

Sorenson Squeeze[™]

for Macintosh—User Guide
Version 3.0

sorensonmedia

Enter your serial number in the following space.

Serial Number: _____

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One or more of the features described in this manual are claimed by one or more of the following US patents:

US Patent Nos. 5,031,037; 5,124,791; 5,799,110; 5,844,612; 5,398,069

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Contents

Introduction and Installation	5
Squeeze Features	6
Installation	8
<i>Minimum System Requirements</i>	8
<i>Sorenson Squeeze Installation</i>	8
<i>Squeeze Registration</i>	9
Common Sorenson Squeeze Interfaces	11
Projects Dialog Box	11
Main Squeeze Interface	12
Compression Settings	16
Filter Settings	22
<i>Additional Information About Deinterlacing</i>	25
Keyboard Shortcuts	28
Menu Bar	30
Output Folders	32
<i>Specify the Default Output Folder</i>	32
<i>Specify Output Folder Location</i>	32
<i>Always Ask Where to Save Output</i>	33
Compress Your Movies	35
Supported Input Formats	35
<i>Separate Audio and Video Source Files</i>	37
Supported Output Formats	39
Capture Video Content	41
Trim Points	44
<i>Set the Trim Points</i>	44
<i>Identify the In and Out Trim Points</i>	44
<i>Clear Trim Points</i>	44
Customize Settings	45

<i>Customize a Preset Data Rate Button</i>	45
<i>Customize the Filter Settings</i>	48
Quick and Easy Compression	51
Compress for QuickTime	54
Compress for Flash MX	59
<i>Flash SWF Player Settings</i>	59
<i>Compress the File</i>	67
Compress for MPEG-4	72
Compress with Watch Folders (Batch Process) ..	77
Upload Your Movies to Sorenson Vcast	82
Audio Codecs	85
Audio Compression Guidelines	86
<i>Audio Production</i>	86
<i>Digital Audio</i>	87
Fraunhofer MP3	88
<i>MP3 Overview</i>	88
<i>Encode Parameters</i>	88
ADPCM	90
QDesign Music Codec 2	91
<i>Introduction</i>	91
<i>Bitrate</i>	92
QUALCOMM PureVoice	93
<i>Options</i>	93
Apple IMA 4:1	94
AAC	95
Uncompressed Audio	96
Video Codecs	97
Sorenson Compression	98
<i>Compression Principles</i>	98
<i>How Sorenson Compression Works</i>	99
Sorenson Video 3	102
<i>Features</i>	102
<i>Encode Tab</i>	103
<i>Playback Tab</i>	107
<i>Streaming Tab</i>	110
<i>Masking Tab</i>	112
<i>Watermark Tab</i>	115
<i>Multiple Processor Support</i>	118
Sorenson Spark Pro	119
<i>Sorenson Spark Pro Features</i>	119
<i>Summary Tab</i>	120

<i>Encode Tab</i>	121
<i>Playback Tab</i>	123
Sorenson MPEG-4 Pro	125
<i>Sorenson MPEG-4 Pro Features</i>	125
<i>Summary Tab</i>	126
<i>Encode Tab</i>	127
<i>Streaming Tab</i>	132
<i>About Tab</i>	134
Video Compression Guidelines	135
General Video Considerations	136
<i>Data Rate</i>	136
<i>Delivery Mechanism</i>	138
<i>Encode Performance Considerations</i>	141
<i>Playback Considerations</i>	142
Content Considerations	145
<i>Training Videos</i>	145
<i>Sports Video</i>	147
Streaming Media	149
RTSP Streaming	150
<i>Advantages</i>	150
<i>Disadvantages</i>	151
HTTP Streaming/Progressive Download	153
<i>Advantages</i>	153
<i>Disadvantages</i>	154
Summary	155
Technical Support	157
Glossary	159
Index	167

Introduction and Installation

Sorenson Squeeze™ is the Sorenson Media™ simple, yet powerful compression tool that encodes high-quality video for MPEG-4, and/or Macromedia® Flash™ MX, and/or QuickTime® (depending on the version of Squeeze you purchased). Sorenson Squeeze leverages Sorenson Video® 3's (QuickTime), Sorenson Spark's (Flash) Variable Bit Rate (VBR) compression feature and Sorenson MPEG-4's maximum performance for the MPEG-4 standard.

The advanced features of Squeeze meet the demands of professional multimedia producers. In addition to the advanced features, Squeeze offers easy to use Preset Data Rates that require no in-depth knowledge of the complexities of compression technology. Within Squeeze, simply select an output type and a Preset Data Rate Setting and the Automated Compression Engine (ACE) produces the best results for your movie.

This user guide is intended for all versions of Sorenson Squeeze 3.0 for the Macintosh® platform. Table 1 identifies the output files you can create with each version of Squeeze.

Table 1: Available Output Formats According to Version of Squeeze

Version	Available Output Formats
Sorenson Squeeze 3 for Macromedia Flash MX	FLV SWF
Sorenson Squeeze 3 for MPEG-4	MP4
Sorenson Squeeze 3 Compression Suite	MOV FLV SWF MP4

Squeeze Features

- ◆ **Two-Pass Variable Bit Rate (VBR) Compression**—An advanced technology that produces higher-quality video while only using slightly more processing time.
- ◆ **One-Pass VBR**—Takes the same amount of processing time as constant bit rate compression, but approaches Two-Pass VBR in quality.
- ◆ **Intelligent presets for Multiple Data Rates**—Creates movies for multiple target mediums such as Streaming, Progressive download, and Local delivery.
- ◆ **Deinterlacing**—Removes the interlacing artifacts caused by the two-fields-per-frame characteristic in conventional video.
- ◆ **Video Filters**—Allows you to customize: Contrast/Brightness control, Gamma correction, Black/White Restore, Remove Telecine, Deinterlacing, Fade In/Out, Normalize Audio, and Video Noise Reduction.
- ◆ **DV Capture**—Allows you to capture DV content directly into Squeeze for compression.
- ◆ **Watch Folders**—Allows you to compress multiple files (batch processing) by designating a specific folder as your Watch Folder. Squeeze compresses the contents of your Watch Folder.
- ◆ **Stitching SWF Files**—Takes large files and breaks them into a series of smaller SWF files overcoming the file size concern and the frame count limitation of SWF files. The stitched files play in succession, loading and unloading files until all of the files are played.
- ◆ **Cropping**—Allows you to crop your content to standard formats and to custom sizes.
- ◆ **Support for QuickTime 5/6** (Sorenson Squeeze 3 Compression Suite only)—Allows you to output to QuickTime movies (MOV files).

- ◆ **Support for Macromedia Flash MX**—(Sorenson Squeeze 3 Compression Suite and Sorenson Squeeze 3 for Macromedia Flash MX only) Allows you to output to Flash files (SWF and FLV). Includes the use of player templates and advanced playback options for SWF files.
- ◆ **Support for Sorenson MPEG-4™** (Sorenson Squeeze 3 Compression Suite and Sorenson Squeeze 3 for MPEG-4 only)—Allows you to output to MPEG-4 files (MP4).
- ◆ **Integration with Sorenson Vcast™**—Allows you to immediately publish your compressed movie to anyone over the Internet. Sorenson Vcast is the Sorenson Media automated online video storage and delivery service. For more information, see <http://vcast.sorenson.com>.

Installation

Prior to installing Sorenson Squeeze, verify that your system meets the minimum requirements.

Minimum System Requirements

Prior to installing Squeeze, make sure your computer meets or exceeds the following system requirements.

- ◆ Power PC with a G3 processor or greater
- ◆ Mac® OS X or later
- ◆ QuickTime 6.0 or later (Sorenson Squeeze 3 for Macromedia Flash MX requires QuickTime 5.0.2 or later)
- ◆ 128 MB of RAM
- ◆ 20 MB available hard disk space

Sorenson Squeeze Installation

To install Sorenson Squeeze:

1. Insert the Sorenson Squeeze CD in your CD-ROM drive.
2. Double-click the **Sorenson Squeeze CD icon**.
3. Double-click the **Install Sorenson Squeeze icon** to start the installer.
4. Follow the installation dialogs to complete the installation.

Depending on the version of Squeeze you purchased, the following video codec(s) are installed.

Table 2: Codecs Installed According to Version of Squeeze

Version	Codec
Sorenson Squeeze 3 for Macromedia Flash MX	Sorenson Spark™ Pro
Sorenson Squeeze 3 for MPEG-4	Sorenson MPEG-4 Pro
Sorenson Squeeze 3 Compression Suite	Sorenson MPEG-4 Pro Sorenson Spark Pro Sorenson Video 3.1 Pro

After you have completed the Sorenson Squeeze installation, double-click the **Launch Squeeze icon**  to open the application. When Squeeze opens, the Squeeze Projects dialog box appears as is shown in Figure 1 on page 11.

Squeeze Registration

Sorenson Media is confident that its software greatly increases your productivity. For Sorenson Media to continue to provide you with the highest quality software, offer technical support, and inform you about new Sorenson Media products, please register your software.

You can access the online registration from the Menu bar by selecting **Help | Squeeze Registration**.

Common Sorenson Squeeze Interfaces

Projects Dialog Box

Before you begin compressing your content, you should become familiar with the Sorenson Squeeze interfaces. Figure 1 shows the Projects dialog box.



Figure 1: Sorenson Squeeze Projects Dialog Box

Table 3 on page 11 identifies functionality that is accessed through the Projects Dialog box.

Table 3: Projects Dialog Box Interface Descriptions

Feature	Description
 Movie File	Movie File Icon: Opens an interface to select a source file for compressing.
Watch Folder 	Watch Folder Icon: Allows you to compress multiple files (batch processing) by designating a specific folder as your Watch Folder. Squeeze then compresses the contents of your Watch Folder. For more information, see "Compress with Watch Folders (Batch Process)" on page 77.
 DV Capture	DV Capture Icon: Opens the DV capture feature of Squeeze. For more information, see "Capture Video Content" on page 41.

Main Squeeze Interface

Main Squeeze Interface

After selecting the movie file you want to compress using the File Open option in the Projects Dialog box, the Main Squeeze Interface opens as is shown in Figure 2 on page 12.

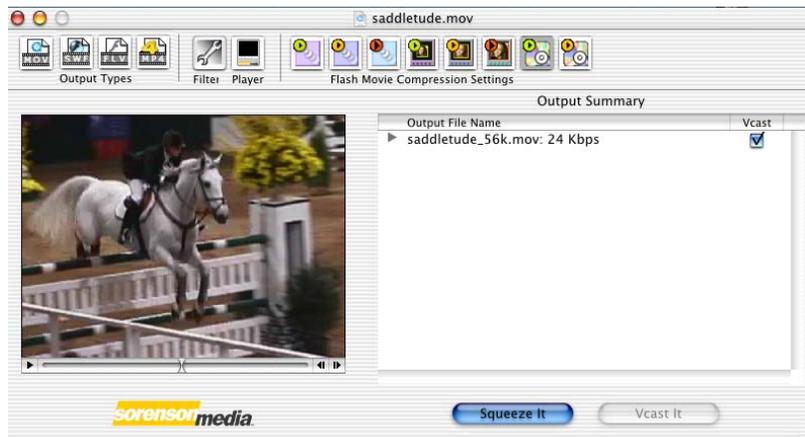


Figure 2: Main Squeeze Interface

Table 4 identifies functionality that is accessed through the Main Squeeze Interface.

Table 4: Main Squeeze Interface Descriptions

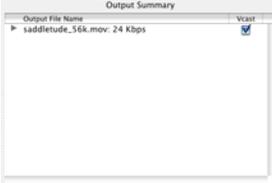
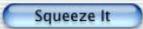
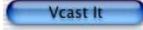
Feature	Description
 <p>Output Types</p>	<p>Output Type Buttons: Select a button to create a Flash FLV file, Flash SWF file, Sorenson MPEG-4 MP4 file, and/or QuickTime MOV file. All output types are available if you purchased the Sorenson Squeeze 3 Compression Suite.</p> <p>If you purchased Sorenson Squeeze 3 for Macromedia Flash MX, only the Flash FLV and Flash SWF output options appear. If you purchased Sorenson Squeeze 3 for MPEG-4, only the MP4 output option appears.</p> <p>► <i>Note: If you have previously installed Sorenson Video 3 Pro on your computer, the MOV output option also appears when you install Sorenson Squeeze 3 for Macromedia Flash MX or Sorenson Squeeze 3.0 for MPEG-4.</i></p> <p>You can select multiple output types. See Table 10 on page 39 for more information about available output types.</p>
 <p>Filter</p>	<p>Filter Settings Button: Accesses the Video Filters dialog box to adjust the video filters. For more information about video filters, see “Filter Settings” on page 22</p>
 <p>Player</p>	<p>Flash SWF Player Options Button: Allows you to edit the Flash SWF Player Settings. This button is only active when a SWF output file is selected in the Output Summary window. For more information about the Flash Player options, see “Flash SWF Player Settings” on page 59.</p> <p>► <i>Note: This button does not appear if you purchased Sorenson Squeeze 3 for MPEG-4.</i></p>

Main Squeeze Interface

Table 4: Main Squeeze Interface Descriptions (Continued)

Feature	Description
	<p>Preset Streaming Data Rate Buttons: Allows you to select from three predefined Data Rates that are configured to achieve the best results for streaming downloads at specified Data Rates. For more information about streaming downloads, see “Streaming Media” on page 149.</p> <p>The button displays the preset name when the mouse pointer is over the button. The default names of the Preset Streaming Buttons are</p> <ul style="list-style-type: none"> ◆ 56k ◆ 100k ◆ 300k <p>You can modify the values of the presets through the Compression Settings dialog box. For additional information about modifying the Compression Settings, see “Customize a Preset Data Rate Button” on page 45.</p>
	<p>Preset Progressive Data Rate Buttons: Allows you to select from three predefined Data Rates that are configured to achieve the best results for progressive downloads at specified Data Rates. For more information about progressive downloads, see “HTTP Streaming/Progressive Download” on page 153.</p> <p>The button displays the preset name when the mouse pointer is over the button. The default names that appear for the Preset Progressive Settings are</p> <ul style="list-style-type: none"> ◆ Small ◆ Medium ◆ Large <p>You can modify the values of the presets through the Compression Settings dialog box. For additional information about modifying the Compression Settings, see “Customize a Preset Data Rate Button” on page 45.</p>

Table 4: Main Squeeze Interface Descriptions (Continued)

Feature	Description
	<p>Preset Local Playback Data Rate Buttons: Allows you to select from two predefined Data Rates that are configured to achieve the best results for local delivery (LAN or CD) at specified Data Rates.</p> <p>The button displays the preset name when the mouse pointer is over the button. The default names that appear for the Preset Local Settings are</p> <ul style="list-style-type: none"> ◆ LAN ◆ CD <p>You can modify the values of the presets through the Compression Settings dialog box. For additional information about modifying the Compression Settings, see “Customize a Preset Data Rate Button” on page 45.</p>
	<p>Preview Window: Displays the source movie you are compressing.</p>
	<p>Output Summary Window: Displays the list of output compression files you have selected. Clicking on the arrow causes the settings associated with the file to appear.</p> <p>There are two ways to remove a compression job from the Output Summary Window.</p> <ul style="list-style-type: none"> ◆ Hold the Ctrl key, select the entry you desire to remove from the Output Summary Window, and then select Remove from the pop-up list. ◆ Select the Output Type Button that corresponds to the file you desire to remove and then single click on the corresponding Preset Data Rate Button.
	<p>Squeeze It Button: Compresses your movie(s).</p>
	<p>Vcast Button: Sends compressed files to Sorenson Vcast, the Sorenson Media automated online video storage and delivery service. For additional information about Vcast, See “Upload Your Movies to Sorenson Vcast” on page 82.</p>

Compression Settings

The Sorenson Squeeze Compression Settings allow you to adjust the compression parameters and fine-tune your final movie. There are two methods to access the Compression Settings.

- ◆ Double-click any Preset Data Rate Button on the Main Squeeze Interface.
- ◆ Hold the Control key and click on a file in the Output Summary Window of the Main Squeeze Interface. Then select **Edit** in the pop-up window.

Figure 3 on page 16 shows the Compression Settings dialog box.

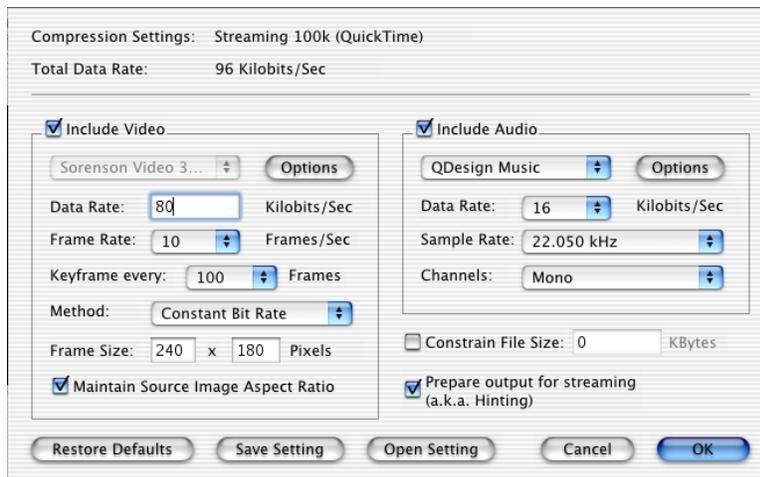
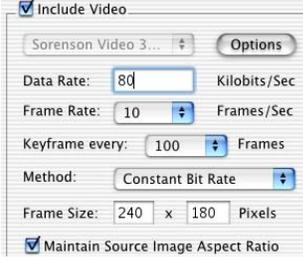


Figure 3: Compressions Settings Dialog Box

Table 5 contains a description of the information that is displayed or adjustable in the Compression Settings dialog box.

Table 5: Squeeze Compression Settings Descriptions

Feature	Description
Compression Settings: Streaming 100k (QuickTime)	<p>Compression Settings Name Field: Displays the name of the Preset Data Rate Button you are editing and the output type you have selected. This field is display only and not adjustable.</p>
Total Data Rate: 96 Kilobits/Sec	<p>Total Data Rate Field: Reflects the total Data Rate of the combined audio and video Data Rates. This field is display only.</p>
	<p>Include Video: Contains the options and features to enhance the quality of your video. If you deselect the Include Video checkbox, your output file does not contain video.</p> <ul style="list-style-type: none"> ◆ Video Codec: Depending on the version of Squeeze you purchased, Sorenson Video 3 (SV3) Pro, and/or Sorenson Spark Pro, and/or Sorenson MPEG-4 can appear as the video codec. In this example Sorenson Spark Video 3 is displayed. For more information on Sorenson Video 3, Sorenson Spark, and Sorenson MPEG-4 see “Video Codecs” on page 97. ◆ Options Button: Configures the selected codec’s advanced settings. In the interface you can make adjustments to optimize the quality of your video. For more information about the Video codec options, see “Video Codecs” on page 97. ◆ Data Rate: Measures the bandwidth or connection speed. In this example, the Data Rate is set at 80 Kilobits/second. Higher Data Rates require more bandwidth and result in higher quality output files. <p>➤ <i>Note: When using the “Prepare Output for Streaming (a.k.a. Hinting)” option, set the Data Rate a little lower than the connection speed of your average user to allow for network overhead.</i></p>

Compression Settings

Table 5: Squeeze Compression Settings Descriptions (Continued)

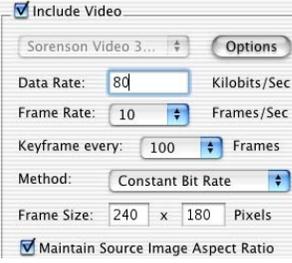
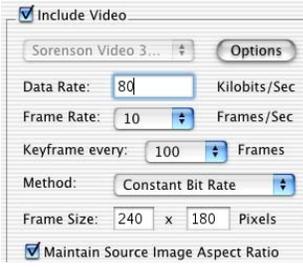
Feature	Description
	<ul style="list-style-type: none"> <li data-bbox="711 520 1175 638">◆ Frame Rate: Indicates the number of frames (individual pictures of the movie) that are played each second. The higher you set the Frame Rate, the smoother the playback appears. <p data-bbox="760 659 1192 974">Because video looks much better with native Frame Rates, it is recommended to set the Frame Rate high if your delivery medium and playback platforms allow it. However, if you need to reduce the Frame Rate, the best results come from dividing the Frame Rate by whole numbers. Squeeze gives you the option of selecting specific Frame Rates or ratios such as, 1:1, 1:2, and 1:3. For example, if you are compressing NTSC video [30 frames per second (fps)], Squeeze divides the Frame Rate by 2 or 3 for even playback. This results in Frame Rates of 15 or 10 respectively.</p> <ul style="list-style-type: none"> <li data-bbox="711 995 1192 1205">▶ <i>Note: If you are compressing a talking head clip with little motion, cutting the Frame Rate in half will allow you to reduce the Data Rate by about 20 percent without reducing the quality of the output video. However, if you are compressing high-motion video, reducing the Frame Rate in half allows you to reduce the Data Rate by a higher percentage without reducing the quality of the output video.</i> <ul style="list-style-type: none"> <li data-bbox="711 1226 1166 1394">◆ Keyframe Every: Allows you to add a keyframe at the frequency you select. The default values in the pop-up menu for keyframes allow you to place a keyframe every 100, 80, 60, 50, 40, or 30 frames. More frequent use of keyframes results in larger overall file size.

Table 5: Squeeze Compression Settings Descriptions (Continued)

Feature	Description
	<p>Method: Allows you to select from the available compression methods depending on the output options and the video codec you have selected. Available options are Constant Bit Rate (CBR)—Compresses with the same bit rate for each frame. CBR can take half the compression time as Two-Pass VBR, but sacrifices noticeable quality. Sorenson 1-Pass VBR—Compresses with variable bit rates depending on the complexity of the frame. VBR is an advanced technology that produces higher-quality video. One-Pass VBR produces high-quality finished movies, even at very low Data Rates with high motion clips. One-Pass VBR produces slightly less quality video than Two-Pass VBR, but the feature does not use any more processor time than compressing without VBR. Sorenson 2-Pass VBR— Analyzes the entire movie before it begins compressing and determines the best way to compress the video within your given compression parameters. Two-Pass VBR produces the highest quality video but the encoding time takes nearly twice as long as compressing without VBR.</p> <p>Only use Two-Pass VBR for progressive download movies. After the analysis, Sorenson Squeeze compresses the clip, allocating more bandwidth to high motion or complex sections and less bandwidth to simpler sections. All this is done while maintaining an average of the specified target Data Rate.</p> <ul style="list-style-type: none"> ◆ Frame Size: Specifies the Frame Size (width and height) of your movie. ◆ Maintain Source Image Aspect Ratio: Results in the output files maintaining the proportions of the original file without distortion. By default, the Maintain Source Image Aspect Ratio option is selected. The output file is created close to the specified Frame Size while maintaining the aspect ratio.

