of available megabytes in the selected record path.

Quit

Keyboard Shortcut: ^Q

Class: Project Module

Description: Select Quit, from the Project Menu when you want to end your Studio 16 session. A requester will appear to verify you want to quit. To save the current window arrangement and Preference settings, select Save Setup from the Project Menu before quitting.

NOTE If you have recorded into RAM, be sure to move your samples to hard disk before turning off your Amiga.

Recorder

Keyboard Shortcut: ^ R

Class: Application Module

Description: The Recorder Module allows you to monitor incoming audio, adjust the gain, filter and sampling rate, and record audio to hard disk.

The Meter Module is often used in conjunction with record. By evaluating the input levels on the meters, the gain level is easier to adjust.

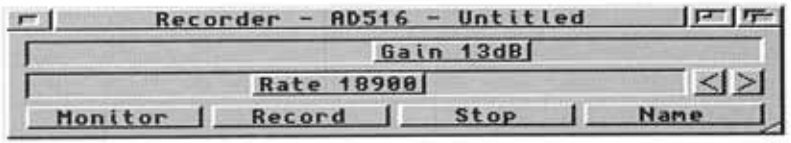

Figure 8-90. AD516 Recorder

Procedure

Record a Sound With the AD516 or AD1012

1. Set up your audio connections as mentioned in Chapter 2 - Installation .
2. Launch Recorder, Mixer and Meter from the Applications Menu, ^R^M^V.
3. AD516 ONLY - From the Recorder Menu, select Input L and Input R to record a stereo sample.
4. AD1012 ONLY - Record a mono sample, by selecting Input.
5. Click **Monitor** in the Recorder.
6. With **Monitor** activated, you will be monitoring the audio input. This means the audio entering the "audio in" jacks is being digitized and passed back out the "audio out" jacks. The sound is being digitized, but not stored on your hard disk.
7. With monitor on, you should be able to hear your audio source, and you should see activity in the Mixer and Meters. If this doesn't occur, check your audio sources and connections. Check the Mixer input and output level, they should both be at +00dB.

   The Mixer has a scrolling graph for each channel. When Monitor is turned on, you will see activity in the Mixer's input and output channel.

NOTE **AD516 ONLY** - If you are recording in stereo. The scrolling graph will usually be symmetrical, the recorder is digitizing both the left and right channels. Unplug the audio from the left channel to see the result of a mono sample on the scrolling graph.

8. Once you are hearing audio, and see activity in Mixer and Meters you can adjust the **Rate** and **Gain** controls in the record window. (A detailed description follows in gadget reference.)
9. Click the **Name** button to assign a name for the sample you are about to record. When prompted, type in the name and hit return.
10. When you are ready to record, click the **Record** button. A Record Status Display will appear with the size of the sample being recorded and the remaining disk space available in the record path, and the SMPTE start time if SMPTE was coming into the AD516 during the recording.
11. Click the **Stop** button to stop recording.
12. Check Sample List for the new sample.
13. Play the sample by selecting the sample's name in Sample List and hitting *A*-P.

NOTE **AD516 ONLY** - A stereo sample will appear in the Sample List as two samples, like: Untitled_L, and Untitled_R. Play both channels by selecting both samples in Sample List. Shift clicking will enable you to select both of them, hit *A*-P to play.

Gadget

Gain

The gain slider adjusts the gain of the card's internal input amplifier. This is similar to a "record level" on a tape deck. You generally want to keep the gain as high as possible without causing "clipping". Clipping occurs when the input signal exceeds the analog to digital converter's range. You can see clipping on your input meters and Mixer. In the Meters, it shows up in two ways: the digital VU meter in the meter window will hit the far right side and turn another color at the end. You can also see clipping when the scrolling waveform touches the top and bottom of its box often. In the Mixer, the peak indicator over the scrolling graph will flash. Clipping causes distortion in your recorded audio and should be avoided by reducing the gain.

The gain level required varies from device to device. Also, when adjusting the gain, you may hear small, rapid clicks. This is called "zipper noise" and is normal on the AD1012. On the AD516, monitoring will stop while you are adjusting gain.

There is a big difference between GAIN and VOLUME in Studio 16. The gain setting adjusts the gain on analog amplifiers before the Analog to Digital converter. Volume settings (as in the mixer) use the DSP to digitally attenuate or amplify a track. When recording a new sample, you should set the Mixer volume sliders to +0dB, and adjust the gain for

full scale. You can always lower the volume on playback. For maximum Signal-to-Noise Ratio, you should always record at full scale, 0dB.

