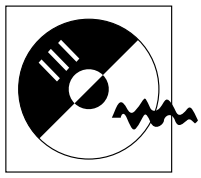

SONIC SOLUTIONS

SonicStudio 5

Digital Video Option

(SS-518)

SonicStudio 5, Digital Video Option (SS-518)

Written and designed at Sonic Solutions, 101 Rowland Blvd., Novato, CA. 94945, USA

Printed in the USA

Sonic Part Number 820006C (12/96)

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About the Sonic Digital Video Playback Option

The Sonic Digital Video Playback Option is a software plug-in for SonicStudio™ that integrates supported third-party digital video boards with SonicStudio workstations. Designed for audio post-production in film and video, it enables you to record and play back full-motion, digital video from within SonicStudio software.

With the Sonic Digital Video Playback Option, you can perform the following:

- Record multiple channels of equal to or less than 24-bit audio and broadcast-quality video simultaneously.
- Do live overdubs against random access digital video playback.
- Cue to any timecode location instantly then drop a sound file right to the frame.
- Break up a single video file into movie clips using QuickTime editing.

We think you'll find that Sonic Digital Video Playback will increase your productivity and flexibility as soon as you begin using it.

QuickTime

Starting with version 5.1, Sonic Video uses QuickTime as its native video file format. QuickTime is essentially the video "handler" for the Macintosh Operating System and is responsible for grabbing the incoming video frames from a video source, storing them in a file, then taking those frames and playing them back sequentially to your video monitor. QuickTime also incorporates audio, built-in MIDI capability, timecode support, variable resolutions, multiple frame rates and selectable compression algorithms.

QuickTime ships with several built-in "codecs," or *co*mpression-*dec*ompression algorithms. A codec is the real number-cruncher of the video capture process. Some codecs, such as the ones Apple includes, are software-only, meaning they can run on the Macintosh without additional hardware. Other codecs require hardware, but generally offer much greater performance with higher quality, higher resolution, or more frames-per-second (fps).

The key point to remember about codecs is that just because a file is a QuickTime file, that does not mean that it is playable on your particular video board. If a file was digitized using another codec on a separate hardware platforms, and your board does not support this codec, then it may not be able to "decode" the video file or, at least not at the playback rate you would like to see.

QuickTime V2.5, the latest version from Apple, does offer a certain degree of real-time translation between codecs, as well as an interchangeable Motion-JPEG codec, so it may be possible to

play back full-motion video files that were digitized using another codec. Sonic Solutions cannot guarantee that this will work for your system or situation, however. For the latest information on exchanging QuickTime V2.5 video files, check the QuickTime web page at http://quicktime.apple.com, or the SonicStudio pages at the Sonic web site at http://www.sonic.com. We will post information about our findings as we go.

Upgrading from SonicStudio V2.2.6

If you previously used the Sonic Digital Video Option with SonicStudio V2.2.6, you will not be able to use your existing video files with SonicStudio V5.1. Since Sonic video files are usually used as reference for sweetening and post and not as masters, this should not affect most users. Conversely, video files created with SonicStudio V5.1 cannot be played in V2.2.6 software.

One of the great advantages of using the QuickTime format is that SonicStudio now can exchange video files with software that utilizes the same video hardware. Many professional video editing platforms have moved to the QuickTime format, and several inexpensive but high-quality video boards are now available, often shipping with video software such as Adobe Premiere. This means that a video can be captured and edited in one application, then, using the same board either on the same computer or over a Sonic MediaNet[a] network, the file can be played in SonicStudio for sweetening, spotting, composing, scoring, overdubbing and any other audio post application.

Supported Video Capture Boards

SonicStudio V5.1 implements support for the following video capture and playback boards:

- Data Translation Media 100 qx (PCI)
- Radius VideoVision Studio (NuBus)
- Truevision Targa 2000 (NuBus and PCI)

These are the only boards that are fully supported. With the SonicStudio QuickTime engine, it may be possible to use ANY QuickTime compatible video board, such as the Targa 2000 RTX or the Radius VideoVision PCI. However, Sonic cannot guarantee any degree of performance, technical support, or continued support for any hardware other than these officially-supported boards.

Each of the supported boards uses its own codec, and offers full-motion video at resolutions up to full-screen in NTSC, PAL, or SECAM. The boards are not identical in quality or features, but it is beyond the scope of this manual to provide video quality commentary or comparison. You may wish to ask your local retailer for more information about each video board.

Setup and Configurations

This section contains information about system requirements as well as video board information.

System Requirements

The Sonic Digital Video Playback Option requires:

- A SonicStudio 2•8, SonicStudio 4•12, or SonicStudio 16•24 workstation

- A supported Macintosh (Quadra series), Power Macintosh or MacOS-compatible system
- A supported hard disk for SonicStudio audio files
- MacOS V7.5.1 or higher (7.5.3 recommended)
- QuickTime V2.1 or 2.5 (depending on video hardware)
- Hard disk configuration for digital video as recommended by your video board manufacturer.
- 32 MB RAM minimum (40 MB recommended)

For the latest information on compatible hard drives and computers, please visit the Sonic Solutions web site at:

http://www.sonic.com

or call your customer service representative at (415) 893-7000.

Sonic Digital Video is compatible with:

- MediaNet V1.5.1 or higher
- SonicStudio FX boards

For the optimum configuration, we also recommend the following software options for SonicStudio:

- Machine Control Option
- EDL Translator with Autoconform
- SonicOMF

Depending on your facility design, you may also require the following peripherals. (These items will be explained in greater detail in the next section):

- Blackburst generator for house sync
- Aardsync from Aardvark

Video Board Information

This section lists the compatibility information for each video board type. The following table describes the topics.

Board Type:	Indicates whether the expansion board is NuBus or PCI-based
QuickTime Version:	Support for either QuickTime V2.5 or 2.1
RGB Monitor Support:	Offers an output for an RGB computer monitor
Current Software:	Current supported software version for Sonic Video
NTSC or PAL Monitor:	Indicates if this monitor is configured as a MacOS finder desktop or as a video playback screen only

Radius VideoVision Studio

Board Type:	NuBus
QuickTime Version:	2.5
RGB Monitor Support:	Yes
Current Software:	2.5.1
NTSC or PAL Monitor:	Desktop

Data Translation Media 100

Board Type:	PCI
QuickTime Version	2.5
RGB Monitor Support:	No
Current Software:	1.1
NTSC or PAL Monitor:	Full Screen video playback

Truevision Targa 2000

Board Type:	NuBus
QuickTime Version	2.1
RGB Monitor Support:	Yes
Current Software:	1.3 for 68k series; 1.5.2 for PowerPC
NTSC or PAL Monitor:	Desktop or Video only

Truevision Targa 2000

Board Type:	PCI
QuickTime Version	2.5
RGB Monitor Support:	Yes
Current Software:	1.5.2
NTSC or PAL Monitor:	Desktop or Video only

Performance and Bandwidth

This table can help you to calculate how much drive space and disk performance you might need for your particular facility. The video settings are determined in the Capture Settings dialog box, accessible in the SonicStudio software. Each board has its own setting parameters, so the quality setting is relative to that board only. The quality setting determines the data rate at which the board will capture the incoming video.

Table 1-1 Quality Settings per Board

Quality Setting:	50%	75%	100%
Radius VideoVision @ half- screen	300KB	400KB	90% max.
Radius VideoVision @ full- screen	900KB	1.3MB	90% max., 1.4MB
Media 100qx @ 640 x 480	1.5MB	2.0MB	2.5MB
Targa 2000 NuBus @ half-screen	292KB	461KB	711KB
Targa 2000 NuBus @ full-screen	955KB	1.7MB	>2MB
Targa 2000 PCI @ half-screen	292KB	461KB	711KB
Targa 2000 PCI @ full-screen	955KB	1.7MB	>2MB

Rates given are per second of captured video. KB= kilobytes; MB=megabytes.

Most standalone, external hard discs bought today can write between 2-3 MB/sec continuous. However, as the data rate approaches 2 MB/sec, the number of dropped frames can increase rapidly. If you wish to record at data rates of 2 MB/sec or higher, we recommend using a SCSI accelerator and RAID configuration for the fastest throughput.

Media 100 qx: The Media 100 captures a full 640 x 480 resolution regardless of the screen setting. We recommend recording with the half-screen setting if you need the desktop space.

Radius: The Radius VideoVision Studio drops a large number of frames at 100 percent quality. These frames are not recovered or interpolated, so the movie ends up shorter than it should be. We recommend using a maximum setting of 90 percent to record in the highest possible quality.