Compression Settings

Table 5: Squeeze Compression Settings Descriptions (Continued)

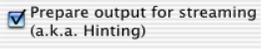
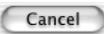
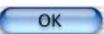
Feature	Description
	<p>Include Audio: Contains the options and features that enhance the quality of the audio portion of your movie. If you deselect the Include Audio checkbox, your output file does not contain audio.</p> <ul style="list-style-type: none"> ◆ Audio Codec: Selects the audio codec. Depending on the version of Squeeze that you have, there are up to seven available audio codecs. In this example the QDesign Music codec is selected. If other codecs are available for the selected output, they appear in the pop-up menu. For more information on the audio codecs, see “Audio Codecs” on page 85. ◆ Options Button: Launches the selected codec’s advanced settings interface allowing you to make adjustments to optimize the quality of the audio. The Options button is grayed out and unavailable if there are not options for a particular codec. ◆ Data Rate: Provides a pop-up menu to select a Data Rate for your movie audio content. The option is grayed out and unavailable if the codec does not allow you to modify the Data Rate. ◆ Sample Rate: Provides a pop-up menu to select a Sample Rate for your movie audio content. The Sample Rate options are 8.000, 11.025, 22.050, 32.000, 44.100, or 48.000 kHz. Higher Sample Rates result in larger file sizes and better sound quality. See “Sample Rate” on page 88 for more information. ◆ Channels: Provides an option of mono or stereo audio for your movie. Selecting stereo results in larger file size. Unless you know your audio has significant differences between the left and right channels, it is generally best to encode to mono to save space and processing power.
	<p>Prepare Output for Streaming (a.k.a. Hinting): Hints your movie so it is ready for streaming. Hinting creates a “hint” track for each media track. The hint tracks tell the server how to package the media data for delivery. The Hinting feature is only available for QuickTime and MP4 movies and is grayed out in the other output type selections. For more information on streaming, see “Streaming Media” on page 149.</p>

Table 5: Squeeze Compression Settings Descriptions (Continued)

Feature	Description
	<p>Constrain File Size: Allows you to specify the target file size of the output file. The compressed output file usually does not exceed the value you enter. Using this feature automates the selection of the audio and video compression settings by selecting optimal settings for the specified target size.</p> <p>Squeeze selects the compression settings based on the original default compression values that are associated with the Preset Data Rate Button(s) of Squeeze and then adjusts these values to reach the desired total file size.</p>
	<p>Restore Default Button: Restores all of the values to the preset default values.</p>
	<p>Save Setting Button: Allows you to save the modifications you have made to the Compression Settings as a Squeeze document to reuse later.</p> <p>► <i>Note: The Constrain File Size setting is dependant on each source file and is not saved in the Squeeze document. You must manually enter the Constrain File Size Value for each instance of Squeeze.</i></p>
	<p>Open Setting Button: Allows you to open saved Squeeze documents and use the saved settings.</p>
	<p>Cancel Button: Cancels the modifications you have made in the Compressions Settings dialog box.</p>
	<p>OK Button: Saves the modifications to the Compression Settings for the current files you are compressing.</p>

Filter Settings

Filter Settings allow you to apply filters to the movie you are compressing. Select the **Filter Settings button**  on the Main Squeeze Interface to access the Squeeze filters. The Filter Settings dialog window is shown in Figure 4.

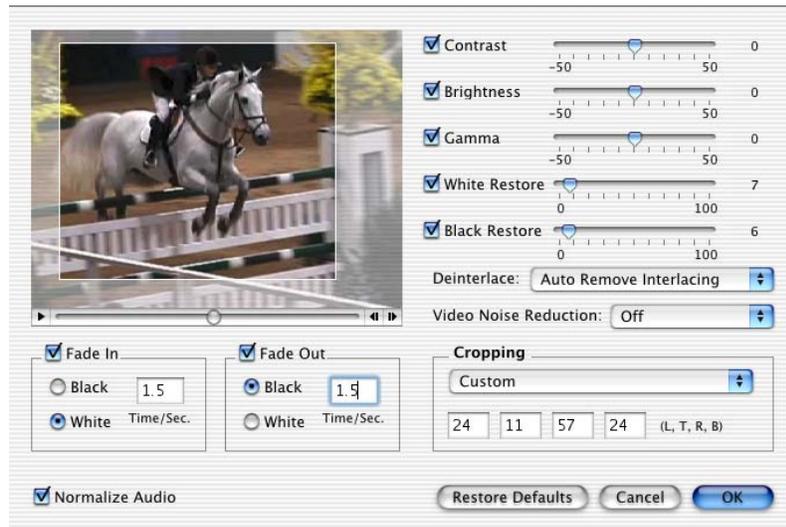


Figure 4: Filter Settings Dialog Window

Table 6 on page 23 contains a description of the information that is displayed or adjustable in the Filter Settings dialog window.

Table 6: Squeeze Filter Interface Descriptions

Feature	Description
	<p>Preview Window: Previews your content as you make adjustments with the filters.</p> <p>Slider Bar: Allows you to navigate to any frame in the movie and view the frame in the preview window. The slider bar is located directly underneath the preview window. This tool is useful if you want to see the impact of filter modifications on different frames in the movie.</p>
	<p>Contrast: Changes the range of dark to light pixels in a linear fashion. When you raise the contrast, the dark pixels get darker and the light pixels get lighter. Increasing the contrast can wash out the highlights and make shadows look totally black. Lowering the contrast tends to make your image look gray.</p>
	<p>Brightness: Makes the image lighter or darker. Modifying the brightness changes all the pixels proportionately. Thus, the light tones tend to become totally white when you raise the brightness and the dark tones become totally black when you lower the brightness.</p>
	<p>Gamma: Modifies the mid-range tones while leaving the very dark and the very light tones relatively unmodified. It is similar to adjusting the brightness and contrast simultaneously but does not tend to lose detail in highlights and shadows.</p>
	<p>White Restore: Sets the level that pixels are set to white. For example, as you set the value higher more pixels become white.</p>
	<p>Black Restore: Sets the level that pixels are set to black. For example, as you set the value higher more pixels become black.</p>

Filter Settings

Table 6: Squeeze Filter Interface Descriptions (Continued)

Feature	Description
	<p>Deinterlace: Removes the interlacing artifacts caused by the two-fields-per-frame characteristic in conventional video. The pop-up menu offers options of:</p> <ul style="list-style-type: none"> ◆ Off ◆ Auto Remove Interlacing ◆ Remove Upper Field ◆ Remove Lower Field ◆ Remove Telecine (upper field dominant) ◆ Remove Telecine (lower field dominant) <p>For additional information about deinterlacing see “Additional Information About Deinterlacing” on page 25.</p>
	<p>Video Noise Reduction: Reduces the video noise in your content without causing it to look blurry. Reducing noise makes the encoding process easier. There are three options:</p> <ul style="list-style-type: none"> ◆ Off: Use when your video has virtually no video noise as is common with professionally produced videos. ◆ Light: Use when your video has minimal noise such as is common with inexpensive DV cameras. The Light setting does not change the appearance of your video. ◆ Heavy: Use when your video has heavy noise such as is common with VHS content. Using the Heavy setting changes the appearance of your video.
	<p>Fade In: Allows you to create a black or white fade-in segment at the beginning of your movie. To create a fade-in transition, select the Fade In checkbox, select Black or White, then enter the number of seconds for your fade-in transition. The Fade In feature also fades the audio in.</p>
	<p>Fade Out: Allows you to create a black or white fade-out segment at the end of your movie. To create a fade-out transition, select the Fade Out checkbox, select Black or White, then enter the number of seconds for your fade-out transition. The Fade Out feature also fades the audio out.</p>

Table 6: Squeeze Filter Interface Descriptions (Continued)

Feature	Description
	<p>Cropping: Provides the ability to crop your video. To produce the best results, occasionally you need to crop your video. Cropping can eliminate dark or ragged edges, focus on a specific portion of your video, or crop the black areas off letterbox video. Squeeze has a Custom cropping option and three common ratios. If you select Custom cropping, you can click and drag the cropping frame from an edge of the Preview Window or enter numeric values to specify how many pixels you want cropped from the specified edge. The Frame Size options are</p> <ul style="list-style-type: none"> ◆ Off ◆ Custom ◆ Standard TV (4:3) ◆ Wide Screen TV (16:9) ◆ Wide Screen Movie (2.35:1)
	<p>Normalize Audio: Analyzes the movie to determine the loudest sound level. The volume of that “loudest sound” is then used as the maximum volume. Squeeze applies the volume adjustment to the entire output file.</p>
	<ul style="list-style-type: none"> ◆ OK: Saves the modifications to the Filter Settings for the files you are compressing. ◆ Cancel: Cancels the modifications you have made to the Filter Settings. ◆ Restore Defaults: Restores all of the values to the preset default values.

Additional Information About Deinterlacing

All NTSC or PAL video frames consist of alternating upper and lower fields. When viewing interlaced video on a computer screen, high-action frames often become separated into alternating lines that look like motion stripes. For the best desktop playback results, deinterlace full-screen video prior to encoding. Removing the interlacing effect makes it look and encode better.

- *Note: If you capture your video at half-screen resolution, you might not need to deinterlace the video. Most computer capture cards deinterlace the video as they capture.*

Filter Settings

The Deinterlace pop-up menu offers two methods for deinterlacing video and two options for movies originally shot on film. For best results when deinterlacing, capture your source at full-screen resolution.

- ◆ **Auto Remove Interlacing:** Auto Remove Interlacing is turned on whenever Squeeze detects a source file with a Frame Size of 720x480-486 or 720x576-584. Typically, files with a Frame Size of 720x480-486 or 720x576-584 contain interlacing. If the source is wider than 720 pixels, the Auto Deinterlace feature does not work.
 - ◆ **Remove Lower Field and Remove Upper Field:** The Lower and Upper options remove either the upper or lower field of the original source. After the selected (lower or upper) field is removed, the remaining field is condensed. Either option generally produces sharp images by eliminating the motion stripe artifacts from interlacing.
- *Note: If you use the Lower or Upper deinterlacing options and get a slight stutter in the video, you might be seeing frame duplication resulting from source material that was shot on film and transferred to video. In these cases, it is suggested that you capture the source video at full-frame size and rate and use the Remove Telecine option.*

Telecine is a process that is used to convert film (24fps) to video (NTSC, 30fps). To compensate for the different Frame Rates, the Telecine process adds additional frames. However, when you compress video you get better results if you return the video to its original Frame Rate (24fps).

To check if your source file has the additional frames, view a sequence (without any edits) frame by frame. If your source has Telecine, you will see a pattern of three progressive frames followed by two interlaced frames or a duplicate frame inserted every 5 frames (4 frames of normal frames plus 1 duplicate).

- ◆ **Remove Telecine (upper field dominant):** Allows you to remove the lower frames that were added in the Telecine process.
 - ◆ **Remove Telecine (lower field dominant):** Allows you to remove the upper frames that were added in the Telecine process. In most cases, the Telecine process adds the extra frames in a specific pattern and Remove Telecine (upper field dominant) removes the frames and returns the video to its original Frame Rate. However, occasionally the Telecine process adds frames using an opposite pattern, thus Remove Telecine (lower field dominant) removes the added frames. If Remove Telecine (upper field dominant) does not work, use Remove Telecine (lower field dominant).
- *Note: If you are compressing PAL video, you do not need to use Remove Telecine. Transferring from film to PAL does not add frames.*

Keyboard Shortcuts

Sorenson Squeeze allows you to use keyboard shortcuts to perform tasks in Sorenson Squeeze. Table 7 identifies the available keyboard shortcuts.

Table 7: Keyboard Shortcuts

Keyboard Shortcut	Resulting Action
Command+H	Hides the open Squeeze Interfaces.
Command+Q	Shuts down and quits the Squeeze application.
Command+O	Opens a new source file. If there is already an open source file in the Main Squeeze Interface, a new instance of Squeeze starts.
Shift+Command+O	Opens a Watch Folder. If there is already an open source file in the Main Squeeze Interface, a new instance of Squeeze starts.
Command+W	Closes a source file.
Command+I	Begins a new video capture. If there is already an open source file in the Main Squeeze Interface, a new instance of Squeeze starts.
Command+D	Opens the interface to set the default output directory.
Command+M	Minimizes the Main Squeeze Interface.
Command+?	Opens the Squeeze help file.
Up Arrow	Increases the volume of a source file as it is previewed in the Main Squeeze Interface. This key does not affect the audio in the output file.
Down Arrow	Decreases the volume of a source file as it is previewed in the Main Squeeze Interface. This key does not affect the audio in the output file.
Command+Right Arrow	Causes the source file in the Preview Window of the Main Squeeze Interface to play.
Space Bar	Causes the source file in the Preview Window of the Main Squeeze Interface to play.
Alt+Right Arrow	Causes the source file in the Preview Window of the Main Squeeze Interface to fast forward to the end.

Table 7: Keyboard Shortcuts (Continued)

Keyboard Shortcut	Resulting Action
Alt+Left Arrow	Causes the source file in the Preview Window of the Main Squeeze Interface to rewind to the beginning.
Right Arrow	Causes the source file in the Preview Window of the Main Squeeze Interface to advance one frame.
Left Arrow	Causes the source file in the Preview Window of the Main Squeeze Interface to go back one frame.

Menu Bar

The Menu bar allows you to access functionality in Sorenson Squeeze. Table 8 identifies the functionality that is accessible through the Menu bar.

Table 8: Menu Bar Features

Menu Bar	Resulting Action
Squeeze About Sorenson Squeeze	Identifies the version of Sorenson Squeeze you are running.
Squeeze Hide Squeeze	Hides the open Squeeze Interfaces.
Squeeze Hide Others	Hides all other programs only leaving Squeeze visible.
Squeeze Show All	Shows all open programs.
Squeeze Quit Squeeze	Shuts down and quits the Squeeze application.
File Open	Opens a new source file. If there is already an open source file in the Main Squeeze Interface, a new instance of Squeeze starts.
File Open Watch Folder	Opens a Watch Folder. If there is already an open source file in the Main Squeeze Interface, a new instance of Squeeze starts.
File Close	Closes a source file.
File DV Import	Begins a new video capture. If there is already an open source file in the Main Squeeze Interface, a new instance of Squeeze starts.
File Import Audio	Allows you to import a separate audio source to go with a video source. The audio file must be the same type of file as the video source file. This feature is particularly useful for the Matrox® audience who produce content as separate audio and video files.
Output Set Default Output Directory	Opens the interface to set the default output directory.
Output Output File Location	Allows you to choose between having the output files placed in the same directory as the source directory or having the output files placed in the Default Output Directory.

Table 8: Menu Bar Features (Continued)

Menu Bar	Resulting Action
Output Always Ask Where to Save	Causes a dialog box to appear each time you compress a file. Using the dialog box, you specify an output location for each file you compress.
Vcast About Vcast	Opens a Web page that introduces you to Vcast.
Vcast Account Setup	Opens the online Vcast registration page.
Vcast Connect to Vcast	Provides a login to access your Vcast account. This option is only available when you are not logged in to Vcast.
Vcast Disconnect from Vcast	Disconnects you from your Vcast account. This option is only available when you are logged in to Vcast.
Vcast Assets	Connects you to your Vcast Assets Web page. This option is only available when you are logged in to Vcast.
Window Minimize Window	Minimizes the Main Squeeze Interface.
Window Bring All to Front	Brings all of the open Squeeze windows in front of other windows belonging to other applications.
Help Squeeze Help	Opens the Help file
Help User Guide	Opens the Acrobat® version of the User Guide.
Help Squeeze Registration	Opens the online registration Web page for Sorenson Squeeze.
Help Product Updates	Opens the Squeeze updates Web page and identifies any updates that are available to you.
Help MPEG-4 Compatibility	Opens a Web page that supplies information about tested MPEG-4 players and provides links to players that are compatible with Sorenson Squeeze.
Help Flash Information	Opens a Web page that provides resources to help create Flash video files.
Help Sorenson Squeeze Support	Opens the Sorenson Media Support Web page.

Output Folders

The output folder is the location that the compressed files are placed when the compression is complete.

Specify the Default Output Folder

You can access the interface to set the default output folder location for Squeeze by selecting **Output | Set Default Output Directory** from the menu bar or entering **Command D** on your keyboard.

When the *Choose a Folder* dialog box appears, select the **New Folder** button to create a new folder to serve as the output folder or browse to the existing folder you want to serve as the output folder and select the **Choose** button.



Figure 5: *Choose a Folder* Dialog Box

Specify Output Folder Location

From the Menu bar, select **Output | Output File Location** and then choose between using the **Default Output Folder** that you specified or use the **Same as the Source Directory**. By default the Same as the Source Directory is selected.

Always Ask Where to Save Output

From the Menu bar, select **Output | Always Ask Where to Save Output** and you are prompted to designate an output folder each time you perform a compression.

Compress Your Movies

Supported Input Formats

Table 9 identifies the input formats that Sorenson Squeeze supports.

Table 9: Squeeze Supported Input Formats

Format Extension	Description
AIF/AIFF	The Apple® Audio Interchange File Format. An AIF/AIFF file contains the raw audio data, channel information (mono or stereo), bit depth, sample rate, and application-specific data areas.
AVI	Audio Video Interleaved file. Audio and video files that conform to the Microsoft® Windows® Resource Interchange File Format (RIFF) specification. Many high-end video editing programs output to raw format AVI.
DV	Digital Video. Standard digital format commonly used in digital video cameras. You can transfer DV movies to your computer using your computer's FireWire® port (IEEE 1394 or i.Link®).
MOV	File format for Apple QuickTime movies. QuickTime 5.0.2 or later must be installed if you want to use MOV files as input files. <ul style="list-style-type: none">▶ <i>Note: Squeeze does not support compressing QuickTime Media Skins. Always create QuickTime Media Skins after compressing the video.</i>▶ <i>Note: QuickTime authoring tools allow a producer to protect a MOV file from being saved or exported. You cannot successfully compress protected source files using Squeeze.</i>

Supported Input Formats

Table 9: Squeeze Supported Input Formats (Continued)

Format Extension	Description
WAV	Wave Audio Format. A WAV file is an audio file format, created by Microsoft, that has become a standard PC audio file format for everything from system and game sounds to CD-quality audio. Used primarily in PCs, the WAV file format is accepted as a viable interchange medium for other computer platforms including Macintosh.

- **Note:** Using Trim Points allows you to select a portion of a source file as your input source. See “Trim Points” on page 44.

Separate Audio and Video Source Files

You can import a separate audio source file to go with a video source file. You must use the same media type for the audio file as the input video source file. This feature is particularly useful when content is produced as separate audio and video files (Matrox audience).

To open a separate Audio Source file:

1. Launch the Sorenson Squeeze application by clicking on the **Launch Squeeze icon**  to access the Squeeze Project dialog box.



Figure 6: Squeeze Project Dialog Box

Supported Input Formats

2. Select the **Movie File icon** to access the *Open: Sorenson Squeeze* dialog box as shown in Figure 7.

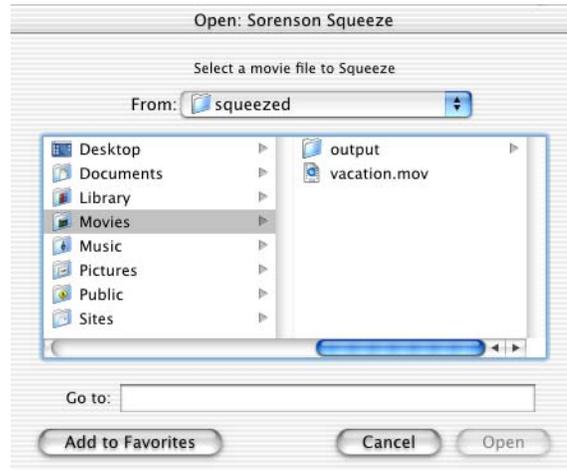


Figure 7: *Open: Sorenson Squeeze* Dialog Box

3. Locate and select your supported video input file.
4. Select the **Open button** and your movie appears in the Preview Window of the Main Squeeze Interface.
 - **Note:** You can also open Squeeze by dragging and dropping your uncompressed movie onto the **Launch Squeeze icon** or the **Main Squeeze Interface**.
5. From the Menu bar, select **File | Import Audio**.
6. Locate and select your supported audio input file.

Your movie is ready to compress. Complete the compression process as you would for any other file. See “Quick and Easy Compression” on page 51 for information about compressing your movie.

Supported Output Formats

The Output format is the video format of your movie after you compress it. Table 10 identifies the output formats that are available for each version of Squeeze.

Table 10: Available Output Formats According to Version of Squeeze.

Version	Available Output Formats
Sorenson Squeeze 3 for Macromedia Flash MX	FLV SWF
Sorenson Squeeze 3 for MPEG-4	MP4
Sorenson Squeeze 3 Compression Suite	FLV SWF MOV MP4

- **Note:** *Sorenson Squeeze 3 for Macromedia Flash MX and Sorenson Squeeze 3 for MPEG-4 users who have previously installed Sorenson Video 3 Pro, can also create MOV files as output files.*

Table 11 describes each of the output formats.

Supported Output Formats

Table 11: Output Format Descriptions

Format Extension	Description
SWF	File format for Macromedia Flash movies. It is a self-contained Flash movie that is played in Macromedia Flash MX or Flash Player 6.
FLV	Video file format for Flash movies. An FLV file is a video component that you can import into a flash document (FLA), which is then exported to a Flash movie (SWF). To view movies generated in the FLV file format, you must install Macromedia Flash MX.
MOV	File format for Apple QuickTime movies. Sorenson Squeeze outputs your movie file to MOV format for viewing in QuickTime 5.0.2 or later.
MP4	The international standard for coding video in a digital format as specified by the Moving Picture Experts Group (MPEG) and is fully compliant with the ISO MPEG-4 specification.

Capture Video Content

Sorenson Squeeze provides a video capture feature that allows you to capture your content directly into the Squeeze application. If you are creating your movie using a DV camera, all you need is a FireWire port on your computer and a FireWire cable to import your movie into Squeeze.

To capture video content into Squeeze:

1. Connect your camera to your computer using FireWire.
2. Turn your DV camera on.
3. Launch the Sorenson Squeeze application by clicking on the **Launch Squeeze icon**  to access the Squeeze Project dialog box.



Figure 8: Squeeze Projects Dialog Box.

Capture Video Content

4. Select the DV Capture option. The Video Capture dialog box appears with the video content you are capturing in the preview window as is shown in Figure 9.

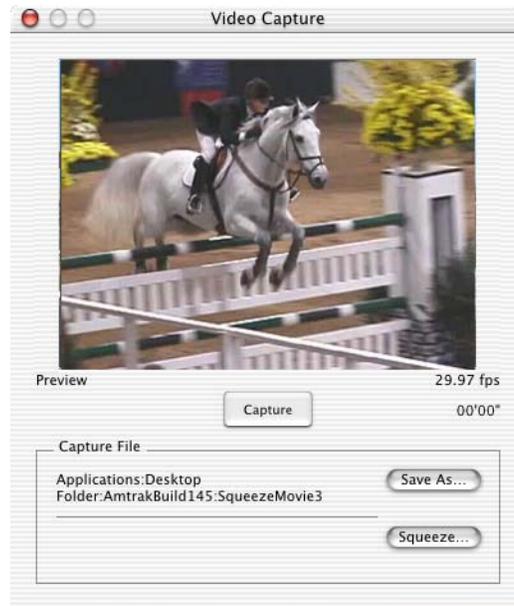


Figure 9: Video Capture Dialog Box

- *Note:* You can also access the Video Capture dialog box by selecting **File | DV Import** from the Menu bar or entering **Command+I** on your keyboard.
5. Select the **Save As** button to access the Save As dialog box.
 6. Name your DV movie file, designate a location for it, and then select the **Save** button.
 7. Select the **Capture** button.
- *Note:* The capture terminates if your computer display or hard drive enters “sleep” mode while a capture is in progress. Check the Energy Saver settings in the Macintosh System Preferences to ensure that the settings do not cause sleep to occur while capturing.

8. When you are finished capturing your movie, select the **Stop button**.
9. Select the **Squeeze button** to open your captured content into Squeeze.

Your movie is ready for you to compress. See “Customize Settings” on page 45 and “Quick and Easy Compression” on page 51 for information about compressing your movie.

Trim Points

Trim Points allow you to set a single set of compression In and Out Trim Points. The Trim Points provide a pre-processing control for trimming or shortening the source video. The portion of the video outside the In and Out Trim Points is not included in the compressed output file. By default, there are not any Trim Points applied to source files.

Set the Trim Points

To set the Trim Points:

- 1 Position the Movie Playhead to the location in the movie timeline that you want to insert the In Trim Point.
- 2 Hold the **Shift** key down to insert the In Trim Point.
- 3 While continuing to hold the **Shift** key, advance the Movie Playhead to the location in the movie timeline that you want to insert the Out Trim Point and release the **Shift** key.

- *Note: You can position the movie playhead by clicking and dragging the Movie Playhead with the mouse or by using the player control **Reverse 1 Frame** and **Advance 1 Frame** buttons.*

Identify the In and Out Trim Points

When the In and Out Trim Points are set, Trim Shading appears on the timeline between the Trim Points.

Clear Trim Points

To clear the Trim Points, click anywhere in the timeline while Trim Shading is present.

Customize Settings

Even though the Preset Data Rate Button(s) have been optimized for high-quality results, your particular content might require you to change the Compression Settings and Filter Settings.

Customize a Preset Data Rate Button

When you customize the Compression Settings, the settings are not automatically saved after you exit Squeeze. To customize the Compression Settings for a Preset Data Rate Button:

1. Launch the Sorenson Squeeze application by clicking on the **Launch Squeeze icon**  to access the Squeeze Project dialog box.