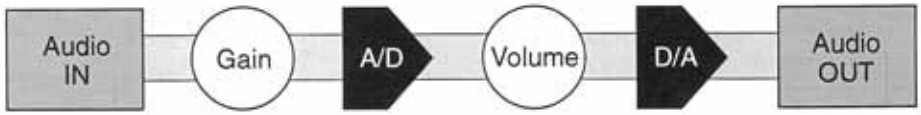

Figure 8-91. Gain Versus Volume

If adjusting the gain level has no effect on the audio level, refer to Chapter 7 - Troubleshooting.

Filter

This feature is only available on the AD1012. It sets the -3dB cutoff point of the 8th order low pass anti-aliasing filters of AD1012. There are two filters: one on the input and one on the output. Both are always set to the same frequency. Preferably, this filter should be set to half the sampling rate, but you can vary it for different effects.

NOTE **AD516 ONLY** - The AD516 has a much sharper digital filter. It's always set to 45% of the sampling rate.

Rate

This sets the sampling rate for use by **Monitor** and **Record**. For example, 44100 Hz (44.1 KHz) is the sampling rate used by CD players and gives a theoretical 22KHz frequency response. The theoretical frequency response of digitized audio is half the sampling rate.

Studio 16 can record sound at many different sampling rates. The faster the sampling rate, the better the frequency response of the recorded signal. Unfortunately, with faster sampling rates, more disk space is used. And just as importantly, faster sampling rates mean faster data transfer rates. As a general rule of thumb, with a 44KHz sampling rate, you will use 5MB per minute of audio per channel. See the space requirement chart in Chapter 4.

As you move the rate slider, the sampling rate will change to a new value. The AD516 and AD1012 only have certain distinct rates available--set by the card's master clock. In other words, the cards can not sample at any arbitrary rate. Instead, you must select a rate from the predetermined rates available. (For the AD1012 these rates are determined by the formula: RATE = 10,000,000 ÷ x, where x can range from

122 to 1320. The number 10,000,000 is derived from the DSP's 10MHz master clock.) The **Rate** slider will show you all available rates.

Users often feel the need to use a 44K sampling rate since it is the CD standard. But, if your final distribution media isn't a CD, there's not much point in using that fast of a sampling rate. Often, a 30K-32K sampling rate is just as good for material that will end up on tape. While monitor is on, try adjusting the rate slider and listening to the effect it has on audio quality. Pick the lowest rate that gives you acceptable audio quality. Once you pick a rate you should try to record all your samples at the same rate. This will prevent any problems when mixing samples.

There are a few situations that may require you to use lower sampling rates:

- Your hard disk is full
- Your hard disk is skipping during playback
- Your screen flashes

See Chapter 7 - Troubleshooting - for more information.

Monitor Click this button to begin monitoring the Audio going into the A516 or AD1012. To adjust the level of the **Monitor**, you can load a Mixer and adjust the monitor or input channel by sliding the associated bar up or down.

Record Click this button to start recording.

Stop The Stop button is clicked to stop recording. The hard disk light may continue to flash for 1-20 seconds. This is normal and is dependent on your channel buffer size and hard disk speed.

Auto Filter Only available on the AD1012. Activating Auto Filter will cause the Filter Value to "track" the Sampling Rate at the preferred relationship of: Filter Rate =1/2 Sampling Rate. Changes in the Sampling Rate will automatically cause the Filter rate to update as long as auto filter is activated.

The AD516's low pass filter is always set to .45 times the sampling rate

Name This button must be selected to name a sample before making a recording. The default setting is Untitled. If the sample name has already been used, Studio 16 will append a number

to the new recording. To change a name of a sample after is has been recorded, you can use the Rename option in the Sample List Menu.

NOTE Do not use a greater than symbol (>) in a sample name. It is reserved to delineate regions.

Recorder Menu

The Recorder Menu allows you to select the input and output channel(s) to record. If you are recording in mono, select either Input L or Input R. For stereo, activate both channels. You may also select Output L or Output R.

If you have multiple cards installed, you can record more than 2 channels simultaneously.

Handler Menu

This menu only appears if you have more than one AD516 or AD1012 installed, it allows you to select which card the recorder settings will affect.

Sample List

Keyboard Shortcut: ^ O

Class: Application Module

Description: The Sample List contains lists of your samples by directory. You can play, rename, delete, and edit from Sample List. Launch the Sample List by selecting it from the Applications Menu, or type ^ O.