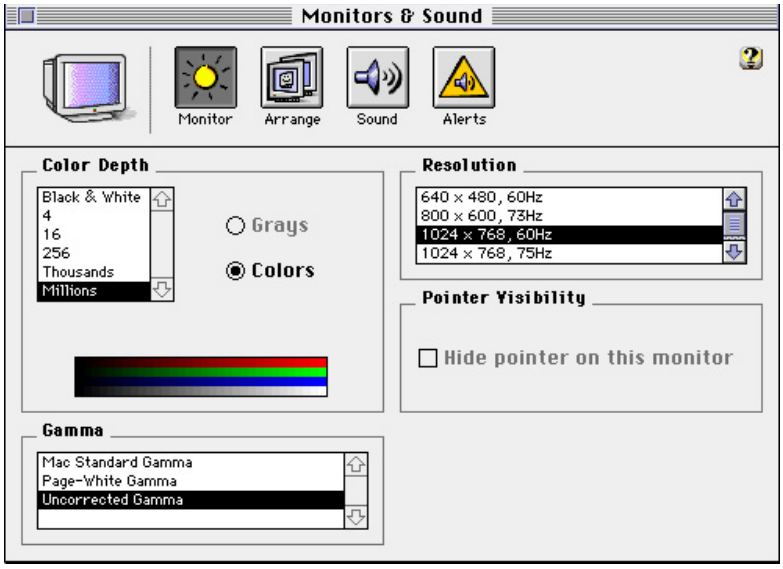
Installing Boards

Video capture boards should generally be configured in the highest priority slot in your computer, because of video demand on the CPU. Check your Macintosh owner's manual to find the priority of the slots in your particular computer.

Caution Make sure the boards do NOT touch, and always be sure to follow proper grounding procedures before installing expansion boards in your computer. For information about how to install your SonicStudio hardware, please refer to the "SonicStudio Installation and Maintenance."

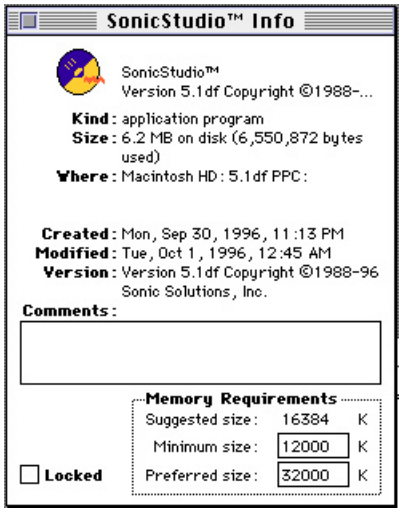
Setting Up Monitors

Set up your monitors and video board according to the manufacturer's instructions. There are a number of possible monitor configurations, including multiple RGB monitors or a single RGB with a composite NTSC or PAL monitor. With any of the video boards, the monitor displaying your digital video will have to be set for **millions of colors.** To set the monitor resolution and color depth, use the Monitors or Monitors & Sound dialog box, found in the Apple Menu.



Setting Memory

Digital video has higher memory requirements than audio alone. SonicStudio should be configured with at least 24 MB of RAM, but we recommend allocating 32 MB or more. Refer to the SonicStudio Info dialog box for more information.



Setting Memory Requirements

To set the memory requirements for SonicStudio, do the following:

STEP 1 Open the SonicStudio application on your hard drive.

STEP 2 Click it once to select it.

STEP 3 Select **File/Get Info** from the menubar.

The SonicStudio Info dialog box contains a text box titled **Memory Requirements**.

STEP 4 In the Preferred size field, enter the following:

24000k (minimum)

Data Translation Media 100: The Media 100 qx has higher memory requirements than the other boards. You will need to allocate at least 32 MB to SonicStudio when using the Data Translation Media 100 qx as the digital video board.

Machine Control

The Machine Control option for SonicStudio allows you to control a supported Video Tape Recorder (VTR) or other device using a serial RS-422 9-pin connection. This makes video loading, locating, and audio mixdown very convenient since all transport controls can be handled from within software. Refer to the "SonicStudio Reference Manual" for detailed information on machine control.

Quickstart:

To quickly set up machine control:

STEP 1 Connect the serial cable that shipped with your SonicStudio workstation to one of the following:

The Serial connector on your SonicStudio 16•24 board

or

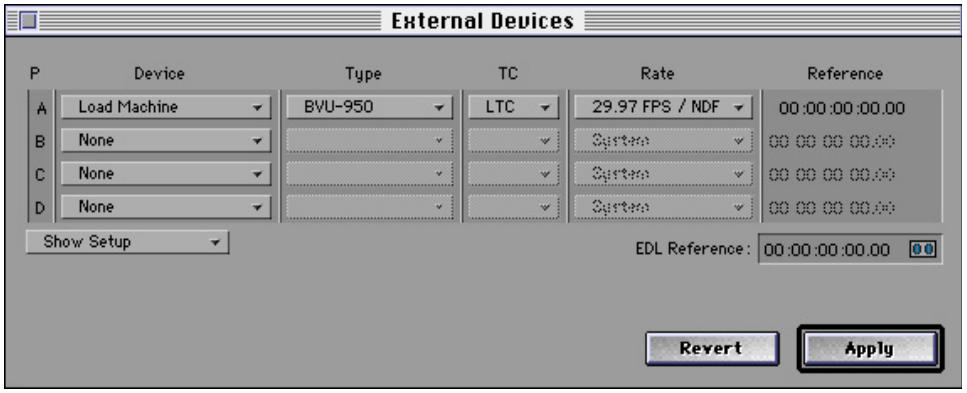
The serial port on the small, half-size, "SCSI-connector" board that came with your SonicStudio 2•8 or SonicStudio 4•12.

STEP 2 Connect Port A of the serial cable to the Remote 9-pin connection on your VTR.

STEP 3 Set the VTR to Remote (instead of Local) on the front panel of the VTR.

STEP 4 Select **Preferences/External Devices** on the menubar.

The External Devices dialog box displays. The P designates Port; four are listed vertically and are named: A, B, C, D.



STEP 5 Set Port A to **Load Machine**.

STEP 6 Press the **Apply** button. If SonicStudio does not recognize the machine, do one of the following:

STEP 7 Load a tape in the VTR

or

Select the machine type manually from the Type pop-up list.

STEP 8 Close the External Devices dialog box.

STEP 9 Select File/Transport Panel from the menubar.

STEP 10 Set **Load** as master.

STEP 11 Press Play to play the VTR from the SonicStudio Transport Panel.

If the tape does not play, refer to the "SonicStudio Reference Manual."

Timecode Reading

In order to time stamp your video and audio recordings for synchronization purposes, you will want to connect the SonicStudio timecode reader to your VTR. For more information

about this hardware and software setup, please refer to the "SonicStudio Reference Manual" and "SonicStudio Installation and Maintenance."

Quickstart:

To quickly setup for timecode reading, do the following:

STEP 1 Connect one of the following:

Connect the serial cable that came with your SonicStudio workstation to the Serial connector from your SonicStudio 16•24

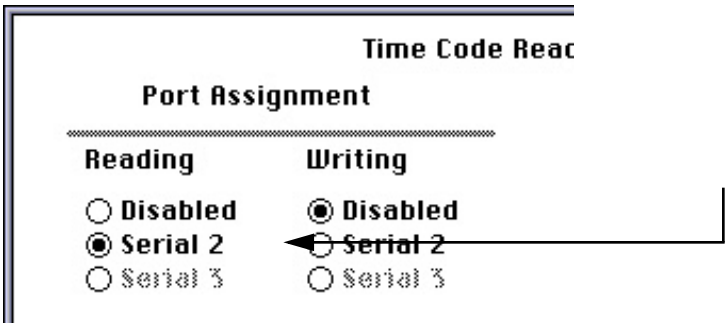
or

Connect the small, half-size board that came with your SonicStudio 2•8 or SonicStudio 4•12.

STEP 2 Connect the timecode reader (female XLR connector) to the timecode output of your VTR (this could be a dedicated timecode output from the videotape address track, or an audio output from audio channel one, depending on your tape and VTR.)

STEP 3 Open the **File**/**Preferences**/**Time Code Read/Write** preferences dialog box on the menubar

STEP 4 In the upper left hand corner, select Serial 2 to enable timecode reading. The Time Code Reader dialog box is illustrated.



STEP 5 Click the OK button.

