
ReelDVD™

User Guide

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ReelDVD User Guide

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INTRODUCTION

Welcome to the world of DVD authoring! Whether your goal is to create interactive tutorials, marketing videos or multimedia presentations, with ReelDVD authoring software you'll quickly be on the road to authoring your own DVD titles.

This ReelDVD User Guide includes an overview of DVD authoring and detailed information about the ReelDVD graphical user interface and menu commands.

Enjoy!

What is DVD?

DVD, which stands for *Digital Versatile Disc*, is a fusion of multimedia and a digital video player, movies and interactivity. Taking advantage of the latest advances in digital compression technology, DVD discs hold up to 13 times more digital information than a CD-ROM, and can be used to create innovative, cutting-edge interactive video titles that incorporate a wide range of source material, including videos, slide shows, multiple audio and subtitle streams, and other components...in fact, nearly anything today's video producer can imagine.

All this and more...welcome to the world of DVD!

About ReelDVD

ReelDVD is a fast, easy-to-use DVD authoring tool that supports many of the features in the DVD-Video specification, providing the means for you to quickly create a feature-packed single-title DVD-Video disc. DVD discs are authored in a *scenario*, also called a *storyboard*, where you combine video and audio assets and then add links between menus, videos, and slide shows that define how the user will interact with the DVD disc.

The intuitive ReelDVD user interface makes full-use of drag-and-drop operations, making DVD authoring easier than ever before. For example, a piece of video, called a *track*, can be added to a scenario by simply dragging-and-dropping the video from Windows NT Explorer into the Storyboard area. In the same way, audio and subpicture assets are added to each video track by dropping the assets onto the video track's icon or timeline. With support for up to three parallel audio and subtitle streams, you can also easily create bilingual or even trilingual DVD-Videos with subtitles.

After you set up the story, you can check the program flow using software simulation, which allows you to preview how the DVD title will run on a DVD-Video player. Once you have confirmed that the project plays as you intended, you can then output the content directly to hard disk or DVD-R for immediate playback, to DLT tape for mass replication, or to CD-R using CD writing software.

Features

ReelDVD supports the following DVD features.

- Timeline assembly
- Up to three audio and three subtitle streams
- Slide and still shows
- Creation of chapter points
- Up to 999 menus
- Interactive video menus (“motion menus”)
- 16-color palette for menu highlights and subtitles
- Real-time software simulation
- Output to Hard Disk, DVD-R, DLT and CD-R media
- NTSC & PAL formats
- Compatibility with Scenarist NT

New Features in 2.0

ReelDVD 2.0 introduces several exciting new features, as well. With Version 2.0, you can now:

- Use layered Photoshop files for menus (generates subpicture masks & menu buttons automatically)
- Use 16:9 aspect ratio video for Widescreen playback
- Automatically include DVD Player software on the discs you produce
- Link menu buttons to individual chapter stops within your video tracks
- Output to DLT tape for disc replication

SECTION 1

INSTALLATION

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1.1 System Requirements

- Single or dual processor Pentium III system (400 MHz min.)
- Microsoft Windows NT 4.0 SP 5 or later, Windows 2000
- 128 MB RAM
- CD-ROM drive
- SVGA monitor
- PCI- or AGP-based video card with 8 MB of video memory, 24- or 32-bit color depth. (1024x768 min. resolution recommended.) Be sure to use the latest driver software available for your video card.¹
- Sound Blaster compatible sound card with DirectSound support
- 100 MB of hard disk space to install ReelDVD and support programs
- 15 GB SCSI hard disk space for data, projects and asset files
- If your system uses SCSI hard drives, you will need a PCI or motherboard SCSI controller card. We recommend the Adaptec 2940UW or equivalent.

If you are connecting your SCSI controller to an external Pioneer DVD-R writer, it is recommended that the drive be connected to a SCSI bus on its own in order to avoid potential write failures due to SCSI device conflicts.



ReelDVD does not support ISA-bus SCSI adapters. They may not function correctly with ReelDVD.

1. For additional requirements for bundled software packages, please see their accompanying documentation.

1.2 Hard Disk Management

1.2.1 Minimum Space Requirements

Storage requirements for a DVD project are a minimum of twice the size of the target DVD volume plus the original asset file size. This is more than 14 GB for the full capacity of a typical single-sided, single-layer disc:

- 4.7 GB for the asset files
- 4.7 GB for the multiplexed video objects
- 4.7 GB for DVD-Video files or Disc Image

The above minimal disk space requirements, furthermore, are possible only when you have instructed ReelDVD to delete both the Temporary Files and DVD Video Files directories, which ReelDVD does by default. The option to delete these directories appears in the Project Settings dialog box. (See Section 3.3, “Project Settings dialog,” on page 3-5.)

The DVD Video Files and Temporary Files directories each require the same amount of disk space as the Disc Image directory. If you output a full 4.7 GB project and choose not to delete the DVD Video Files and Temporary Files directories, you will need over 18 GB of disk space.



Keep in mind that you can locate each directory on a separate hard disk. Therefore, three 5 GB hard disks will work just as well as a single 15 GB drive.

1.2.2 Drive Partitioning

The old FAT (File Allocation Table) partition format that originated with DOS does not support files larger than 2 GB. Since a typical DVD project will be much larger than this, it is recommended that you create an NTFS (Windows NT File System) partition or volume on your hard disk for your disc image data. The NTFS format does support files larger than 2 GB.

If you are using Windows 2000, you will also have the option of using the newer FAT32 file system format, which supports larger files than FAT16, but is still limited to under 4 GB per file. Therefore, NTFS is still recommended due to the fact that a DVD may require as much as 4.7 GB in a single disc image file.

1.3 Installing the KeyLok Device

The KeyLok device, or “dongle,” supplies preset algorithms in response to requests from ReelDVD. ReelDVD must receive these algorithms from the dongle or it will not run.

1. **Power down your computer.**
2. **Remove the printer cable (if applicable) from the DB25 socket (parallel port).**
3. **Attach the dongle to the parallel port and attach the printer cable (if applicable) to the dongle.**

It is not necessary to have an additional dongle to run ReelDVD along with other Sonic products. However, you may need to contact Sonic Technical Support to request a valid license key for your current KeyLok device.



When you first launch ReelDVD, you will be prompted to enter a license key. The key appears on a label affixed to the inside cover of the ReelDVD disc jacket. Be sure to enter the license key exactly as it appears on the sticker.

If you receive an error message stating that the key is invalid or the dongle is missing, please check that you have entered the key correctly and that the parallel port on your computer is enabled and working. To check this, connect a parallel printer or other device to your parallel port and make sure the device can actually receive output from your computer through the parallel port.

1.4 Installing the Software

The first step is to log on to your Windows NT computer with a User name that is a member of your computer’s local Administrators group.

1. **Open the Windows NT Logon Information window and type Administrator for the User name.**
2. **Type your Password and select your Domain name.**

The Domain should be the name of your local computer.

3. Click OK to log on to your computer.

If you are upgrading from a previous version of ReelDVD, proceed to Section 1.4.1, “Upgrading from ReelDVD 1.x”. Otherwise, skip directly to Section 1.4.2, “Installing ReelDVD”.

1.4.1 Upgrading from ReelDVD 1.x

Before you install ReelDVD 2.0, you should uninstall any pre-existing versions of the software.

1. Open the Windows Control Panel and double-click the **Add/Remove Programs** icon.
2. Select “Daikin ReelDVD” and click **Change/Remove** to uninstall the existing version.

If prompted to remove shared files, select “No to All.”

When the removal process is complete, you may proceed to Section 1.4.2, “Installing ReelDVD” below.

1.4.2 Installing ReelDVD

If you are upgrading from a previous version of ReelDVD, be sure to complete the steps in Section 1.4.1, “Upgrading from ReelDVD 1.x”. Then proceed with the following:

1. Load the ReelDVD Installation CD into your CD-ROM drive.

If the ReelDVD Setup utility does not automatically launch, locate and run the file **ReelDVDSetup.exe** in the root directory of the disc.
2. Click the **ReelDVD** button and follow the onscreen instructions to install ReelDVD on your computer.
3. Choose **Yes** to restart your computer when prompted and click **OK**.

After installing ReelDVD, refer to the following sections to install the support software that has been included in the ReelDVD package.

1.4.3 Installing the DVD Player Software

ReelDVD 2.0 includes InterVideo's WinDVD 2000 software player. This player can be used both as a standard DVD player and as an emulation tool for testing projects before recording them to disc.

1. If the ReelDVD Setup utility is not already running, load the ReelDVD Installation CD into your CD-ROM drive and launch it.
2. Click the **WinDVD** button and follow the onscreen instructions to install WinDVD 2000 on your computer.

If you encounter any problems with the installation or use of this software, please consult the additional documentation in the WinDVD directory, as well as the InterVideo Web site (<http://www.intervideo.com>).

1.4.4 Installing the Video Encoder Software

ReelDVD 2.0 also comes bundled with the trial version of Custom Technology's Cinema Craft Encoder Lite video encoder. This encoder is available both as a stand-alone utility and as a plug-in for the Adobe Premiere video editing software. To install the Premiere plug-in version, Adobe Premiere must already be installed on your computer. You will be prompted during the CCE-Lite installation to load the stand-alone version, plug-in version, or both.

1. If the ReelDVD Setup utility is not already running, load the ReelDVD Installation CD into your CD-ROM drive and launch it.
2. Click the **CCE-Lite** button and follow the onscreen instructions to install Cinema Craft Encoder Lite on your computer.

If you encounter any problems with this software, please consult the User's Guide via the **Start** menu in **Programs | Cinema Craft Encoder Lite | User's Guide**. Alternatively, you can refer to Custom Technology's Cinema Craft Web site (<http://www.cinemacraft.com>).



If you have purchased the Video Encoder option with ReelDVD, you will find a serial number located on the inside cover of the ReelDVD disc jacket that will unlock the full functionality of the encoder. You can enter this number in the encoder software's About dialog. (See Chapter 5, "License Key Registration" in the CCE-Lite User's Guide for more information.)

1.4.5 Installing the CD Writing Software

ReelDVD allows you to create *miniDVD's*—CD's that contain DVD disc images for playback on PC computers. The ReelDVD package includes NTI's CD-Maker 2000 Professional Edition software to provide this CD writing capability.

1. **Insert the NTI CD-Maker 2000 Professional Edition installation CD into the CD-ROM drive.**

The NTI installer should automatically launch. If not, launch the installer manually from the disc.

2. **Follow the onscreen instructions to install the NTI CD-Maker 2000 Professional Edition software.**

For a list of supported recordable devices, please consult the **ReadMe.txt** file installed to the NTI CD-Maker 2000 Pro installation directory. Please visit the NewTech Infosystems Web site (<http://www.ntius.com>) for additional information.



MiniDVD's are not playable in consumer set-top DVD players. They can only be played back in PC's equipped with DVD-ROM drives or 8X or better CD-ROM drives. DVD Player software must also be installed.

SECTION 2

REELDVD WORK AREAS

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2.1 About the ReelDVD User Interface

The ReelDVD user interface is made up primarily of the menu and tool bars and three basic work areas: the Storyboard Area, Track Window, and Preview Window. These windows may be resized, and docked or undocked.