A sample in the Sample List is a digitized sound on your hard disk. Since Studio 16 always works with files on the hard disk, it is a little different from most programs. For example, there is no need to save each sound before you quit. If you quit Studio 16, then re-run it later, all your sounds in the Sample List will still be there. Of course, if you have your samples in RAM:, your samples will be lost when you turn off your Amiga unless you save them to disk.

All the samples in the Sample List are draggable to the Cue List. As are the regions that can be displayed in Sample List (activate Show Regions in the Sample List Menu).

All the Sample List Menu options can be executed on multiple samples. Select multiple samples by holding down the shift key, and clicking on the Samples' names.

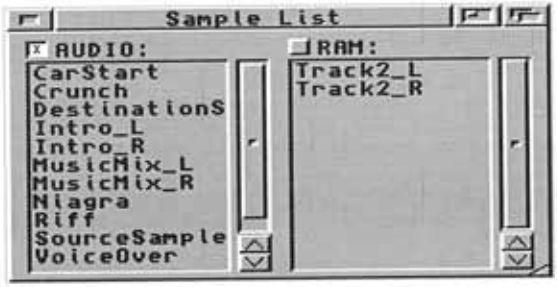

Figure 8-92. Sample List

Gadget

Record Path The record path is the directory where samples will be recorded to. It is indicated by an active box next to the directory name. To change the record path, add another path (menu option) and then click the active box next to the new directory's name.

Sample List Menu

Play Sample Select this option to play a sample. Select multiple samples by shift clicking. When playing back multiple samples, the sampling rate must be the same for all samples. A single AD516 is limited to a maximum of 8 simultaneous samples, the AD1012 is limited to a maximum of 4.

NOTE **AD516 ONLY** - A stereo sample will appear in the Sample List as two samples, like: Untitled_L, and Untitled_R. Play both channels by selecting both samples in Sample List. Shift clicking will enable you to select both of them, hit *A*-P to play.

To adjust the volume and pan of samples while they play, load the Mixer from the Applications Menu and make level adjustments in real-time.

Stop Playback To stop playing sounds, select the Stop Playback item, (*A*-S).

Rename Sample The **Rename** option allows you to change the name of samples in Sample List. Select one or more sample names so that they are highlighted. Select the **Rename** Samples option. For each sample selected, a requester will appear asking you to type in the new name for the sample.

Delete Sample To remove a sound permanently from your hard disk and the Sample List, select its name in the Sample List then select the Delete option. This will delete the file.

WARNING There is no way to recover a sample deleted in Sample List or the Cue List.

Convert Sample This option allows you to convert the file format of a sample to an alternate format. Once a Studio16_2.0 sample has been converted to another format, it can still be accessed by Studio 16, but any region parameters and/or SMPTE start times that were associated with it may be lost.

When converting samples to eight bit formats, you decrease the size of the file size by half, and you also lower its fidelity. However, if you are working with samples that don't require a high Signal-to-Noise Ratio, (e.g. explosions, crashes. etc.) converting them to an 8 bit format will save disk space and still allow you to play them simultaneously with your 16 bit samples, assuming they were recorded at the same rate.

Available file formats are:

Studio 16_2.0 Format
Studio16_2.0 is a 16 bit format, similar to AIFF, but it appends special data that keeps track of non-destructive edits and regions. Note that even though the AD1012 records with 12 bits of resolution, it stores files using 16 bits. This format was not altered for the 3.0 release of Studio 16.

Studio16_1.0 Format
The original Studio 16 format.

AIFF 16 bit Format
This is a standard file format for 16 bit files. Studio 16 edits, loads, and saves sounds with 16 bits. AIFF is very common on the Macintosh, and is used by some Amiga software. AIFF does not remember regions or non-destructive edits.

AIFF 8 bit Format
This is an AIFF format that only uses 8 bits. If you convert to this format, you will lose some sound quality since you are dropping bits. However, the file's size will be reduced by about half.

IFF 8SVX Format
This is a very common Amiga format for 8 bit samples. Files convert to this format can be loaded into 8 bit sound editors, such as Perfect Sound or Audition 4. If you convert to this format, you will lose some sound quality since you are dropping bits. However, if the file is a sound effect you may not notice the decrease in fidelity, and the file's size will be reduced by about half.