Figure 10: Squeeze Project Dialog Box

Customize Settings

2. Select the **Movie File icon** to access the *Open: Sorenson Squeeze* dialog box as shown in Figure 11.

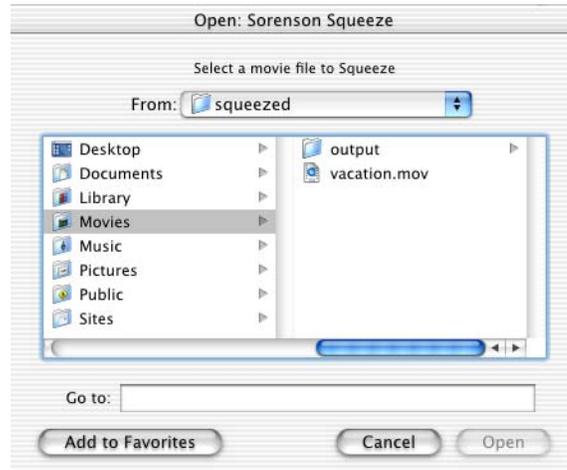


Figure 11: *Open: Sorenson Squeeze* Dialog Box

3. Locate and select your supported input file (AIF, AVI, DV, MOV, or WAV formats).
4. Select the **Open button** and your movie appears in the Preview Window of the Main Squeeze Interface.
 - **Note:** You can also open Squeeze by dragging and dropping your uncompressed movie onto the **Launch Squeeze icon** or the **Main Squeeze Interface**.
5. Select an **Output Type Button** indicating the file format of your compressed movie.

Depending on the version of Squeeze that you purchased, there are up to four available output formats available to you. For more information about Output options, see “Supported Output Formats” on page 39.

6. Double-click the Preset Data Rate Button to access the Compression Settings dialog box.

- ▶ *Note: You can also access the Compression Settings by holding the **Control** key and clicking on a file in the Output Summary Window in the Main Squeeze Interface and then selecting **Edit** in the pop-up window.*
- 7. Edit the Compression Settings for your specific needs.

For more information on the individual settings and options, see “Compression Settings” on page 16.
- ▶ *Note: If you are streaming your movie, set the Data Rate close to or less than your target audience’s connection speed.*
- 8. Select the **OK button** .

Save and Reuse a Compression Setting

You can save a customized compression setting for reuse at a later time by selecting the **Save Settings button** and saving the Squeeze document in a directory of your choice. When you want to reuse the saved settings, select the **Open Settings button** and browse to the location of your saved Squeeze document.

- ▶ *Note: The Constrain File Size setting is dependant on each source file and is not saved in the Squeeze document. You must manually enter the Constrain File Size Value for each instance of Squeeze.*

Customize the Filter Settings

Each time you launch Squeeze, the filter settings are returned to their default values. To customize the Filter Settings for an instance of Squeeze:

1. Launch the Sorenson Squeeze application by clicking on the **Launch Squeeze icon**  to access the Squeeze Project dialog box.



Figure 12: Squeeze Project Dialog Box

2. Select the **Movie File icon** to access the *Open: Sorenson Squeeze* dialog box as shown in Figure 13.

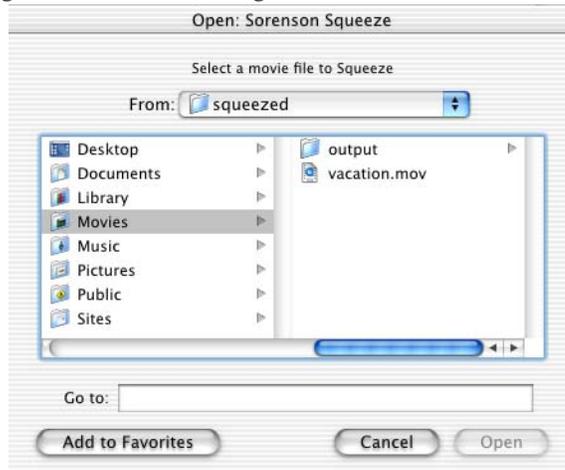


Figure 13: Open: Sorenson Squeeze Dialog Box

3. Locate and select your supported input file (AIF, AVI, DV, MOV, or WAV formats).
 4. Select the **Open button** and your movie appears in the Preview Window of the Main Squeeze Interface.
- *Note: You can also open Squeeze by dragging and dropping your uncompressed movie onto the **Launch Squeeze icon** or the **Main Squeeze Interface**.*
5. Select the **Filter Settings button**  on the Main Squeeze Interface to access the Filter Settings dialog box as is shown in Figure 14.

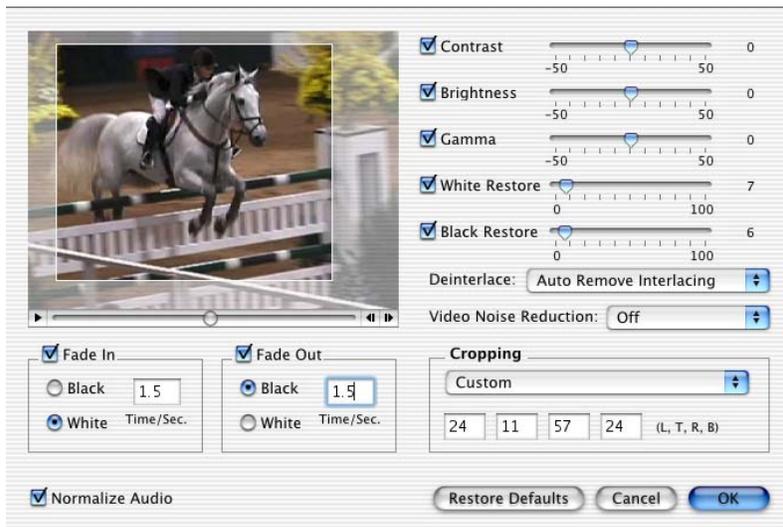


Figure 14: Filter Settings Dialog Box

Customize Settings

6. Adjust the filters settings to meet your needs. For more information on the individual settings and options, see “Filter Settings” on page 22.

When you make changes to the Filter Settings, the changes apply to all Preset Data Rate Button(s) and all uncompressed files in the Output File Summary window. For example, if you want to make the gamma setting different for a modem connection than a LAN connection; set the filter, compress your modem output, set the filter again, and compress the LAN output.

7. Select the **OK button**  to save your filter settings.
- *Note: If you want to restore the Filter Settings to the default values, select the **Default button** in the dialog box.*

Quick and Easy Compression

The Sorenson Squeeze Preset Data Rate Button(s) allow you to compress your movies quickly and easily. The only compression detail you need to know is the data rate (connection speed) and delivery method of your target audience.

To compress your movie quick and easy, follow these simple steps:

1. Launch the Sorenson Squeeze application by clicking on the **Launch Squeeze icon**  to access the Squeeze Project dialog box.



Figure 15: Squeeze Project Dialog Box

Quick and Easy Compression

2. Select the **Movie File icon** to access the *Open: Sorenson Squeeze* dialog box as shown in Figure 16.

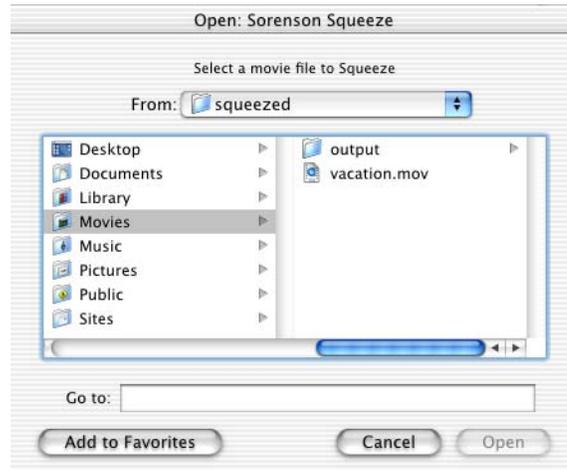


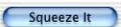
Figure 16: *Open: Sorenson Squeeze* Dialog Box

3. Locate and select your supported input file (AIF, AVI, DV, MOV, or WAV formats).
4. Select the **Open button** and your movie appears in the Preview Window of the Main Squeeze Interface.
 - ▶ **Note:** You can also open Squeeze by dragging and dropping your uncompressed movie onto the **Launch Squeeze icon** or the **Main Squeeze Interface**.
5. Select an **Output Type Button** indicating the file format of your compressed movie.

Depending on the version of Squeeze that you purchased, there are up to four available output formats available to you. For more information about Output options, see “Supported Output Formats” on page 39.

6. Select a Preset Data Rate Button for your target audience. You can select as many Preset Data Rate Buttons that you want to compress your movie for.

As you select the Preset Data Rate Button, you need to consider two questions: 1) What is your target audience's connection speed(s)? 2) What is the delivery method of your movie: Streaming, Progressive, or Local Delivery? For more information, see "Compression Settings" on page 16 and "Streaming Media" on page 149.

7. Select the **Squeeze It button** .

A window with a progress bar appears indicating the number of output files Squeeze is creating (one for each selected Preset Data Rate Button and file output type) and the progress of the current compression job.

When your compression job is finished, Squeeze places the finished, compressed movie(s) in the folder containing your source movie file unless you have specified a different output folder location (see "Specify the Default Output Folder" on page 32).

Compress for QuickTime

If you purchased the Sorenson Squeeze 3 Compression Suite, you can compress your movie(s) for the QuickTime MOV format. MOV is the file format for Apple QuickTime movies. Sorenson Squeeze outputs your source file to MOV format that is viewable in QuickTime 5.0.2 or later.

To compress your movie for QuickTime:

1. Launch the Sorenson Squeeze application by clicking on the **Launch Squeeze icon**  to access the Squeeze Project dialog box.



Figure 17: Squeeze Project Dialog Box

2. Select the **Movie File icon** to access the *Open: Sorenson Squeeze* dialog box as shown in Figure 18.

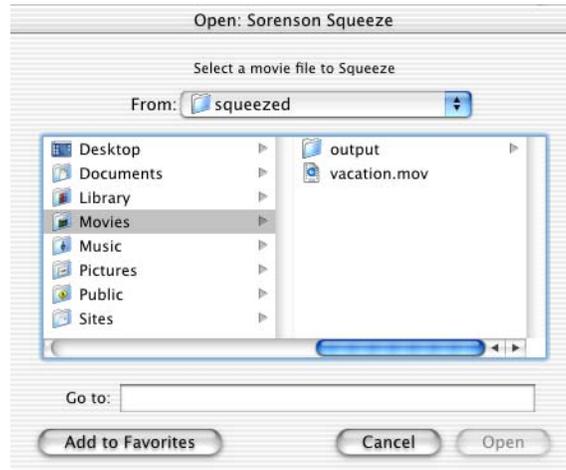


Figure 18: *Open: Sorenson Squeeze Dialog Box*

3. Locate and select your supported input file (AIF, AVI, DV, MOV, or WAV formats).
4. Select the **Open button** and your movie appears in the Preview Window of the Main Squeeze Interface.
 - ▶ **Note:** You can also open Squeeze by dragging and dropping your uncompressed movie onto the **Launch Squeeze icon** or the **Main Squeeze Interface**.
5. Select the **QuickTime output button**  .

Compress for QuickTime

6. Select the Preset Data Rate Button(s) that meet the needs of your audience. You can select as many Preset Data Rates as you desire.

If the Preset Data Rate Settings do not meet the needs of your specific audience, you can modify your output compression settings as is described in “Compression Settings” on page 16 and “Customize a Preset Data Rate Button” on page 45.

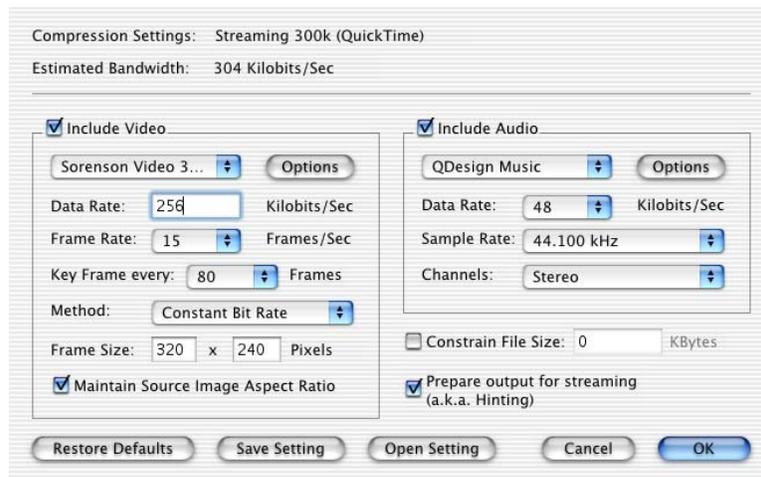


Figure 19: Output Compression Settings for QuickTime File

- **Note:** If you intend to stream your MOV file, you must select the Prepare Output for Streaming (Hinting) option. If you selected one of the Streaming Preset Data Rate Buttons, this feature is already selected.

7. If you want to adjust the filter settings, select the **Filter Settings** button  on the Main Squeeze Interface to open the Filter Settings dialog box.

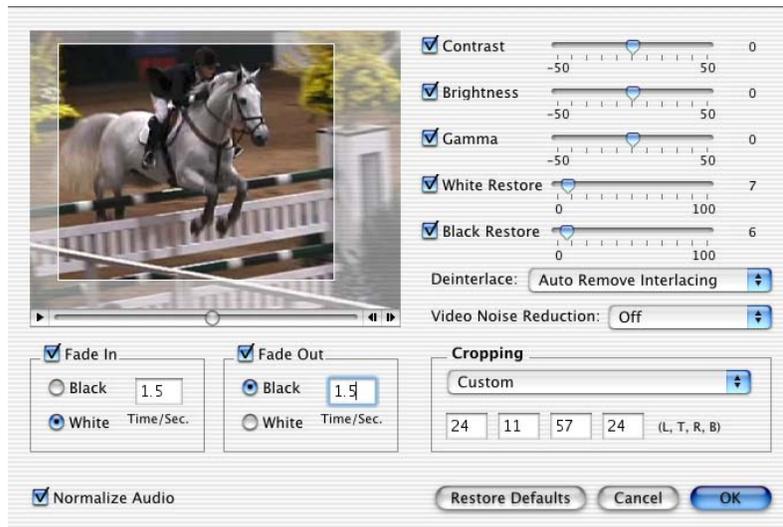


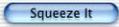
Figure 20: Filter Settings Dialog Window

8. Adjust the Filter Settings and then select the **OK** button.

For information about adjusting the filter settings, see “Filter Settings” on page 22 and “Customize the Filter Settings” on page 48.

The changes you make to the Filter Settings are applied to all the files you are compressing in the Output File Summary window.

Compress for QuickTime

9. Select the **Squeeze It button**  to compress your QuickTime movie.

A window with a progress bar appears indicating the number of output files Squeeze is creating (one for each selected Preset Data Rate Button and file output type) and the progress of the current compression job.

When your compression job is finished, Squeeze places the finished, compressed movie(s) in the folder containing your source movie file unless you have specified a different output folder location (see “Specify the Default Output Folder” on page 32).

Compress for Flash MX

If you purchased the Sorenson Squeeze 3 Compression Suite or Sorenson Squeeze 3 for Macromedia Flash MX, you can compress your input movie(s) to Flash SWF and/or FLV files. Flash SWF is the file format for Macromedia Flash movies. It is a self-contained Flash movie that is played in Macromedia Flash Player 6.

Flash SWF Player Settings

If you choose to create a Flash SWF file, you can use the Flash SWF Player Settings interface to specify how the SWF file plays in Flash Player 6.

The Output SWF Player Settings can only be accessed when an uncompressed SWF file is selected in the Output File Summary window of the Main Squeeze Interface as is shown in Figure 21.

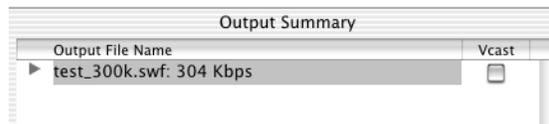


Figure 21: Squeeze Output File Summary Window with Uncompressed SWF File.

There are two methods to access the SWF Player settings.

- ◆ Select the **Flash SWF Player Settings button**  on the Main Squeeze Interface.
- ◆ Hold the **Control** key down and click the output file in the Summary Window of the Main Squeeze Interface, then select **Edit Player Options** in the pop-up list.

Play Options Tab

With the **Play Options tab** selected, you can modify the playback options.

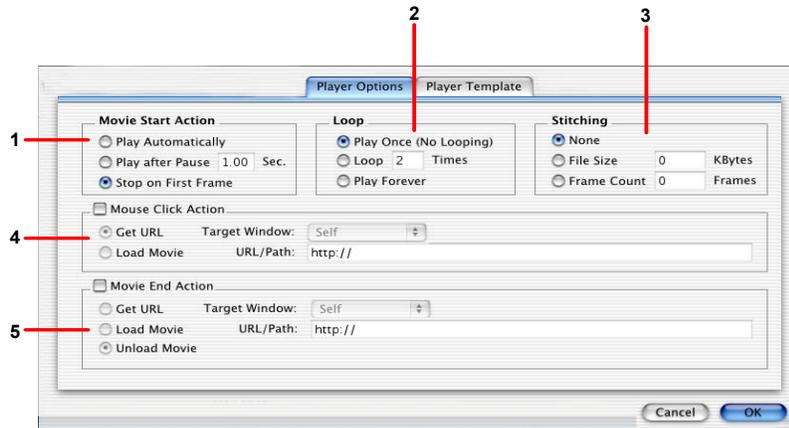


Figure 22: Flash SWF Player Settings Play Options Tab

1- Movie Start Action: The Movie Start Action option allows you to choose from three options to specify the action when the movie starts. By default, Play Automatically is selected.

- ◆ **Play Automatically:** Causes the SWF file to play as soon as it is loaded into the Macromedia Flash Player.
- ◆ **Play After Pause:** Causes the SWF file to pause the amount of seconds you specify before playing in the Macromedia Flash Player. You must enter a value to determine the length of the pause.
- ◆ **Stop on First Frame:** Causes the first frame of the SWF file to load into the Macromedia Flash Player and then stop until there is user interaction to continue playing the file.

► **Note:** If you apply a template to your SWF file that contains an ActionScript specifying an action for the Movie Start, the template overrides the selections you make in this interface.

2- Loop: The Loop option allows you to choose from three options to specify the number of consecutive times the movie plays. By default, Play Once is selected.

- ◆ **Play Once:** Causes the SWF file to play one time without looping.
 - ◆ **Loop:** Causes the SWF files to loop the number of times you specify. You must enter a value to indicate the number of loops you desire.
 - ◆ **Play Forever:** Causes the SWF file to continually loop until there is user intervention to stop the file from playing.
- *Note: If you apply a template to your SWF file that contains an ActionScript specifying a Loop action, the template overrides the selections you make in this interface.*

3- Stitching: The maximum frame count for SWF files is 16,000 frames. If your output file exceeds 16,000 frames the output file stops encoding the remainder of the source file and the output file ends without encoding the entire source file. The Macromedia Flash Player causes the entire SWF file to be held in the RAM of the viewer's computer until the file has completed playing. Some users might not have enough RAM to play large SWF files.

The stitching feature of Sorenson Squeeze allows you to take large files and break them into a series of smaller SWF files, overcoming the file size concern and the frame count limitation of SWF files. The stitched files play in succession, loading and unloading files until all of the files are played.

As is shown in Table 12, stitched files appear in the Squeeze output folder on your computer as a series of SWF files using the output file name with underscores followed by a number representing the file in the series. An XML file based on the output file name is also produced for use with Sorenson Vcast. The Smart Loader file for the series is the SWF file without the underscore and number.

- *Note: The individual stitched files are also referred to as slices.*

Table 12: Sample Output Files Generated by Sorenson Squeeze

File Name	Description
Sample.swf	Smart Loader file
Sample_0.swf	1st Slice of series
Sample_1.swf	2nd Slice of series
Sample_2.swf	3rd Slice of series
Sample_3.swf	4th Slice of series
Sample.xml	.xml file used by Sorenson Vcast

- **Note:** The number of sliced files in the output folder depends on the size of the source file and the Stitching values you select.

The Smart Loader file determines when the player has enough of the first slice to begin playing the movie and continue downloading the series of files without interrupting the viewing of the movie. The Smart Loader also reduces the load time for the video because it only needs to load the first slice before it begins playing instead of waiting to load the movie. The audience does not realize they are viewing a series of files because the movie appears as one long movie, but in actuality, it is a series of short videos.

The Stitching option allows you to choose from three options to specify how your SWF files are stitched. The default selection for stitching is None.

- ◆ **None:** Turns off stitching and creates one SWF output file. If you select **None**, verify that your output file has all of the content of the source file and is not truncated because the output file exceeds 16,000 frames. It is wise to also look at the file size and make sure it is not too large for your audience. To overcome these concerns, use one of the other Stitching options.
 - ◆ **File Size:** Allows you to specify how large each slice is before creating an additional slice in the stitched file. This feature is particularly useful if you are concerned about your audience not having enough RAM on their viewing computer. Smaller file sizes require less RAM.
 - ◆ **Frame Count:** Allows you to specify the number of frames that each slice contains before creating an additional slice in the stitched file. Higher frame counts result in larger file sizes, but fewer stitched files. Do not enter a value exceeding 16,000 frames.
- *Note: If you select a file size that would result in a file exceeding the 16,000 maximum frame count, the file size selection is disregarded and the file is stitched at a smaller file size ensuring the maximum frame count is not exceeded.*

When determining how to use stitching with SWF files, consider your audience and their needs and try different settings to obtain the best results.

- *Note: In some instances when stitched files are played, you might detect a slight audio glitch between slices of the stitched files. This is considered normal behavior and is a side effect of using Stitching.*

4- Mouse Click Action: The Mouse Click option allows you to choose from two options to specify the resulting action when a user mouse clicks the Macromedia Flash Player while the SWF file is playing. By default, the Mouse Click Action option is not active.

- ◆ **Get URL:** Causes the specified URL to open in a browser. In the URL/Path field, insert the URL you want to open when you mouse click the Flash Player. In the Target Window, you must select one of the four options:
 - **Blank:** Creates a new browser window and loads the URL into it.
 - **Parent:** Removes the current frameset and loads the URL in its place. Use this option if you have multiple nested framesets, and you want your linked URL to replace only the frameset in which your movie resides.
 - **Self:** Loads the URL into the same frame or window as the current movie.
 - **Top:** Loads the URL into the current browser and removes all framesets in the process. Use this option if your movie is in a frame, but you want your linked URL to load normally into the browser, outside the confines of any frames.
- ◆ **Load Movie:** Causes the specified movie to open in the same player when it is mouse clicked. In the URL/Path field, insert the path to the movie you want to open when you mouse click the Flash Player.

5- Movie End Action: The Movie End Action option allows you to choose from three options to specify the resulting action when the movie ends. By default, the Movie End Action option is not active.

- ◆ **Get URL:** Causes the specified URL to open when the movie ends. In the URL/Path field, insert the URL you want to open. In the Target Window, you must select one of the four options:
 - **Blank:** Creates a new browser window and loads the URL into it.
 - **Parent:** Removes the current frameset and loads the URL in its place. Use this option if you have multiple nested framesets, and you want your linked URL to replace only the frameset in which your movie resides.
 - **Self:** Loads the URL into the same frame or window as the current movie.
 - **Top:** Loads the URL into the current browser and removes all framesets in the process. Use this option if your movie is in a frame, but you want your linked URL to load normally into the browser, outside the confines of any frames.
- ◆ **Load Movie:** Causes the specified movie to open in the same player when the original movie ends. In the URL/Path field, insert the path to the movie you want to open when the original movie ends.
- ◆ **Unload Movie:** Causes the player to unload the movie from the player when it ends. This option also causes the SWF file to be removed from the RAM of the viewing computer when the movie is unloaded.

Player Templates Tab

When you select the **Player Templates tab**, you can apply templates and ActionScripts to your SWF file. The templates can provide functionality like player controls to your SWF file that you can use multiple times without additional coding.