STEP 6 Start playback on your VTR.

STEP 7 Open the **File/ Status Monitors/Timecode Status** dialog box from the menubar.

STEP 8 Select **File/Utilities/Measure TC Rate/Format** from the menubar.

Enable the Time Code Reader by clicking on Reading: Serial 2.

The incoming timecode will be measured and SonicStudio will be configured to the incoming timecode format (29.97NDF, 29.97DF, or 25fps), automatically setting your System Time Display to that format.

Synchronization Issues

Synchronization between multiple audio and video devices is an unavoidable consideration in an audio post facility. For audio and video to remain locked together from upload to playback, SonicStudio and your VTRs need to be resolved to the same clock source. Without resolving the clocks, the audio recorded into the system may not line up with the video in SonicStudio or when transferred back to tape. Minute differences in the timing between any two playback mechanisms can build up over time, resulting in a slow drifting in the sync between output signals.

The timecode that is fed to the SonicStudio timecode reader is not used for clock, but for location information. It tells SonicStudio where the VTR is or when to start playing, but is not used as a clock master. A continuous clock source is more desirable than the timecode output from a VTR because it generally provides a more stable clock and requires less lock-up time because it is always present.

To be assured that all devices lock together and stay locked over time, most facilities use a *house sync* of some kind, usually in the form of either word sync or video black, depending on the types of equipment owned and the business of that facility. This house sync

is then fed to all the devices that need to work together. The result is that all devices are now locked to a common timing source. Timecode is used to start all devices at a certain time, then they will always remain in sync because they reference the same clock master.

If blackburst video is available, you will need to convert it to word sync for input to the SonicStudio audio interfaces, all of which offer BNC-type word sync inputs. The Aardsync from Aardvark may be used for this purpose. The Aardsync will take video black and generate word sync at a host of different sample rates, including pull-up and pull-down sample rates for audio from film-to-video transfers.

If you just need to lock SonicStudio to a single VTR and you do not have common house sync source, we recommend purchasing a blackburst generator (a device that outputs a video black signal) and the Aardvark Aardsync to convert the signal into word sync.

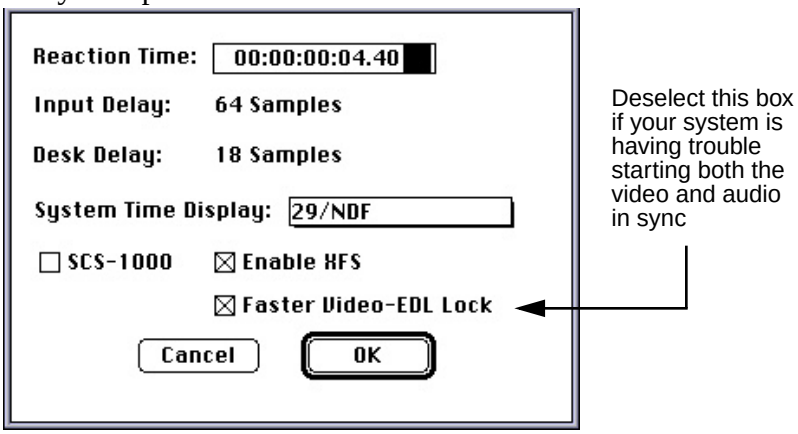
In either case, route the video signal to the Aardsync AND to the VTR external sync input, then connect the word sync from the Aardsync into the word sync input of a SonicStudio audio interface. In software, set up SonicStudio to use word sync as the clock master. Both the VTR and SonicStudio will then be resolved to the same clock source and will not drift out of sync over time.

Faster Video Lock with EDL

Important: The performance required of drives and computers for digital video is very demanding. If you find that your system is having a difficult time playing back the audio and video in sync, there are a few things you can do to correct the situation:

- Add more RAM to your host computer. There may not be enough buffer space to adequately handle the video data. We recommend this solution only after you have tried all others.

- Increase the speed of your drive subsystem. A Redundant Array of Inexpensive Disks (RAID) array with a SCSI controller card is actually the recommended setup for the Media 100 qx, but you can get away with lesser configurations for any of the supported video boards. For optimal playback and video quality, a RAID offers the best performance.
- Lower your data rate. Capturing and playing back at lower data rates can reduce the demand on your system, although the trade-off is in video quality.
- Uncheck the **Faster Video - EDL Lock** option in the **System** Preferences, located in the **Preferences** submenu in the **File** menu. The **Faster Video - EDL Lock** option defaults to ON, and is intended for systems that have fast drive configurations or lower data requirements. We have found that the Targa 2000 PCI and Media 100 qx may require the disabling of the **Faster Video - EDL Lock** option. Refer to the following figure for information on system preferences.



Recording Video

There are two ways to record video in SonicStudio:

- Record video only
- Record video and audio simultaneously

This first section describes the process of recording primarily video, but some of the same procedures will be used for audio-video recordings.

Recording Video Only

Starting a New Video Recording

Before you use these steps, make sure all your connections such as machine control, audio, video, word sync, house sync and timecode are properly setup. See the previous chapter in this manual for information on setup and configuration.

To start a new video recording, do the following:

STEP 1 Select **File/ New/ New Video** from the menubar**.**

STEP 2 When you select **New Video**, a dialog box displays and asks for a name for the video file as well as a directory and path location to save the video file.

STEP 3 Navigate to the drive and folder of your choice.

STEP 4 Enter a name or use the default name:

Sonic Movie

STEP 5 Click the Save button.

Note *Where to record the video:* Be sure to save the file to the recommended video drive, as specified by the video board manufacturer. Recording video to SonicStudio XFS mounted drives is not supported. If you are using MediaNet, you can record video-only to a mounted MOFS volume, but you cannot record audio and video simultaneously to the same or separate MOFS volumes using MediaNet.

The Movie Capture Dialog Box

The Movie Capture dialog box displays on the monitor attached to your video board, except in the case of the Media 100 qx, in which case it appears on the monitor with the highest resolution (millions of colors). SonicStudio searches up to three monitors for the screen with the best possible resolution and places the video on that screen.

If it places the Movie Capture dialog box on the wrong screen, you may want to verify that the desired video monitor is set for millions of colors.

The Movie Capture dialog box has a control bar at the bottom of the dialog box which allows you to do the following:

- Configure your movie capture settings
- Set your time stamp source
- Start time for the capture

All the functions in the control bar are also accessible in the Play menu for easy QuicKeys access.

Setting Video Resolution

When the Movie Capture dialog box appears, it remembers your last-used setting for Video Screen Size.

To set the video screen size, do the following:

STEP 1 Go to **Play/Video Screen Size** on the menubar. Quarter Screen, Half Screen and Full Screen options display.

STEP 2 Select Half Screen or Full Screen from the menubar.

The default screen size is Half Screen. You cannot record video at Quarter Screen, but any movie recorded at a larger resolution can be resized to Quarter Screen on playback if desired.

Note Screen Resolutions: Full Screen means that the movie will record or play back at 640 x 480 pixels. Half Screen is half of each dimension, equal to 320 x 240 pixels. Playback at Quarter Screen is 160 x 120 pixels. In general, recording at 320 x 240 uses one-third to one-fourth the drive space of a Full Screen record.

If you decide to record at Full Screen, two situations can occur:

- If your video monitor is at resolution *higher* than 640 x 480, then there should be room for the entire Movie Capture dialog box, including control bar and dialog box title bar.
- If your monitor is of resolution 640 x 480, there will NOT be enough room for the control bar or title bar. In this situation, SonicStudio will fill the entire screen with the video input source (except for the menubar). The control bar or title bar will not exist, and you must access commands normally found on the control bar from the **Play** menu.

Radius: The RGB monitor attached to the Radius VideoVision Studio card must be at 640 x 480 and support millions of colors.

Targa 2000: The Targa (NuBus) cannot resize movies for playback at different resolutions. (The exception to this is the Targa PCI, which has the ability to downsize on playback.) If you wish to view the movie at Full Screen upon playback, you will need to record at full screen. Movies should be played back at the resolution they were recorded at. If the movie starts playing back at the rate of about two frames per second, it is probably trying to play back at a different resolution than it was recorded.

Media 100 qx: The Movie Capture dialog box will contain a smaller window that displays the video program material, surrounded by a blue border. The small display is a function of the Media 100 qx itself and is done to assure full-motion video performance, even though the monitor is attached to the Macintosh video port, not the video board.