RAW Format
This stores raw sample data in two's complement binary form. The first sample will be in the first word of the file (each sample is 16 bits), the second sample will be in the second word (third and fourth bytes), etc. This format is not generally recommended, except perhaps for use by programmers who want a simple file format to load.

Edit Sample

Selecting a sample name then the **Edit** option will bring up the sample in an editor. See the **Edit** Reference Section for a more complete description.

Add New Path

Select this option to add another directory to the Sample List. This is especially useful if you are working with multiple hard drives or you have samples organized into multiple directories. When selected, a path requester will appear

allowing you to select a new path. Click OK to update Sample List. A maximum of eight directories can be listed at once.

Remove Path Select Remove to bring up a Remove Path requester. Only those directories currently listed in Sample List will be available for removal.

Update Path Selecting this option will update the current directories in the Sample List. This is useful if you are using a removable media drive like SyQuest, and you change cartridges, or if you are copying files from DF0 and you change diskettes.

Show Regions When activated, a region list will be added to the right of your paths. The region list will display the regions that have been selected for a specific sample. Select a sample with regions, and the names of the regions will be displayed in the region list. You can drag regions from the Sample List into the Cue List.

SMPTE Generator

Keyboard Shortcut: ^ G

Class: Application Module

Description: The SMPTE Generator module allows you to generate internal SMPTE time code. You can use the internal time code generator to drive the Cue List and the SMPTE Monitor modules.

When SMPTE Generator is opened, it automatically sets the current SMPTE Source to Internal. When you close the SMPTE generator, the default source becomes active again.

The main advantage of the internal time code generator is its ability to trigger the Cue List. Anyone can set up long audio sequences of different samples without using the editor to do destructive editing. The Cue List allows you to specify the starting time code and mix level of an unlimited number of sounds.

The SMPTE Generator does not output physical time code, or enable you to stripe tapes. SunRize's optional module, SMPTE Output, includes this feature.

Figure 8-93. SMPTE Generator

Gadget

Display The SMPTE display obviously shows the current time code being generated by Studio 16. Not so obvious is the fact the you can type directly into the display when it is stopped. Just click on the digit you want to change and type in the new number. Also, when used in conjunction with the Cue List, SMPTE Generator will update to the location of the play flag whenever it is moved.

Play This will start time code generation from the current value displayed. If Cue List has entries listed, and it's turned on, clicking play here will trigger the Cue List.

Stop This will stop (pause) the generation of time code, to continue generation click (play).

Rewind This will advance the counter at 5 × normal speed in the reverse direction. Time code is not generated in this mode.

Fast Forward This will advance the counter at 5 × normal speed. Time code is not generated in this mode.

The recommended set time is 5 seconds before the first sample triggers. This allows time for samples to preload.

SMPTE Gen Menu

Zero SMPTE Time Select this option to reset the SMPTE counter to 00:00:00:00.

Play / Stop / Rewind / FastForward These functions are explained above in the gadget section. The keyboard shortcuts for the buttons are listed next to their menu item names.

Store Menu

This menu allows you to store up to 10 preset time codes. To store a specific time code, first type in the desired frame location into the SMPTE Generator display or fastforward to the desired time. Then select a **Memory # 0-9** item from this menu or hit the right Amiga key, shift, and a number key 0-9.

Recall Menu

To recall a preset time code, simply hit the right Amiga and the number key used to store it or select a **TimeCode Recall 00:00:00:00** item.

SMPTE Monitor

Keyboard Shortcut: ^ S

Class: Application Module

Description: The SMPTE Monitor allows you to view incoming external or internal SMPTE time code. It is useful for viewing the value of external time code coming into a card. This module can allow you to do pencil edits without having to record a SMPTE window box on video tape. If you own a genlock, you can use this module to produce a SMPTE window dub. Select Hide Title Bar from the SMPTE Monitor Menu.

When used in conjunction with the Cue List, SMPTE Monitor will update to the location of the play flag whenever it is moved.

Figure 8-94. SMPTE Monitor

The SMPTE monitor displays the current time code in its window. The SMPTE monitor also looks for three types of SMPTE errors, invalid time code and SMPTE time-out and SMPTE jump. If a time code is deemed invalid by Studio 16, one of three small squares in the upper left corner of the SMPTE Monitor window will flash. It is normal for this square to flash occasionally, such as when you start and stop time code. If the square flashes constantly, check to make sure that you have set the correct SMPTE frame rate in Preferences.

From Left to Right, the squares mean:

SMPTE Time Out

No time code was detected for about 1/2 a second. Pausing your video deck will cause this.