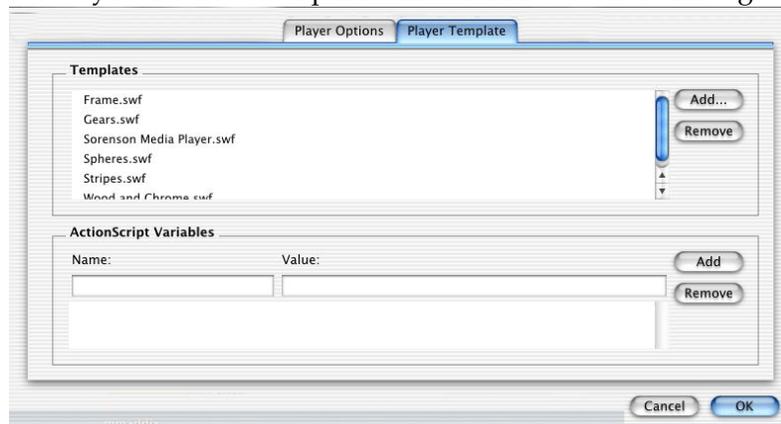


Figure 23: Flash SWF Player Settings Player Templates Tab

Templates: Provides a list of the available templates that you can apply to your SWF file. The default selection is None.

- ◆ You can use the **Add button** to import additional templates to your list. When you select the Add button, a standard Open dialog box appears. You must browse to the location of your new template and select the **Open button**. Templates must be uncompressed SWF files with an instance name of smMovieClip.
 - ◆ The Remove button allows you to remove a template from your list. Highlight the template you want to delete and then select the **Remove button**.
- *Note: Information about creating templates is found at <http://www.sorenson.com/flash>.*
- *Note: The Remove button only removes the template from the Templates folder that Squeeze creates. It does not remove other copies of the template that are in other locations on your computer, including where you imported the template from.*

ActionScript Variables: The ActionScripts Variables option allows you to add variables to the root of the SWF movie clip when it is published.

- ◆ The Add button becomes active when you have entered the Name and Value for the ActionScript Variable. The Value must be a text string and cannot be another variable or an integer.
- ◆ The Remove button allows you to remove existing ActionScripts from the list of variables of the movie clip. The Remove button becomes active when you highlight an ActionScript that appears in the list of ActionScripts.

Compress the File

To compress your movie(s) to Flash format:

1. Launch the Sorenson Squeeze application by clicking on the **Launch Squeeze icon**  to access the Squeeze Project dialog box.



Figure 24: Squeeze Project Dialog Box

Compress for Flash MX

2. Select the **Movie File icon** to access the *Open: Sorenson Squeeze* dialog box as shown in Figure 25.

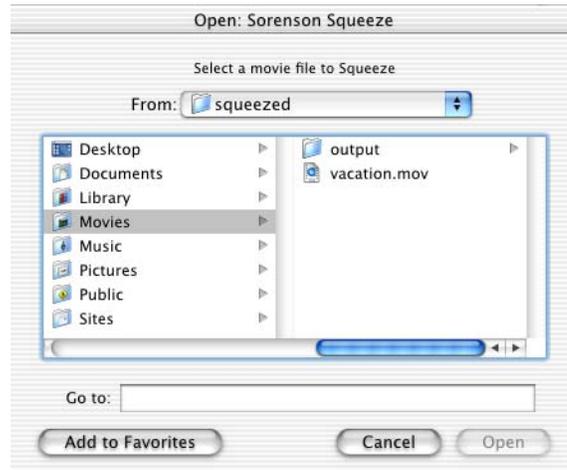


Figure 25: *Open: Sorenson Squeeze Dialog Box*

3. Locate and select your supported input file (AIF, AVI, DV, MOV, or WAV formats).
4. Select the **Open button** and your movie appears in the Preview Window of the Main Squeeze Interface.
 - **Note:** You can also open Squeeze by dragging and dropping your uncompressed movie onto the **Launch Squeeze icon** or the **Main Squeeze Interface**.
5. Select the Flash **SWF**  or **FLV**  **output button**.

6. Select the Preset Data Rate Button(s) that meet the needs of your audience. You can select as many Preset Data Rate settings as you desire.

If the Preset Data Rate Settings do not meet the needs of your specific audience, you can modify your output compression settings as is described in “Compression Settings” on page 16 and “Customize a Preset Data Rate Button” on page 45.

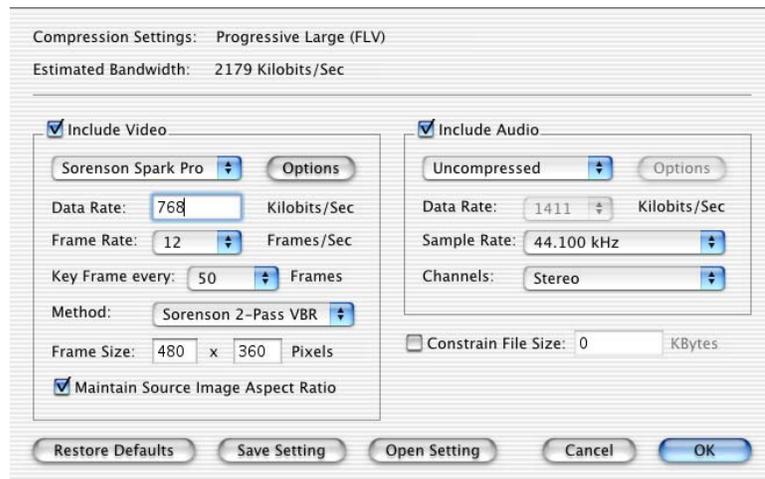


Figure 26: Output Compression Settings for Flash Files

- **Note:** If you are compressing to an FLV format, make sure the Frame Rate matches the Frame Rate of the Flash document that you are importing the FLV files into.
- **Note:** When you are creating FLV files that are imported into the time line of a Macromedia Flash MX file, use the Uncompressed Audio option. Flash MX compresses the audio portion of FLV files and if you do not select Uncompressed Audio, the audio is compressed twice.

7. If you want to adjust the filter settings, select the **Filter Settings** button  on the Main Squeeze Interface to open the Filter Settings dialog box.

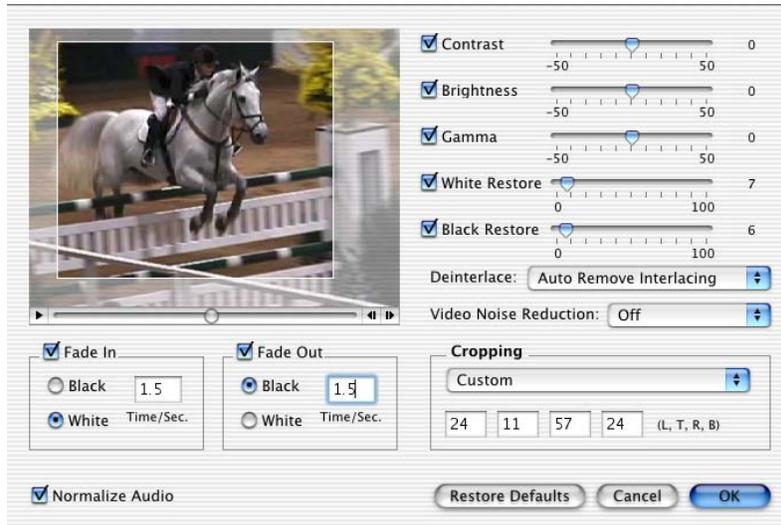


Figure 27: Filter Settings Dialog Window

8. Adjust the Filter Settings and then select the **OK** button.

For information about adjusting the filter settings, see “Filter Settings” on page 22 and “Customize the Filter Settings” on page 48.

The changes you make to the Filter Settings are applied to all the files you are compressing in the Output File Summary window.

9. If you are creating a SWF file, you can edit the Output SWF Player Settings as is described in “Flash SWF Player Settings” on page 59.

10. Select the **Squeeze It button**  to compress your Flash movie.

A window with a progress bar appears indicating the number of output files Squeeze is creating (one for each selected Preset Data Rate Button and file output type) and the progress of the current compression job.

When your compression job is finished, Squeeze places the finished, compressed movie(s) in the folder containing your source movie file unless you have specified a different output folder location (see “Specify the Default Output Folder” on page 32).

Compress for MPEG-4

Compress for MPEG-4

If you purchased the Sorenson Squeeze 3 Compression Suite or Sorenson Squeeze 3 for MPEG-4, you can compress your movie(s) to a MPEG-4 (MP4) file.

To compress your movies to MPEG-4 format:

1. Launch the Sorenson Squeeze application by clicking on the **Launch Squeeze icon**  to access the Squeeze Project dialog box.



Figure 28: Squeeze Project Dialog Box

2. Select the **Movie File icon** to access the *Open: Sorenson Squeeze* dialog box as shown in Figure 29.

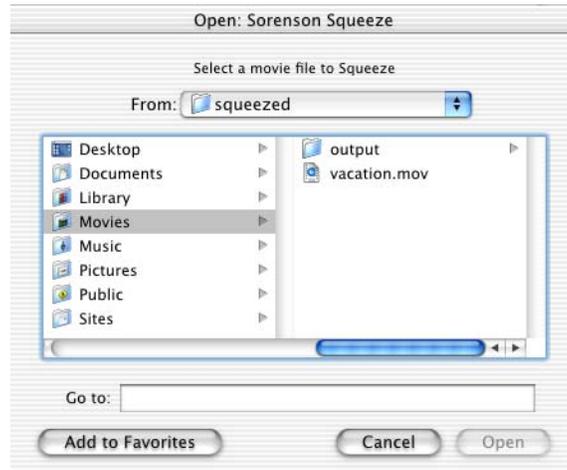


Figure 29: *Open: Sorenson Squeeze Dialog Box*

3. Locate and select your supported input file (AIF, AVI, DV, MOV, or WAV formats).
4. Select the **Open button** and your movie appears in the Preview Window of the Main Squeeze Interface.
 - ▶ **Note:** You can also open Squeeze by dragging and dropping your uncompressed movie onto the **Launch Squeeze icon** or the **Main Squeeze Interface**.
5. Select the **MP4 output button** .

Compress for MPEG-4

6. Select the Preset Data Rate Button(s) that meet the needs of your audience. You can select as many Preset Data Rate settings as you desire.

If the Preset Data Rate Settings do not meet the needs of your specific audience, you can modify your output compression settings as is described in “Compression Settings” on page 16 and “Customize a Preset Data Rate Button” on page 45.

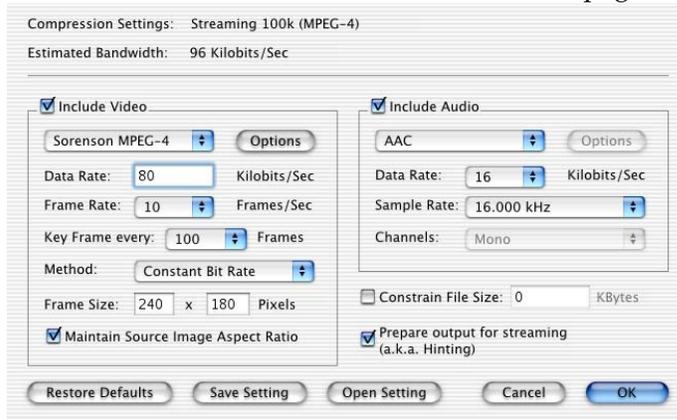


Figure 30: Output Compression Settings for MPEG-4 File

- **Note:** If you intend to stream your MP4 file, you must select the Prepare Output for Streaming (Hinting) option. If you selected one of the Streaming Preset Data Rate Buttons, this feature is already selected.

- If you want to adjust the filter settings, select the **Filter Settings** button  on the Main Squeeze Interface to open the Filter Settings dialog box.

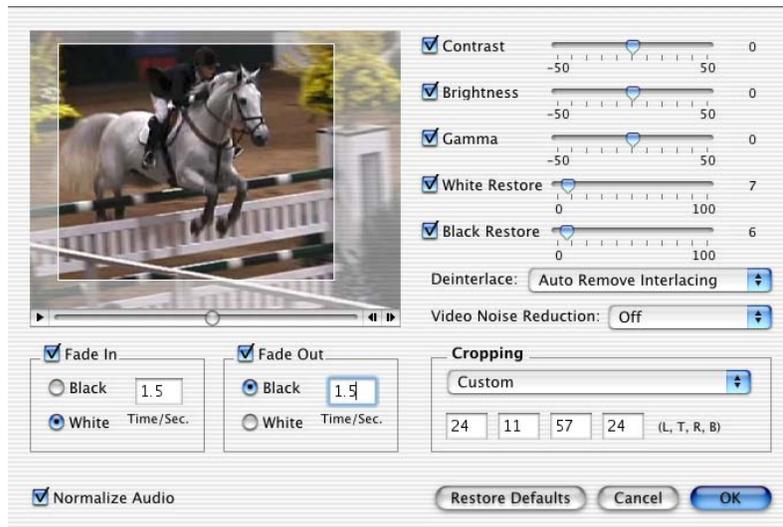
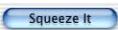


Figure 31: Filter Settings Dialog Window

- Adjust the Filter Settings and then select the **OK** button.

For information about adjusting the filter settings, see “Filter Settings” on page 22 and “Customize the Filter Settings” on page 48.

The changes you make to the Filter Settings are applied to all the files you are compressing in the Output File Summary window.

- Select the **Squeeze It** button  to compress your QuickTime movie.

A window with a progress bar appears indicating the number of output files Squeeze is creating (one for each selected Preset Data Rate Button and file output type) and the progress of the current compression job.

Compress for MPEG-4

When your compression job is finished, Squeeze places the finished, compressed movie(s) in the folder containing your source movie file unless you have specified a different output folder location (see "Specify the Default Output Folder" on page 32).

Compress with Watch Folders (Batch Process)

Squeeze allows you to perform batch processing with multiple source files using Watch Folders. You can put as many source files as you want in a folder and then have Squeeze compress the files in that folder.

The Watch Folder can be located anywhere on your hard drive or on any network drive for which you have access.

To compress multiple source files:

1. Launch the Sorenson Squeeze application by clicking on the **Launch Squeeze icon**  to access the Squeeze Projects dialog box.



Figure 32: Squeeze Projects Dialog Box

Compress with Watch Folders (Batch Process)

2. Select the **Open Watch Folder icon** or from the Menu bar, select **File | Open Watch Folder** to access the *Choose a Folder* dialog box as is shown in Figure 33.

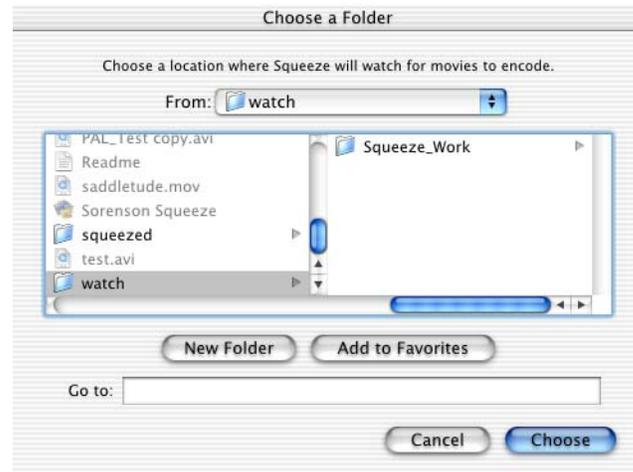


Figure 33: Choose a Folder Dialog Box

3. Create a folder to use as your “Watch Folder” by selecting the **New Folder button**.

You can use an existing folder or create a new folder to serve as your Watch Folder. If you want to use an existing folder, you can skip this step.

4. Browse to the folder you want to use as your “Watch Folder” and then select the **Choose** button.

Squeeze automatically creates two folder inside of the Watch Folder.

- ◆ **Squeeze_Work** (Located at the root of the Watch Folder)— Where Squeeze places your compressed files.
 - ◆ **Squeeze_SourceFiles** (Located at the root of the Squeeze_Work folder)— For storing source files after Squeeze compresses them. As Squeeze compresses your source files, they are moved to this folder.
- *Note: If you designate a specific Output Folder feature as described in “Output Folders” on page 32, the output files are placed in the specified folder rather than the Squeeze Done folder.*
5. As is shown in Figure 34, the Main Squeeze Interface indicates that you have opened a Watch Folder. Select your output format(s) and Preset Data Rate Button(s). You can select multiple formats and presets if you desire.

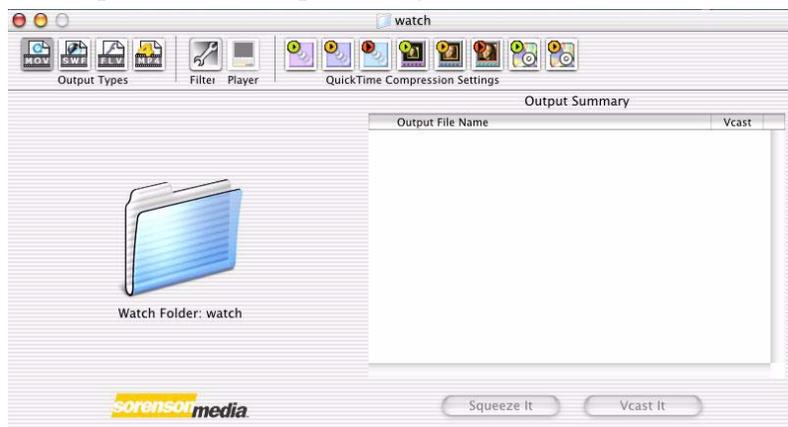


Figure 34: Watch Folder View of Main Squeeze Interface

6. If the Preset Data Rate Settings do not meet the needs of your specific audience, you can modify your output compression settings as is described in “Compression Settings” on page 16 and “Customize a Preset Data Rate Button” on page 45.

Compress with Watch Folders (Batch Process)

7. If you want to adjust the filter settings, select the **Filter Settings** button  on the Main Squeeze Interface to open the Filter Settings dialog box.

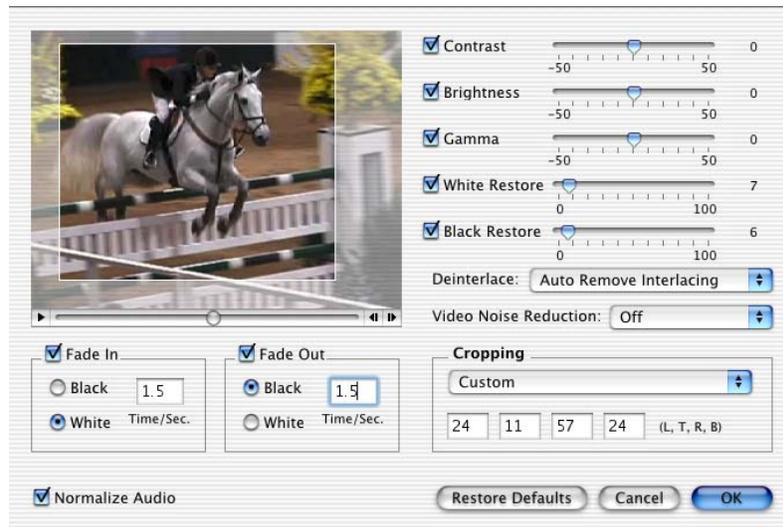


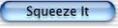
Figure 35: Filter Settings Dialog Window

8. Adjust the Filter Settings and then select the **OK** button.

For information about adjusting the filter settings, see “Filter Settings” on page 22 and “Customize the Filter Settings” on page 48.

The changes you make to the Filter Settings are applied to all the files that you compress in the active Watch Folder.

Compress with Watch Folders (Batch Process)

9. Select the **Squeeze It** button  .

Squeeze compresses the existing contents of your Watch Folder.

While the Watch Folder remains open, you can add additional source files to your Watch Folder and Squeeze compresses them based on the settings you specified.



Figure 36: *Squeeze Watching Folder Window*

Upload Your Movies to Sorenson Vcast

Sorenson Vcast is the Sorenson Media automated online video storage and delivery service. After you register for a Vcast account, you can compress your movies and upload them directly to your Vcast account. Your movies are then made available for viewing to whomever you want.

Vcast supports both RTSP (Real-Time Streaming Protocol) and HTTP streaming (progressive download) movies. For more information on streaming and progressive download, see "Streaming Media" on page 149.

*Note: If you intend to stream QuickTime or MPEG-4 files from Vcast, select the **Prepare Output for Streaming (Hinting)** option in the Compression Settings dialog box before compressing (see "Prepare Output for Streaming (Hinting)" on page 20).*

To upload your movies to Sorenson Vcast:

1. Register for a Vcast account, by selecting **Vcast | Vcast Account Setup** from the Menu bar. Squeeze connects you to the Sorenson Vcast Web page where you can set up your Vcast account.
 - *Note: If you already have a Vcast account, you can skip this step.*
2. Compress your movie(s).
For more information, see "Compress Your Movies" on page 35.

Upload Your Movies to Sorenson Vcast

3. As shown in Figure 37 in the Output Summary window, check the Vcast box(es) for the file(s) you want to upload.

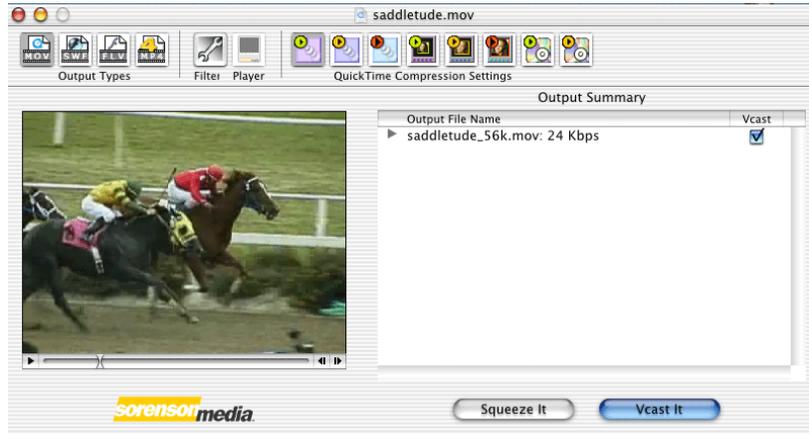
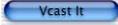


Figure 37: Vcast Option Selected in Output Summary Window

4. Select the **Vcast It** button  and a log in dialog box appears as is shown in Figure 38.

User Name

Password

Remember this account

Add to Keychain

Cancel Continue

Figure 38: Vcast Log In Dialog Box

Upload Your Movies to Sorenson Vcast

5. Enter your User Name and Password and then select the **Continue button**. If you select the **Remember this account** checkbox, you do not need to reenter your Vcast log in information for the current session of Squeeze. If you select the **Add to keychain** checkbox, the password auto-populates after you enter your user name. The Add to keychain selection is always remembered by Squeeze.

A status dialog box appears indicating the progress of the files being uploaded to the Vcast server. When your files are uploaded, the dialog reads Transfer Complete.

- *Note: When you are uploading Stitched files only the Smart Loader file appears. For more information, see "Stitching" on page 61*
6. When Vcast finishes uploading your file(s), select the **Close button**.
 7. From the Menu bar, select **Vcast | Connect to Vcast**.

Squeeze opens the Vcast Assets Web page. From the Assets page you can manage your files and distribute them to your viewers. Refer to the Vcast help files for more information.

Audio Codecs

An audio codec is the software application that compresses the audio portion of your media. Table 13 identifies the audio codecs that are installed with each version of Squeeze.

Table 13: Audio Codecs Installed According to Version of Squeeze.

Version	Audio Codecs
Sorenson Squeeze 3 for Macromedia Flash MX	Fraunhofer MP3 ADPCM Uncompressed Audio
Sorenson Squeeze 3 for MPEG-4	AAC
Sorenson Squeeze 3 Compression Suite	Fraunhofer MP3 ADPCM Uncompressed Audio Qdesign Music Codec 2 QUALCOMM PureVoice Apple IMA 4:1 AAC

Note: Codec is a contraction for the terms encoder/decoder. However, in this user guide when the term codec is used it sometimes only refers to the encoder.