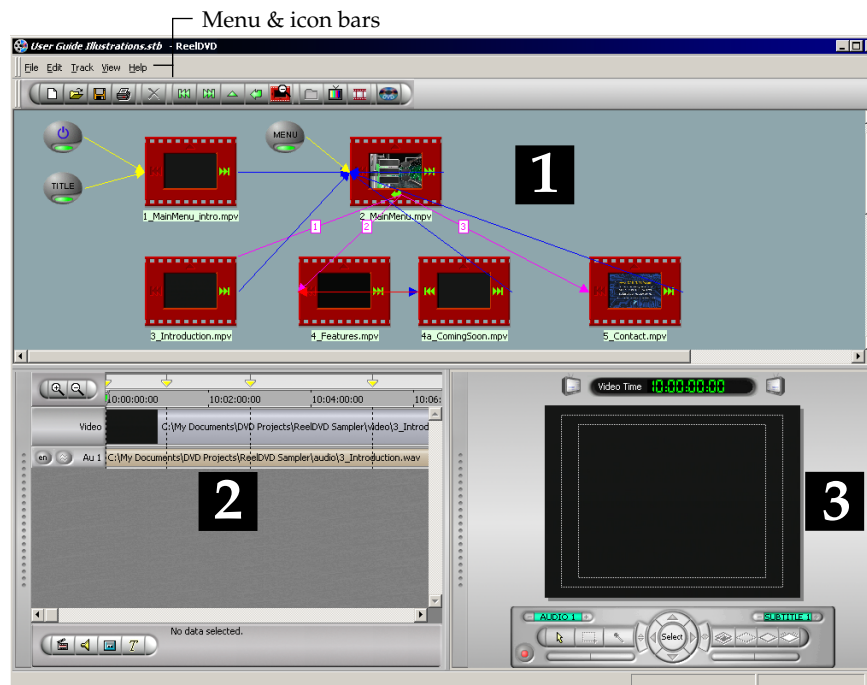


Figure 2-1 The ReelDVD User Interface

- 1 Storyboard Area.....** Main work area. Used to add video, audio, still image and subpicture assets, define links between tracks, and for other authoring work.
- 2 Track Window** Used to trim video, assemble slide shows, create or modify chapter points, add audio & subpicture streams, and set language attributes.
- 3 Preview Window** Used to play back the current state of the project to see the results of your work. Also used to edit the size and location of menu buttons and the path between buttons, and to check subtitle appearance and placement.

The user interface also includes the Explorer Window, which is used to locate and work with source files for a ReelDVD project, and the Information Window, which pops up as needed to give warning and status messages.

2.2 The Tool Bar

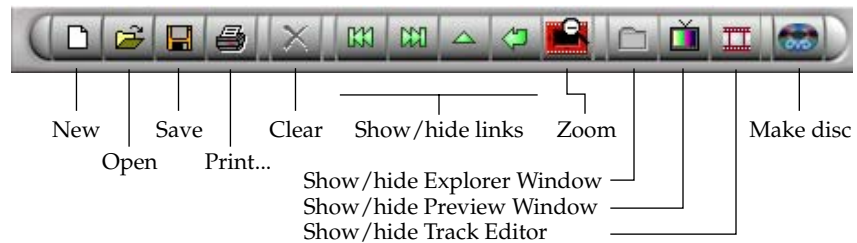


Figure 2-2 The Tool Bar

When ReelDVD is first launched, the main Tool Bar is found just below the menu bar and above the Storyboard area. Click and drag on the tab at the left of the bar to detach it, making it a floating window.

The buttons on the Tool Bar (described left to right) provide quick access to a number of often-used functions:

New Project Creates a new, blank project. (Prompts to save current project if necessary.)

Open Project Brings up the Open dialog, allowing you to find and open an existing ReelDVD project.

Save Project Saves the current project. If the project has not previously been saved, the Save As dialog will appear, allowing you to save the current project under a new file name. The default file type is Storyboard (.stb), which creates a new file that becomes the active project in ReelDVD.

Print... Brings up the Print dialog, allowing you to print the Storyboard view of the current project. Parameters include printer, print range and number of copies.

Clear Clears the currently selected object(s).

Show Previous Link Toggles on and off the display of the red arrows indicating Previous links in the Storyboard area.

Show Next Link Toggles on and off the display of the blue arrows indicating Next links in the Storyboard area.

Show Return Link Toggles on and off the display of the green arrows indicating Return links in the Storyboard area.

Show Button Link Toggles on and off the display of the yellow arrows indicating Button links in the Storyboard area.

Zoom In/Out Toggles between a large and small view of the Storyboard area.

Explorer Window Toggles on and off the display of the Explorer Window.

Track Window Toggles on and off the display of the Track Window.

Preview Window Toggles on and off the display of the Preview Window.

Make Disc... Brings up the Make Disc dialog, allowing you to set up and execute the writing of a disc image for the current project, and to record that image to tape or disc. (See Section 3.7, "Make Disc dialog," on page 3-20 for more information.)

The functions of the New, Open, Save, Print, Clear, Zoom In/Out, Explorer Window, Track Window, Preview Window, and Make Disc buttons on the Tool Bar may also be accessed via ReelDVD's menus (see Section 3, "Menus and Dialogs").

2.3 The Storyboard Area

The Storyboard area is the main work area where you do most of your basic authoring. Because DVD-Video is an interactive format, the Storyboard area offers a truly non-linear production environment.

The content that makes up a DVD title is grouped into linear playback units known as Tracks. The various playback paths that the viewer can take through these Tracks is referred to as the *navigation* of the title. The work of defining this navigation, which involves creating links between

Tracks and menus, is done in the Storyboard area. The Storyboard area is also used for adding video, audio, still image and subpicture assets to the project.

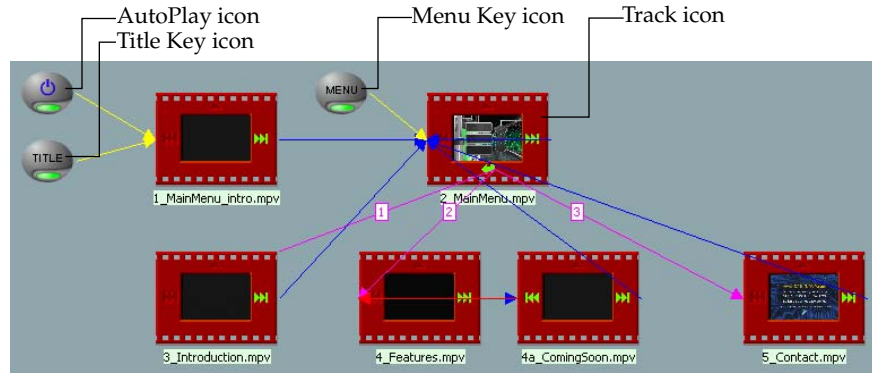


Figure 2-3 The Storyboard Area

The Zoom button on the Tool Bar toggles between a large and small view of the Storyboard area. The area functions exactly the same in both modes.

2.3.1 Track icons

To create Tracks in ReelDVD, you simply drag the icon of a video or still image file from the Explorer Window and drop it into the Storyboard area (multiple files may be dropped at once). Each Track (one for each source file) is represented by a rectangular Track icon with a thumbnail displaying the first frame of the Track's video stream. The name of the source file appears below the track icon.

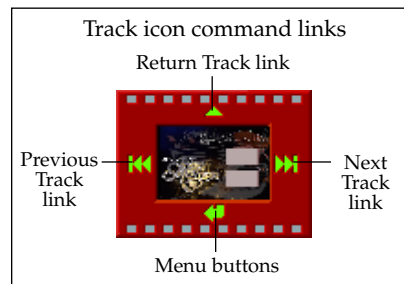


Figure 2-4 Detail of a Track Icon

Clicking on a Track icon makes that Track appear in both the Track Window and the Preview Window. A Track icon may be moved anywhere within the Storyboard area by clicking and dragging.

The red outer portion of each Track icon contains a set of command links used to define how the Track fits into the overall navigational flow of the title. Links between tracks are defined by clicking on the link in one track and dragging to another. A Link Arrow will appear in a color corresponding to the type of link created, and the link indicator on the Track icon will light up. (The display of Link Arrows may be toggled on and off using the Tool Bar.) When the cursor is held over a given link, a small text box will appear showing the destination of that link.

A Track icon may have four types of links:

- The **Next** (NXT) Track link (right side) is used to set the Track (designated by a blue Link Arrow) that the player will jump to when the viewer presses the SKIP FORWARD key on the remote control. The Next Track link also defines the Track that playback will jump to when the current Track ends.
- The **Previous** (PREV) Track link (left side) is used to set the Track (designated by a red Link Arrow) that the player will jump to when the viewer presses the SKIP BACKWARD key on the remote control.
- The **Return** (UP) Track link (top) defines the Track (designated by a green Link Arrow) to jump to when the viewer presses the RETURN key.
- The **Command** (CMD) Track link indicator appears at the bottom of the Track icon when a button is created in a Track. The indicator lights up when the command for any button in a Track is defined as a link. The destination of the link may be a Track (magenta Link Arrow) or a chapter within a Track (orange Link Arrow).

2.3.2 AutoPlay, Title, and Menu icons

In addition to standard Track icons, the Storyboard area also contains a set of three special icons:

- The **AutoPlay** icon indicates (with a yellow arrow) the Track that will play automatically when the disc is first inserted into the player or drive. ReelDVD automatically designates the first Track added to the project as the AutoPlay Track. (If that Track is cleared, the Track that was added next becomes the Autoplay Track.) The AutoPlay Track is usually used for the opening sequence, copyright notices and other important introductory information.

- The **Title** icon specifies the Track that will play when the viewer presses the TITLE key on the remote control.
- The **Menu** icon specifies the Track that will play when the viewer presses the MENU key.

2.4 The Track Window

The Track Window is used to put together the various component parts, known as streams, that make up the Track that is currently selected in the Storyboard area. A Track must include a video stream, which may be motion video or still pictures, and may also include audio, subpicture and button highlight streams.

Up to three audio streams and three subpicture streams are allowed in each Track. Using the Track Window, you can add/delete and modify audio and subpicture streams, drag them on a timeline to position them in relation to the video, add/delete and modify chapter points, set language attributes, and perform other operations. Display of the Track Window may be toggled on and off from the Tool Bar.

While the Track Window has some similarities to non-linear video editing systems, it is not used for editing video or audio. Before a video clip can be used as a video stream in ReelDVD, it must already be encoded into a file in the MPEG-1 or MPEG-2 format, and should be edited to play back exactly as you want it to appear on the DVD (see Section 4.2.1, “Video Assets,” on page 4-6).

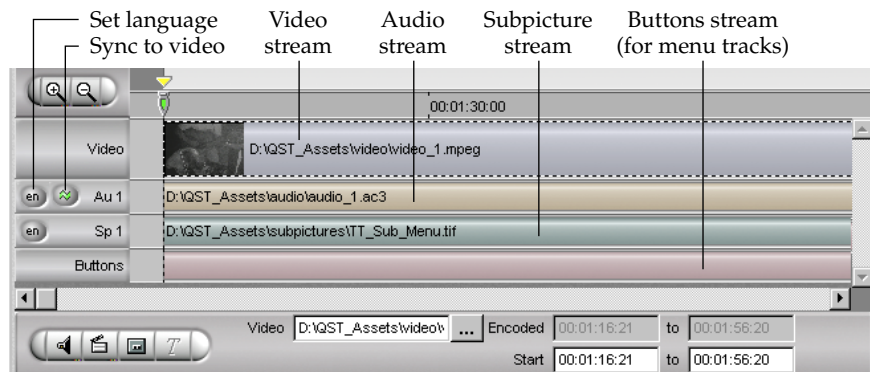


Figure 2-5 The Track Window

The central area of the Track Window is reserved for horizontal bars which represent the streams in the Track. When a Track is first created by dragging a video or image file into the Storyboard area, a horizontal bar representing the video stream appears to the right of the “Video” label. The first part of this bar shows a thumbnail image of the video stream’s contents.

Timeline and Chapters

The duration of a Track is defined by the duration of the video stream. This duration is shown in a timeline running horizontally near the top of the Track Window. The timecode values marking the timeline will vary depending on the timecode values associated with the video in the source MPEG file. The **Zoom In** and **Zoom Out** buttons to the left allow you change the scale of the timeline.

The green indicator on the timeline shows the current playback position in the Track. Dragging this indicator will change the video frame displayed in the Preview Window. When a Track is played, however, it will always play from the beginning.

Above the timeline is the display area for chapter markers. By default, a Track contains a single chapter, indicated by the yellow triangle at the left of the display area. Clicking on the **New Chapter** button at the lower left will create a new chapter that starts at the current location of the timeline indicator. A new chapter marker will appear in the display area at this location, and a vertical dashed line will appear across the streams in the Track Window to show the chapter break.