SMPTE Time Code Error

This error is generated if an illegal time code is read by the SMPTE reader. For example, a time code with 69 seconds would generate this error. This error typically results from

distortion, usually a bad cable, a bad connection, or tape drop out.

SMPTE Time Code Jump
This error means that a discontinuity occurred in the time code. For example 00:01:00:01, 00:01:00:02, 00:03:00:12, 00:03:00:13 would cause this error. Jumps typically occur when you fast forward or rewind the time code source.

If you have multiple AD516s or AD1012s, use Preferences to select the card to be the source of time code monitored.

SMPTE Capture Procedures

SMPTE Capture allows you to determine the exact frame number of a specific event. By typing A-F when the SMPTE Monitor window is active, you can stop and start the SMPTE monitor.

1. Load SMPTE Generator and SMPTE Monitor from Applications Menu..
2. Start the SMPTE Generator by clicking **Play**.
3. IMPORTANT - Click on the SMPTE monitor window to make it active.
4. Select Freeze Display from the SMPTE Monitor Menu to capture the SMPTE Monitor display. Note that the keyboard shortcut for Freeze Display is *A*-F
5. Hit *A*-F again or select the freeze menu option to resume monitoring.

You can also capture specific time frame in the Cue List by using the TimeCode Add Option.

SMPTE Monitor Menu Procedures

Hide Title Bar

This option removes the title bar from the window. It is ideal for making a SMPTE dub onto video tape, provided you have a Gen Lock. Click anywhere on the screen to deactivate this option.

Freeze Display

This option pauses SMPTE Monitor on any time code. Use this option to locate a specific frame of video as it plays. The keyboard shortcut (*A*-F) is almost always used.

Shell Commands

The following list of Shell commands are available in Studio 16. These commands allow you to access Studio 16 samples and SMPTE time code without loading the Studio 16 Program.

- Studio16 - Load Studio 16
- StudioClose - Remove Studio 16 Modules from Memory
- StudioOpen - Open Library and Load Studio 16 Device Drivers and Utilities
- StudioPlay - Play Sounds from AD516 without loading Studio 16
- StudioQuery - Display SMPTE Time Code
- StudioStop - Stop Currently Playing Sounds
- StudioWait - Wait for Specified SMPTE Time to Occur

Studio16

Class: Shell Command

Format: Studio16

Description: The Studio16 command is used to launch the Studio 16 environment. After Studio 16 loads itself, it will display an About window containing the program revision number and other specifications about your setup.

The Studio 16 Screen Option allows you to specify which screen Studio 16 opens its modules on.

Procedures

Opening Studio 16 on a WorkBench Screen

Loading Studio 16 to a WorkBench screen allows you to take advantage of monitors with higher resolution that only work with WorkBench. From Shell, type:

```
cd Studio16_3:
Studio16 Screen WorkBench
```

You should change your WorkBench screen to 8 colors using WorkBench preferences.

Opening Studio 16 on any Screen

Open Studio16 on any screen by using the above command, but replace WorkBench with the first few letter of the alternate screen's title. The title is located in the upper left corner on the screen's title bar.

Example: If you have an application who opens a screen with the text "ABC Software Corp. (c) 1992" in the title bar, you could cause Studio16 to open onto this screen by typing:

```
cd Studio16_3:
Studio16 Screen ABC
```

Studio 16 prefers an 8 color screen, but it will try to open on anything. Also, the color mapping of the screen's application may not match Studio 16's.

StudioClose

Class: Shell Command

Format: StudioClose

Description: StudioClose is a Shell command that removes all Studio 16 modules from memory. It's just like selecting Quit. See StudioPlay for an illustration.

StudioOpen

Class: Shell Command

Format: StudioOpen <ModuleName>

ModuleName represents the name of a Studio 16 module. (Optional Parameter)

Description: StudioOpen is a Shell command that will open the Studio16 library and load device drivers and utilities plus an optional Studio 16 module into memory. See StudioPlay for an illustration.

StudioPlay

Class: Shell Command

Format: StudioPlay <SampleName>

SampleName represents the name of a Studio 16 sample. (It should be a complete path, i.e. Audio:DoorBell)

Description: A Shell command that allows you to play sounds from the AD516 without loading Studio 16. It may also be used to incorporate 16 bit samples in your own programs.