Audio Compression Guidelines

While audio is less data intensive than video, it still requires 11 MB of storage for one minute of uncompressed, CD-quality sound. To reduce these data requirements, there are a number of different audio codecs. These different audio codecs deliver different audio quality, based on your source. To compress the highest audio quality, it is important to understand the characteristics of the audio source. Audio that is well produced with clear instruments and vocals encodes very well, while material that has significant background noise can have more noticeable artifacts in the encoded output. This section contains general information about audio compression and a description of each codec and its features and options.

Audio Production

To achieve good audio compression, you must begin with clean audio. If you are encoding material from a CD, try to record the file using direct digital transfer instead of through the analog input of your sound card. The sound card introduces an unnecessary digital-to-analog and analog-to-digital conversion that can create noise in your source audio. Direct digital transfer tools are available for both Mac and PC platforms. If you must record from an analog source, be sure to use the highest quality sound card available.

Make sure the input levels are set appropriately and that the input signal is not “clipping” (hitting full scale signal strength). To monitor the input level, watch the level meter associated with the input volume control, external mixer, or audio recording application. A good setting for the input signal level is about 2 dB below full input load level (below clipping).

Digital Audio

Before you pick the audio compression format, it is important to understand a few facts about audio in general. Digital audio is measured in samples per second (Hertz or Hz). CD audio is 44.1 kHz, and is the maximum most systems can use. 44.1 kHz stereo audio has a Data Rate of 150 KB/second, which is much too high for most applications without compression.

Historically, most multimedia audio was sampled for compression at 22.05 kHz or 11.025 kHz. The sampling rate you need depends on the type of audio you are using. For all music, 44.1 kHz is ideal, but 22.05 generally sounds adequate. For voice, 22 kHz is more than enough and 11 kHz sounds pretty good. For voice in very constrained environments, 6 kHz is acceptable for male voices and 8 kHz is acceptable for female voices.

Audio is digitized as either 8-bit or 16-bit, however, Sorenson Squeeze only supports 16-bit.

The audio file size is generally proportional to the sampling rate, with stereo doubling the file size. Unless you know your audio has significant differences between the left and right channels, it is generally best to encode to mono to save space and processing power. The typical tools for reducing the Data Rate are

- ◆ Reducing the Sample Rate
- ◆ Converting to mono
- ◆ Digital compression

Fraunhofer MP3

Squeeze includes the Fraunhofer MP3 codec so you can use the MP3 format as the audio track in your movies. The Fraunhofer MP3 codec, is a professional codec created by Fraunhofer IIS, the company who invented MP3.

MP3 Overview

MP3 is a highly compressed audio format that is very popular for distributing music over the Internet. MP3 is part of the MPEG family of compression standards and stands for MPEG-1 Audio Layer 3. MP3 allows you to store digital audio in much smaller files while preserving the quality of the original file.

MP3 files are commonly stored at 128 kbits/sec (approximately 16 KBytes/sec), at CD-quality sampling rate (44.1 kHz), sample depth (16 bits), stereo. These settings provide approximately 11:1 compression. Using the above settings, the quality of your MP3 is virtually indistinguishable from the original uncompressed source.

Encode Parameters

When you use Fraunhofer MP3 as your audio codec, you can control a number of parameters. Although the default settings typically produce good results, you might want to adjust certain parameters to suit your needs.

Sample Rate

The Sample Rate is the number of times, per second, that the audio signal is captured. In general, the higher the Sample Rate, the higher the sound quality of the resulting audio, but the larger the audio file. The Sample Rate is very important in determining the highest frequency that you can capture. The human ear can hear frequencies from 20 Hz to a maximum of 20,000 Hz. To capture a frequency in an audio file, the Sample

Rate must be more than twice that frequency. The MP3 default Sample Rate is 44.1 kHz, which is also the Sample Rate of audio CDs. Other common Sample Rates for MP3 are 22.050 kHz and 11.025 kHz for lower bitrate files (below 64 kbits/sec) and 44.1 kHz for higher bitrates (64 kbits/sec and above).

Data Rate

The main parameter controlling the quality of the MP3 file is the bitrate. The higher the Data Rate, the better the sound quality and the larger the final file. A bitrate of 128 kbits/sec is a widely used standard for high-quality MP3 files.

ADPCM

ADPCM

The Adaptive Differential Pulse Code Modulation (ADPCM) quantizes the difference between the speech signal and a prediction that has been made of the speech signal. If the prediction is accurate then the difference between the real and predicted speech samples has a lower variance than the real speech samples resulting in smaller file sizes.

At the decoder the quantized difference signal is added to the predicted signal to give the reconstructed speech signal. The performance of the codec is aided by using adaptive prediction and quantization, so that the predictor and difference quantizer adapt to the changing characteristics of the speech being coded.

Adjustments to the ADPCM codec are made through the Squeeze Compression Settings dialog box.

QDesign Music Codec 2

This section provides an introduction to the QDesign Music Codec 2 and discusses the options available for this codec. The information in this section is provided courtesy of QDesign, Inc.

Introduction

The QDesign Music Codec 2 enables you to publish broadcast-quality sound for real-time distribution on the Web. Because the QDesign Music Codec 2 is the Internet audio compression solution for QuickTime, producers can add QDesign Music 2 files to any media type supported by QuickTime, including video, graphics, interactive VR, animation, etc.

The QDesign Music Codec 2 provides quality, performance, ease of use, and robustness against network errors. QDesign's "Packetizer" and "AutoPilot" technologies provide the most comprehensive audio coding solution for producing the highest quality audio for the Web, CD-ROM and Internet music distribution. The QDesign Packetizer has been incorporated as a standard feature to QuickTime 4, making streaming QDesign encoded files very robust against network errors. The QDesign AutoPilot technology encapsulates the intelligence necessary to dynamically adapt and adjust perceptual coding parameters to maximize encoded audio results depending on the input source. The QDesign Music Codec 2 enables you to reduce files to as little as one percent of its original size while maintaining full-bandwidth stereo sound.

The benefits of using the QDesign Music Codec 2 are

- ◆ Stores more high quality audio using less disk space.
- ◆ Streams higher quality audio at lower data-rates.
- ◆ Extended data rates make the Professional Edition the most complete audio compression solution for streaming Web audio and for Internet music distribution.

Bitrate

The QDesign Music codec allows you to select a bit rate for your music track. Bitrate is the total Data Rate per second of the audio file. The bitrate indicates the amount of information, in bits per second, used for encoding the source audio. The lower the bitrate, the higher the compression ratio. The higher the bitrate, the higher the audio quality.

The ideal choice of bitrate depends largely on the target delivery platform for the material. For example, a 28.8K modem handles data at a maximum bitrate of 28.8 kbits/second. Therefore the highest bitrate you would use to ensure real-time streaming of the audio over a 28.8K modem is 28 kbits/second (although 24 or 20 kbits/second would be more appropriate to accommodate TCP/IP overhead and Data Rate fluctuations).

- ▶ *Note: 8 bits equals 1 byte so that at 24 kbits/s the Data Rate is equivalent to 3 KB/second.*

QUALCOMM PureVoice

QUALCOMM PureVoice codec is a built-in QuickTime audio compression codec. This is the same codec used in QUALCOMM digital cellular phones. PureVoice is an outstanding specialized speech codec, but outside of speech, its uses are limited. PureVoice offers good performance and excellent compression. There are two compression modes, full and half. Full compresses at 9:1 for the highest sound quality. Half compresses at 19:1 for smaller sizes.

In general, speech codecs are designed to perform best when encoding speech, or speech-like sounds. Speech compression technologies are based on modeling of the human speech generation process. Speech codecs are generally intended for telephony applications that do not transmit any other sounds except for human voice. This means that any dialog with ambient sounds or background music is difficult for a speech codec and often results in poor quality. However, in pure-voice applications, speech codecs can provide good quality at lower Data Rates than most audio codecs.

Options

The following is a description of each of the PureVoice options:

- ◆ **PureVoice Full Rate**—this settings produces the best sound quality and compresses files at a 9:1 ratio. (When Optimize for Compression is selected this option is PureVoice SmartRate.)
- ◆ **QUALCOMM Half Rate**—this setting produces the smallest file size while sacrificing some sound quality and compresses files at a 19:1 ratio. (When Optimize for Compression is selected, this option is QUALCOMM Half Rate for streaming.)
- ◆ **Optimize Compression for Streaming**—this setting optimizes your audio for streaming applications.

Apple IMA 4:1

Apple IMA 4:1

The IMA audio codec has existed in QuickTime since version 2.1. IMA offers good quality and playback performance at reasonable Data Rates. It compresses 16-bit audio at 4:1, so a 22kHz mono track would compress to 10Kb/second. In a CD-ROM environment where processor power is more of a concern than overall Data Rate, IMA is a good choice.

Before QuickTime 3, IMA was the only real audio compression solution in QuickTime. But to retain 44.1 kHz stereo sound, IMA has to encode at 384 Kbits/second. To enable audio to transmit in real-time over a 28.8 dial-up Internet connection, the source file is resampled to 4 kHz mono, resulting in unacceptable quality.

AAC

Squeeze includes an AAC codec for use when creating MPEG-4 files. AAC was developed and standardized as an ISO/IEC specification by four industry leaders (AT&T®, Dolby® Laboratories, Fraunhofer IIS, and Sony® Corporation). AAC is supported by a growing number of hardware and software manufacturers.

AAC is high-quality audio coding technology and the solution of choice for many broadcast and electronic music-distribution applications. AAC is compatible with all digital rights management, encryption, and watermarking solutions currently available.

In independent tests, the coding efficiency of AAC proved superior to MP3, providing higher-quality audio reproduction at lower bit rates. It is a fully state-of-the-art audio compression tool kit that provides performance superior to any known approach at bit rates greater than 64 kbps and excellent performance relative to the alternatives at bit rates reaching as low as 16 kbps. AAC provides up to 48 channels of audio, sample rates of up to 96 kHz and can achieve ITU-R broadcast quality at 320 kbps for a 5.1-channel audio program.

AAC takes advantage of such new tools as temporal noise shaping, backward adaptive linear prediction, and enhanced joint stereo coding techniques. AAC supports a wide range of sampling rates (8–96 kHz), bit rates (16–576 kbps), and from one to 48 audio channels.

Adjustments to the AAC codec are made through the Squeeze Compression Settings dialog box.

Uncompressed Audio

Uncompressed Audio

The Uncompressed Audio option is only available when creating Macromedia Flash FLV output files. It causes Squeeze to not compress the audio portion of a source file. Only use this option when you are creating FLV files that are imported into the time line of a Macromedia Flash MX file. Flash MX compresses the audio portion of FLV files and if you do not select Uncompressed Audio, the audio is compressed twice.

Video Codecs

A video codec is the software application that compresses the video portion of your media. Table 14 identifies the video codecs that are installed with each version of Squeeze.

Table 14: Video Codecs Installed According to Version of Squeeze.

Version	Video Codecs
Sorenson Squeeze 3 for Macromedia Flash MX	Sorenson Spark Pro
Sorenson Squeeze 3 for MPEG-4	Sorenson MPEG-4 Pro
Sorenson Squeeze 3 Compression Suite	Sorenson Spark Pro Sorenson Video 3.1 Pro Sorenson MPEG-4 Pro

The following sections discusses Sorenson Video 3, Spark Pro, and Sorenson MPEG-4 codec features and options.

Sorenson Compression

This section explains some basic compression concepts and how they relate to Sorenson compression.

Compression Principles

Compression is like making orange juice concentrate. Fresh oranges go in one end and concentrate comes out the other. The concentrated orange juice takes up less space, is easier to distribute, and the consumer can easily reconstitute it.

Likewise, video compression takes a large file and makes it smaller. The smaller files require less hard disk space, less memory to run, and less bandwidth to play over networks or the Internet. Many compression schemes exist and have their specific strengths and weaknesses.

Lossless vs. Lossy Compression

There are two types of compression:

- ◆ **Lossless**—Lossless compression preserves all the data, but makes it more compact. The movie that comes out is exactly the same quality as what went in. Lossless compression produces very high quality digital audio or video, but requires a lot of data. The drawback with Lossless compression is that it is inefficient when trying to maximize storage space or network and Internet delivery capacity (bandwidth).
- ◆ **Lossy**—Lossy compression eliminates some of the data. Most images and sounds have more details than the eye and ear can discern. By eliminating some of these details, Lossy compression can achieve smaller files than Lossless compression. However, as the files get smaller, the reduction in quality can become noticeable. The smaller file sizes make Lossy compression ideal for placing video on a CD-ROM or delivering video over a network or the Internet. Sorenson codecs are Lossy codecs, as are most codecs in use today.

Spatial and Temporal Compression

There are two different ways to compress digital media:

- ◆ **Spatial compression**—Spatial refers to compression applied to a single frame of data. The frame is compressed independently of any surrounding frames. Compression can be Lossless or Lossy. A spatially compressed frame is often referred to as an “intraframe.”
- ◆ **Temporal compression**—Temporal compression identifies the differences between frames and stores only those differences. Unchanged areas are simply repeated from the previous frame(s). A temporally compressed frame is often referred to as an “interframe.”

How Sorenson Compression Works

The Sorenson Video 3 codec has significantly increased the digital video capabilities of Apple's QuickTime architecture. Sorenson Spark has added breakthrough capabilities to Flash. However, to achieve good results, you need to understand how the codecs works.

Interframe vs. Intraframe

Compressed video frames are defined as interframes or intraframes.

- ◆ Interframes—The Sorenson codecs are categorized as “interframe” codecs. Interframe means many frames are described based on their difference from the preceding frame. The Sorenson codec's efficient interframe compression is part of what separates them from other compression technologies, requiring a much lower data rate than most other codecs to produce good quality video.
- ◆ Intraframes—“Intraframe” codecs compress each frame separately and independent of surrounding frames (JPEG is an intraframe codec). However, interframe codecs also use intraframes. The intraframes are used as the reference frames (keyframes) for the interframes.

The Sorenson codecs always begin with a keyframe. Each keyframe becomes the main reference frame for the following interframes. Whenever the next frame is significantly different from the previous frame, the codec compresses a new keyframe.

Color

Another way the Sorenson codecs save storage space is through color space reduction. The human eye is much more sensitive to brightness (luminance) than to color (chrominance). Sorenson Video takes advantage of this by storing color information in 2x2 blocks. These 2x2 blocks of color are known as YUV 4:2:0 colorspace and are commonly used in other codecs as well.

YUV 4:2:0 saves space by storing less color information. For each 2x2 block of data, YUV 4:2:0 stores 4 luminance samples (Y), one for each pixel, but only two chrominance (U, V) samples. This greatly reduces the amount of information needed to reconstruct the image, providing a much higher compression ratio.

YUV 4:2:0 is a great way to save space, and in most instances the reduced color information is invisible to the eye. The color sub-sampling is independent of the compression level and is always reduced to 2x2 blocks.

- *Note: Because the Sorenson codecs divide an image into 16x16 pixel blocks (vector), the codec is most efficient when the Frame Size is an even multiple of 16. If the Frame Size is not an even multiple of 16, the codec simply pads the odd vectors with empty pixels to force a full 16x16 pattern. The empty pixels are then removed on playback to reconstruct the image at the original dimensions.*

Asymmetric

Some codecs are fairly symmetrical in that it takes a similar amount of time to decode as it does to encode. The Sorenson codecs are asymmetrical. It takes more time on the encode side to allow for real-time decoding.

Sorenson Video 3

The Sorenson Video® 3 codec is the result of over ten years of intensive research and development. The evidence of this investment is seen in the unparalleled combination of compression and quality. As an integral part of Apple's QuickTime technology—beginning with QuickTime 3—Sorenson Video has delivered high quality compressed video across multiple computer platforms and the Internet.

Features

The professional compression options are grouped into tabs on the Sorenson Video Settings dialog box. The tabs, with the corresponding options are

- ◆ Summary—A read-only summary of the current settings
- ◆ Encode—Select encode control options
 - Quick Compress
 - Bidirectional Prediction/Playback Scalability
 - Automatic Keyframes
 - Sorenson One-Pass VBR
 - Minimum Quality/Drop frames mode
- ◆ Playback—Select playback options for compressed video
 - Image Smoothing
 - Media Key
- ◆ Streaming—Enhance streaming performance for RTP/RTSP
 - Slice Pictures into Packets
 - Force Block Refresh
- ◆ Masking—Specify masking characteristics
 - Stencil Type/Quality
 - Define Masking Characteristics
 - Mask Smoothing
- ◆ Watermark—Set watermark
 - Position
 - Pixel Offset
 - Opacity

- ◆ Multiple processor support—automatic

The following sections list each tab with a complete description of the individual features, what they do, and how to use them.

Encode Tab

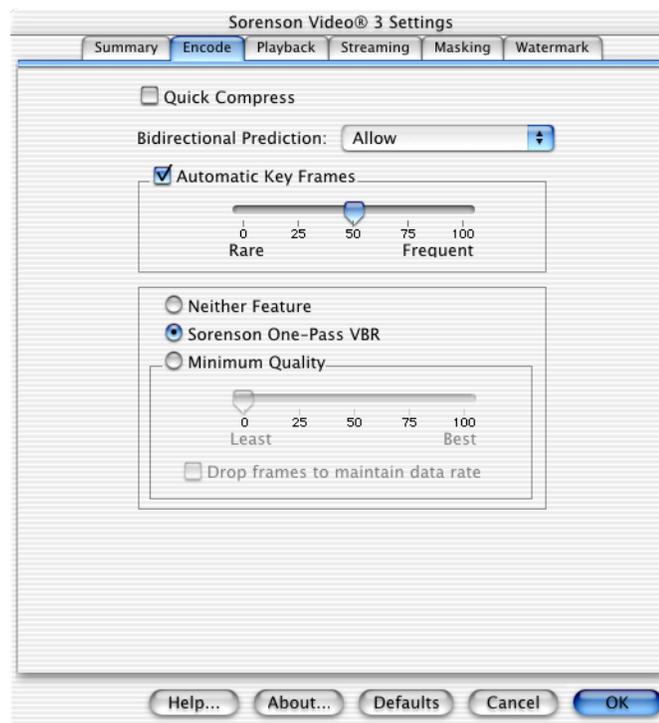


Figure 39: Sorenson Video 3: Encode Tab

Quick Compress

The Quick Compress option compresses about 20 percent faster with minimal quality loss. For many situations, Quick Compress is a very good choice for delivering faster encode times while maintaining most of the video quality.

If you need to compress in real-time, use the Quick Compress option. If you are unhappy with the real-time compression, you can:

- ◆ Reduce the Frame Size
- ◆ Reduce the Frame Rate
- ◆ Use a faster computer

Bidirectional Prediction

From the Bidirectional Prediction pop-up menu, you can select Off, Allow, or Force for Playback Scalability.

- ◆ **Off:** Turns Bidirectional Prediction off.
- ◆ **Allow:** Turns Bidirectional Prediction on, but Sorenson Video 3 decides when it is best to use it.
- ◆ **Force for Playback Scalability:** Turns Bidirectional Prediction on always and allows for playback scalability.

A bidirectional frame is a frame created by the compressor and inserted between intraframes and/or interframes. The compressor analyzes the frames before and after the bidirectional frame and then creates and inserts a frame based on the average quality of both. Using bidirectional prediction increases the compression efficiency and the quality of your video. An inherent characteristic of bidirectional prediction, is that it creates a duplicate of the first frame, and drops the last frame. If you have important information on the last frame such as text, do not select the Use Bidirectional Prediction option.

Playback scalability encodes the video so that if the computer is overwhelmed, QuickTime can drop to 1/2 the Frame Rate (it skips every other frame). The 1/2 speed option opens up the lower end system significantly without any significant drawbacks. If you are using a 30 fps movie, the quality of the full 30 fps is identical to a straight 30 fps movie and the quality of the 15 fps fallback is identical to a straight 15 fps movie. You do not lose anything in quality and you gain playback capability on the lower end.

With most codecs, when video decompression overwhelms the processor's capabilities, the video freezes on the last decoded frame. The system continues playing audio, and starts decompressing video again at the next keyframe. The result is very jerky video. This problem forces video content creators to compress at the lowest common denominator or to create multiple copies of the video at different Data Rates. The playback scalability of Sorenson Video 3 provides a much more elegant solution to this problem.

- ▶ *Note: If you are compressing at less than 15 fps, using bidirectional frames causes audio-video sync problems. Sorenson Video 3 automatically turns bidirectional frames off when you compress at less than 15 fps and are not using Two-Pass VBR or are using One-Pass VBR. However, when you use Two-Pass VBR or Fixed Quality compressions, Sorenson Video 3 always uses bidirectional frames. Therefore, it is recommend that if you are compressing with Two-Pass VBR or fixed Quality at less than 15 fps, turn the Bidirectional Prediction feature off.*

Automatic Keyframes

The Automatic Keyframes option detects the differences between frames. When the difference reaches the specified threshold, Sorenson Video 3 inserts a new keyframe. The Automatic keyframes slider allows you to specify how different a frame must be from the previous frame before

Sorenson Video 3 inserts a keyframe. The ideal is to find a setting that inserts a keyframe at the beginning of each scene, without inserting unnecessary keyframes inside individual scenes. The only exception is fast motion scenes that often require additional keyframes.

Lower slider values produce fewer keyframes (requires greater difference between frames) and higher slider values produce more keyframes (requires less difference between frames). The default value of 50 is good for most applications. It is recommend to stay within the 35-65 range for best results. Depending on your content, you might need to compress several times to find the optimum setting.

If you use Discreet® Cleaner™ Pro, the program shows you the frames that are keyframes during compression. You can also check with the Data Rate graph after a clip is done. If you use Adobe® Premiere®, the Data Rate Analysis option shows you where keyframes are after the clip is compressed.

Sorenson One-Pass VBR

The One-Pass VBR (Variable Bit Rate encoding) option produces video quality close to Two-Pass VBR quality but takes about the same time to compress as non-VBR. One-Pass VBR was developed inside of Sorenson Video 3, and does not require a host software to perform this feature (unlike Two-Pass VBR that requires Squeeze or Cleaner). In addition, because it is only one pass, it can be easily used for real-time compression. One-Pass VBR automatically adjusts to maintain stricter Data Rate adherence if the streaming feature is turned on.

Minimum Quality

When you select the Minimum Quality setting, it forces the codec to keep the picture quality above the specified level. If the quality begins to drop below that level, the codec increases the data rate to maintain the quality.

It is very challenging to maintain both image quality and a constant Frame Rate when streaming video for dial-up modem delivery. Selecting the Drop Frames option in conjunction with Minimum Quality allows the codec to maintain the requested Data Rate and the quality at the selected level, while possibly sacrificing Frame Rate.

If you do not want the Data Rate to increase, select the **Drop Frames to Maintain Data Rate** option. With “Drop frames” turned on, if the data rate begins to increase above the specified threshold, the codec drops frames to maintain the specified Data Rate. This action temporarily reduces the Frame Rate and the codec automatically returns to the specified Frame Rate when it can maintain the specified Data Rate.

Playback Tab

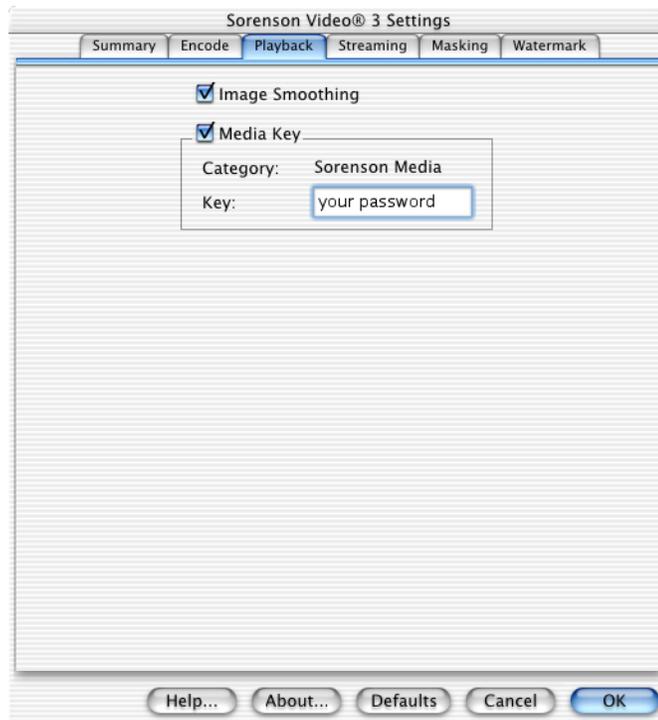


Figure 40: Sorenson Video 3: Playback Tab

Image Smoothing

When you compress content at Internet Data Rates, you often see some blocky areas on playback. When you turn on Image Smoothing the decoder evens out the blocky edges on playback. This feature is designed for low Data Rate delivery. Turn this feature off for high quality video.