Other Windows

When the Movie Capture dialog box is open, make sure to relocate any other dialog boxes that may fall in front or behind the capture dialog box. SonicStudio will automatically bring the Movie Capture dialog box to the front before recording any video, but this is a good habit to get into, as conflicting dialog boxes can affect playback and record performance.

Note Make sure the Transport Panel is separate and does not overlap the Movie Capture dialog box or the movie capture will fail.

Setting the Video Input and Compression

You now must specify your video input source and compression settings. Each board has its own set of parameters that may be controlled from the Capture Settings dialog box. Refer to your video board manufacturer's manual for detailed information on any of the parameters in the Settings dialog box.To configure your capture settings, do the following:

STEP 1 Do one of the following:

Click **Settings** on the Movie Capture dialog box control bar

or

Select **Play**/**Capture Settings** on the menubar.

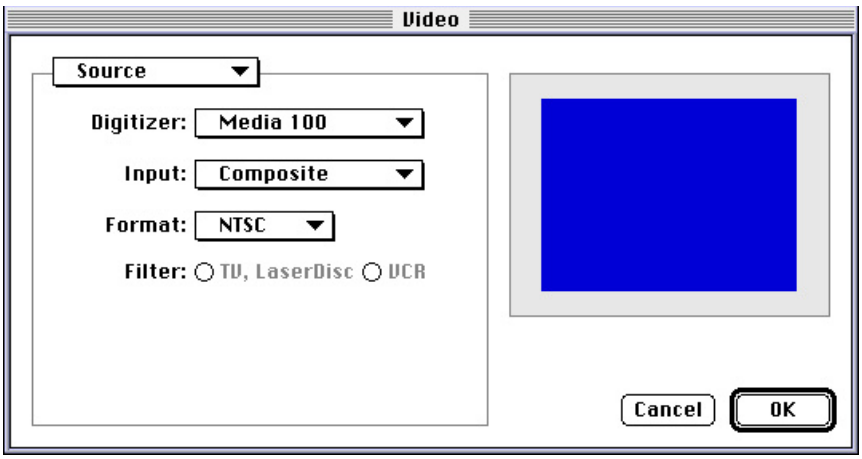
The Capture Settings dialog box displays.

STEP 2 Select your Source by choosing **Source** from the **Settings** pull-down menu.

You can specify the input format (NTSC, PAL, or SECAM) and the source (Composite, S-Video, component, etc.)

STEP 3 Using the pull-down menu again, go to the **Compression** section of the Capture Settings dialog box. Here you will specify the quality level (see the chart in video configurations for data rates at various quality settings), the number of frames per second, and the compressor codec.

After experimenting, you will know which quality levels are satisfactory for your work. We recommend running several small tests with different screen sizes and quality settings to determine the optimal settings for your work and drive configuration.



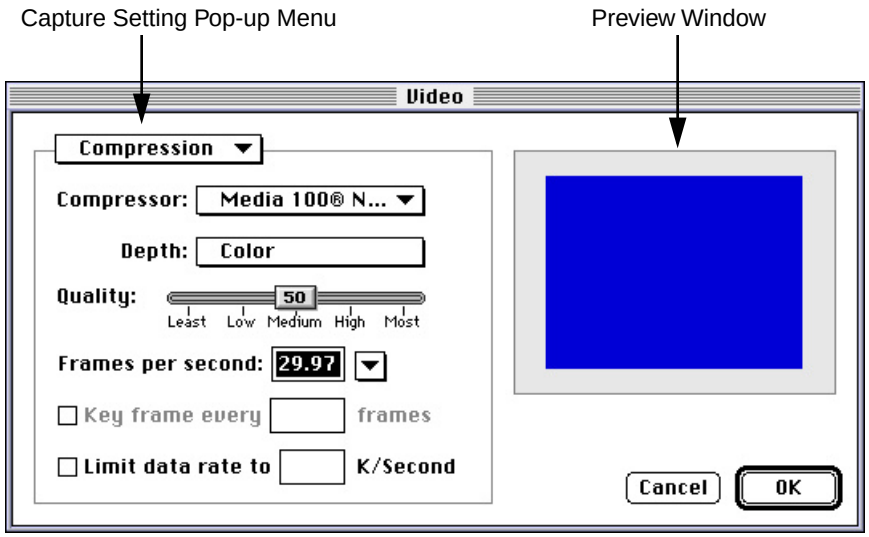
STEP 4 For the number of frames per second, enter the following:

29.97 (for NTSC)

25.0 (for PAL or SECAM)

Leaving this space blank should automatically capture the best possible rate.

STEP 5 Select the codec that is specific to your video board (Media 100 NTSC, Targa 2000, or Radius Studio.)



Note Many other codecs are also available, namely the software codecs included with QuickTime. You can choose any of the codecs, but for full-motion/full-screen performance, use the codec that is specific to your video capture hardware.

STEP 6 After entering these parameters in the Settings dialog box, click OK.

If you haven't before, you should now see your incoming video signal displayed in the Movie Capture dialog box. If you don't, check that the tape is indeed playing, as well as your connections and settings.

Radius: We recommend using the default settings Horizontal Interpolation OFF and Maintain Data Rate OFF.

Targa 2000: The Targa board works differently in that it MUST have an active input signal when you create a new movie or change your settings in order for the preview to be displayed. If you create a New Video without a signal present, you will see a gray capture dialog box. To "wake up" the video preview, change the Movie Capture screen size. We recommend putting your VTR in play-pause whenever you open a New Video or change your Capture Settings.

Setting the Time Stamp Source

Time stamping video works much like time stamping audio. Using the incoming timecode from either 9-pin or the timecode reader, the video file is marked with a SMPTE-EBU timecode number. This number serves as the reference when synchronizing the digital video against the SonicStudio EDL.

A video time stamp is helpful under the following conditions:

- You wish to synchronize the audio and video in SonicStudio after you have recorded it.
- You wish to reference the original timecode values that are present on the source tape.

The SonicStudio Edit Decision List (EDL), where the audio is edited, uses a 24-hour timeline to visually arrange the audio elements you record, and playback in the EDL can star from any time location within that timeline. The time stamp that is applied to the video is used as the basis for synchronizing the EDL and the video. In other words, if the video time stamp is 01:00:00:00 (that is hours:minutes:seconds:frames), then it will playback in sync with the EDL when play is initiated from a point in the EDL that

is between 01:00:00:00 and the end of the movie. The video time stamp is a way to reference the video with the timeline of the EDL.

To select a source for time stamp, do the following:

STEP 1 Click the **Timecode** button on the Movie Capture dialog box control bar

or

Select an option from the **Play**/**Time Stamp Source** on the menubar. The four options from which you may choose for video time stamps include:

- No Time Stamp (default)
- Timecode Reader
- Load Port 9-pin
- Dump Port 9-pin

Selecting the No Time Stamp option will result in a video time stamp of 00:00:00:00.

Selecting the Timecode Reader option time stamps the video file with a timecode value received via the Timecode Reader XLR input.

Selecting the Load Port 9-pin option time stamps the video file with a timecode value received via the 9-pin serial cable (Port A or Port B, depending on settings in the **External Devices** dialog box).

Selecting the Dump Port 9-pin option time stamps the video file with a timecode value received via the 9-pin serial cable (Port A or Port B, depending on settings in the **External Devices** dialog box).

Selecting the Timecode Reader or 9-pin options assumes that you have properly configured your system with respect to software and cabling.

Note In general, the Timecode Reader is the more accurate time stamp selection because of the nature of timecode in the serial RS-422 protocol.

The time stamp will be saved in the QuickTime *Timecode Track*, one of the data layers within a QuickTime file. This time stamp remains with the QuickTime file whenever it is opened, until it is overwritten with a new time stamp (see Video Playback section in this guide).

Monitoring During Record

Only the Data Translation Media 100 qx supports the Monitoring During Record option and it does not affect other video capture boards. This option is included in the event that the additional capture performance offered by turning OFF Monitor During Record is required.

To set the Monitor During Record option, do one of the following:

STEP 1 Click the Monitor During Record button on the Movie Capture dialog box control bar

or

Select **Play**/Monitor During Record from the menubar. When clicked or selected, the option toggles on or off.

When on, the video input signal displays in the Movie Capture dialog box during the capture process as illustrated in Figure 1-1.

When off, a red X displays over the Monitor During Record button and the Video dialog box freezes when the Movie Capture dialog box starts recording. The incoming video remains visible on the composite monitor attached to the Data Translation Media 100 qx.