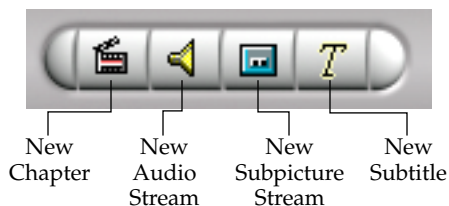


Figure 2-6 Track Window Buttons

Adding Streams

To add an audio or subpicture stream to a Track, you may drag and drop the icon of the file that you want to add onto the icon of that Track in the Storyboard area. Or you may drop the file icon anywhere in the Track

Window. However, when working with multiple streams of a given type (audio or subpicture), it may be useful to be able to control whether an added file becomes stream 1, 2 or 3 of that stream type in that Track. By using the **New Audio Stream** or **New Subpicture Stream** button at the lower left, you can create empty streams in the Track Window, then drop the file icon directly into the preferred stream. Subtitles can be typed in using the built-in subtitle editor by clicking the **New Subtitle** button.

When a stream is selected in the Track Window, information about the stream's attributes is displayed in a set of fields at the bottom of the Track Window. The source file for the stream may be changed by clicking on the browse button (marked "...") next to the filepath field, which will bring up the Select File dialog box. The type of information displayed in the other fields varies depending on the type of stream (video, audio or subpicture).

2.4.1 Motion Video streams

Each Track may use only one video stream. A video stream may be motion video in the MPEG format, or it may be one or more still images. The minimum duration allowed for a motion video stream is 0.4 seconds.

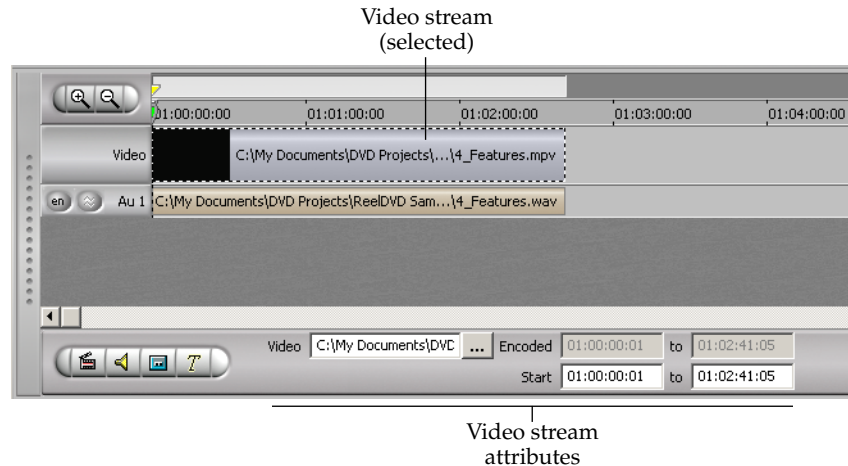


Figure 2-7 Video Stream Attributes

When a motion video stream is selected in the Track Window, the attribute fields displayed are labeled Video, Encoded and Start.

- The **Video** field shows the path to the source video file. The browse button ("...") brings up the Select File dialog box, which you may use to change the video file.
- The **Encoded** fields (gray) display the timecode of the first and last frames of the video file as it was encoded. The timecode of the last frame of video is calculated based on the first frame's time code and the duration of the clip.



NOTE

Encoders that do not handle timecode, such as the Matrox RT2000 and DigiSuite DTV, may put meaningless values in the timecode field.

- The **Start** fields (white) specify the timecode values of the first and last frames of video that will actually be used by ReelDVD in the project. When a track is created or the source video is changed, these values default to those of the Encoded fields, meaning that the entire source file will be used as the video stream for that Track. To trim the head or tail of the video clip, enter new values in the Start fields. (If an entered value falls outside the range shown in the Encoded fields, ReelDVD will automatically adjust the values to match the Encoded values).



NOTE

*The in-point of the Start timecode must fall on the first frame of a **Group of Pictures** (GOP) in the MPEG stream, which occurs approximately once every half-second. (There is no such limitation for the out-point.) ReelDVD will automatically adjust an entered value to the start of the nearest GOP.*

2.4.2 Still Image streams

For the most part, ReelDVD handles still images the same way it handles motion video. The images are displayed in the video stream section of the Track window, and their duration defines the duration of the Track.

Still images are used in DVD for one of three different purposes: as backgrounds for still menus, in Still Shows and in Slide Shows. Of these, only Slide Shows may have audio accompaniment.

Both Still Shows and Slide Shows involve a series of still images appended together for continuous playback:

- In a **Still Show**, each image remains on screen until the viewer presses a key on the remote control. Because the images in a Still Show have no defined duration, still shows have no audio or subtitle tracks.

- In a **Slide Show**, the duration of each image and the sequence of the images are both set by the DVD author. A Slide Show may be accompanied by one or more audio and/or subtitle tracks. Once again, it is the duration of the video stream—in this case the combined duration of all the slides in the show—that determines the duration of a given Track, and thus the duration of any audio and subpicture streams.

Like any other Tracks, Still Shows, Slide Shows and Menus are created by dropping a source file—in this case a still image (see Section 4.2.3, “Still Images,” on page 4-12 for supported file formats)—into the Storyboard area. A dialog box asks which type of Track you wish to create. With the new Track open in the Track Window, a horizontal bar representing the image’s duration appears in the video stream area. The first part of this bar shows a thumbnail of the image.

By default, each image in a Slide Show is set to play for 10 seconds. The duration of a selected image may be changed by dragging the edge of that image’s *segment* (the horizontal bar, including the thumbnail, that represents the image in the video stream area). Alternatively, you may enter new values in the Start attribute fields at the bottom right. (Note that there are no Encoded attribute fields when a Track’s video stream is made up of still images rather than motion video.)

Additional images are added to a Still Show or Slide Show by dragging source file icons from the Explorer Window directly into the Track’s video stream. The images will appear in the video stream in the order that they are dropped, but once the images are in the stream, their order may be modified by dragging.



Figure 2-8 Slide Show Attributes

2.4.3 Audio streams

ReelDVD supports up to three streams of audio per Track. The viewer may switch between these streams during playback by pressing the AUDIO key on the remote control.

Three different audio formats are commonly supported for use in DVD-Video: Dolby Digital (AC-3) and Linear PCM on both NTSC and PAL players, plus MPEG Audio on PAL players only (Section 4.2.2, “Audio Assets,” on page 4-10).

To add an audio stream in the Track Window, drag in the icon of the source file from the Explorer Window (see Section 5.2.3, “Importing Audio,” on page 5-5 for more information on importing audio into a ReelDVD project).

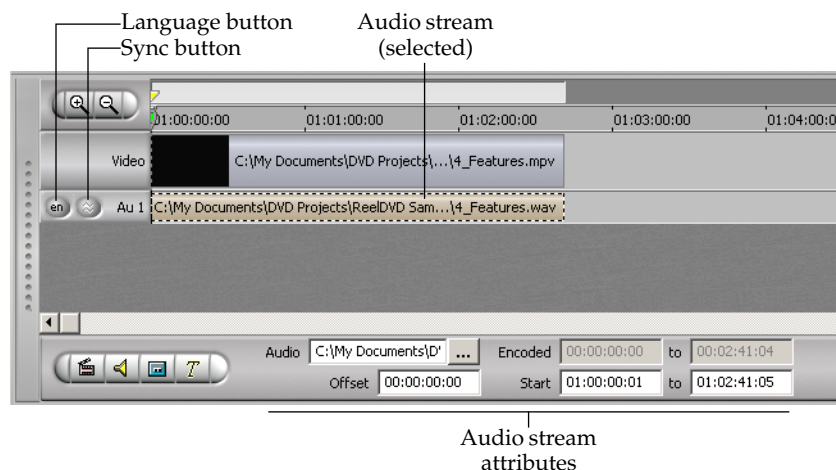


Figure 2-9 Audio Stream Attributes

Keep the following in mind when working with audio streams:

- Audio that extends beyond the end of a Track’s video stream will be automatically trimmed to fit within the duration of the video. Similarly, an audio stream cannot start playing before the video stream.
- Multiple audio clips may be assembled into a single audio stream. However, there can be no empty spaces between the audio clips in the stream. Trim the duration of an individual clip in the stream by dragging on the edges of its segment.

- If an audio stream is empty, but a higher-numbered stream contains audio, you will get an error message when you try to create a disc image for your project. In other words, you must use stream 1 if there is only a single stream of audio, and streams 1 and 2 if there are only two streams.
- All the audio in a given stream position (stream 1, 2, or 3) must be in the same format across all the Tracks in the project. (The format and bit-rate of audio stream 1 of Track 1, for instance, must match that of audio stream 1 of Track 2.)

Sync with Video

Dolby Digital audio files may contain timecode information that can be used to synchronize their audio to timecode information in the video stream. PCM and MPEG Audio files do not contain timecode information.

The **Sync button** to the immediate left of each audio stream in the Track Window toggles on to allow the synchronization of audio file timecode to the timecode of the video stream.

- If an audio file contains timecode and that timecode overlaps with the timecode of the video stream, the Sync button will default to on (“Sync with Video” mode), and ReelDVD will use the timecode data to synchronize the audio to the video.
- If the audio file contains non-overlapping time code or no time code at all, the button will automatically default to off, and the beginning of the audio will snap to the start of the video. The button should be manually set to off if the video and audio files contain timecode that is overlapping but mismatched.

Once an audio stream’s Sync button is set to off, either automatically or manually, it can only be reactivated if the existing audio data is removed from the stream, at which time the button may be turned on and new audio dropped into the stream.

Audio Attributes

When an audio stream is selected in the Track Window, it’s attributes are displayed in the fields at bottom.

- The **Audio** field shows the path to the source video file. The browse button (“...”) brings up the Select File dialog box, which you may use to change the audio file.

- The **Encoded** fields (gray) show the timecodes of the first and last frames of the audio file as it was encoded. The timecode of the last frame of audio is calculated based on the first frame's timecode and the duration of the clip. Audio files that do not contain timecode values, such as Linear PCM and MPEG Audio (as well as some AC-3 files) will show a start value of 00:00:00:00.
- The **Offset** field shows the point, relative to the start of the audio file, at which audio playback will begin. If the Sync button is on and the audio timecode starts at a lower value than the video timecode, the Offset field will display the difference; if the first audio timecode is the same as or higher than the start of the video, the offset will default to 00:00:00:00. If the Sync button is off, you can change the value in this field, adjusting synchronization with the video by trimming the head of the audio.
- The **Start** fields (white) show the timecodes in the video at which playback of the selected audio stream will begin and end. If the Sync button is on, the audio start-point will be determined by matching the timecode of the audio with that of the video stream. If the Sync button is off, entering new values will change the point in the video at which that audio stream will start and stop playing.

As an example of how the Offset and Start fields interact, consider a video stream with timecode starting at 01:00:00:00. If the audio stream has a Start value of 01:00:02:00, and an Offset of 00:00:05:00, audio will begin playing two seconds into the video, from a point in the audio data that is five seconds from the beginning of the original audio file.

Audio Languages

DVD-Video players have the capability to automatically play back the appropriate audio stream of a Track based on language preference settings in the player's setup menu. To make this feature work, each audio stream is assigned a language code.

The default language for audio streams is determined in the Project Settings dialog box (see Section 3.3.2, "Languages tab," on page 3-8). The language code of an individual stream may be changed by clicking on the **Language button** found to the far left of each audio stream in the Track Window. A Select Language dialog box appears with a list of available language codes (including "Not Specified").

If you change the language code for an audio stream, an alert dialog will ask if you want to change the language code for that stream position in all the Tracks in the project (this will have no effect on the language actually spoken in the audio stream). In other words, the language code for a given stream position (1, 2, or 3) must be consistent from Track to Track throughout the project.

2.4.4 Subpicture streams

A subpicture is a 2-bit (four color) image that is overlaid on top of the program material (motion video or still image) in the video stream. Subpictures are used for menu button highlights and for subtitles.

On menus, subpictures are used in conjunction with a background to create the composited menu image seen by the viewer. When used for subtitles, on the other hand, subpictures are displayed in series, with multiple subpictures making up a subtitle stream. No more than one subtitle in the stream may be visible at any given time.

Subpicture Types

In ReelDVD, each subpicture is categorized as one of three specific types: Menu, Simple and Infinite.