Media Key

A media key is essentially a password for a movie. By setting a media key, you can prevent unauthorized users from viewing the video. When a clip is compressed with a media key, you must supply the correct key to view the video. Media keys are very useful for anyone concerned about security for their video.

For example, if you do not want a user to watch the final movie of a computer game before they finish, set a media key that is not supplied until the game is over (the program can supply it automatically at the appropriate time). Another example is to use media keys to secure video content on an unsecure Web site.

To compress with a media key, type the password you want into the Media Key field. The password is case sensitive. Write down the password and keep it in a secure location or use a password you will not forget.

After you compress the video with a media key, there are several ways to give that key to QuickTime. You can add the media key to the QuickTime settings using the Control Panel or you can write your software to deliver the media key directly to QuickTime. *For programming information, consult the API Documentation on the QuickTime developer site (<http://developer.apple.com/quicktime/>).*

To add a media key to the QuickTime settings:

1. From the System Preferences, select **QuickTime**.
The QuickTime Settings dialog box appears.
2. Select **Media Keys** tab.
3. Select the **Add button**.
4. In the category field, type "**Sorenson Media**" (two words, not case sensitive).
5. In the Key field, enter your media key (case sensitive).

After you enter the media key, QuickTime plays any movie that requires the registered key.

- ▶ *Note: After you turn the Media Key option on, it remains on until you turn it off. If you do not want to encode the next clip with a media key, be sure to turn the option off.*

Streaming Tab

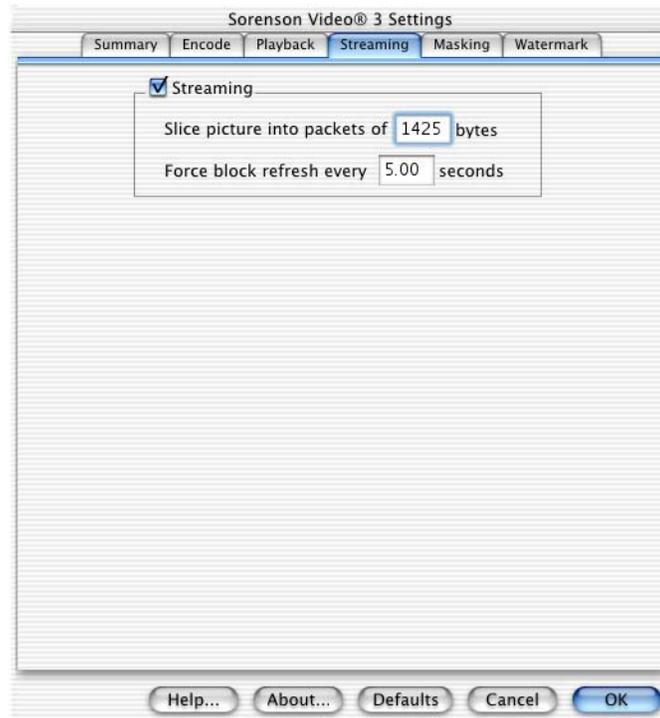


Figure 41: Sorenson Video 3: Streaming Tab

Slice Picture Into Packets

The *Slice Picture Into Packets* feature allows you to divide each frame into packets (measured in bytes). Dividing the frame in this manner allows it to lose “packets” of data, but the entire frame is not lost. This option works in conjunction with the QuickTime Hinted Streaming option. In QuickTime, the option equivalent to Slice Picture is Packet size limit. The default value should be used. The valid range of values for slice size is 512 - 1450. However, if you change the QuickTime Hinted Streaming option setting, you must set the Slice value at 20 less than the QuickTime setting.

Force Block Refresh

Sorenson Video 3 is an interframe codec. This means that each frame of video is described based on the difference from the preceding frame. Each keyframe begins a new interframe dependency.

As each frame of video is compressed, it is divided into 16x16 blocks (vectors). The encoded blocks are sent and reconstructed by the decoder on the other end. For a more detailed discussion of the encoding process, see *“How Sorenson Compression Works” on page 99*.

Under normal operations, there are two methods of updating a block between keyframes. The first is to update the entire block and the second is to update only the differences in the block. The entire block is only sent when it is substantially different. When the majority of the block remains the same, only the changed area of the block is updated. In addition to the normal operation, the Force Block Refresh option allows you to specify a maximum refresh period (in seconds) for entire blocks within the frame. If a block has not been updated when this period expires, the codec forces a refresh of that block.

A forced refresh period is very important when using RTSP to stream video over the Internet because it is unlikely that the first frame sent when you connect to a streaming broadcast is a keyframe. If data is not received during a transmission, the block or blocks appear garbled on the reassembled video. Without a forced refresh, the lost data remains garbled until the next keyframe is sent. The forced refresh setting helps you deliver the highest possible quality streaming video.

For more information on video delivery methods, see *“Delivery Mechanism” on page 138*.

Masking Tab

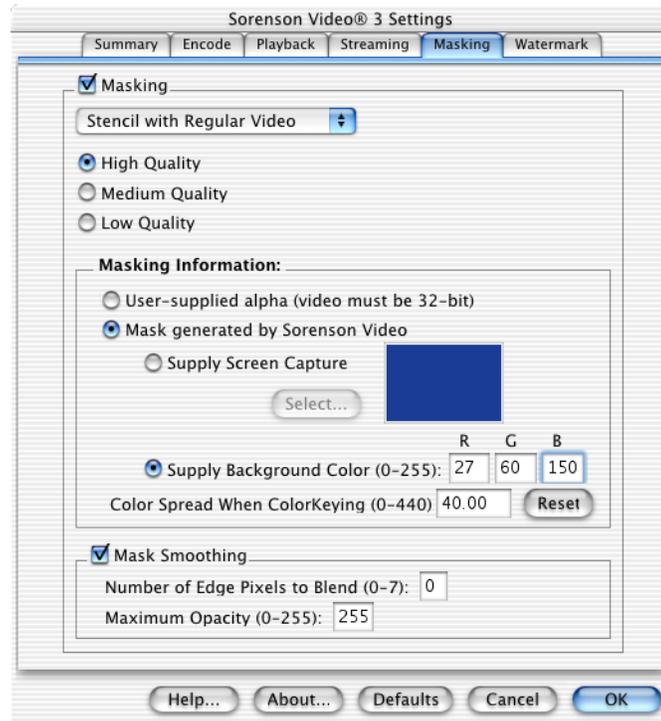


Figure 42: Sorenson Video 3: Masking Tab

The Masking tab gives you options that allow you to isolate the foremost part of your video so you can insert an image, movie or other video sequences as the background. This feature works similar to chroma-key. For example, when you watch a weather report on TV, the reporter is standing in front of a “blue-screen” background, while a computer inserts video images as the background.

To take advantage of the Masking capabilities of Sorenson Video 3 Professional Edition, create your own “blue-screen” set and shoot your video sequence against that background. The codec needs to know the screen color so that it can extract the foreground from the screen, a process called Color Keying. When compressing, the codec asks you for one of the following:

- ◆ The RGB color
- ◆ An image file containing a snapshot of your “blue-screen”

In addition to the screen color, the user can also input a color spread that specifies how far (in Euclidean distance) RGB colors can be from the target screen color and still be considered background.

Stenciling

Stenciling determines the method you want to use to extract the foreground from your video.

The first masking option allows you to select the type of stenciling you want to use. From the pop-up menu, you can select one of two stenciling methods. You can also select the quality that you want to compress the stencil.

- ◆ **Stenciling Alone**—This option extracts the foreground shape information only and does not compress any of the color (texture) in the foreground.
- ◆ **Stenciling with Regular Video**—This option adds to the option above by including all the foreground texture.
- ◆ **Stencil Compression Quality**—High corresponds to Lossless compression of the stencil. Low corresponds to minimal quality.

Masking Information

The Masking Information options allow you to characterize the background you want to insert in your video.

- ◆ **User-Supplied Alpha**—Select this option to compress video that already has a stenciling or alpha mask associated with it. If that mask is a regular 8-bit alpha mask, then it is converted to a binary mask. Partial transparency detailed by an 8-bit alpha mask is lost, but the shape is retained.
- ◆ **Mask generated by Sorenson Video 3**—Select this option if you shot “blue-screened” video.
 - **Supply Screen Capture**—You provide an image file of the screen as it is lighted during the shooting of the video.
 - **Supply Background RGB Color**—Enter the color of the background of your “blue-screen” video.
- ◆ **Color Spread When Color Keying**—Designates how far (in Euclidean distance) RGB colors can be from the target screen color and still be considered background.

Mask Smoothing

You have the option to enable Mask Smoothing. If you do not enable Mask Smoothing, Sorenson Video 3 does not feather the edge of the binary alpha mask during decompressing. This option leaves crisp edges between foreground and the inserted background.

If you enable Mask Smoothing, you have two features for controlling the feathering.

- ◆ **Number of Edge Pixels to Blend**—Specify how far into the foreground (measured inward from the boundary of the foreground) the background is blended. This choice can mask some edge effects.
- ◆ **Maximum Opacity**—Change the opacity of the foreground video. Use this feature to create a ghost effect. Amount of opacity is measured in values from 0 to 255, with 255 being completely opaque and 0 being invisible.

Watermark Tab

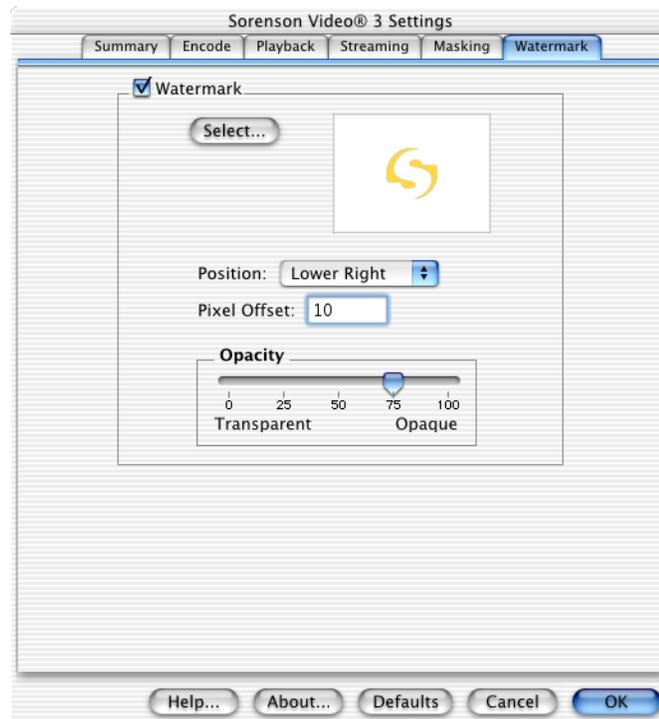


Figure 43: Sorenson Video 3: Watermark Tab

With the Watermark feature, you can select and place a custom watermark on your encoded video. You can use the watermark as copyright protection, or simply as a seal indicating who produced and/or compressed the video.

The image for your watermark is inserted into the data stream header and placed on each decoded frame at playback. The watermark is compressed with a Lossless algorithm and does not lose quality, regardless of your compression ratio. The watermark also does not increase the Data Rate requirements or take bandwidth from the video data.

- *Note: The watermark cannot be altered or removed from the video clip. If someone attempts to remove the watermark from the video stream, the clip no longer plays.*

Position

Specify where on your video frame you want your watermark to appear: upper or lower right, upper or lower left.

Pixel Offset

Specify the distance, in pixels, you want the watermark offset from the selected position. For example, if you selected lower right as your watermark position, you can offset the watermark 10 pixels from the lower right edge.

Opacity

Move the slider to specify the opacity or transparency of your watermark. Opacity is defined on a scale of 0-100 with 0 being completely transparent (you cannot see the watermark) and 100 being completely opaque (you cannot see through the watermark—except for the transparent color).

Setting a Watermark

Create a grayscale or color Pict (Mac) or BMP (Windows) image to use as your watermark. The color of the top left pixel defines the transparent color. For example, if the top left pixel is white, then all white pixels in the image are transparent in the watermark. All non-transparent pixels cover up the video underneath, depending on the opacity settings.

- *Note: Very large watermarks can cause playback problems on slower computers because of the processing necessary to lay the graphic over the video. If you plan on using a watermark with slower computers, keep the mark small to avoid any possible problems.*

Use the following steps to set a watermark in your compressed video.

1. In the Sorenson Video 3 Settings dialog box, select the **Watermark** tab.
2. Select the **Enable Watermark** checkbox.

The file dialog box appears and the Watermark options become available, allowing you to select and define the placement of your watermark.

- *Note: If you decide to not use the watermark feature, you can simply deselect the Enable Watermark option and recompress your file.*
3. From the file dialog box, locate and select the image you want for your watermark.

After you select the watermark file, the watermark is displayed in the preview window. The preview window allows you to verify your watermark selection prior to compressing the video.

- *Note: Depending on the size of the watermark, it might appear scaled in the preview window. The watermark itself is not changed, the dialog simply scales the preview to fit the window.*

Now that you have chosen the watermark file, you can define where the watermark appears on your video.

4. From the Position pop-up list, select the watermark location you want.
5. Enter the Pixel Offset you want.
6. Set the watermark opacity you want.

The best way to preview the watermark opacity is to actually compress the video. You might want to compress a small segment of video to test the watermark placement and visibility before compressing the entire clip.

If you want to change the watermark image, click the **Select button** and follow steps 3-5.

Multiple Processor Support

Sorenson Video 3 Pro supports encoding with multiple processors. If you have a multiprocessor system, Sorenson Video 3 uses the additional processors to increase encode speed. Table 15 shows the estimated performance increase with multiple processors. Actual performance varies depending on your system configuration.

Table 15: Multiple Processor Performance Increase

Number of CPUs	Performance increase
2	1.8x
3	2.4x
4	3.2x

Sorenson Spark Pro

Sorenson Spark is a motion video codec that allows you to add video content to Flash movies. Because Spark is a high-quality video codec, it can dramatically lower the bandwidth required to deliver video into Flash while maintaining the video quality. A Standard version is included in Flash MX. Spark Pro gives users an advanced feature set and higher quality video output.

Sorenson Spark Pro Features

The Sorenson Spark codec provides features that give you the fine control necessary to handle all types of video, from interviews to sports footage. Using these features, you can produce high quality video even at very low Data Rates.

The professional compression options in Sorenson Spark are grouped into tabs on the settings dialog box. The tabs, with the corresponding options are

- ◆ Summary—A read-only summary of the current settings
- ◆ Encode—Select encode control options
 - Quick Compress
 - Drop Frames
 - Automatic Keyframes
 - Minimum Quality
- ◆ Playback—Select playback options for compressed video
 - Image Smoothing
 - Playback Scalability

The following sections list each tab with a complete description of the individual features, what they do, and how to use them.

Summary Tab

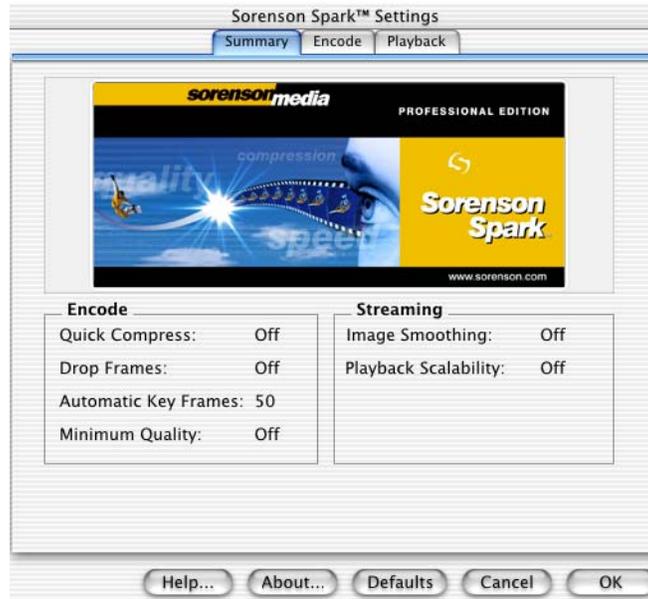


Figure 44: Sorenson Spark: Summary Tab

The Summary tab displays all of the options that are enabled in the codec. By default the only feature that is enabled is Automatic Keyframes.

- **Note:** If you select the **Default button** when the Summary tab is active, all features for all tabs are returned to their default values.

Encode Tab

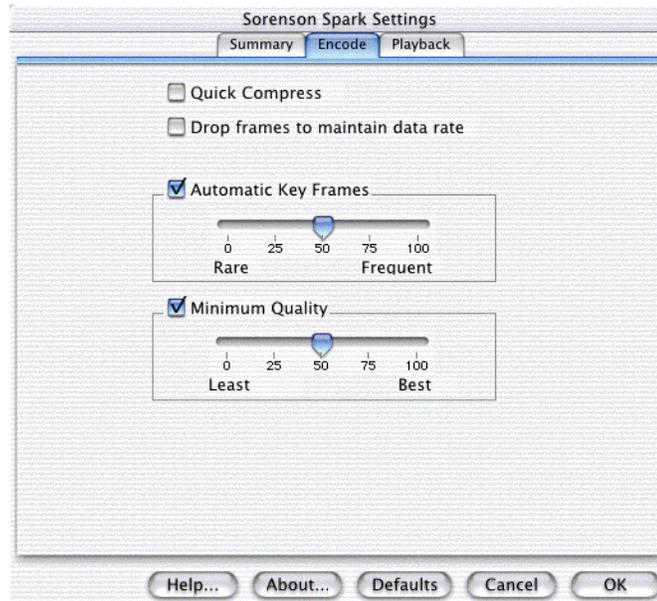


Figure 45: Sorenson Spark: Encode Tab

Quick Compress

The Quick Compress option compresses about 20 percent faster with minimal quality loss. For many situations, Quick Compress is a very good choice for delivering faster encode times while maintaining most of the video quality.

If you need to compress in real-time, use the Quick Compress option. If you are unhappy with the real-time compression, you can:

- ◆ Reduce the Frame Size
- ◆ Reduce the Frame Rate
- ◆ Use a faster computer

Drop Frames

If you do not want the Data Rate to increase, select the **Drop Frames to Maintain Data Rate** option. With “Drop frames” turned on, if the data rate begins to increase above the specified threshold, the codec drops frames to maintain the specified Data Rate. This action temporarily reduces the Frame Rate and the codec automatically returns to the specified Frame Rate when it can maintain the specified Data Rate.

Automatic Keyframes

The Automatic Keyframes option detects the differences between frames. When the difference reaches the specified threshold, the codec inserts a new keyframe. The Automatic keyframes slider allows you to specify how different a frame must be from the previous frame before the codec inserts a keyframe. The ideal is to find a setting that inserts a keyframe at the beginning of each scene, without inserting unnecessary keyframes inside individual scenes. The only exception is fast motion scenes that often require additional keyframes.

Lower slider values produce fewer keyframes (requires greater difference between frames) and higher slider values produce more keyframes (requires less difference between frames). The default value of 50 is good for most applications. We recommend staying within the 35-65 range for best results. Depending on your content, you might need to compress several times to find the optimum setting.

Minimum Quality

When you select the Minimum Quality setting, it forces the codec to keep the picture quality above the specified level. If the quality begins to drop below that level, the codec increases the data rate to maintain the quality.

It is very challenging to maintain both image quality and a constant Frame Rate when streaming video for dial-up modem delivery. Selecting the Drop Frames option in conjunction with Minimum Quality allows the codec to maintain the requested Data Rate and the quality at the selected level, while possibly sacrificing Frame Rate.

Playback Tab

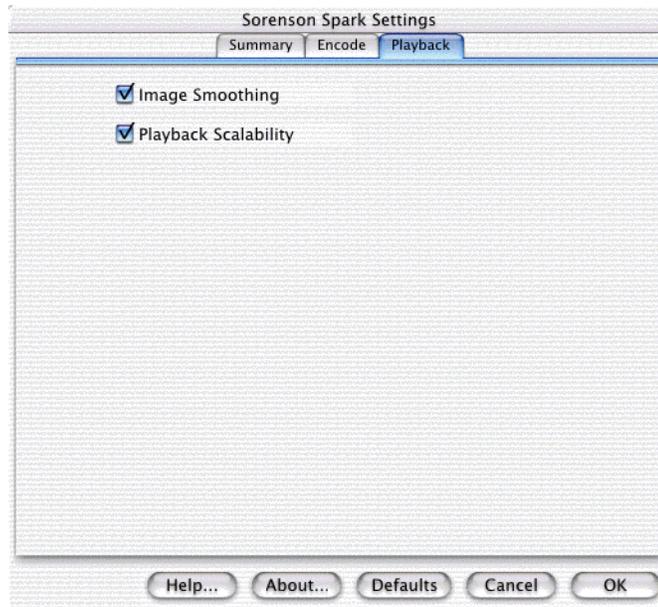


Figure 46: Sorenson Spark: Playback Tab

Image Smoothing

When you compress content at Internet Data Rates, you often see some blocky areas on playback. When you turn on Image Smoothing the decoder evens out the blocky edges on playback. This feature is designed for low Data Rate delivery. Turn this feature off for high quality video.

Playback Scalability

Another option for increasing the playback range with low-end computers is to use Sorenson Spark's playback scalability option. When you select the scalability option during compression, the clip is configured to drop frames evenly for computers that cannot keep up.

For example, if you create a 320x240x30 fps movie clip at 70 KB/s, some slower computers are not able to decode the clip at the full Frame Rate. Without playback scalability, the computer simply stops decoding video until the next keyframe (the audio continues). This makes for very "jerky" playback.

However, if you encode the video with playback scalability turned on, the decoder sees that option and automatically drops every other frame, decoding at 15 fps instead of 30 (1/2 the encoded Frame Rate). The quality of the movie is the same as if it had been encoded at 15 fps instead of 30 fps and the user experiences smooth playback.

Sorenson MPEG-4 Pro

The Sorenson MPEG-4 professional features give you the fine control you need to produce great looking digital video, even at very low data rates.

Sorenson MPEG-4 Pro Features

The professional compression options are grouped into tabs on the Sorenson MPEG-4 Settings dialog box. The tabs, with the corresponding options are

- ◆ Summary—A read-only summary of the current settings
- ◆ Encode—Select encode control options
 - Quick Compress
 - Drop Frames
 - B-Frames
 - MPEG-4 Quantization
 - Quarter Sample
 - Interlace Compression
 - Global Motion Compensation
 - Insert Keyframes on Scene Changes
 - Minimum Quality
- ◆ Streaming—Enhance streaming performance for RTP/RTSP
 - Slice Picture into Packets
 - Force Block Refresh
- ◆ About—Displays the version of the software and support information

The following sections list each tab with a complete description of the individual features, what they do, and how to use them.

Summary Tab

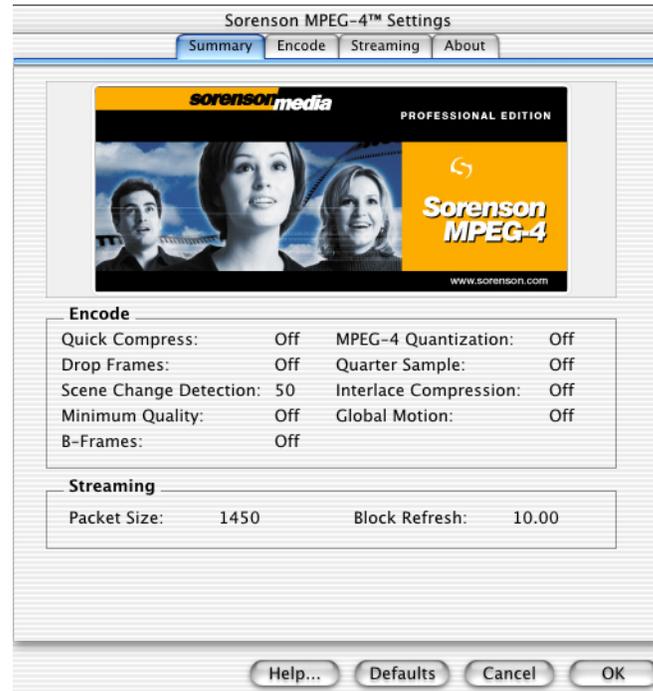


Figure 47: Sorenson MPEG-4: Summary Tab

The Summary tab displays all of the options that are enabled in the codec. By default, the only feature that is enabled is Scene Change Detection.