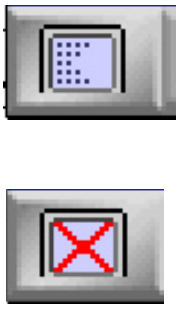


Figure 1-1 Monitor During Record Button (on and off)

Starting the Movie Capture

When you are ready to capture video, do the following:

STEP 1 Make sure you are cued to the desired location on your tape.

STEP 2 You can do either of the following under Machine Control:

Roll the tape manually (using the VTR controls)

or

Start the deck from the SonicStudio Transport Panel (using machine control).

STEP 3 To start the movie capture, do one of the following:

Click on the **Record** button on the Movie Capture dialog box control bar

or

Select **Play**/**Start Capture** on the menubar.

After a few seconds, your Macintosh appears to freeze except for the video display and your mouse cursor also disappears. This condition is normal. Because capturing video is a CPU-intensive process, all other functions in the SonicStudio and other programs are "turned off" to provide the video board with the most CPU cycles. To stop recording, simply click the mouse (it doesn't matter where, the mouse click will have no affect on the screen except to stop the recording).

Other video capture rules include:

- Disable any unnecessary system extensions or control panels.
- Running DSP processes in the background may be possible but it degrades your video performance by dropping frames.
- Turn off all timed software such as archiving or screen saver software in the event that it decides to activate during the video record.
- Run a very clean system; remove all unnecessary system extensions and control panels.
- Make sure you have reserved enough drive space for the amount of video you want to record. A video record will terminate automatically if you run out of room on your drive. Use the data rate chart in the configuration section of this manual to estimate the needed drive space.
- Make sure your system time base is the same as the incoming timecode from your video source, otherwise you may take an incorrect time stamp. Set the system time base in your **File**/**Preferences**/**System** preferences in the menubar. If you

measured your incoming timecode as described in the configuration chapter of this manual, the system should already be set to the proper format.

- If you are not on a network, you can turn off Appletalk for increased video performance. This can be done in the Chooser, found on the Apple menu. If you are using MediaNet or you are on a network, you may want to leave Appletalk on.

Summary of the Recording Steps

To recap, before starting the video capture, do the following:

STEP 1 Set your capture resolution (half screen or full screen).

STEP 2 Clear the Movie Capture dialog box of any overlapping windows.

STEP 3 Specify your video settings (quality, source, and any filtering).

STEP 4 Set your Time Stamp source (if any).

STEP 5 Set the Monitor During Record on or off (Media 100 qx only).

STEP 6 Start the Movie Capture.

STEP 7 Stop the capture by clicking the mouse.

Radius: In most cases, video performance does not differ between video-only and audio-video captures. However, recording audio and video simultaneously using two separate expansion boards is a very CPU-intensive process. The Radius board, for instance, will have a few dropped frames for audio-video records versus almost none for video-only records. This often has to do with the number of video frames a board can store at one time. SonicStudio must "talk" to the computer’s CPU regularly. When it does, it may interrupt the video stream. The Radius board cannot store enough video to provide a continuous record during the Sonic interrupt, and may therefore drop part of a frame.

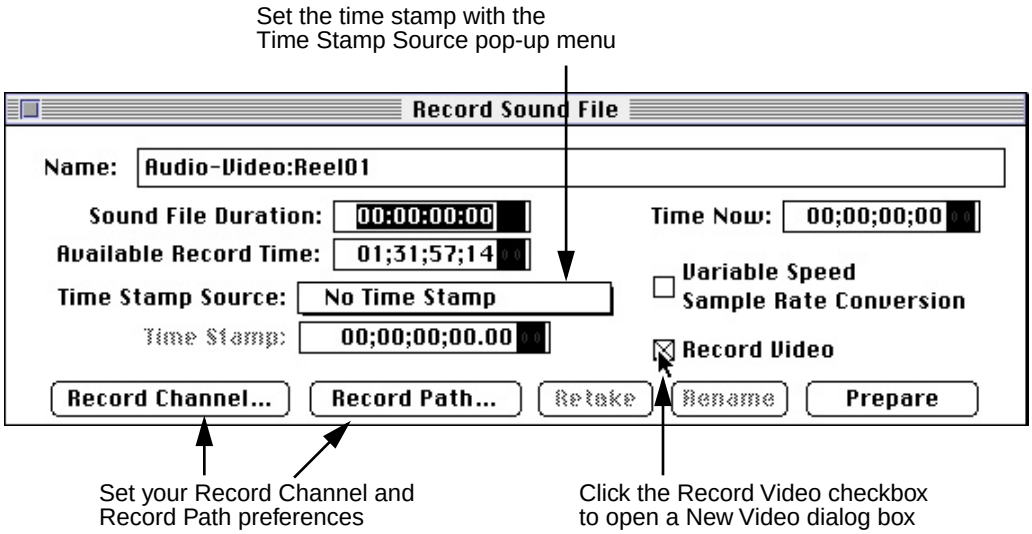
Recording Audio and Video

The Record Sound File Dialog Box

Use the Record Sound File dialog box when you need to record audio and video together in a single pass. The Record Sound File dialog box contains information about the recording you are about to make, such as the path name, time stamp source, available drive space, and other options. For detailed information on using the Record Sound File dialog box, please refer to the "SonicStudio Reference Manual."

To use the Record Sound File option:

STEP 1 Select **File**/**Record Sound File** on the menubar. The Record Sound File dialog box and the Transport Panel display.



While capturing video, you may record up to 16 channels of audio (depending on the number of inputs your system is configured for) at resolutions up to 24-bits. There are no restrictions with respect to channel mode (4, 8, 16) on SonicStudio 16•24. You may find that higher resolutions or more channels of audio may mean a few more dropped frames on certain video boards, but generally performance should be the same.

Timed Records

If you specify a length in the timecode field for Sound File Duration (this is known as *allocated recording* and is designated in the Record Sound File dialog box), the audio will stop recording after that duration. The video, however, will keep recording. Allocated recording has not been implemented for video in SonicStudio V5.1.

The Movie Capture Dialog Box

To configure the Movie Capture dialog box using the Record Sound File dialog box, do the following:

STEP 1 Open the Movie Capture dialog box using the Record Sound File dialog box.

STEP 2 Click the **Record Video** checkbox. The Macintosh Save dialog box displays and lets you specify a name and location to save the video file.

STEP 3 Set your capture resolution (half screen or full screen).

STEP 4 Clear the Movie Capture dialog box of any overlapping windows.

STEP 5 Specify your video settings (quality, source, and any image filtering).

Note Time Stamps and Start Capture are set differently for audio-video recordings.

Setting the Time Stamp Source

In audio-video recordings, the time stamps for audio and video will not be identical because the audio actually starts recording before the video does. The time stamps will be offset so that when both files are opened, they are synchronized for playback. Also the audio and video must have the same time stamp source. To select the source, do the following:

STEP 1 From the Time Stamp pop-up menu in the Record Sound File dialog box, select one of the following:

Select Timecode Reader, Load Port 9-pin or Dump Port 9-pin. (The default selection is No Time Stamp.)

- Selecting No Time Stamp (the default) will result in a time stamp value of 00:00:00:00 for audio. The video time stamp will be offset to the timecode value at which it began recording verses the audio. This can range from one to ten seconds.
- Selecting Timecode Reader will time stamp the video and audio files with the timecode values received via the Timecode Reader XLR input.
- Selecting Load Port 9-pin will time stamp the video and audio with the timecode values received via the serial 9-pin cable (Port A or Port B depending on your settings in the External Devices preferences).
- Selecting Dump Port 9-pin will time stamp the video and audio with the timecode values received via the serial 9-pin cable (Port A or Port B depending on your settings in the External Devices preferences).

The other time stamp sources such as TCR with Offset and Active Edit List are not supported for audio-video records in SonicStudio V5.1.

Starting the Record

Before starting the audio-video recording, make sure your VTR is playing. Allow a pre-roll for about ten seconds. Because the audio starts recording first and the delay specified for time stamping, video may not drop into record for up to ten seconds.

STEP 1 You can start the VTR in one of two ways:

Use the VTR's transport controls

or

Press Play on the SonicStudio Transport Panel if you are configured for Machine Control.

STEP 2 To start the record, press the Pause button on the SonicStudio Transport Panel.

Tech Tip: A convenient way to start and stop both the VTR and the recording simultaneously is to make **System** the master on the Transport Panel, and the **Load** or **Dump** (whichever machine you are recording from) the slave. When Pause is pressed on the Transport Panel, the VTR starts to play and SonicStudio begins to record. When you click the mouse to stop the record, the slaved VTR also stops.