- **Menu** subpictures extend for the full duration of a Track, and therefore a Menu subpicture has to be the only subpicture in its stream. During playback, Menu subpictures are displayed to the viewer whether the player's Subtitles option is on or off. Menu subpictures may not be used in Tracks that contain more than one chapter.
- **Simple** subtitles are only visible if a player's Subtitles option is on. The subpicture stream is made up of one or more subtitle images, each of which displays for the duration specified in the Start attribute fields.
- **Infinite** subtitles are only visible if a player's Subtitles option is on. The subpicture stream is made up of one or more subtitle images. Each image has a start time defined in the Start field. But Infinite subtitles have no end time, so they display until a new subtitle starts or until the end of the current chapter.

When a subpicture stream is first created in the Track Window, the type of the first subpicture added will always default to Menu. If a new subpicture is subsequently added to that subpicture stream, the type of the original subpicture changes to Infinite, and the type of the new picture defaults to Simple.

Subpicture Attributes

When a subpicture is selected in the Track Window, its attributes are displayed in the attribute fields in the lower right corner.

- The **Subpicture** field shows the path to the source file for the subpicture. The browse button (“...”) brings up the Select File dialog box, which you may use to change the source file.
- The dropdown **Type** menu is used to display the type (Menu, Simple or Infinite) of the selected subpicture. Click on the menu to change the type.
- The **Start** field shows the start timecode of the subpicture. If the subpicture type is Menu, this value is read-only and will always match the start time of the video stream. If the type is Simple or Infinite, the start value may be edited. For Simple subpictures, there is also an end-point field, which may also be edited, that indicates the frame on which display of the subtitle should stop.

Subtitle Languages

ReelDVD supports up to three streams of subtitles per Track. As with audio streams, subtitle streams are assigned a default language code set in the Project Settings dialog box (see Section 3.3.2, “Languages tab,” on page 3-8). Based on the language preference settings in the setup menu of a viewer’s player, the player will auto-select the appropriate subtitle stream during playback. The viewer may also switch between subtitle streams during playback by using the SUBTITLE and SUBTITLE ON/OFF keys on the remote control.

The language of an individual stream may be changed in the Track Window by clicking on the **Language button** found to the far left of each subpicture stream in the Track Window. If you change the language code, an alert dialog will ask if you want to change the language code for that subpicture stream position in all the Tracks in the project (this will have no effect on the language that was actually used in the subpicture images). In other words, the language code for a given subpicture stream position (1, 2, or 3) must be consistent from Track to Track throughout the project.

Subpicture Preparation

Both menu subpictures and subtitles may be prepared as image files and then brought into a ReelDVD project (see Section 4.2.4, “Subpictures” and Section 4.2.5, “Subtitles” for information on preparing subpictures and subtitles). To add a subpicture in the Track Window, drag in the icon of the source image file from the Explorer Window.

If you use a higher-numbered subpicture stream while a lower-numbered subpicture stream is empty, you will get an error message when you try to create a disc image for your project. In other words, you must use stream 1 if there is only a single subpicture stream, and streams 1 and 2 if there are only two streams.

Subtitles (but not menu subpictures) may be created directly within ReelDVD using the built-in subtitle generator. Clicking on the **New Subtitle button** at the lower left of the Track Window will bring up the Create Subtitle dialog box, allowing you to type in the text and to specify subtitle parameters such as font, size, location, and start and stop times (see Section 3.6, “Create Subtitle dialog,” on page 3-19). Both the text and the parameter settings may subsequently be modified at any time.

2.4.5 Button highlight stream

Whenever a subpicture stream is present, ReelDVD automatically creates a button highlight stream as well. The button highlight stream in the Track Window will appear empty (gray) until buttons for the Track are created in the Preview Window, after which it will appear as a colored bar. Because button highlight streams have no attributes, no attribute fields are displayed at the bottom of the Track Window when the button highlight stream is selected.

The button highlight stream contains both the hotspot definitions and the commands for on-screen buttons.

- A **hotspot** is the rectangular area of the screen that is assigned to a given menu button. This rectangle (defined in the Preview Window) determines the area that will be affected by Selection and Activation colors when the viewer uses the UP/DOWN/LEFT/RIGHT and ENTER keys on the remote control. If the DVD is played in a computer-hosted DVD-ROM drive, a button’s hotspot defines the area of the screen within which that button will respond to mouse rollovers and clicks.

- A button **command** tells the DVD player what to do when a given button is activated. The commands for buttons are defined in the Storyboard Area. Buttons created in ReelDVD may link to another Track, link to a Chapter within a Track, or may have “No Operation” (“Nop”).

See Section 5.3.2, “Creating Menu Buttons,” on page 5-10 for information on creating buttons.

2.5 The Preview Window

The Preview Window is used for three aspects of authoring:

- To define the size and position of menu buttons, and the button paths
- To check placement and appearance when adding subtitles
- To view simulation of video playback and program flow

Display of the Preview Window may be toggled on and off from the Tool Bar.

The Preview Window has two modes: Design and Simulation. To switch between modes, click on the “LED” at the bottom left of the Preview Window. In Design mode, the LED is red and the control panel at bottom contains a set of tools for working on buttons and subtitles. In Simulation mode, the LED is green, and the panel contains all the same keys found on a DVD-Video remote control, allowing you to play the project in its current state as if it were playing on a DVD-Video player.

2.5.1 Design mode

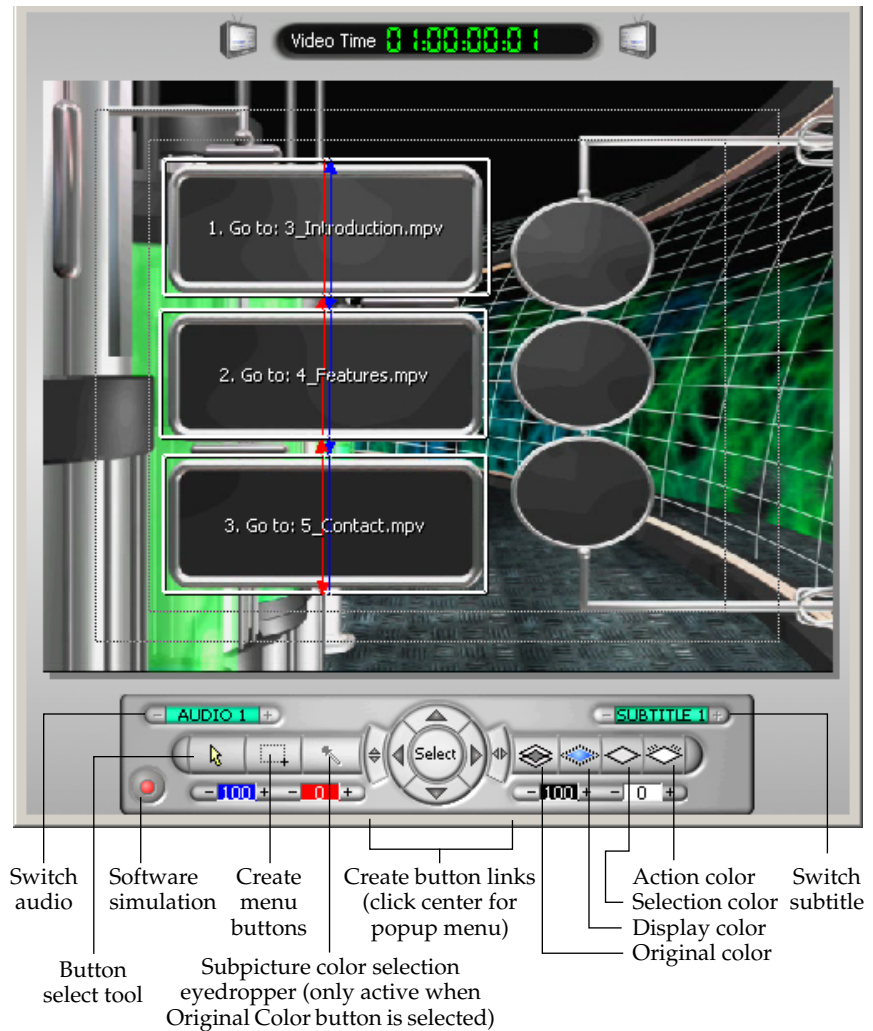


Figure 2-10 Designing a menu in the Preview Window

As noted above, in Design mode the Preview Window offers a complete set of tools for working on menu buttons and subtitles.

Stream Indicators

At the upper left and right corners, respectively, of the Preview Window's control panel area, we find the Audio and Subtitle stream indicators:

- **Audio Indicator** – Used to show the currently playing audio stream, as well as to change or mute the stream. Clicking on the “+” and “-” buttons will cycle through the available streams for the current Track (up to 3). Clicking on the Audio indicator itself will toggle audio playback between muted (indicator darkened) and audible (indicator lit).
- **Subtitle Indicator** – Used to show the currently playing subtitle stream, as well as to change or hide the stream. Clicking on the “+” and “-” buttons will cycle through the available streams for the current Track (up to 3). If the subtitles are Simple type or Infinite type, clicking on the Subtitle indicator itself will toggle the display between hidden (indicator darkened) and visible (indicator lit).



Menu type subpictures are always displayed. It is also possible to force imported Simple and Infinite subtitles to be displayed by using the Display_Start script file setting. See “About the Script File Settings” on page 4-19 for more information.

Running across the middle of the control panel there is a horizontal tool bar for the Preview Window's design functions. Clicking on the circular button in middle pops up a menu that offers an alternative way to activate most of these tools.

Cursor Modes

The left side of the control panel's tool bar contains three buttons (described left to right):

Selection Tool Sets the mouse cursor to Selection mode, allowing you to select and resize menu buttons that have already been defined (if any).

New Button Tool Sets the mouse cursor to New Button mode. You create a new button on the current menu by clicking and dragging in the display, which defines the rectangle of the new button's hotspot.

Eyedropper Tool Sets the mouse cursor to Color Picker mode (only available in the “Original Color” display mode; see below). To define subpicture mask colors, click on a pixel in the subpicture, then indicate which of the four subpicture mask colors the selected color should map to.

Button Link Tools

The tools in the center of the tool bar are used for defining button links:

Up/Down/Left/Right Link Tools Arranged in a ring around the pop-up menu button, these buttons set the mouse cursor to one of four link modes: Up, Down, Left or Right. To define the order in which the buttons on a menu are linked together, click within the hotspot for one button and drag to the hotspot of the next button. For example, if the Down link tool is used to link Button #1 to Button #2, then pressing the DOWN key on the remote control when Button #1 is selected will change the selection to Button #2. Note that the arrows representing links in the Preview Window are color-coded as follows: Up=red, Down=blue, Left=yellow, Right=green. When a given link tool is selected, only the button links of that type will be visible. (To see all of the button links, click on the Selection or New Button tool.)

Vertical Link Tool Found just to the left of center, this button sets the mouse cursor to Up/Down link mode. In this mode, you can define Down and Up links simultaneously by clicking within a button hotspot area and dragging to the destination hotspot. For example, when the Vertical link tool is used to drag from Button #1 to Button #2, then a Down link will be created from Button #1 to Button #2, and an Up link will be created from Button #2 back to Button #1. When this tool is selected, only Up and Down link arrows are visible.

Horizontal Link Tool Found just to the right of center, this button sets the mouse cursor to Left/Right link mode. In this mode, you can define Left and Right links simultaneously by clicking within a button hotspot area and dragging to the destination hotspot. For example, when the Horizontal link tool is used to drag from Button #1 to Button #2, then a Right link will be created from Button #1 to Button #2, and a Left link will be created from Button #2 back to Button #1. When this tool is selected, only Right and Left link arrows are visible.

Viewing Modes and Color/Contrast Settings

As noted above, a subpicture is a four color image. Each of the four colors in the subpicture image file (Color 1 through 4) is used to define an area of the screen. The actual color that will appear in each of these four areas during playback, as well as the contrast value (opacity) of each color, may be set in the Preview Window. You also set the color and contrast for areas that are within button hotspots. This defines the appearance of hotspot areas both when a button is selected and when it is activated. (See Section 3.3.4, “Color tab,” on page 3-11 for information on setting project-wide defaults for subpicture color-mapping.)

The right side of the control panel’s tool bar contains four buttons (described left to right) that activate different viewing modes for the Preview Window. These modes also determine which color and contrast settings (normal display, button selected display, or button activated display) are currently available for editing with the four Color/Contrast indicators found along the bottom of the Preview Window’s control panel.