Procedures

Playing Multiple Sounds

If you plan to do multiple StudioPlay commands, and if you want to maximize the speed at which they respond, you can use the following sequence:

```
StudioOpen
StudioPlay <SampleName>
StudioPlay <SampleName>
StudioClose
```

The command **StudioOpen** will load Studio16 device drivers to RAM. **StudioClose** removes them.

StudioQuery

Class: Shell Command

Format: StudioQuery

Description: StudioQuery will display the current SMPTE time code in the format HH:MM:SS:FF. For a quicker response, precede the command with StudioOpen, and follow it with StudioClose. See StudioPlay for a similar example.

StudioStop

Class: Shell Command

Format: StudioStop

Description: StudioStop is a Shell command that can used to stop currently playing sounds from the Shell.

StudioWait

Class: Shell Command

Format: StudioWait *HH:MM:SS:FF*

Description:

StudioWait will wait for a specified SMPTE time to occur. This is useful for synchronizing SHELL or AREXX scripts, AmigaVision, CanDo, and other programs with SMPTE time code. To use StudioWait in a program, that program must be capable of executing a DOS or SHELL command. StudioWait can be interrupted with a ^C or the 'break' AmigaDOS shell command. StudioWait loads the device drivers when it is first executed. For maximum response, you can use the sequence:

```
StudioOpen
StudioWait <time code>
StudioWait <time code>
StudioClose
```

Time

Class: Application Module

Description: The Time module displays the current system time of your Amiga. This module is resizeable which makes it easy to place on the Studio16 screen. Refer to you Amiga manual for instructions on setting the system time.

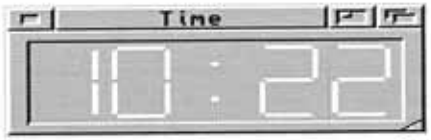

Figure 8-95. Time

Tiny Mixer

Class: Application Module

Description: This module controls the volume of each of the playback channels as well as the input and output channels. The volume may be changed before, during, or after sample playback. The input volume slider is used to control the volume of the monitor channel. That is, the amount of sound passing from the input of the card to the output of the card. Use a mixer when you need to adjust a sample's volume in real-time.

The Tiny Mixer features digital volume controls with a range from +6dB to -40dB in 1dB increments and -00dB (-∞ or, no volume).

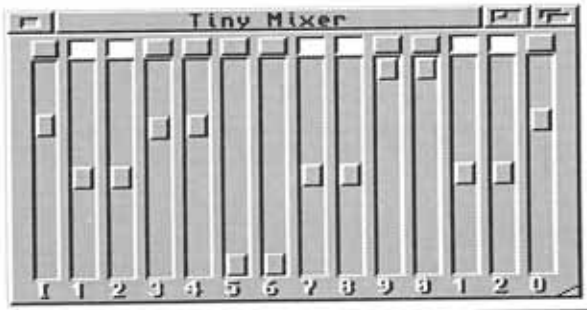

Figure 8-96. Tiny Mixer

The Tiny Mixer has two advantages over the main Mixer:

- Tiny Mixer takes up less memory and CPU processing time than the standard Mixer module. It should be used on smaller or slower computer systems.
- Tiny Mixer can be resized to fit just about anywhere on a crowded Studio16 screen and easily displays more than six channels.

NOTE AD516 ONLY - The Tiny Mixer does not have a pan adjustment.

Tiny Mixer Menu

The only menu option for Tiny Mixer contains the channel selector. Use your mouse to select which channels to show in the mixer.

Utility

Class: Utility Module

Description: Utility is responsible for loading and saving files and is used when playing sounds. It does not require user access.

Technical Support

If you have any problems with your Studio 16 system, please note the following instructions.

1. If you have a read/write error on your installation floppy disks, call SunRize for replacement.
2. Check the **Read_Me** file in the Studio 16 directory. This file contains recent developments and updated information that is not included in this manual.
3. Read Chapter 7 - Troubleshooting.
4. If you suspect a malfunctioning AD516 or AD1012, call SunRize for instructions.

NOTE When calling SunRize for technical support, please have the Studio 16 software version and your serial number handy. The software version is displayed in the About window. Your serial number is on the first page of this manual.

SunRize Industries Technical Support can be reached at (408) 374-4962. Technical Support is available Monday through Friday from 9:00 a.m. to 5:00 p.m. PST.

U.S.A.

SunRize Industries
2959 Winchester Blvd., 2nd Floor
Campbell, CA 95008 USA
Tel: (408)-374-4962
Fax: (408)-374-4963

European users may contact their local distributor for technical support.