Audio begins recording when the time display reaches zero on the Transport Panel (if the display is set for System or Current Master). A few seconds later, the Movie Capture dialog box begins recording as the control bar Record button depresses and turns red automatically.

At this point, the system resembles a video-only record. All applications freeze except the video display; the mouse disappears.

To stop the recording, simply click the mouse button. The Video dialog box closes and the mouse reappears.

Note During longer recordings (perhaps 30 minutes or more), some amount of "post-processing" (up to one minute or so) may occur while the system cleans up and stores the file.

If you wish to immediately perform another audio and video capture, do the following:

STEP 3 Click the Record button on the Transport Panel.

A Macintosh dialog box displays and prompts you to name the next video file.

STEP 4 Enter the file name.

STEP 5 Perform the steps as described earlier in this section.

Digital Video Playback

Opening Video and Audio

To open the audio and video recorded in SonicStudio, do the following:

STEP 1 Open an EDL by selecting **File/New/New EDL** from the menubar. An EDL displays.

STEP 2 After an EDL displays, you can open your video.

STEP 3 Select **File/Open/Open Video** from the menubar.

Open the video as you would any file using the Macintosh Browser dialog box. When a video file is opened, it places two marks into the top panel of the EDL: Video Start and Video End. The marks help you visualize the length of the video, to show you the current offset based on time stamp, and to mark the point where video

starts playback against the audio it was recorded with (remember, the audio starts earlier). Depending on the video time stamp, you may not see these marks until zoomed out in the EDL.

If you recorded audio and video together, you will now want to put your audio onto the EDL in sync with the video.

STEP 4 Click the EDL to make it the frontmost window.

STEP 5 Select **Cue Placement** from the **EDL** menu. The Place **(cue placement)** dialog box displays.

STEP 6 Click the **Time stamp** button in the **Place (cue placement)** dialog box This is the rightmost button on the dialog box.

When sound is dragged to the EDL, it will now drop to the time stamp contained within the sound file. For example, if the audio you recorded has a time stamp of 01:24:23:16, then this is where the left edge of the sound file will be placed in the EDL timeline, no matter where you drop it.

STEP 7 Open one of the following:

File/SonicManager from the menubar

or

XFS MediaNet mounted volume on the Macintosh desktop.

STEP 8 Locate the audio file that you recorded with the video.

STEP 9 Drag and drop the audio file to the top panel of the EDL where the marks are located.

STEP 10 Make the EDL the frontmost window again.

STEP 11 Press the E key on the Macintosh keyboard to zoom to the entire EDL panel. Your EDL panel should resemble the illustration shown in Figure 1-2 titled EDL Panel Display.

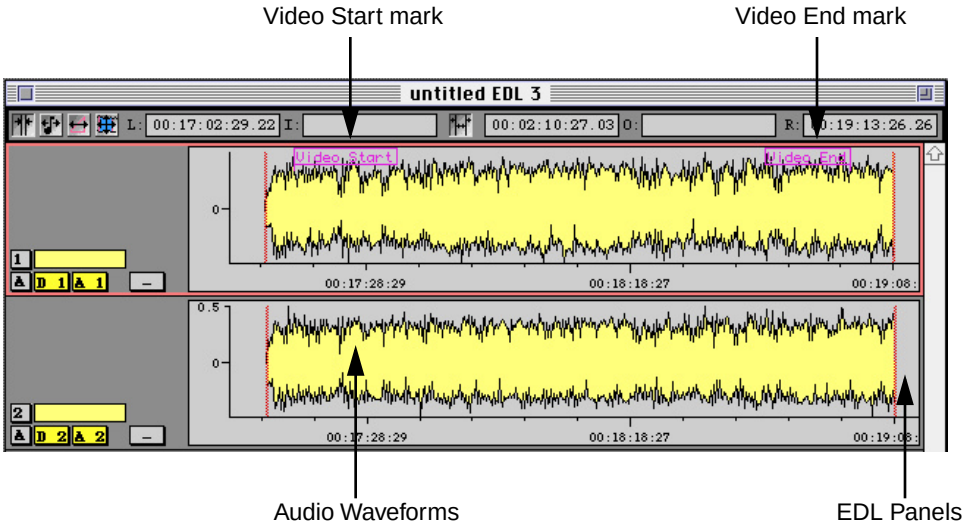


Figure 1-2 EDL Panel Display

Playback Options

To display the Playback Options, do the following:

STEP 1 Select **Play** on the menubar. The video playback options display:

- *Video Screen Size* has a submenu that allows you to choose the video playback window size from three selections: Quarter-Screen, Half-Screen, and Full-Screen.
- Quarter-Screen: Displays the video window at 160 x 120 pixels.
- Half-Screen: Displays the video window at 320 x 240 pixels.

- Full-Screen: Displays the video window at 640 x 480, except in the case where your monitor is only 640 x 480. In this case, the title bar is removed and the video fills the entire screen.
- The menu item **Lock Video to EDL** is a toggle switch that turns the video lock to EDL on and off.

On (checked): starting playback on the EDL using the space bar or Transport Panel starts the video playback at the proper location. The video will also follow when scrubbing the EDL audio or when cueing or nudging the EDL time.

Off (unchecked): EDL playback and location is independent of the video. The video will not follow the EDL at any time.

With **Lock Video to EDL** checked, press the space bar or play on the Transport Panel to start the EDL and video playback only if the EDL is playing a time location that matches the video offset. In other words, if the video time stamp is 00:10:00:00, and it's 10 minutes long, then the video will only play if EDL playback starts between 00:10:00:00 and 00:20:00:00 on the EDL. If EDL playback were started from before 00:10:00:00, the video jumps to the first frame and waits for the playhead to reach that number. If the EDL playback were started after the end of the video, for example 00:50:00:00, the video would jump to the last frame and stay there.

Media 100: A small playback display is used for the Media 100 qx only. This feature is actually built-in to the Media 100 board itself and is required for optimal playback on the Macintosh RGB monitor. SonicStudio triggers the small playback display whenever playback is initiated from the EDL or Transport Panel. Refer to Figure 1-3 for an illustration of a small playback display.

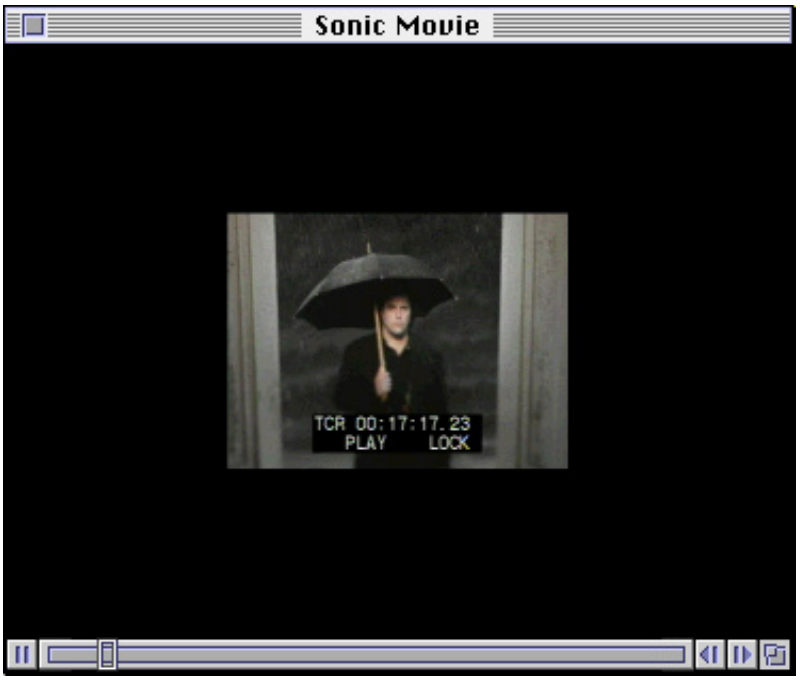
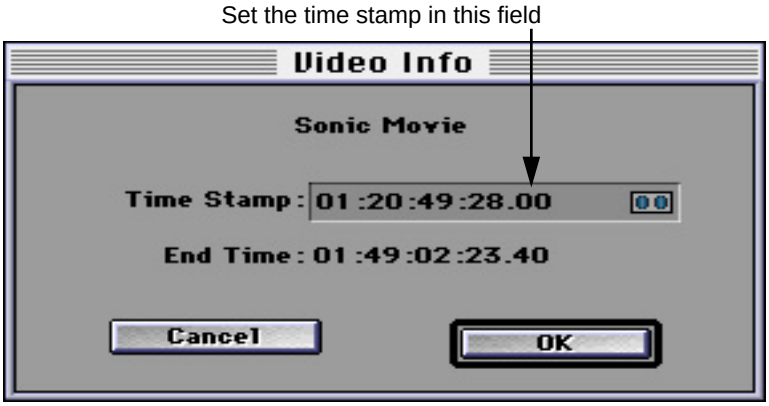


Figure 1-3 Example of Small Playback Display

The menu item V*ideo Info* brings up the Video Info dialog box allowing you to view the current time stamp or enter a new one. Refer to the illustration of the Video Info dialog box. In SonicStudio V5.1, the Time Stamp field is the only active field, although the End Time should display the length of the video file.