Original Color Mode Displays the subpicture overlay from the source file (without displaying the video stream in the background). The Eyedropper Tool is only active in this mode. The Color/Contrast values are not editable.

Display Color Mode The default display mode, which shows how subtitles and subpictures will normally look when overlaid on the video stream. The Color/Contrast values may be edited. To change the color mapping for a given color (1 through 4), click on the indicator for that color and select a new color from the pop-up palette. To increase or decrease the contrast, click the “+” and “-” buttons on either side of the color indicator (the DVD specification supports sixteen contrast levels from transparent to opaque).

Selection Color Mode Shows how the portion of the subpicture that is within a button hotspot will look when the menu button defined by that hotspot is selected. The color and contrast values for selected buttons may be set independently of the Display Color Mode. Areas of the subpicture that are not within any hotspot will not be affected by the settings in this mode.

Action Color Mode Shows how the portion of the subpicture that is within a button hotspot will look when the menu button defined by that hotspot is activated (the viewer presses ENTER or SELECT on the remote). The color and contrast values for activated buttons may be set

independently of the Display Color Mode. Areas of the subpicture that are not within any hotspot will not be affected by the settings in this mode.

2.5.2 Simulation mode

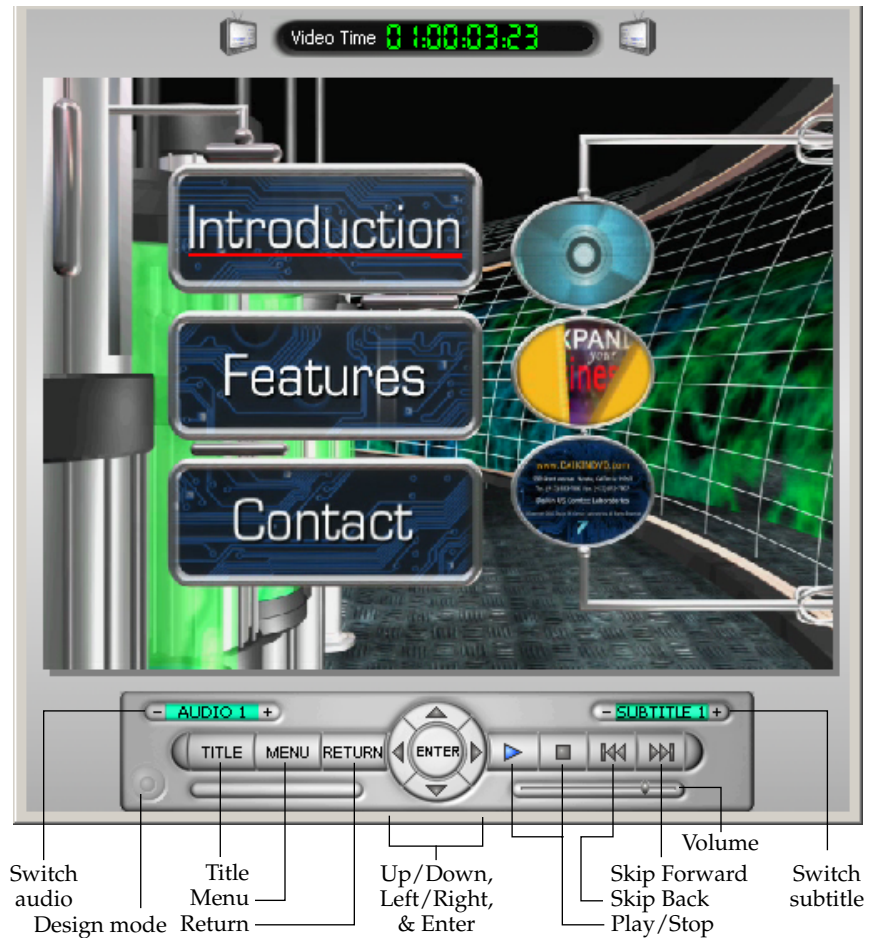


Figure 2-11 The Preview Window in Simulation Mode

When the Preview Window is in the Simulation mode, the control panel represents a DVD-Video player remote control.

Stream Indicators

At the upper left and right corners, respectively, we find the Audio and Subtitle indicators:

- **Audio Indicator** – Used to show the currently playing audio stream, as well as to change or mute the stream. Clicking on the “+” and “-” buttons will cycle through the available streams for the current Track (up to 3). Clicking on the Audio indicator itself will toggle audio playback between muted (indicator darkened) and audible (indicator lit).
- **Subtitle Indicator** – Used to show the currently playing subtitle stream, as well as to change or hide the stream. Clicking on the “+” and “-” buttons will cycle through the available streams for the current Track (up to 3). If the subtitles are Simple type or Infinite type, clicking on the Subtitle indicator itself will toggle the display between hidden (indicator darkened) and visible (indicator lit).



Menu type subpictures are always displayed, as are any subtitles imported with the `Display_Start` script file parameter set to “Forced.” See “About the Script File Settings” on page 4-19 for more information.

DVD Remote Keys

Across the middle of the control panel we find keys corresponding to those of typical DVD remote control (described left to right):

Title Corresponds to the TITLE, GUIDE, or TOP MENU key. This key causes playback to jump immediately to the Track indicated by the Title icon in the Storyboard area. Typically, this is defined as the top-level menu of the menu hierarchy, or the first Track on the DVD.

Menu Corresponds to the MENU key. This key causes playback to jump immediately to the Root Menu, the Track indicated by the Menu icon in the Storyboard area. Typically, this is defined as the main menu of the project’s contents.

Return Corresponds to the RETURN key. This key causes playback to jump immediately to the Track indicated as the Return track for the current Track playing (if any). Typically, the Return track is defined as the menu immediately preceding the current Track. (Although the Return function is not commonly used in movie titles, it is extremely useful for interactive titles.)

Up/Down/Left/Right These buttons correspond to the remote control keys used to select items on a DVD menu. The sequence of button selection will follow the Up/Down/Left/Right links that have been authored for a given menu.

Enter Corresponds to the ENTER or SELECT key. This key is used to activate the selected item on a DVD menu, causing it to jump to a new Track as defined in the authoring.

Play/Stop Corresponds to the PLAY and STOP keys, which start and stop playback of the DVD content, beginning at the currently selected Track or icon (AutoStart, Title, Menu) in the Storyboard area.

Skip Backward Corresponds to the SKIP BACKWARD key. This key is used to skip back to the beginning of the current chapter. If pressed twice quickly, it skips to the beginning of the previous chapter (or previous Track, if any, when on the first chapter).

Skip Forward Corresponds to the SKIP FORWARD key. This key is used to skip forward to the beginning of the next chapter (or next Track, if any, when on the last chapter).

Volume This slider, at the bottom right of the control panel, sets the playback volume of the audio content to one of 11 possible levels. To the left is quieter, to the right is louder.

2.6 The Explorer Window

The Explorer Window offers a convenient way to locate and work with the various source files that go into a ReelDVD project. The Window includes a Folders pane and a Files pane. Like Windows Explorer, the Folders pane shows an expandable tree view of all of the folders on the current volume of storage media. The Files pane shows a list (which may be filtered) of files in the current folder.

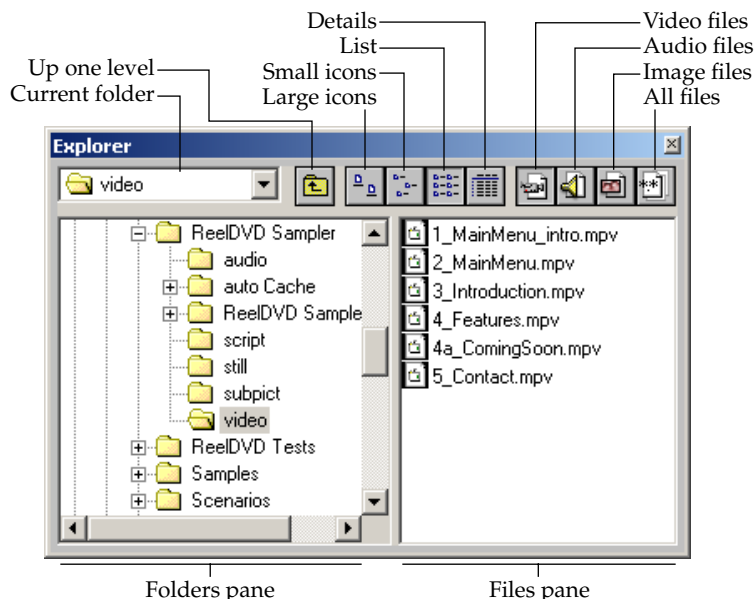


Figure 2-12 The Explorer Window

The Explorer Window also includes a set of tools for navigating storage media and filtering the contents of the Files pane based on file type. These tools (described from left to right) are arranged across the top of the window:

Current Folder This field shows the name of the folder whose contents are currently displayed in the Files pane.

Up One Level Changes the folder currently displayed in the Files pane to the next higher directory.

Large Icons Shows files in the Files pane using their large icons.

Small Icons Shows files in the Files pane using their small icons.

List Shows files in the Files pane using their small icons arranged in list fashion.

Details Shows all the file details.

Video Files Filters the list in the Files pane to display only video files (*.m2v, *.mpg, *.mpeg, *.mpv, *.mv2, *.vbs).

Audio Files Filters the list in the Files pane to display only audio files (*.ac3, *.aif, *.aiff, *.mpa, *.wav).

Image Files Filters the list in the Files pane to display only still images (*.bmp, *.jpeg, *.jpg, *.mps, *.pict, *.psd, *.tga, *.tif, *.tiff).

All Files Shows all files in the current folder (no filtering).

2.7 The Information Window

The Information Window appears automatically when a warning or error message has been generated within ReelDVD. It displays the given error or warning, and also displays additional information that may be useful for understanding the context of the problem. The information in the window may be copied and pasted to another document, or it can be saved to a file. (It is particularly helpful to save the log if you plan to contact technical support about a problem.)

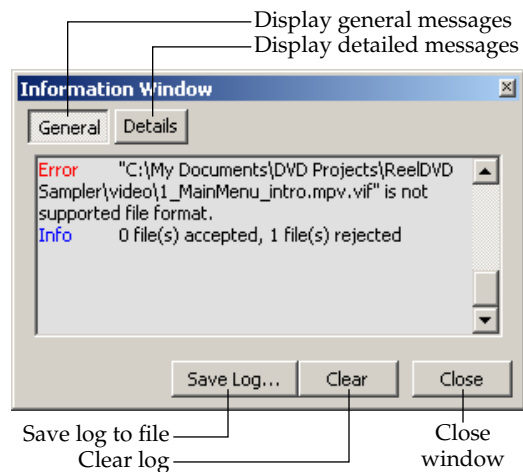


Figure 2-13 The Information Window

The information window has five buttons:

General Displays standard ReelDVD warning and error messages.

Details Displays more detailed messages. (Generally useful only during the Make Disc operation.)

Save Log... Saves the messages to a log file in Rich Text Format, which may then be sent to Sonic Technical Support for review in case of a problem. (It is important to give exact error or warning messages when contacting Sonic Technical Support for help.)

Clear Clears the message log.

Close Closes the Information Window.

SECTION 3

MENUS AND DIALOGS

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3.1 Main Menu

In addition to the DVD authoring features of the main user interface, ReelDVD also provides a number of other functions and commands that are accessed through menu selections and dialogs. These include the ability to customize project preferences, to save a single frame of a video track as a Windows Bitmap (.bmp) file, and to sort tracks.

ReelDVD includes five items in the main menu: File, Edit, Track, View, and Help.

3.1.1 File Menu

The File menu allows access to the following commands:

New Creates a new, blank project. (Prompts to save current project if necessary.)

Open Brings up the Open dialog, allowing you to find and open an existing ReelDVD project.

Save Saves the current project under the existing file name. (Prompts for file name if it is a new project.)

Save As... Brings up the Save As dialog, allowing you to save the current project under a new file name. The default file type is Storyboard (.stb), which creates a new file that becomes the active project in ReelDVD. A project may also be saved as a Storyboard Template (.stt) or Scenarist Script (.scp).