Australia

AmiTech
P.O. Box 343
Shop 9/2A Surf Road
Cronella, NSW 2230
Tel: +61 (02) 544-1874
Fax: +61 (02) 544-1873

Benelux (Belgium, Holland, & Luxembourg)	**Take 1 Productions** Ganzeweide 167 6413 GD Heerlen 3 The Netherlands Tel: +31 (045) 22578 Fax: +31 (045) 212263
Brazil	**Beija-Flor Production Arts** Rue Bambina 134/705 BL-01 Rio De Janeiro, CEP 22251 Tel: +55 (21) 246-1992 Fax: +55 (21) 240-9567
Canada	**North American Software** 6184B Kestrel Rd. Mississauga, ONT L5T 1Z2 Tel: (800) 468-4300 Fax: (416) 795-0844
Denmark & Finland	**Broadline Oy** Vanha Porvoontie 295 Vantaa, SF 01260 Tel: +358 (90) 8747 900 Fax: +358 (90) 8744 944
France	**Storm Media Productions** 83 Rue du Chemin, Vert Paris, 75011 Tel: +33 (01)43 57 46 57 Fax: +33 (01) 48 05 75 53
Germany	**Advanced Systems & Software** Hamburger Landstraße 412 6000 Frankfurt 50 Tel: +49 (069) 5 48 81 30 Fax: +49 (069) 5 48 18 45
Italy	**Applied Peripherals & Software** Vio Giovanni XIII, 37 33040 Corono di Rosozzo, Udine Tel: +39 (0432) 759264 Fax: +39 (0432) 759264

Mexico

ALMEX Electronica
Cordoba No. 49, 5° Piso
Col. Roma
06700 Mexico, D.F.
Tel: +52 (5) 208-9292
Fax: +52 (9) 208-9677

Norway

FAMO
Kobenhavn GT. 15
0503 Oslo
Tel: +47 (22) 381 205
Fax: +47 (22) 357 797

South Africa

ML Systems
PO Box 95275
Waterkloof 0145
Tel: +27 (12) 346-1160
Fax: +27 (12) 346-1334

South Korea

Amea Corporation
140, Sam Heung Office Building
Yeoksan-Dong, Kangmam-Ku
Seoul
Tel: +82 (2) 564-4966
Fax: +82 (2) 564-7650

Spain

PiXeL SOFT
Felipe II, 3 BIS
34004 Palencia
Tel: +34 (079) 71 27 00
Fax: +34 (079) 71 28 28

Sweden

Karlberg & Karlberg
Flädie Kyrkväg
S-237 91 Bjärred
Tel: +46 (046) 474 50
Fax: +46 (046) 471 20

Switzerland

Octave 2
Bahnhofstrasse 2
2542 Pieterlen
Tel: +41 (032) 872429
Fax: +41 (032) 872482

Taiwan

Vivid Image Center
No. 56 Lane 25 Sung-Teh Rd.
Taipei
Tel: +886 (02) 759-1371
Fax: +886 (02) 727-1235

United Kingdom

Power Computing Ltd.
Unit 8, Railton Rd.
Woburn Road Industrial Estates
Kempston, Bedford MK42 7PN
Tel: +44 (0234) 843 388
Fax: +44 (0234) 840 234

White Knight
PO Box 2395
Waltham Cross, Herts, EN8 7HQ
Tel: +44 (0992) 714-539
Fax: +44 (0992) 714-539

Hardware Specifications

AD516	AD1012
5 tracks with 68000 at 44KHz	1 tracks with 68000 at 44KHz
8 tracks with 68030 at 44KHz	4 tracks with 68030 at 44KHz
Simultaneous Record and Playback	Simultaneous Record and Playback
Frequency Response 15Hz - 22KHz (-3dB)	Frequency response 20Hz - 20KHz (-3dB)
ADSP 2105 sound coprocessor (rated at 10MIPS, 100ns instruction execution time	ADSP 2105 sound coprocessor (rated at 10 MIPS, 100ns instruction execution time)
LTC SMPTE time code reader (24,25,29.97,30 fps, drop and non-drop)	LTC SMPTE time code reader (24,25,29.97,30 fps, drop and non-drop)
Dual 16 bit delta-sigma A/D converters with digital anti-aliasing filters	12 bit linear analog-to-digital converter with sample and hold
Dual 16 bit delta-sigma D/A converters with digital anti-aliasing filters	12 bit linear digital-to-analog converter with FIFO buffer
64 times oversampling	Two eighth order anti-aliasing filters
14 different sampling rates from 5.5KHz to 48KHz	Adjustable sampling rate up to 48KHz
> 85dB Dynamic Range	>70dB Dynamic Range
THD+N < .0095%	THD+N < 0.04%
Stereo RCA jacks for unbalanced line level (2 Volt RMS) audio inputs and outputs	Mono RCA jacks for unbalanced line level audio input and output
Input resistance 50K	Input resistance 50K