STEP 2 To give the movie a new time stamp, simply type a new number into the Time Stamp field, then click OK. You do not need to re-open or save the video.



Resizing the Video Playback Window

The SonicStudio video playback window can be resized to almost any dimension within 640 x 480* and still retain full motion playback. You can either retain or change the aspect ratio.

(*except for the Targa 2000.)

If for any reason, you wish to use a non-standard display size (for instance, 600 x 200 pixels), do the following:

STEP 1 Grab the window-resize box in the lower right hand corner of the playback window. The video then displays at that aspect ratio.

STEP 2 To keep the video display in the standard 4:3 aspect ratio when resizing, press the **Shift** key while changing the size. The window will then stay in the same 4:3 ratio as you drag the resize box.

Note Remember that when using this method, you can actually resize the window from full screen down to quarter screen, so don't get confused if the window is 160 x 120 but your settings in the **Play** menu say full screen.

Cueing and Playback of EDLs with Video

The Transport Panel Time Display

The time display on the SonicStudio Transport Panel should always match the EDL or the video current location. For instance, if you play the EDL with video locked, the Transport Panel will update (although not rapidly since priority is given to the video playback). Then, upon stopping, the time should indicate the current video frame time as well as the EDL stop time.

Note When cueing or stopping the video and EDL, you may find that there are sometimes discrepancies between the Transport Panel display time and the burn in of the digitized video. There could be two reasons for this:

1. The video has dropped frames and has not recovered them yet. If a movie drops frames during the record, it often duplicates or replaces the frame as soon as it can so that the movie is not shorter than the original material. The burn in may show the same time code twice if this happens, causing a discrepancy between the Transport Panel time display.
2. The Transport Panel always rounds to the nearest frame. If you stop play and the EDL stops at a number of subframes greater than 40, it will round the time display to the next frame. The Transport Panel does not display subframes; there are 80 subframes to the frame so when it passes the halfway mark it rounds up. It is possible then for the Transport Panel time display to be a frame higher than the video timecode burn-in.

Frame Bumping

The Transport Panel plus and minus buttons can be used to "bump" the EDL time and video one frame forward or backward. This is useful, of course, for finding scene changes or spotting hits for sound effects or music cues.

In addition, the keys Q and W do the same action. Q moves back one frame; W moves forward one frame. Note that for both of these methods, the EDL must be the frontmost window and the video should be locked to the EDL.

Cueing

When using the three Transport Panel cue times, the video will follow if the **Locked to EDL** menu option is currently checked. To cue to a desired timecode location, do the following:

STEP 1 Click in one of the timecode fields to highlight the timecode numbers. Refer to Figure 1-4 for an illustration of the Transport Panel.

STEP 2 Enter a timecode value using the numeric keypad on the keyboard.

STEP 3 If a number already exists, press the Clear button on the keyboard to reset it to zero.

STEP 4 Press one of the following:

Enter key on the keyboard

or

Cue button on the Transport Panel.

The video will jump to the appropriate frame, as will the Transport Panel time display.

To capture a timecode value while video is playing, do the following:

STEP 1 Highlight the timecode numbers again by clicking in one of the timecode fields in the Transport Panel. Refer to Figure 1-4.

STEP 2 While the video and EDL are playing back, press the space bar. This will capture the current time and enter it into the cue field.

STEP 3 Press the Enter key or the Cue button to locate to that cue time.

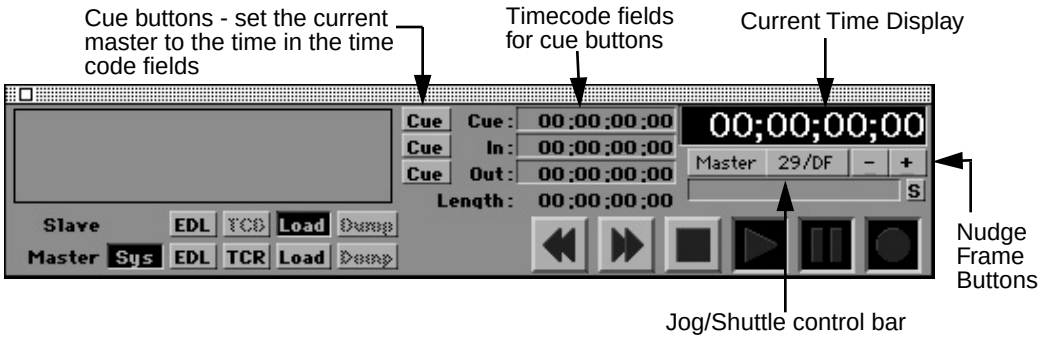


Figure 1-4 Transport Panel

Shuttling/Jogging Audio and Video

When jogging and shuttling in SonicStudio, the video follows the EDL if the **Locked to EDL** option is currently checked. Any of the current methods for scrubbing (also called reel-rocking) will work.

The most responsive method for scrubbing audio and video together at this time is the Transport Panel scrub bar (refer to the Transport Panel illustration).

To switch this bar between jog and shuttle, do the following:

STEP 1 Click the letter **J** or **S** to the right of the bar.

STEP 2 To use the scrub bar, simply click down somewhere in the bar and drag the mouse to the right or left.

Audio and video may also be scrubbed in the EDL with the Reel-Rock tool, as you may be accustomed to.

To scrub the audio in the EDL, do the following:

STEP 1 Click the letter **R** on the keyboard or select the Reel-Rock tool from the EDL tool-set in the upper left hand corner.

STEP 2 Click an EDL panel where you want the scrub to start.

STEP 3 Click and hold on the point in the waveform that you want to scrub.

STEP 4 Move the mouse to the left or right. This action emulates the sound and feel of an analog tape deck, as explained in the "SonicStudio Reference Manual."

Tech Tips on EDL Scrubbing:

- Option-click with the Reel-Rock tool to quickly locate to another point in the EDL panel.
- When using the Gates tool, hold down the control key to temporarily put it into Reel-Rock mode. It will scrub the selected panels.
- When using the Fade tool, hold down the control key when dragging fades to audition the audio while moving the fade.
- When using the Reel-Rock tool, click higher in the EDL panel for a wider swing and faster movement; click lower in the EDL panel for a slower, narrower range.
- Click the S or J button next to the EDL panel name on the left-hand side of the EDL to switch from shuttle to jog or vice versa.

- Use the Command-/ key combination to put the EDL into scrub mode at the current time as indicated by the Transport Panel time display.

The **Control** modifier key and **directional arrow** keys can be used to shuttle the video by itself. When the EDL is the frontmost window, the control modifier key enables the left-right arrows to shuttle forward and backwards, while the up-down arrows change the shuttle speed. This is helpful for previewing video at slow speeds when you are spotting the video for sound cues and sweetening. At faster than realtime speeds, you may find that the video can start to skip or stop altogether as the data rate requirements overload the CPU.

QuickTime Window Controls

The video playback window has a control bar with several buttons and controls. These controls, in combination with certain modifier keys, can be used for cueing and locating the digital video. Refer to Figure 1-5 for information on the QuickTime window controls.

Figure 1-5 QuickTime Window Controls

The descriptions of the control features of the QuickTime video window follow:

- You can quickly scan the entire movie by dragging the slider handle left or right at the desired speed. The video window updates the frames as you drag the slider to show you the current location.
- The nudge buttons allow you to bump the video display one frame forward or backward from the current location. Click the right button to advance the video one frame forward; click the left button to reverse the video one frame backward.

- The Play button turns into a Pause button when pressed. To start the video from the current slider location, press the Play button. To stop playback, press the Pause button.