Export Video Image As... Brings up the Save As dialog, allowing you to save the current video frame shown in the Preview Window as a Windows Bitmap (.bmp) file at full-size (NTSC: 720x480; PAL: 720x576). This is useful for grabbing stills for use in a menu, or for lining up subpictures with frames in a motion menu.

Print Setup... Brings up the Print Setup dialog, allowing you to set up for printing the Storyboard view of the current project. Parameters include printer, paper size and orientation.

Print Preview... Brings up a window showing a preview of the printer output.

Print... Brings up the Print dialog, allowing you to print the Storyboard view of the current project. Parameters include printer, print range and number of copies.

Make Disc... Brings up the Make Disc dialog, allowing you to set up and execute the writing of a disc image for the current project, and to record that image to tape or disc. See Section 3.7, “Make Disc dialog” for more information.

Clear Cache Removes temporary files created by ReelDVD during normal use. (These files are located in the “<Project Name> Cache” folder where the project is stored. The files are automatically regenerated the next time ReelDVD needs them.)

Exit Exits the ReelDVD application. (Prompts to save the current project if necessary.)

The New, Open, Save, Print, and Make Disc commands may also be accessed from the Tool Bar.

3.1.2 Edit Menu

The Edit menu allows access to the following commands:

Cut Cuts the currently selected object(s) to the clipboard.

Copy Copies the currently selected object(s) to the clipboard.

Paste Pastes the contents of the clipboard into the project.

Clear Deletes the currently selected object(s).

Select All Selects all objects in the Storyboard area.

Project Settings... Opens the Project Settings dialog, allowing you to define project-specific parameters (see Section 3.3, “Project Settings dialog”).

Preferences... Opens the Preferences dialog, allowing you to set program-wide preferences (see Section 3.2, “Preferences dialog”).

The Clear command may also be accessed from the Tool Bar.

3.1.3 Track Menu

The Track menu allows access to the following commands:

Add Audio Stream Adds an additional audio stream (up to three total) to the currently selected Track.

Add Subpicture Stream Adds an additional subpicture stream (up to three total) to the currently selected Track.

Verify Checks the validity of the selected Track to verify that the track is compliant with the DVD Video specification. The function checks for data in audio and subpicture streams, sums the bit-rates of the audio streams, and calculates the combined bit-rate (audio plus video) for the Track. The result is reported in the Information Window.

Sort Tracks... Opens the Sort Tracks dialog, where you can change the physical layout order of the Tracks on the disc by clicking and dragging on the thumbnails in the Track list. This may help to reduce DVD seek times for complex projects.

The Add Audio Stream and Add Subpicture Stream commands may also be accessed from the Track Window tool bar (bottom left).

3.1.4 View Menu

The View menu allows access to the following commands:

Tool Bar Toggles on (checked) and off (unchecked) the display of the Tool Bar at the top of the Storyboard area.

Status Bar Toggles on (checked) and off (unchecked) the display of the Status Bar at the bottom of the main window.

Explorer Window Toggles on (checked) and off (unchecked) the display of the Explorer Window.

Track Window Toggles on (checked) and off (unchecked) the display of the Track Window.

Preview Window Toggles on (checked) and off (unchecked) the display of the Preview Window.

Zoom In Zooms in on the Storyboard area for a close-up view.

Zoom Out Zooms out from the Storyboard area for a larger overall view.

Display of the Explorer, Track and Preview windows may also be toggled on and off from the Tool Bar.

3.1.5 Help Menu

The Help menu allows access to the following commands:

Contents... Brings up the Windows On-line Help system.

About ReelDVD... Brings up the About ReelDVD dialog, showing version, license and system information related to your copy of ReelDVD.

3.2 Preferences dialog

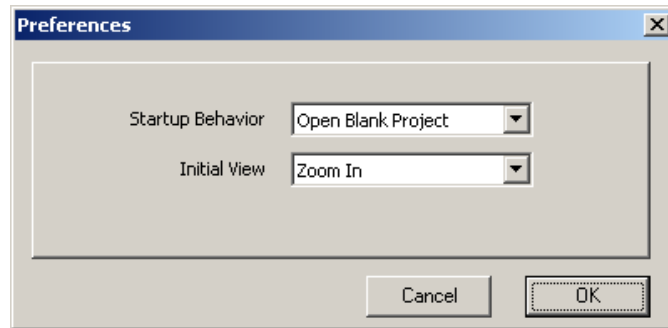


Figure 3-1 The Preferences dialog

The Preferences command on the Edit menu brings up the Preferences dialog, which allows you to customize the following aspects of operation in ReelDVD:

- **Start-up Behavior** – Determines the project that is opened when ReelDVD is first launched, either the project that was open last or a new blank project.
- **Initial View** – Determines whether the Storyboard area is in Zoomed In or Zoomed Out mode when ReelDVD is first launched.

3.3 Project Settings dialog

Accessed by selecting Project Settings on the Edit menu, this dialog is used to define parameters specific to the current project. It is divided into a number of tabs. Two buttons appear in common on all the tabs (except the Layout Settings tab):

Save As Default Saves the settings on the current tab (except the Disc Name field on the Project tab) as defaults for all future projects.

Reset Defaults Returns settings on the current tab to the factory installed default values, and resets these defaults for future projects.

3.3.1 Project tab

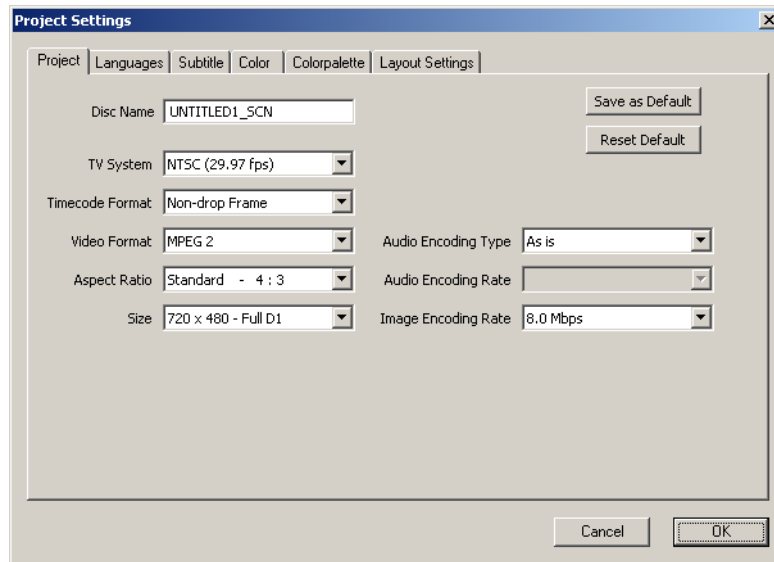


Figure 3-2 The Project tab of the Project Settings dialog

The Project tab includes fields and drop-down menus for setting the following parameters:

- **Disc Name** – Enter the volume name for the project’s disc image. Valid characters for the volume name are: A– Z (upper case only), 0-9, and underscore (_).
- **TV System** – Indicates the TV system of the project’s video content: NTSC (29.97 fps) or PAL (25 fps). (The DVD specification does not allow mixing of TV System content within a single DVD volume.) When the first video file is dropped into a new project, this setting is changed automatically (with a warning message) to the format of that video file. The TV System setting is locked once the first video or still image asset is added to a project.
- **Time Code Format** – To ensure proper synchronization, indicate the timecode format of the audio, video and subtitle source files used in the project: Drop Frame or Non-drop Frame. (This setting only applies when the TV System is NTSC.)

- **Video Format** – Indicates the format of the project’s video content: MPEG-2 or MPEG-1. (The DVD specification does not allow the mixing of video formats within a single Video Title Set (VTS). ReelDVD uses only one Video Title Set, so no mixing of video formats is allowed.) The Video Format setting is locked once the first video or still image asset is added to a project.
- **Aspect Ratio** – Indicates the aspect ratio of the project’s video content. ReelDVD 2.0 supports both Standard 4:3 and Widescreen 16:9 formats. (The DVD specification does not allow the mixing of video aspect ratios within a single Video Title Set, so mixing of aspect ratios is not allowed in ReelDVD.) The Aspect Ratio setting is locked once the first video or still image asset is added to a project.

When working with content in the 16:9 aspect ratio, ReelDVD will automatically create a letterbox version of menu subpictures, ensuring proper alignment of button highlights. Because some vertical picture data is lost in this process, it is recommended that 16:9 subpictures be prepared with thicker horizontal lines (see Section 4.2.4, “Subpictures,” on page 4-14 for more information on subpicture preparation).

- **Size** – Indicates the image size of video, still image, and subpicture content. Valid settings are as follows:

NTSC	MPEG2	720x480 (Full D1) 704x480 (Broadcast D1) 352x480 (Half D1) 352x240 (SIF)
	MPEG1	352x240 (SIF)
PAL	MPEG2	720x576 (Full D1) 704x576 (Broadcast D1) 352x576 (Half D1) 352x288 (SIF)
	MPEG-1	352x288 (SIF)

- **Audio Encoding Type** – Indicates whether audio files—Linear PCM (Wave/AIFF) audio and MPEG audio—are to be used in the format of their source files (As is), or to be encoded to the Dolby Digital 2.0 (two-channel AC-3) format by ReelDVD. The Dolby Digital 2.0 setting may be used to ensure that all the audio in a given stream position (stream 1, 2, or 3) is in the same format, as required by the DVD specification. (The format and bit-rate of audio stream 1 of Track 1, for instance, must match that of audio stream 1 of Track 2.)

- **Audio Encoding Rate** – Indicates the audio encoding bit-rate to use when the Audio Encoding Type is set to Dolby Digital 2.0. Values range from 96 Kbps to 448 Kbps. Dolby recommends values of 196 Kbps for standard stereo, and 224 Kbps where higher definition is required.
- **Image Encoding Rate** – Indicates the bit-rate to use for encoding still images that are added to the current project. The valid range of values depends on the Video Format. For MPEG-1, values range from 0.5 Mbps to 1.8 Mbps, with a default of 1.8 Mbps. For MPEG-2, values range from 1.0 Mbps to 9.0 Mbps with a default of 8.0 Mbps.

3.3.2 Languages tab

The Language tab is used to set parameters related to the Language codes that are assigned to audio and subpicture streams. DVD players use these codes to automatically choose the audio and subpicture streams to play back, based on the languages set by the viewer in the player's setup menu. (If the preferred audio or subpicture language is not available, then playback defaults to audio or subpicture stream 1.) The assigned language is also displayed on-screen when the viewer changes streams with the remote control.

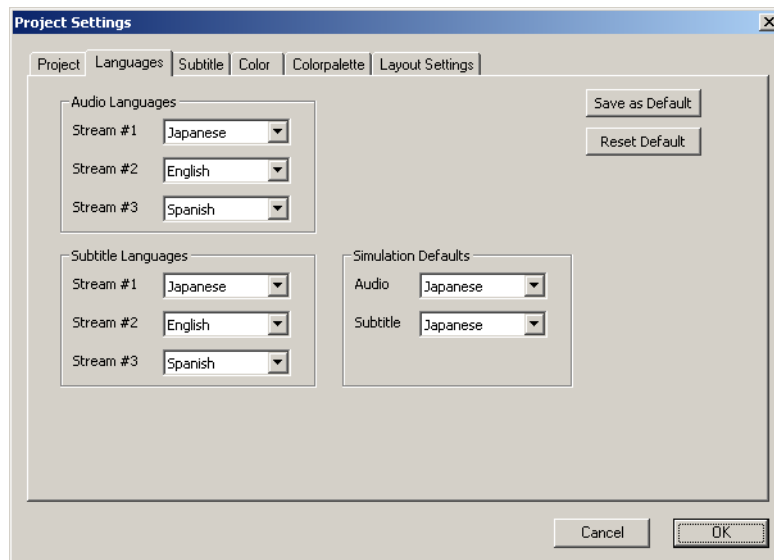


Figure 3-3 The Languages tab of the Project Settings dialog

- **Audio Languages** – Sets the language code assigned to audio streams 1, 2 and 3 in all Tracks of the project. (see Section 2.4.3, “Audio streams” above for information on changing an audio stream’s language code in the Track Window.)
- **Subtitle Languages** – Sets the language code assigned to subpicture streams 1, 2 and 3 in all Tracks of the project. (see Section 2.4.4, “Subpicture streams” above for information on changing a subtitle stream’s language code in the Track Window.)
- **Simulation Defaults** – Defines the audio and subpicture language settings on the setup menu of the DVD-Video player that will be simulated in the Preview Window’s Simulation mode. When the AutoStart icon is selected and simulation begins, ReelDVD will automatically attempt to use these Simulation Default language settings to choose appropriate audio and subpicture streams for playback.