- **Note:** If you select the **Default button**  when the Summary tab is active, all features for all tabs are returned to their default values.

Encode Tab

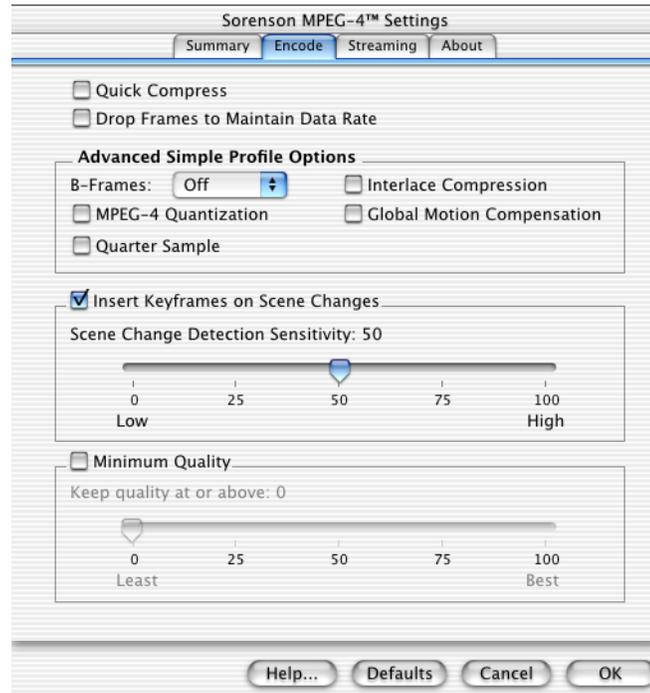


Figure 48: Sorenson MPEG-4: Encode Tab

Quick Compress

The Quick Compress option compresses about 33 percent faster with minimal quality loss. For many situations, Quick Compress is a very good choice for delivering faster encode times while maintaining most of the video quality.

If you need to compress in real-time, use the Quick Compress option. If you are unhappy with the real-time compression, you can:

- ◆ Reduce the Frame Size
- ◆ Reduce the Frame Rate
- ◆ Use a faster computer

Drop Frames

If you do not want the Data Rate to increase, select the **Drop Frames to Maintain Data Rate** option. With “Drop frames” turned on, if the data rate begins to increase above the specified threshold, the codec drops frames to maintain the specified Data Rate. This action temporarily reduces the Frame Rate and the codec automatically returns to the specified Frame Rate when it can maintain the specified Data Rate.

B-Frames

B-Frames are bidirectional predicted frames that record the changes that occur between the frames (keyframe or predicted) before and after it to create the frame. If a player has difficulty playing a compressed video, the player can choose not to play B-Frames resulting in a reduced Frame Rate. Intelligent streaming servers that do not have enough bandwidth to deliver the stream the server can choose to not deliver the B-Frames.

The advantages to using the B-Frames are to achieve higher quality of the video and the ability to have playback scalability. By default, the B-Frame setting is set to off. The options in the pop-up menu are

- ◆ **Off:** Does not insert B-Frames. Generally, this option is best if your Frame Rate is less than 15 frames per second depending on your video source file.
- ◆ **Auto:** Sorenson MPEG-4 determines how many B-Frames (0,1, or 2) to place in the compressed file according to the output Frame Rate that you selected.
- ◆ **1:** Places a B-frame in every other frame. Generally, this option is best if your Frame Rate is 15-23 frames per second depending on your video source file.
- ◆ **2:** Places two successive B-Frames between other frames, resulting in every third frame not being a B-Frame. Generally, this option is best if you are compressing at a rate of 24 frames per second or higher depending on your video source file.

MPEG-4 Quantization

Normal quantization uses a single quantization value during the compression process on each 8x8 block of frequencies. MPEG-4 Quantization uses a weighting matrix to change how that single value is applied to each value of the 8x8 block. Depending on the source video, you might see a noticeable improvement in quality and/or a reduction in file size when MPEG-4 Quantization is selected.

Quarter Sample

The Quarter Sample feature is in an on or off state. Instead of only comparing full or half pixels in 16x16 blocks (vectors) of pixels, the Quarter Sample provides an additional comparison of quarter pixels. The Quarter Sample provides more choices for the codec to look at when it is trying to find the smallest difference between the source frame and the previous frame. Using the Quarter sample feature helps reduce the amount of data sent to the decoder.

The Quarter Sample feature takes more processing time and is best suited for high Data Rate videos. Depending on the video source, enabling the Quarter Sample feature can provide smaller file size and/or higher quality video.

Interlace Compression

Interlacing is the system developed to compensate for limited persistence by alternately drawing even and then odd horizontal lines. By the time the even lines are dimming, the odd lines are illuminated. Viewers perceive the interlaced fields of lines as complete pictures. All NTSC or PAL video frames consist of alternating even and odd fields. When viewing interlaced video on a computer screen, high-action frames often become separated into alternating lines that look like motion stripes. In most circumstances, you do not want to keep interlacing in your compressed videos.

By default, Sorenson Squeeze deinterlaces source files. If you have not turned off the Deinterlacing feature in Squeeze (see page 24), do not use the Interlace Compression feature in Sorenson MPEG-4. If you choose to leave interlacing in the video, you can activate the Interlace Compression feature to perform a better compression. This compression method provides the best results with high motion video containing interlacing.

Global Motion Compensation

Global Motion Compensation can produce up to 30 percent lower bit rates and/or higher quality when compressing source scenes that have certain types of motion. Global Motion Compensation is particularly effective on scenes with transitional motion (i.e. panning) of still scenes.

- ▶ *Note: The B-Frames, MPEG-4 Quantization, Quarter Sample, Interlace Compression, and Global Motion Compensation features are part of the Advanced Simple Profile. Some MPEG-4 players do not support all of these features. Perform test compressions and test playbacks to determine the best player for your output files and communicate the appropriate information to your target audience.*

Insert Keyframes on Scene Changes

The Insert Keyframes on Scene Changes option detects the differences between frames. When the difference reaches the specified threshold, Sorenson MPEG-4 inserts a new keyframe. The Automatic Keyframes slider allows you to specify how different a frame must be from the previous frame before Sorenson MPEG-4 inserts a keyframe. The ideal is to find a setting that inserts a keyframe at the beginning of each scene, without inserting unnecessary keyframes inside individual scenes. The only exception is fast motion scenes that often require additional keyframes.

Lower slider values are less likely to cause the insertion of keyframes (requiring greater difference between frames) and higher slider values are more likely to cause the insertion of keyframes (requiring less difference between frames). The default value of 50 is suitable for most applications. Staying within the 35-65 range usually produces the best results. Depending on your content, you might need to compress several times to find the optimum setting.

Minimum Quality

When you select the Minimum Quality setting, it forces the codec to keep the picture quality above the specified level. If the quality begins to drop below that level, the codec increases the data rate to maintain the quality.

It is very challenging to maintain both image quality and a constant Frame Rate when streaming video for dial-up modem delivery. Selecting the Drop Frames option in conjunction with Minimum Quality allows the codec to maintain the requested Data Rate and the quality at the selected level, while possibly sacrificing Frame Rate.

- ▶ **Note:** If you select the **Default button**  when the Encode tab is active, only the features in the Encode tab are returned to their default values.

Streaming Tab



Figure 49: Sorenson MPEG-4: Streaming Tab

Slice Picture into Packets

Activating the Slice Picture into Packets feature causes the codec to insert resynchronization markers into the bitstream so that packetizers can more easily create packets using the markers allowing players to more easily recover from packet loss. The default value of 1466 bytes should be used. The valid range of values for slice size is 256 - 1466 bytes.

Force Block Refresh

Sorenson MPEG-4 is an interframe codec. This means that each frame of video is described based on the difference from the preceding frame. Each keyframe begins a new interframe dependency.

As each frame of video is compressed, it is divided into 16x16 blocks (vectors). The encoded blocks are sent and reconstructed by the decoder on the other end. For a more detailed discussion of the encoding process, see *“How Sorenson Compression Works” on page 99*.

Under normal operations, there are two methods of updating a block between keyframes. The first is to update the entire block and the second is to update only the differences in the block. The entire block is only sent when it is substantially different. When the majority of the block remains the same, only the changed area of the block is updated. In addition to the normal operation, the Force Block Refresh option allows you to specify a maximum refresh period (in seconds) for entire blocks within the frame. If a block has not been updated when this period expires, the codec forces a refresh of that block.

A forced refresh period is very important when using RTSP to stream video over the Internet because it is unlikely that the first frame sent when you connect to a streaming broadcast is a keyframe. If data is not received during a transmission, the block or blocks appear garbled on the reassembled video. Without a forced refresh, the lost data would remain garbled until the next keyframe is sent. The forced refresh setting helps you deliver the highest possible quality streaming video.

By default, the Sorenson MPEG-4 codec delivers a block refresh every 132 frames. Depending on the frame rate you selected, the amount of time that elapses between block refreshes varies. If you choose to activate the Force Block Refresh option, the default value is every five seconds, however you can alter the value to meet the needs of your audience.

Sorenson MPEG-4 Pro

For more information on video delivery methods, see “*Delivery Mechanism*” on page 138.

- **Note:** If you select the **Default button**  when the Streaming tab is active, only the features in the Streaming tab are returned to their default values.

About Tab

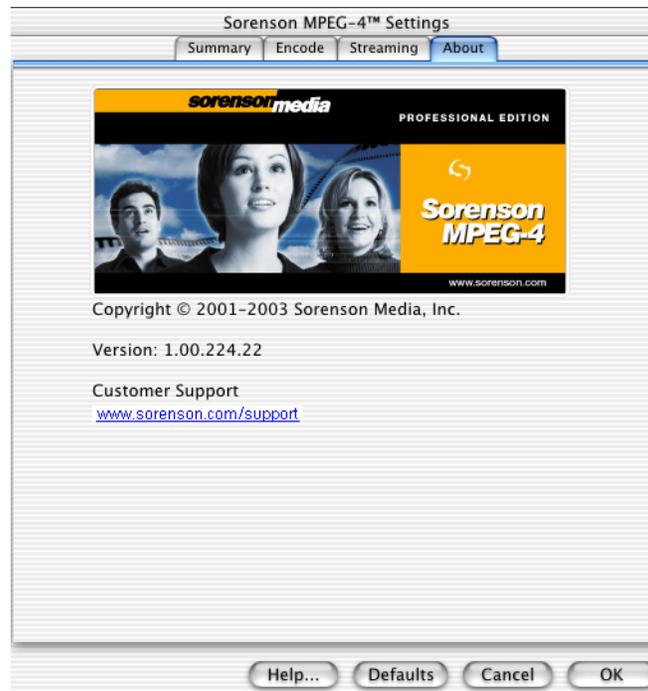


Figure 50: Sorenson MPEG-4: About Tab

The About tab provides information about the version of Sorenson MPEG-4 that you are using and information about contacting Sorenson Media.

Video Compression Guidelines

The key to achieving great compression results is understanding the codec and how the options affect the finished output. This section discusses the options and decisions that determine how video is compressed when using Sorenson Video 3, Sorenson Spark, and Sorenson MPEG-4.

As with any tool, there are some basic guidelines that help you get the most from your Sorenson codecs. This section starts off with some general guidelines that apply to all types of video and then discusses compression of several specific types of video.

General Video Considerations

As you prepare to compress a video clip, there are several factors that have a significant affect on your compression configuration. The method you plan to use for delivering the video influences many of the options available to you. In addition to the delivery mechanism, you must also consider your playback audience. What type of systems do they have and how are they going to receive the video? All of these factors influence one of your first compression choices, the compressed Data Rate.

Data Rate

The Data Rate maximizes the video quality for the targeted delivery channel. For example, if you are delivering video from CD-ROM, the Data Rate can range anywhere from 200 KB/second or less. However, if you are delivering video over the Internet, the Data Rate can range anywhere from 1.5 KB/second to as high as 50 KB/second, depending on the connection speed of your target audience.

One of the most common mistakes with new users is setting a Data Rate that is too high. Generally, quality improves as the Data Rate increases and clips with more movement require higher Data Rates to maintain the quality. However, the Sorenson codecs do have a "quality ceiling." Beyond a certain Data Rate, the clip looks almost uncompressed and the quality doesn't get any better. Fortunately, Sorenson's "quality ceiling" is reached with a much lower Data Rate than many other codecs.

As a starting point, use the following formula to establish your compression range with Sorenson Video 3 and Sorenson Spark.

$$Datarate = \frac{Width \times Height \times FPS}{48000}$$

Depending on your video type, Sorenson Video 3 looks good and performs well when the Data Rate is greater than 1/2 and less than double the result of the Data Rate Formula. For example, a 320x240 30 fps clip yields the following results:

$$Datarate = \frac{320 \times 240 \times 30}{48000} = 48KB/s$$

The general target Data Rate is 48 KB/second for a 320x240, 30fps clip.

A talking head clip with little motion can compress as low as 24KB (about 1/2). However, a sports action clip might need as much as 96 KB/second (double) or higher to look good.

- *Note: High action clips might require a Data Rate above the 96 KB/s target for a standard 320x240 clip. However, the higher Data Rate can make playback difficult on lower-end machines. Be sure to test all compressed video on your target playback platforms.*

The target Data Rate Formula discussed above gives you a starting point. The actual Data Rate you use depends largely on the video content and the target playback platforms. Use the formula as a guide and try several Data Rates within the range, testing them for clarity and playback on your target platforms. If you need to improve the image quality at your target Data Rate (without increasing the Data Rate), try reducing the Frame Rate or using a smaller Frame Size.

Delivery Mechanism

An important part of compressing your video is knowing the distribution method of the final product. The distribution channel often places restrictions on the video compression. For example, if you plan on delivering the finished video across the Internet, you need to take into account the different download speeds and options.

Multimedia video has two common delivery channels:

- ◆ CD-ROM
- ◆ Internet/Intranet

CD-ROM

CD-ROM delivery carries the least possible restrictions. With CD-ROM delivery, you can balance the size and quality of the video with the amount of video you want to deliver. Large video at higher Data Rates takes up more space. Smaller video and/or lower Data Rates allows you to put more minutes of video on the CD. Table 16 shows how much video you can put on a CD at various Data Rates.

Table 16: CD-ROM Video Capacity at Various Data Rates.

Data Rate (KB/s)	Minutes/CD
180 KB/s	63 minutes
90 KB/s	124 minutes
75 KB/s	149 minutes
60 KB/s	186 minutes
30 KB/s	372 minutes

Internet/Intranet

The main restrictions of Internet/intranet delivery are based on the available bandwidth of your network. For example, if you are delivering video over the public Internet, many people in your target audience might use 56k modems. However, if you are delivering video over a company intranet, the connection rate is usually much higher.

The key to selecting the correct Data Rate is to know your audience. After you define your audience, you have three main options:

- ◆ Create all video at 56k dial-up rates (approximately 4 KB/s video plus audio).
- ◆ Create the video at higher Data Rates and assume that users with slower connections will have the patience to download the video. (Many business users have network connections to the Internet and are not limited by slow modem speeds.) This option also works well for intranets where most users are using the company network to access the information.
- ◆ Use QuickTime's Movie Alternates features (QuickTime only). Using Movie Alternates, you can create a movie for the three main Data Rate categories (dial-up, ISDN, and T1 network). When the user requests the movie, QuickTime automatically selects the appropriate movie for the user's connection rate. This is a very good option when you cannot control the connection rate of your users.

If you compress at a higher Data Rate and do not want to use Movie Alternates, keep your clips short so that the maximum download time is not too burdensome for your audience. It is always best to experiment and make sure the performance is what you expect.

After you select your Data Rate, you have two delivery options, HTTP and RTSP. Both methods are considered "streaming" technologies (the video plays as it downloads). However, while both types might appear very similar to the user, there are some significant differences.

General Video Considerations

HTTP—HTTP delivery is when you place a compressed QuickTime or Flash video on a Web page. When a user visits the Web page and selects the video link, the video plays. There are several advantages to HTTP delivery:

- ◆ Uses standard Web server and pages
- ◆ Guaranteed video quality
- ◆ No firewall problems

RTSP—RTSP delivery also has links on a standard Web page, but the video files themselves must reside on a special server, not the standard Web server. You can use RTSP to deliver stored video files much like HTTP streaming or live broadcasts. However, RTSP delivery has several significant differences from HTTP delivery:

- ◆ RTSP is not available for Flash movies
- ◆ Requires a special media broadcast server
- ◆ No guaranteed quality
- ◆ Firewall issues (some firewalls block this type of streaming)
- ◆ Capable of streaming live events
- ◆ Very long streams (file is not stored on local computer)
- ◆ Property protection (because the video is not stored anywhere by the end user)
- ◆ Capable of random access

For a more detailed description of streaming options, see “Streaming Media” on page 149.

Encode Performance Considerations

The Sorenson codecs take longer to encode than to decode (it is asymmetrical). The main consideration in compression time is the amount of data the codec has to analyze. Table 17 shows average Frame Rates achieved compressing moderate motion clips on a Pentium® class 700 MHz computer with the fixed quality set at 50.

Table 17: Sample Compression Rates on a Pentium Class 700 MHz

Frame Size	Average Frame Rate Achieved
320x240	15 fps
160x120	35 fps

As you change the amount of data processed, make sure the compression time matches the change. For example, a 160x120x15fps movie is 1/4 the size of the 320x240x15 clip. The compression time is about 1/4. If you increase your Frame Size, or Frame Rate, the compression time increases.

If you want to encode faster, you have several options:

- ◆ Reduce the Frame Size.
- ◆ Reduce the Frame Rate.
- ◆ Change your Encode Rate option.

If you use the Variable Bit Rate (VBR) options the compression rate is roughly twice as long. VBR actually analyzes the video clip prior to compressing it, requiring two passes through the clip. The results are significantly better, but it also takes more time.

On a much smaller scale, the complexity of the video and the target Data Rate do affect the amount of time required to encode. However, the differences are much less noticeable than with different Frame Sizes and Frame Rates.

Playback Considerations

Playback is generally only an issue with CD-ROM distribution. A CD-ROM handles Data Rates much higher than the Sorenson codecs need (see the Data Rate section). In general, if you use the target Data Rate formula, the playback on most systems is acceptable.

If you are targeting lower end Pentiums and Power PCs, you normally see good performance at 320x240x15 at 70KB/s or less. Smaller Frame Sizes and lower Data Rates increase your playback range while larger Frame Sizes or higher Data Rates might require faster processors to play. Video targeted for Internet and network distribution is not normally a problem because the Data Rates are usually below 70 KB/s.

The key here is the same as when selecting your Data Rate, know your audience. If your target playback audience has more powerful computers, you can safely use higher Data Rates. If you are targeting more universal playback, stay below the 70 KB/s line or consider some of the following options.

Video Doubling (QuickTime Only)

To maintain playback capability on lower-end machines, do not compress video at full-screen (640x480). If you need full-screen display, one option is to use QuickTime's doubling feature. Doubling with Flash is possible, but it is less effective.

One of the great features of the Sorenson codecs is the ability to scale in "doubled" mode and still look good. When scaling by two, most codecs simply fill each 2x2 block with the value of an original single pixel. Sorenson Video 3 takes advantage of a QuickTime conversion mode that provides a smooth scaling algorithm (bicubic for those familiar with Adobe Photoshop®) that looks much better. Using QuickTime's doubling feature is a great way to play 640x480 Sorenson Video 3 movies without the large Data Rate overhead of a 640x480 movie.

Pixel doubling is also very useful for Web movies, where a frequent complaint is the small size. Double a 160x120 Web movie and suddenly you have 1/4 screen video played over the Internet, without lengthy download times. With very low Data Rates, reducing the native Frame Size and then doubling the movie often yields better quality than extreme compression.

To save a movie to automatically play back doubled:

- 1 Open the movie in QuickTime Player.
- 2 From the Movie menu, choose Double Size.
- 3 From the File menu, choose Save.

Now, each time you open the movie, it automatically displays doubled.

Doubling the video can still place a strain on some older computers. The difficulty is caused by older graphics cards that lack hardware acceleration. Machines without hardware accelerated video cards might have trouble displaying doubled video simply because they cannot send the data to the screen fast enough.

CPU Alternates (QuickTime Only)

QuickTime 4 introduced a new option to the Movie Alternates feature: CPU alternates. Using the CPU alternates option, you can create several versions of a movie at different Data Rates and Frame Sizes, specifying each version for a CPU range.

The CPU alternates option allows you to produce great-looking video for today's more powerful computers, but still provide a scaled-down version for the older installed base.

Playback Scalability

Another option for increasing the playback range with low-end computers is to use the Sorenson playback scalability option. When you select the scalability option during compression, the clip is configured to drop frames evenly for computers that cannot keep up.

For example, if you create a 320x240x30 fps movie clip at 70 KB/s, some slower computers cannot decode the clip at the full Frame Rate. Without playback scalability, the computer simply stops decoding video until the next keyframe (then the audio continues). This makes for very “jerky” playback.

However, if you encode the video with playback scalability turned on, the decoder sees that option and automatically drops every other frame, decoding at 15 fps instead of 30 (1/2 the encoded Frame Rate). The quality of the movie is the same as if encoded at 15 fps instead of 30 fps and the user experiences smooth playback.

Summary

In summary, as you prepare video for distribution understand the following playback considerations and options:

- ◆ Data Rate—70 KB/s or less if you require playback on lower-end machines
- ◆ Frame Size—320x240 or less recommended for all machines
- ◆ Frame Rate—15 fps or less for low end machines
- ◆ Doubling—Display full-screen, but is dependent on the computer graphics cards (might have trouble on older machines)
- ◆ CPU alternates—Extends your playback range with lower-end computers while still providing higher Data Rate or larger clips for today’s more powerful computers.
- ◆ Playback scalability—Lets the decoder smoothly drop every other frame for smooth playback on slower computers.

Content Considerations

How you compress your video is largely determined by the content of the video. A video clip of a talking head with very little action and only short bursts of moderate motion compresses very differently than footage of a soccer match.

The following charts provide general guidelines for achieving good compression results using the Sorenson codecs. These guidelines are only intended as a starting point. Each video clip has distinct characteristics. The optimal compression parameters vary based on the content of the clip and your intended delivery method. *For a complete explanation of the Sorenson Video compression options, see "Sorenson Video 3" on page 102.*

Training Videos

Training videos usually consists of interviews, presentations, training materials, and other business communications. In general, training videos are mostly low motion with short sections of moderate action.

Training videos usually compress very well at lower Data Rates. The lower levels of action and motion require less data, thus allowing training video to compress well for most delivery mediums, including the Internet. The following guidelines are only suggested starting points. The optimal Compression Settings depend on the video content, compression level, and finished Frame Size.

Compress for CD-ROM and LAN. When you compress for CD-ROM and/or high-bandwidth network distribution, you can compress with a higher Data Rate. The higher Data Rate allows you to use larger Frame Sizes with greater clarity and detail in the final compressed video.

Content Considerations

The parameters in Table 18 give you a good range for compressing a training video for CD-ROM and high-bandwidth network delivery.

Table 18: Parameters for CD-ROM and High-bandwidth Network Delivery of Training Videos

Frame Size:	320x240
Frame Rate:	15-30
Data Rate:	40-70 KB/s (for maximum playback range)
Keyframe every:	300
Automatic keyframes:	50
Quick compress:	Optional
Playback scalability:	Off

Compress for the Internet. In general, the lower Data Rate requirements of training video make it a good candidate for Internet delivery. The Data Rates used for Internet delivery can vary widely, depending on your target audience. *For more information, see "Delivery Mechanism" on page 138.* The parameters in Table 19 give you a good range for compressing a training video for Internet delivery.