Using the Modifier Keys on the Movie Playback Window

- Hold down the Option key when clicking the left nudge button to send the video frame to the first frame. Click the right nudge button to send the video to the last frame.
- Hold down the Control key and click on either of the nudge buttons to change the button to a small video shuttle control which can be used to preview the video at slower or faster than realtime speeds much like the control-arrow key combinations.
- Hold down the Command key when selecting the left nudge button to play the video at normal speed in reverse. Press the right nudge button to play the video at normal speed forward.

T*ech Tips on Playback:*

- The EDL cannot be slaved to the video window at this time. Pressing play on the video window will ONLY play the video.
- The video playback controls are independent from the Transport Panel and lock to EDL functions, so stopping playback on the video window when locked to an EDL may not have any effect. The EDL and Transport Panel usually override the video playback controls.
- If you wish to move the video slider then start EDL playback from that point, you can use the Transport Panel to cue the EDL time. First, drag the video slider to the desired location. Then, click in the timecode field next to the cue button on the Transport Panel. Hit the space bar to capture the current time, then hit the Cue

button to send the EDL to that location. (This implementation may change in future versions as we tighten the link between audio and video cueing).

Saving Video with EDLs

When an EDL is Saved with a video open, the video becomes linked to the EDL. The next time that EDL is opened, the linked video will open as well. To link the currently opened video to an EDL, do the following:

STEP 1 Make the EDL the frontmost window.

STEP 2 Press command-S on the keyboard

or

Select **File/Save** on the menu bar as you would normally do with an EDL.

When the EDL opens again, it searches for the video by both name and file path. If you move or rename the video file, the EDL will not be able to locate it to for display, and the status window sends the following message:

could not parse video

STEP 1 To locate the video manually, select **File**/**Open Video** from the menu bar.

Tech Tips: Remember the following when saving and opening EDLs with video:

- The video will always attach to the frontmost EDL when saving.
- When opening an EDL with linked video while an EDL and video are already open, the current video will close and the new video will continue to open with the EDL.

- Closing an EDL does not close the video; close the video separately. This is desirable in the event you are working with multiple EDLs or a "scratch" EDL for sound design or other sounds.

Working with Multiple EDLs

With SonicStudio V5.1, you can use multiple open EDLs with the same video but you cannot open multiple videos simultaneously. The video will playback with the frontmost EDL.

The Sonic Digital Video Option was not designed for use with the Multiple EDL Playback feature. Since SonicStudio V5.0, you have been able to play multiple EDLs simultaneously out different audition channels. It is not recommended that multiple EDLs be played back with video open because unpredictable video playback may result. Be sure to stop each EDL audition before switching to another EDL when playing back with video.

Overdub Recording

One of the great advantages to non-linear digital video playback is the ability to do several overdubs quickly and without rewinding. This is great for ADR, Foley, narration, music, or any other live overdub situation, as well as being convenient for loading sound effects and ambience while in sync with picture. In SonicStudio, you can record right into the EDL panels while playing back the QuickTime digital video. For detailed information about using the EDL to record audio, refer to the "SonicStudio Reference Manual." This process is no different when working with video. You can punch-in on the fly with the slash key or automate the punch with the in and out points. Both types of recording are supported.

Mix Automation

The SonicStudio mixing desk supports full dynamic and snapshot automation, as described in the "SonicStudio Reference Manual." However, when writing automation with video playing back, any click on a desk fader, pan pot or filter parameter stops the video playback, making continuous automation difficult. We intend to enhance this in future releases so that video playback is unaffected by the writing or playback of automation moves.

Unsupported Features

Certain advanced features of SonicStudio were not designed to work with the Sonic Digital Video Playback Option. The following features are not supported for use with the QuickTime video implementation:

- Multiple Records and Playback
- Instant Playback
- Double-speed Playback
- Realtime Sample Rate Conversion

QuickTime Video Editing

Another great advantage to the new SonicStudio QuickTime video support is that you can use QuickTime "clip" editing. This allows you to use QuickTime to store sequences of separate movies within a single movie.

You can use the clip edit capability to do the following:

- Copy and paste frames from a single movie into the same or other movies.
- Delete frames from a movie.

- Merge movies for playback.
- Save pieces of a movie as individual movies.
- Organize your video by allowing you to work in small video segments, if necessary.

or

- Add video black to the beginning and end of a video.
- Trim frames of a movie if a new version comes in from the video post facility.
- You can even assemble clips to frame accuracy from production clips to compile an edited video.

SonicStudio can perform some degree of clip editing, but all the features are available in Apple's QuickTime MoviePlayer. The SonicStudio CD-ROM ships with QuickTime V2.5 and MoviePlayer, and it often comes factory-installed with your MacOS. MoviePlayer is included with the QuickTime V2.5 installers on you SonicStudio V5.1 CD-ROM.

Note SonicStudio only has the capability to create new clips by dragging them to the desktop and merge clips by dragging a clip to the currently opened video. SonicStudio cannot save the changes made to the video however. All the other features can be performed in MoviePlayer.

Editing a Movie

QuickTime movie editing and clip manipulation is non-destructive, meaning that the clips do not take up much space on your hard drive, and they are only "pointers" to the original video files. Movie "clippings," which is the default name that the MacOS provides for a pointer file, do not actually contain any video. Therefore, if the original video file that the clip references cannot

be located on your hard drives when you attempt to open a clip, the system warns you that the movie cannot be found. Conveniently, the original movie that the clip points to can be renamed AND moved. The clip will locate the original movie if it is somewhere on the drive.

One possible benefit to this is that it allows you to have multiple EDLs reference the same video file, but each can use their own clip. All the clips reference the same movie, but can be named differently and saved with separate EDLs. The clips could also be archived with the EDL on floppy, while the video media is backed up separately.

The timecode track in the QuickTime file compensates for deleted frames or merged clips, adjusting the total length time while retaining the original time stamp.

Using QuickTime Clip Editing

This section describes how to create clips from all or part of a movie, delete frames from a movie, copy and paste frames in a movie, merge movies, and save changes.

STEP 1 To edit a QuickTime movie, do one of the following:

Launch MoviePlayer on your hard drive

or

Double-click a Sonic Movie.

Creating Clips

To create a new clip from an existing movie in its entirety, do the following:

STEP 1 Click in the video screen somewhere and drag the mouse to the desktop. A file called Movie Clipping displays on the desktop.

To create a clip from a part of the existing movie, do the following:

STEP 2 Press the Shift key and select an area of the movie with the slider, play button, or nudge buttons. The selected area will be shaded in the control bar. Refer to Figure 1-6 for an example of using shift selection to create clips.

STEP 3 Click anywhere in the video screen and drag the mouse to the desktop. A clip will be created which references only those selected frames.

Figure 1-6 Example of Using Shift-Selection to Create Clips

Deleting Frames

To delete frames from a movie, do the following:

STEP 1 Press the shift key and select the desired area of the video using the slider, play button, or nudge buttons.

STEP 2 Press Command-X on the keyboard or select **Edit**/**Cut** from the menubar. The selected frames will be removed from the movie and the "ends" spliced together, making a seamless edit.

Copying and Pasting Frames

To copy and paste frames in a movie, do the following:

STEP 1 Press the shift key and select the desired area of the video with the slider, play button, or nudge buttons.

STEP 2 Press command-C from on the keyboard or select **Edit/Copy** from the menubar.

STEP 3 Select a location in the same or another movie to paste the frames.

STEP 4 Use the slider and nudge keys to locate to the exact frame in which you would like to insert the new clip.

STEP 5 Press command-V on the keyboard or select Edit/Paste from the menubar. The copied clip will be inserted into the video at the frame you selected, making a seamless edit and extending the overall movie length.

Replacing Frames

To replace a group of frames in a movie with a newly copied clip, do the following:

STEP 1 Select an area of the movie using the shift key again.

STEP 2 Select **Edit/Paste** from the menubar. The selected area will be replaced with the frames you copied previously.

Merging Movies

Merging movies works much like copying and pasting frames. To merge movies, do the following:

STEP 1 Locate the movie to the exact frame you want the merged clip to insert using the slider and nudge buttons.

STEP 2 Click on a clip or movie file on the desktop and drag it over the video window.

When you let go of the mouse, the entire clip will be spliced into the current movie at the frame you were located.

Saving Changes to the Movie

Changes to the movie are not saved if made with clip editing until you use the Save command. To save the changes made to a movie, do one of the following:

STEP 1 In standard MacOs fashion, select **File/Save** from the menubar. This saves your changes to the movie

or

To retain your original content and create a copy of the movie, select **File/Save As** instead of Save.

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