3.3.3 Subtitle tab

The Subtitle tab includes buttons and drop-down menus used to define the appearance and position of new subtitles created with ReelDVD’s built-in subtitle generator. Note that these settings do not have any effect on existing subtitles.

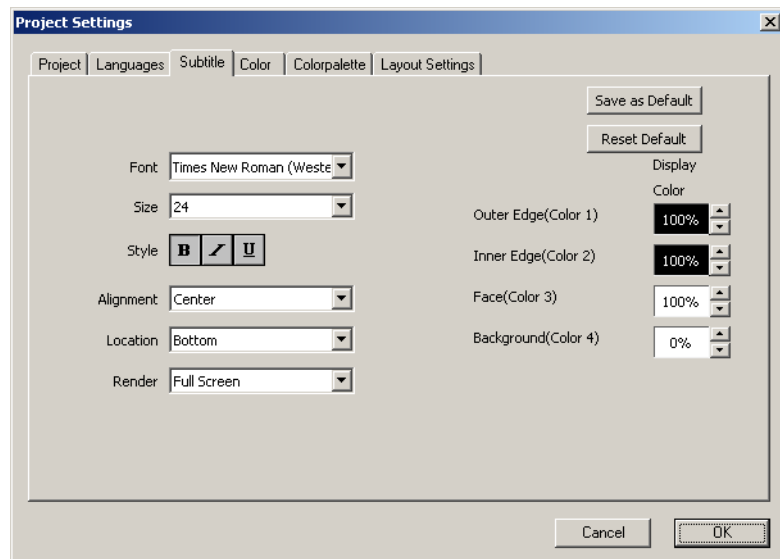


Figure 3-4 The Subtitle tab of the Project Settings dialog

- **Font** – Sets the default subtitle font.
- **Size** – Sets the default subtitle font size.
- **Style** – Sets the default subtitle font style (**Bold**, *Italic*, Underline).
- **Alignment** – Sets the default horizontal alignment of the subtitles (Center, Left, Right).
- **Location** – Sets the vertical position of the subtitles (Top, Middle, Bottom).
- **Render** – Determines whether each subtitle's subpicture image is rendered as a full-screen graphic (e.g. 720x480 for NTSC, Full D1) or as a graphic just large enough for the subtitle text. (The default is Text Area, because the resulting image files use less disk space in the Project Cache.)
- **Outer Edge** – Sets the color and contrast level of the outer 1-pixel outline of the subtitle text. Click on the color swatch to choose from the sixteen colors in the pop-up color palette. Use the up and down arrows to set the contrast to one of sixteen levels, from 0% (transparent) to 100% (opaque). The default color/contrast setting for the Outer Edge is 100% black.
- **Inner Edge** – Sets the color and contrast level of the inner 1-pixel outline of the subtitle text. Click on the color swatch to choose from the sixteen colors in the pop-up color palette. Use the up and down arrows to set the contrast to one of sixteen levels, from 0% (transparent) to 100% (opaque). The default color/contrast setting for the Inner Edge is 100% black.
- **Face** – Sets the color and contrast level of the font face of the subtitle text. Click on the color swatch to choose from the sixteen colors in the pop-up color palette. Use the up and down arrows to set the contrast to one of sixteen levels, from 0% (transparent) to 100% (opaque). The default color/contrast setting for the Face is 100% white.
- **Background** – Sets the color and contrast level of the background color of the subtitle area. Click on the color swatch to choose from the sixteen colors in the pop-up color palette. Use the up and down arrows to set the contrast to one of sixteen levels, from 0% (transparent) to 100% (opaque). The default color/contrast setting for the background area is 0% white.

3.3.4 Color tab

The Color tab allows you to change the default colors and contrast of subpictures used for menus and subtitles. Changes to these settings do not affect any subpictures that are already present in the current project.

As noted above, a subpicture is a four color image. Each color serves as a mask to define an area of the screen. The Color tab is used to map these masks to the actual colors and contrast levels that will appear in the four areas on-screen when the subpicture is displayed.

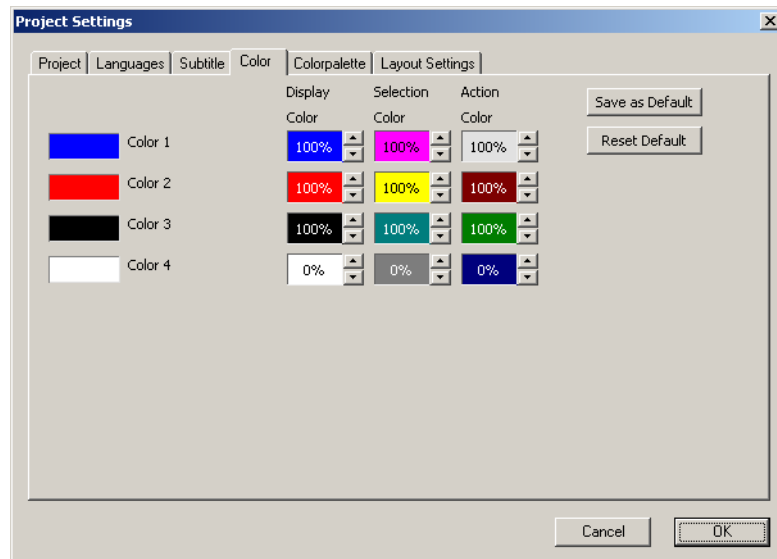


Figure 3-5 The Color tab of the Project Settings dialog

In Figure 3-5 above, the column of color swatches on the left side of the tab indicates the original colors of the subpicture mask, while the other three columns indicate the colors and contrast levels to which the original colors will be mapped in three different playback conditions (Display, Selection, Action). For example, the blue (Color 1) areas of the subpicture will map to a 100% blue Display Color, 100% magenta Selection Color, and 100% medium gray Action Color.

To change a given color mapping, click on a color swatch and choose from the sixteen colors in the pop-up color palette. Use the up and down arrows to set the contrast to one of sixteen levels, from 0% (transparent) to 100% (opaque).

- **Display Color** – Defines color mapping and contrast values for subpictures displayed in their “default” state (no button selection or activation).
- **Selection Color** – Defines color mapping and contrast values for subpictures within the hotspot area of a menu button when the button is selected.
- **Action Color** – Defines color mapping and contrast value for subpictures within the hotspot area of a menu button when the button is activated (by pressing ENTER on the remote).

3.3.5 Color Palette tab

The Color Palette tab is used to define the 16-color palette used in the current project. This color palette determines which 16 colors are available for assignment to subpictures and subtitles, both in the Preview Window and in the Color tab of the Project Settings dialog.



NOTE

Any changes to the color palette will affect all existing subpictures and subtitles that refer to those colors changed.

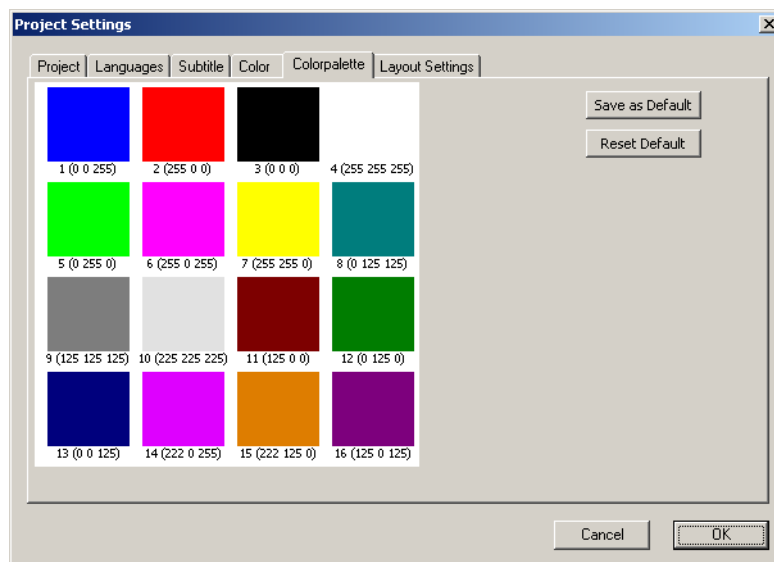


Figure 3-6 The Color Palette tab of the Project Settings dialog

The DVD-Video specification supports 4-bit color palettes for subpicture overlays (subpictures and subtitles), meaning that at any given time 16 different colors are available out of a possible 16 million. In ReelDVD, a single color palette, set in the Color Palette tab, is used for the entire project.

To change a color in the Color Palette, simply click the color swatch you wish to change. The standard Windows Color dialog will appear, from which you may select a new color, after which the RGB values for the new color will be displayed in the swatch.

3.3.6 Layout Settings tab

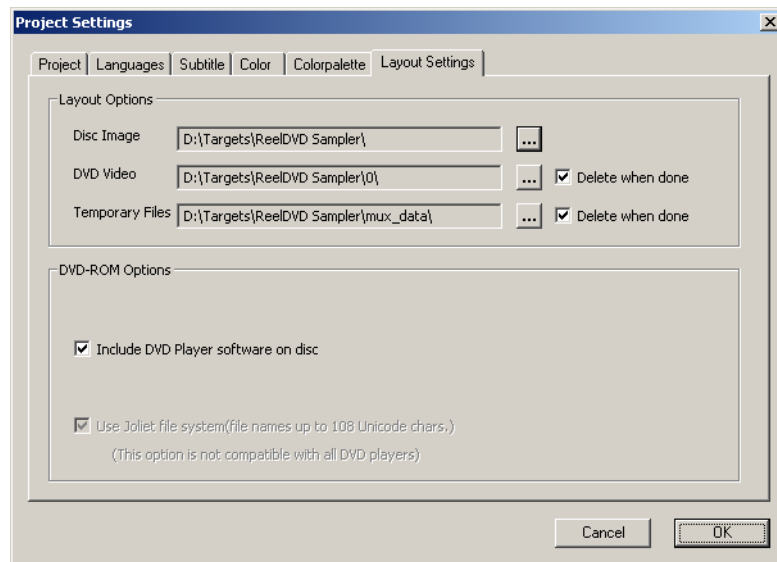


Figure 3-7 The Layout Settings tab of the Project Settings dialog

The Layout Settings tab is used to choose options related to the output of a disc image with the Make Disc command on the File menu. These choices determine the default settings for the options in the Make Disc dialog (see Section 3.7, “Make Disc dialog” below).

Layout Options specify the directories that should be used to store the files that ReelDVD creates in preparation for outputting to a DVD-R or a DLT:

- **Disc Image** – Indicates the directory where ReelDVD will output its work files and final disc image during the Make Disc operation. To avoid conflicts between projects, a new, empty Disc Image directory should be selected for each new ReelDVD project. Clicking on the Browse button will bring up a Browse for Folder dialog that will allow you to select an existing folder. (You must create the target folder outside of ReelDVD before it can be selected here.)

Once the Disc Image directory is set, ReelDVD will automatically fill in the DVD Video and Temporary Files fields (see below). The values shown will represent paths for subdirectories that ReelDVD will automatically create within the Disc Image directory during the Make Disc operation.

- **DVD Video** – Indicates the directory where the DVD-Video files (VIDEO_TS directory) will be written during the Make Disc operation. By default, this directory is defined by ReelDVD as the Zero (“0”) directory beneath the Disc Image directory. However, the hard drive on which the directory resides must have free space equivalent to at least twice the size of the entire project. If there is not enough disk space available, use the Browse button to choose a DVD-Video directory that does not reside on the same hard drive.

The “Delete when done” option tells ReelDVD to remove the files in the DVD-Video directory once the Disc Image file is created. The default setting for “Delete when done” is on (checked). Uncheck this option if you plan to use the DVD player software bundled with ReelDVD to test playback of your project from the hard drive.