AD516	AD1012
Output resistance < 1 ohm	Output resistance < 1 ohm
Input digital gain levels: 16	Input digital gain levels: 100
256K of fast static RAM	64K of fast static RAM, expandable to 256K
8K of ROM	8K of ROM
Zorro II AutoConfig card	Zorro II AutoConfig card
Dimensions: 13.3 x 4.2 inches	Dimensions: 13.3 x 4.2
Power supplied by Amiga	Power supplied by Amiga
List Price $1495	**List Price $595**

Third Party Sources

This appendix contains a list of third party products that you may find useful when using Studio 16. SunRize does not recommend any of these suppliers, they are provided for your convenience only.

SMPTE VITC to LTC Translator

Horita
VLT-50
P.O. Box 3993
Mission Viejo, CA 92690
(714) 489-0240

MIDI to LTC Converter

MidiMan
30 N. Raymond
Pasadena, CA 91103
(818) 449-8838

SMPTE LTC Generator

SunRize Industries
SMPTE Output
2959 Winchester Blvd., 2nd Fl.
Campbell, CA 95008
(408) 374-4962

MIDI Sequencer

The Blue Ribbon SoundWorks, Ltd.
Bars&Pipes Professional
1605 Chantilly Dr., Suite 200
Atlanta, GA 30324
(404) 315-0212

Multi-Media Authoring Software

SCALA, Inc.
MM3000, Infochannel
2323 Horse Pen Rd., Suite 202
Herndon, VA 22071
(703) 713-0900

Non-Linear Video Playback

DPS, Inc.
Personal Animation Recorder
11 Spiral Drive, Suite 10
Florence, KY 41042
(606) 371-5533

AREXX Sequencing Software

ASDG, Inc.
T-Rexx Professional
925 Stewart Street
Madison, WI 53713
(608) 273-9240

Video Effects Generator

NewTek Inc.
Video Toaster
1201 SW Executive Dr.
Topeka, KS 66615
(800) 847-6111

VHS Deck Modification

Allowing simultaneous access to Hi-Fi and Linear audio tracks. Decks include AG-1960.

Carlson-Strand Company
152 Calle de las Molonias
San Clemente, CA 92672
(714) 492-8978

MIDI Controllers

JLCooper
FaderMaster
12500 Beatrice St
Los Angeles, CA 90066
(310) 306-4131

Peavey
PC 1600
7-11 A Street
Meridian, MS 39310
(601) 483-5365

Audio-for-Video Mixer

Mackie Designs
MicroSeries 1202
12230 Woodinville Drive
Woodinville, WA 98072
(800) 258-6683

Production Music

Killer Tracks
6534 Sunset Blvd.
Hollywood, CA 90028
(213) 957-4455
(800) 877-0078

Philadelphia Music Works
P.O. Box 947
Bryn Mawr, PA 19010
(215) 825-5656
(800) 368-0033

Valentino
500 Executive Blvd.
Elmsford, NY 10523
(212) 869-5210
(800) 223-6278

Sound Effects Libraries on CD

Hollywood Edge
7060 Hollywood Blvd. #1120
Hollywood, CA 90028
(213) 466-6723
(800) 292-3755

Sound Ideas
105 West Beaver Creek Rd., Suite #4
Richmond Hill, Ontario L4B 1C6
CANADA
(416) 886-5000
(800) 387-3030

Removable Media Drives

SyQuest Technology
47071 Bayside Parkway
Fremont, CA 94538
(800)-245-2278

Iomega Corporation / Bernoulli
1821 West Iomega Way
Roy, UT 84064
(801) 778-3000
(800) 456-5522

Magneto Optical Drives

Ricoh
3001 Orchard Parkway
San Jose, CA 95134
(800)-955-3453

Panasonic Accessories and Systems
2130 Townline Rd.
Peoria, IL 61615
(800)-742-8086

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2959 Winchester Blvd., 2nd Floor
Campbell, CA 95008