Table 19: Parameters for Internet Delivery of Training Videos

Frame Size:	Dial-up: 240x180 or smaller ISDN/T1: 320x240
Frame Rate:	Dial-up: 4-15 ISDN/T1: 15
Data Rate:	Dial-up: 1.5-5 KB/s ISDN/T1: 12-50 KB/s depending on content and Frame Size
Keyframe every:	300
Automatic keyframes:	50
Quick compress:	Off
Playback scalability:	Off

Sports Video

The high motion content of sports footage requires higher Data Rates to maintain clarity and detail. The higher Data Rate requirements also make it much more difficult to deliver these clips on the Internet. At dial-up Data Rates (1.5-2 KB/s) much of the detail is lost in the continuous motion. However, you can still achieve good quality at CD-ROM, intranet, and network rates.

Compress for CD-ROM and LAN. When you compress for CD-ROM and/or high-bandwidth network distribution, you can compress with a higher Data Rate. The higher Data Rate allows you to use larger Frame Sizes with greater clarity and detail in the final compressed video. The parameter settings in Table 20 give you a good range for compressing sports and action video for CD-ROM and LAN delivery.

Table 20: Parameters for CD-ROM and LAN Delivery of Sports and Action Videos

Frame Size:	320x240 or smaller
Frame Rate:	15-30
Data Rate:	70-150 KB/s
Keyframe every:	300
Automatic keyframes:	50
Quick compress:	Off
Playback scalability:	On

Compress for the Internet. If you need to deliver sports and action clips over the Internet, you should produce files at lower intranet Data Rates. Users with fast Internet connections can view the files with little or no waiting, but dial-up users have to wait for the files to download. In these situations, it is best to make the clips short to keep the download times within acceptable limits for dial-up users.

Content Considerations

The parameters in Table 21 give you a good range for compressing sports and action video for Internet delivery.

Table 21: Parameters for Internet Delivery of Sports and Action Videos

Frame Size:	Dial-up: 160x120 ISDN/T1: 240x180 or smaller
Frame Rate:	Dial-up: 8-15 ISDN/T1: 15 (1/2 native Frame Rate)
Data Rate:	Dial-up: 20-40 KB/s ISDN/T1: 30-70 KB/s depending on content and Frame Size
Keyframe every:	300
Automatic keyframes:	50
Quick compress:	Off
Playback scalability:	Off

Streaming Media

The phrase “Streaming Media” is commonly used when referring to video and audio content delivery over the Internet. Streaming media can take the form of live broadcasts of video or audio streams and it can also refer to delivery of stored media files, played on demand. Both data types can play as the information downloads to the viewer.

There is some misunderstanding as to what “streaming” really means. Based on common usage, streaming media refers to the ability of a media file to play as it downloads. From the perspective of most end users, when they select a file and it starts to play, that is streaming.

There are two types of streaming: RTSP and HTTP. Both methods play video as the file downloads. The method you use depends on your streaming requirements. Table 22 on page 155 identifies the streaming method(s) that are supported for each available output format.

RTSP Streaming

In general, the streaming industry defines streaming as RTSP (Real-Time Streaming Protocol) streaming. RTSP streaming has the following characteristics:

- ◆ Media plays as it downloads.
- ◆ No media file is stored on the local computer.
- ◆ Requires a special “media” server.
- ◆ The server controls the transmission rate (“push” streaming).
- ◆ Uses UDP, a “Lossy” transmission protocol (if data is corrupted or lost during transmission, it is simply discarded).

RTSP streaming is often referred to as “push” or server-base. A common example of RTSP streaming is QuickTime (QuickTime Streaming Server).

RTSP streaming is a technology designed to deal with real-time (live) transmissions over IP networks (e.g. the Internet). To help deliver the information in real-time, RTSP uses UDP as the transmission protocol. UDP is a Lossy protocol that basically sends the data out without checking to make sure it arrived. When sending real-time data, replacing lost packets does not work. By the time the replacement data packet arrives, it is no longer needed (it is out of date).

Advantages

RTSP streaming has several advantages:

- ◆ **No local file storage:** Because RTSP streams are not stored by the viewer, these streams work very well for long video segments or for live/continuous broadcasts (radio or television feeds).
- ◆ **Random access with stored streams:** When streaming stored files, the user can jump to any arbitrary point in the video stream without downloading the entire stream.

- ◆ **Bandwidth control:** The streaming server determines the bandwidth of the stream. The viewer simply takes the data that is broadcast, regardless of their Internet connection speed (you can match the stream bandwidth with the user's connection speed). Because the streaming server controls the bandwidth of the stream, it is much simpler to plan for peak download times.
- ◆ **Multicast transmissions:** Multicast sends out a single stream that branches only when it needs to. Multicast helps to reduce network congestion by minimizing the number of streams at any given time. Some networks and large portions of the Internet do not support Multicast.
- ◆ **Unicast transmissions:** Unicast sends a separate stream to each client. Each time someone accesses the clip, a new stream is created. If too many clients simultaneously access the stream, it can quickly clog the network. However, most networks support unicast making it a very reliable way to deliver RTSP streams.

Disadvantages

As with any technology, there are also some disadvantages.

- ◆ **Lost data packets:** Lost data packets might result in the viewer not receiving the full quality of the original stream. The lost data can cause some blocks to appear scrambled because they lack the complete information necessary to reconstruct properly. The "Forced Block Refresh" option in the Sorenson Video 3 and Sorenson MPEG-4 codecs help overcome this problem.
- ◆ **Trouble with firewalls:** A current concern with RTSP streaming is that many firewalls do not allow UDP transmissions to pass. Firewall administrators can easily change the configuration to admit streaming data, but the initial failure can easily lead to confusion and frustration for your viewers. When RTSP/UDP becomes a more established transmission system, this concern should go away.

RTSP Streaming

- ◆ **Must deliver stream at the client's connection rate:** If you deliver a stream in excess of the client's connection rate, the download buffer fills up and overflows. The video that overflows is simply lost and the client might see "holes" in the video where the excess data was lost. You can produce multiple streams for the different Data Rates (much like QuickTime's movie alternates), but each stream must stay within the Data Rate boundaries.

HTTP Streaming/Progressive Download

HTTP streaming uses the standard Internet “HyperText Transport Protocol” (HTTP) to deliver stored media files. This is the same protocol used to transmit information from a Web server to your Web browser. HTTP streaming was introduced as part of Apple’s QuickTime 3 and is referred to as “progressive download.”

Advantages

HTTP streaming is a very convenient streaming solution with several advantages.

- ◆ **No media server required:** The media file resides on a standard Web server, thus eliminating the extra expense of a separate media server, which are costly.
- ◆ **Simplified setup of media files:** Because there is no streaming server, all you have to do is create the media clip and place a link to the compressed file on a standard Web page.
- ◆ **Local storage of files:** The file plays as it downloads and the finished download is stored in the local computer’s Internet cache. The user can then view the file multiple times without having to download the file each time.
- ◆ **Deliver media independently of the client’s available Data Rate:** If you want to deliver a media file with a Data Rate of 8 KB/s (equal to 64 Kb/s) and the client only has a 56 Kb connection, the browser client simply buffers more media before it starts to play. This feature allows you to dramatically improve the video quality while still streaming your video.
- ◆ **Lossless transport protocol:** Any missing data is sent again so the user never experiences media quality loss due to transmission losses.

Based on these advantages, HTTP delivery is a very good way to deliver short clips to a broad audience. Most movie trailers we see out on the Internet are delivered using HTTP. It does not make sense to try and stream these short previews. Plus, HTTP delivery allows the user to save the clip and pass it on to friends (better exposure), the download is Lossless, so the quality of the clip is guaranteed, and you can set the Data Rate to maximize display quality without worrying too much about the end user's connection speed.

Disadvantages

Like any technology, HTTP delivery is not perfect. There are also some disadvantages:

- ◆ **Local storage of files:**
 - If you are concerned about control of your video, HTTP is not the best delivery mechanism. After the user downloads the video, the file is beyond your control (although the watermark feature in Sorenson Video 3 Professional Edition can help alleviate this concern, see page 116).
 - Local storage restricts the streams to short or moderate length files because long files can overwhelm the local storage resources. For example, an hour of video at 56k modem rates occupies about 30 MB of storage space. If you need to stream longer files, try using RTSP.
 - The viewer does not have random access into the stream until the file is completely downloaded.
 - File-based download eliminates the possibility of live event streaming.
- ◆ **Lack of server bandwidth control:** Makes it very difficult to project and schedule for peak download demands. The client downloads the file based on their current connection rate, not server restrictions.
- ◆ **The Lossless protocol:** Can slow download times as lost packets are retransmitted. This can increase network congestion.
- ◆ **Unicast Transmission:** HTTP streaming can only use unicast transmissions (one stream for each client).

Summary

With the release of QuickTime 4, Apple Computer provided access to both HTTP and RTSP streaming technologies. Using QuickTime, you have the choice to deliver your media files through either or both (even in the same file). QuickTime, allows you to select the delivery method that best meets your needs.

If you are streaming live content or very long video clips, RTSP is the clear choice. If you are delivering short video clips and want to ensure high quality regardless of the user's connection speed, HTTP is the best choice. QuickTime allows you to select the technology that best meets the needs of your video and your audience.

In some cases, you might even want to combine the streaming methods. For example, you want to deliver a presentation or seminar over the Internet. You can create an audio stream for RTSP delivery and then combine it with an HTTP stream for the accompanying slides and graphics. HTTP provides the guaranteed quality necessary to deliver usable graphics for your online presentation. Table 22 compares the features of RTSP and HTTP streaming.

Table 22: RTSP vs. HTTP Streaming

Feature	RTSP Streaming	HTTP Streaming
Flash (FLV)	No	No
Flash (SWF)	No	Yes
MPEG-4 (MP4)	Yes	No
QuickTime (MOV)	Yes	Yes
Playback during download	Yes	Yes
File stored locally	No	Yes
Requires media server	Yes	No

Summary

Table 22: RTSP vs. HTTP Streaming (Continued)

Feature	RTSP Streaming	HTTP Streaming
Transmission bandwidth control	Server	Client/ Network
Transport protocol	RTSP (Lossy)	HTTP (Lossless)
Firewall issues	Might be blocked	Passes through
Random access	At any time	After download only
Length of stream	Unlimited (live broadcast)	Limited (file-based)
Unicast	Yes	Yes
Multicast	Yes	No

- **Note:** You can Stream FLV files using the Flash Communication Server, which uses the Real-Time Messaging Protocol (RTMP).

Technical Support

If you are unable to resolve a Sorenson Squeeze question or problem, refer to the Sorenson Media Technical Support Web page at <http://www.sorenson.com/support>.

Glossary

As with any book about technology, we use our share of acronyms and jargon. We provide this glossary as a quick reference of terms and concepts that might not be familiar to you. All terms are listed in alphabetical order.

Amplitude

The strength of an audio signal. Amplitude is related to the volume of a sound and is measured in decibels (dB).

Artifact

A sound that occurs in an audio file that has been compressed with a codec (e.g. QDesign Music Encoder, MPEG, etc.) that was not present in the original uncompressed source.

Asymmetric

Unequal. Refers to the time spent encoding vs. decoding using the Sorenson codecs. Encoding can take much longer than decoding.

Bandwidth

The amount of data/second that can be delivered to your computer. A 56k modem has a bandwidth of 56 Kb/second.

Bidirectional Frames

A bidirectional frame is a frame created by the compressor and inserted between intraframes and/or interframes. The compressor analyzes the frames before and after the bidirectional frame and then creates and inserts a frame based on the average quality of both.

Bitrate

The amount of information that is required to transmit 1 second of audio information. For example, a bitrate of 24 kbits/s indicates that the audio requires 24 kbits, or 3 KBytes, of information for 1 second of audio. To place the bitrate in context: a 28.8K Modem can handle a maximum of 28.8 kbits/s of information, while an audio CD-player reads data from a CD at a rate of 1411 kbits/s.

Broadcast

A streaming option that sends a single stream that branches down all channels, regardless of whether a client is listening.

CD-ROM

Compact Disc—Read Only Memory.

Chrominance

The perception of color.

Clipping

When an audio signal contains maximum amplitude levels that are too high for the device that is receiving that signal, the input is said to be clipping. A clipped audio file can contain a great deal of distortion and as a result sound rough and harsh.

Codec

A contraction for the terms Encoder/Decoder. A codec encodes data for efficient transmission and then decodes the received data for presentation.

Compression

The act of making a file or data stream smaller. Compression can be either Lossy or Lossless. The Sorenson codecs are Lossy.

Compressor

An audio device that reduces the amplitude range of an audio track. The effect of the compressor is to make the loud parts of a signal softer and to make the very soft parts louder.

Decoding

Reconstructing an encoded file or data stream.

De-esser

A special type of compressor that operates only at high frequencies, usually above 3 or 4 kHz. It is used to reduce the effect of vocal sibilant sounds and is generally not used for non-vocal audio.

Distortion

When an audio file sounds different than it normally should it is said to be distorted. Distortion is often caused by clipping and can often produce audio that sounds overly rough or harsh.

Encoding

Analyzing and compressing a file or data stream.

Firewall

A device used to keep uninvited guests from entering a private network.

FPS

Frames per second.

Frame

A single image, much like a photograph. NTSC video usually contains 30 frames per second.

Stitching

The stitching feature of Sorenson Squeeze allows you to take large files and breaks them into a series of smaller SWF files overcoming the file size concern and the frame count limitation of SWF files. The stitched files play in succession, loading and unloading files until all of the files are played.

HTTP

HyperText Transport Protocol. The standard protocol used to transfer information over the Internet.

Glossary

Interframe

A temporally compressed frame (see temporal compression).

Internet

A decentralized, global network. Commonly known as the World Wide Web.

Intraframe

A spatially compressed frame (see spatial compression).

Intranet

A localized, private network based on the same technology as the Internet.

Kb

Kilobits. Used to measure the amount of data sent each second (Kb/s).

KB

KiloBytes. Used to measure the amount of data sent each second (KB/s). 1 KB(yte) = 8 Kb(its).

Keyframe

A spatially compressed frame used as the reference point for interframes. The keyframes maintain the overall integrity of the video. When you compress video, you identify the portions of the video that are modified from frame to frame. Without adding keyframes, over a series of frames, the quality of the overall video is reduced.

LAN

Local Area Network

Limiter

A special type of compressor that prevents the amplitude of an audio track from exceeding a certain preset level, no matter what the input amplitude might be. Limiters are sometimes used to prevent unexpected high-amplitude signals from causing large amounts of distortion.

Lossless

A compression scheme where the reconstructed image is exactly the same as the original. No data is lost.

Lossy

A compression scheme where some of the less important or less visible data is discarded to make the image smaller. The reconstructed image is close to the original, but not exactly the same.

Luminance

Brightness of an image or object.

Masking

Masking allows you to isolate the foremost part of your video so you can insert an image, movie or other video sequences as the background. This feature works similar to chroma-key.

Multicast

Delivering a single stream that branches to multiple recipients. Results in a single stream in the delivery pipe and greatly reduces network congestion.

NTSC

National Television Standards Committee. The NTSC defines the North American television standard.

PAL

Phase Alternating Line. The dominant European television standard.

QuickTime

Apple computer's multimedia delivery architecture. Sorenson Video 3 is a QuickTime codec.

RTP

Real-time Transport Protocol. A data transport protocol defined to deliver live media capture to one or more clients at the same time. Requires an RTP server to capture, compress, packetize, and transmit the data over a network in real-time. The transport protocol used by RTSP streaming.

RTSP

Real-Time Streaming Protocol. The standard used to transmit stored media to one or more clients at the same time. Provides client controls for random access to the content stream. Requires an RTSP server. RTSP uses RTP as the transport protocol.

Sample Rate

Similar to the Frame Rate for a film, this represents the number of times, per second, that the audio signal is captured. In general, the higher the Sample Rate, the higher the sound quality of the resulting audio, but the larger the audio file. The Sample Rate is very important in determining what the highest frequency that can be captured is. The human ear can hear frequencies from 20 Hz to a maximum of 20,000 Hz. For a frequency to be captured in an audio file, the Sample Rate must be more than twice that frequency. For instance, the Sample Rate of CD audio is 44,100 Hz (44.1 kHz) so that the highest frequency it can represent is 22,050 Hz. This clearly covers the range of human hearing.

Sibilance

Voice recordings often contain excessive loudness of the voice sibilants, and this effect is sometimes called sibilance. The most difficult sibilants to reproduce accurately are the sounds “s” and “sh”. This effect is reduced by the use of a de-esser.

Spatial Compression

Compression applied to a single frame, independent of any preceding frames. Often called an “intraframe”.

Streaming

Playing a multimedia file as it downloads.

Temporal Compression

A compression technique that compares a frame to the preceding frame and then transmits only the differences. Often called “interframe” compression.

UDP

User Datagram Protocol. The data transmission standard used by RTP to broadcast data over IP networks. UDP is designed for broadcast and thus lacks many of the error correction features of TCP. UDP is a “Lossy” protocol, meaning that some data might be lost in transmission.

Unicast

Delivering a separate stream for each user. Results in multiple streams being delivered through a single pipe.

Vector

A 16x16 pixel block from a video frame.

WAN

Wide Area Network.

YUV 4:2:0

A color encoding scheme composed of 8x8 pixel color blocks, used to save space when encoding graphics and video. For every 16 luminance samples (Y), there are only eight chrominance samples (U, V).

A

Alternates
 CPU 143
 movie 139
Amplitude 159
Apple IMA 94
Artifact 159
Asymmetric 141, 159
Audio
 capture 87
 digital 87
Audio Codecs 85
 compression guidelines 86
Audio production 86
Automatic Key Frames 122
Automatic Keyframes 105

B

Bandwidth 159
Batch Processing 77
Bidirectional frames 104, 159
Bidirectional Prediction 104
Bitrate 160
Black Restore 23
Brightness 23
Broadcast 160

C

CD-ROM 138, 160
CD-ROM, compressing for 147
Choose data rate 136
Chrominance 100, 160
Clipping 160
Codec 160
 install 8
 interframes 100
 intraframe 100

 understanding 98
Color space 100
Compressing
 custom settings 45
 Flash 59, 72
 Multiple Source Files 77
 quick and easy 51
 QuickTime 54
Compressing for Flash 59
Compressing Multiple Source
Files 77
Compressing with Watch Folders
77
Compression 98, 160
 CD-ROM 147
 examples 145–148
 guidelines 135, 145
 interframe 100
 intraframe 100
 lossless 98
 lossy 98
 network (LAN) 147
 overview 98
 spatial 99
 speed 141
 for streaming 111
 temporal 99
 understanding 98
 web 146, 147
compression settings 16
Compressor 160
Content considerations
 How to compress 145
Contrast 23
CPU alternates 143

Index

Cropping 25

D

Data rate

- CD-ROM 138
- choosing 136
- formula 136
- Internet 139
- intranet 139
- mistakes 136

Decoding 161

De-esser 161

Deinterlace 24, 25

Deinterlacing

- Auto 26
- Even 26
- Odd 26

Digital Audio 87

Distortion 161

Doubling 142

Drop Frames 105, 122

E

Encode performance 141

Encode tab 103

- Automatic Keyframes 122
- Drop Frames 122
- Minimum Quality 122
- Quick compress 120, 121

Encode time

- asymmetric 101
- vs. decode 101

Encoding 161

Examples 145–148

F

Fade 24

Fade In 24

Fade Out 24

features 102

- Automatic Keyframes 105
- Bidirectional Prediction 104
- Force Block Refresh 111
- Image Smoothing 103, 107

Media Key 108

Minimum Quality 106

Multiple Processor Support
118

Quick compress 104

Sorenson 1-Pass VBR 106

filters 48

Firewall 161

Flash

compressing for 59

Compressing the File 67

SWF Player Settings 59

Flash Player Options Icon 13

Flash SWF Player Settings 59

ActionScript Variables 67

Loop 61

Mouse Click Action 64

Movie Start Action 60

Play Options Tab 60

Player Templates Tab 66

Stitching 61

Templates 66

Force Block Refresh 111

FPS 161

Frame 161

Frame size, optimal 101

Full-screen video 142

G

Gamma 23

H

Hertz 87

How to compress 135

HTTP 140, 153, 161

I

IMA 94

Image Smoothing 103, 107, 123

Input Formats

35

AIF/AIFF 35

AVI 35

DV 35

- MOV 35
- Supported 35
- WAV 36
- Installation 8
- Interframe 100, 162
- Internet 162
- Internet delivery 139
- Intraframe 100, 162
- Intranet 162
- Intranet delivery 139
- K**
- KB 162
- Kb 162
- Keyboard Shortcuts 28
- Keyframe 100, 162
- Keyframes
 - automatic 105, 122
- L**
- LAN 162
 - compressing for 145
- LAN, compressing for 147
- Limiter 162
- Loop 61
- Lossless 98, 163
- Lossy 98, 163
- Luminance 100, 163
- M**
- Mask Smoothing 114
- Masking 112, 163
 - Mask smoothing 114
 - Masking information 114
 - Stenciling 113
- Masking information 114
- Media Key 108
- Menu Bar 30
- Minimum Quality 106, 122
- Movie Alternates 139
- MP3 88
- MPEG-4
 - AAC Codec 95
 - MP4 40
- Multicast 151, 163
- Multiple Processor Support 118
- N**
- Network, compressing for 147
- NTSC 163
- O**
- Output Folder
 - Specifying 32
- Output Folders 32
- Output Formats
 - 39
 - FLV 40
 - MOV 40
 - MP4 40
 - Supported 39
 - SWF 40
- P**
- PAL 163
- Password 108
- Pixel doubling 142
- Playback 107
 - smoothing 103, 107
- Playback considerations 142, ??–144
 - CPU alternates 143
 - playback scalability 144
 - video doubling 142
- Playback Scalability 105, 124, 144
- Playback tab 123
 - Image Smoothing 123
 - Playback Scalability 124
- Preset Local Playback Data Rate Settings 15
- Preset Progressive Data Rate Settings 14
- Preset Streaming Data Rate Settings 14
- Processors, multiple 118
- Production
 - audio 86
- Progressive download 153

Index

Q

QDesign Music Codec 2 91
Qualcomm PureVoice 93
Quick Compress 104, 120, 121
Quick compress 146, 147
QuickTime 163

R

Remove Interlacing Odd 26
RTP 164
RTSP 140, 150, 155, 164

S

Sample rate 164
Scalability, playback 144
Scale 142
Security 108
Set data rate 136
Sibilance 164
Slice picture 110
Smart Loader file 62
Smoothing video 103, 107, 123
Sorenson 1-Pass VBR 106
Sorenson MPEG-4 Pro 125
 About Tab 134
 Encode Tab 127
 Features 125
 Streaming Tab 132
Sorenson Spark Pro 119
 Encode Tab 121
 Features 119
 Playback Tab 123
 Playback tab 123
Sorenson Video 3 102
 Encode tab 103
 Features 102
 Masking tab 112
 Playback tab 107
 Streaming tab 110
 Watermark tab 115
Spatial compression 99, 164
Sports video 147
Squeeze features 6

Squeeze interface 11

Squeeze Interfaces

 Menu Bar 30
 Output Folders 32

Stenciling 113

Stitching 6, 61, 161

Streaming 110, 149, 164

 Force block refresh 111
 HTTP 140, 153
 live 150
 RTSP 140, 150
 Slice picture into packets 110
 video 139

Streaming media 149

SWF Player Settings 59

Symmetrical 101

System requirements 8

T

Target data rate 136

Technical Support, contact 157

Templates 66

Templates for SWF Files 66

Temporal compression 99, 165

Time to compress 141

Training video 145, 148

Trim Points 44

 Clear 44
 Identifying In and Out Points
 44
 Setting 44

U

UDP 150, 165

Unicast 151, 165

V

Variable Bit Rate

 1-Pass 19

VBR 19

Vector 165

Video Codecs 97

 Sorenson Video 3 102

Video content 145

- Video delivery 138
- Video doubling 142
- Video Filters 22
 - Brightness 23
 - Contrast 23
 - Cropping 25
 - Deinterlace 24
 - Deinterlacing 25
 - Fade In 24
 - Fade Out 24
 - Video Noise Reduction 24
- Video filters
 - deinterlacing 25
- Video Noise Reduction 24
- Video streaming 139
- VideoFilters
 - Contrast 23
- W**
- WAN 165
- Watch Folders 77
- Watermark 115
 - setting 116
- Web, compressing for 146, 147
- White Restore 23
- Y**
- YUV-12 100, 165