- **Temporary Files** – Indicates the directory where ReelDVD creates temporary files during the “multiplexing” phase of the Make Disc process. By default, this directory is assigned as the “mux_data” directory beneath the Disc Image directory. However, the hard drive on which the directory resides must have free space equivalent to at least twice the size of the entire project. If there is not enough disk space available, use the Browse button to choose a Temporary Files directory that does not reside on the same hard drive.

The “Delete when done” option removes the files in the Temporary Files directory once the Disc Image file is created. The default setting for “Delete when done” is on (checked). Unchecking this option may cut down on the processing time of subsequent Make Disc operations, but will also use disk space equivalent to the size of the project.

DVD-ROM Options relate to the writing of discs that include non-DVD-Video material (outside of the VIDEO_TS directory):

- **Include DVD Player software** – Specifies whether or not the discs you make will include DVD player software that will allow playback of the disc on a Windows computer that does not already have DVD player software installed. This option makes it feasible to distribute your DVD-Video content on CD-R for playback on computer systems that are equipped with either a CD-ROM or a DVD-ROM drive. These CD-Rs will *not* play on set-top DVD players.

The player software is a restricted, single-title play version of InterVideo's WinDVD 2000. (The full version of WinDVD comes bundled on the ReelDVD Installation CD for use solely by the purchaser of ReelDVD.) The restricted player will not play Dolby Digital audio (due to Dolby licensing restrictions). Also, while it will play the discs on which it is embedded in their entirety, it will only play other discs for a limited period of time (five minutes).

If the "Include DVD Player software" option is checked, an installer for the restricted version of the player software will be included on the discs you create (CD or DVD). Altogether, the software takes up a relatively modest amount of storage space on the disc (approximately 36 MB). Uncheck the box if you do not plan to use the disc in PC computers, or if you do not need the included player software.



NOTE

Please refer to the documentation of the bundled DVD player software to determine minimum system requirements. Many older PC systems may not have the processing power or video acceleration to provide high-quality video playback.

- **Use Joliet file system** – The DVD specification supports two file systems: Universal Disc Format or UDF (for Windows 98, Windows 2000, and Mac OS 8.x and 9.x), and ISO-9660 (for Windows 95, Windows NT, UNIX, and older versions of Mac OS). When you include PC Files on your disc, ReelDVD gives you the option of also including the Joliet file system extensions for ISO-9660. This option is required and automatically selected if the "Include DVD Player software" option is checked.



NOTE

If Joliet is not used, platforms that read the ISO-9660 file system on the disc will truncate longer file names to 30 characters. However, the presence of the Joliet file system is known to cause playback problems for a few consumer DVD players. Therefore, the use of Joliet is not recommended when it can be avoided.

The table below shows the attributes of each file system.

File System	File Names	Character Set	Platform
ISO-9660 (Level 3)	Up to 30 characters	ASCII	Windows 95, Windows NT, UNIX, Mac OS 7.x and older
UDF	Up to 255 characters	ASCII	Windows 98, Windows 2000, Windows ME, Mac OS 8.x and up
Joliet	Up to 108 characters	Unicode	All Windows Operating Systems

3.4 Select Layers dialog

As described earlier (see Section 2.4.4, “Subpicture streams” above), a DVD menu is a Track that combines a still image background (in the video stream) with a subpicture overlay and button hotspot information. The Select Layers dialog allows ReelDVD to automatically generate overlays and hotspots from existing layers in an Adobe Photoshop image (see “Importing Layered Photoshop Images” on page 5-4).

The Select Layers dialog is accessed by dropping a layered Photoshop (.psd) image file onto the ReelDVD Storyboard area. In response to the prompt, select either “Still Menu with Sub-picture” or “Slide Show with Sub-picture.” When the OK button is pressed, ReelDVD uses the visible layers specified in the dialog as masks to automatically create menu button hotspots.

The subpicture mask created by the Select Layers dialog is stored in the same directory as the original Photoshop source file. It is stored in Windows Bitmap (.bmp) format and given a name based on the original source files name: <file>_sp.bmp. If a file already exists with this name, ReelDVD will add an incremental digit to the end of the name in order to ensure a unique name (e.g. <file>_sp1.bmp).

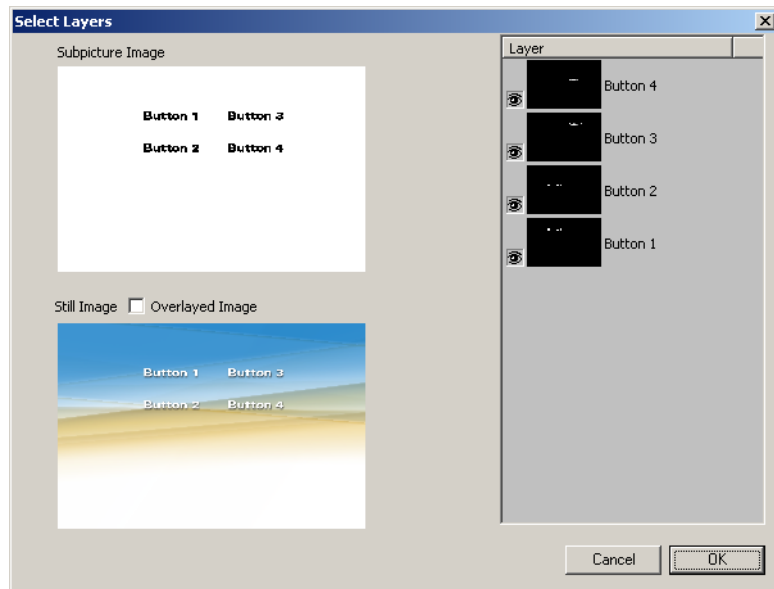


Figure 3-8 The Select Layers dialog

The Select Layers dialog is made up of the following elements:

- **Subpicture Image** – A display area showing the subpicture mask that will be created for the new Track. If no layers have been activated for this mask, the display says, “Subpicture image is not defined.”
- **Still Image** – A display area showing the complete, flattened image (all layers in the original Photoshop file that were set to visible in Photoshop) that will be used as the background for the menu being created. Only visible layers in the Photoshop file will appear in this image.
- **Show Overlay** – When checked, this option overlays the Subpicture Image onto the Still Image display, allowing you to confirm the alignment and registration between the two images.
- **Layers list**– The Layers column shows the name of each layer in the original Photoshop file that was set to visible in Photoshop, as well as a thumbnail of the subpicture mask each layer will create in ReelDVD.
- **Visible indicator** – Like the Visibility setting in Photoshop’s Layers palette, clicking the Visible indicator (the eye icon) for a given layer will toggle that layer’s mask between visible and invisible. If a layer’s indicator is set to visible, a menu button hotspot will automatically be defined corresponding to that layer’s mask. The visibility setting of a

layer in the Layers list has no effect on the background image. By default, all of the layers are preset to visible when the file is first imported.

In addition to creating button hotspots, ReelDVD will also define standard links between the button hotspots based on their location with respect to one another. As with the buttons on any menu, these hotspots and links may subsequently be modified in the Preview Window.

3.5 Sort Tracks dialog

The Sort Tracks dialog displays the order in which the Tracks will be written to the DVD, and allows you to change that order, which may reduce seek times between Tracks in complex projects.

The Track order also affects the numbering of the chapters by ReelDVD. Chapters within a track are always ordered sequentially; the chapter number counts up from the first track and continues in order through all the other tracks in the project.

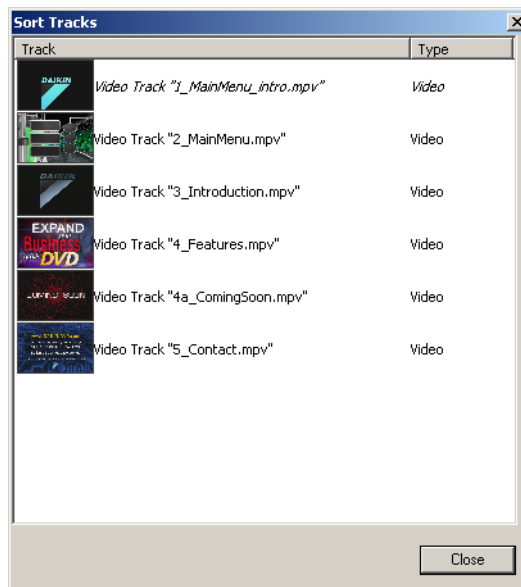


Figure 3-9 The Sort Tracks dialog

To access the Sort Tracks dialog, select Sort Tracks from the Tracks menu. Within the dialog, Tracks are re-ordered by clicking and dragging on the thumbnails in the Track list.



The first Track in the list is the Track pointed to by the AutoStart icon in the Storyboard area, and is thereby defined as the EntryTrack for the disc. This track cannot be moved in the Sort Tracks dialog. Use the Storyboard area to designate a different EntryTrack if the order of this track must be changed.

3.6 Create Subtitle dialog

Subtitles (but not menu subpictures) may be created directly within ReelDVD using the built-in subtitle generator, which is accessed by clicking on the **New Subtitle** button at the lower left of the Track Window. If the green timeline indicator in the Track Window is not within the time-frame of an existing subtitle in the selected subpicture stream, the dialog allows you create a new subtitle. If the indicator is within the time-frame of an existing subtitle that was created internally by ReelDVD, you can use the dialog to edit the text and the settings for that subtitle.

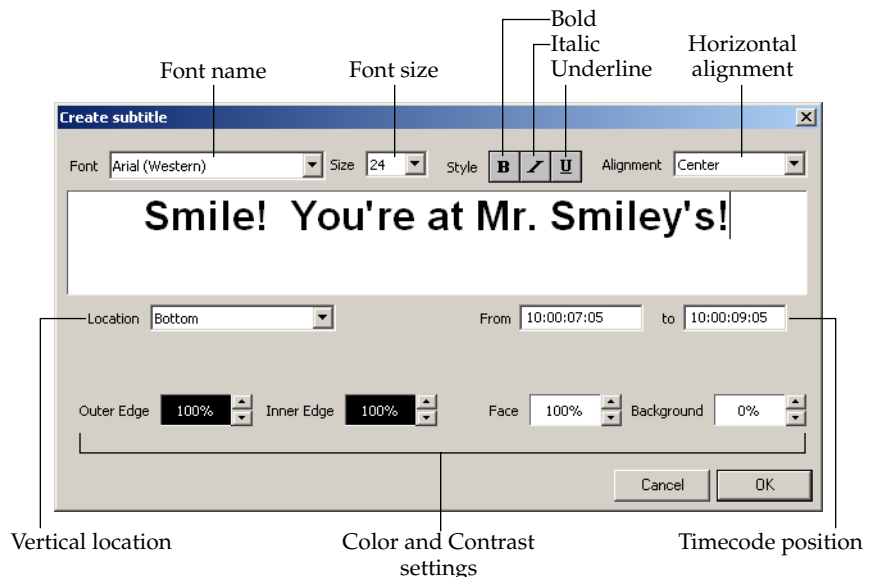


Figure 3-10 The Create Subtitle dialog

The Create Subtitle dialog is comprised of four sections: font attributes, text input area, screen location and duration fields, and color definitions. The dialog allows you to type in the subtitle text, and also to specify subtitle parameters such as Font, Size, Style, Alignment, Location, and Colors. The default settings for these parameters are set on the Subtitle tab of the Project Settings dialog box (see Section 3.3.3, “Subtitle tab,” on page 3-9 for an explanation of these parameters). Both the text and the parameter settings may subsequently be modified at any time.

Each time you make changes to the parameter settings in the Create Subtitle dialog, the changes are in effect the next time you open the dialog. If you want to change the attributes of a series of subtitles, set the attributes for one subtitle, then open each successive subtitle and click OK to apply the attributes.

The Create Subtitle dialog is also used to set the timing of the display of each subtitle:

- The **From** field is used to specify the starting time code of the subtitle. By default, ReelDVD sets the start time of each subtitle based on the position of the green timeline indicator in the Track Window at the time the Create Subtitle dialog is opened. Note that the start time may also be changed in the Track Window by dragging the subtitle’s segment in the subpicture stream.
- The **To** field determines the ending time code of the subtitle. The default duration for subtitles is two seconds. Note that the subtitle duration may also be set in the Track Window by dragging on the edges of the subtitle’s segment in the subpicture stream.

3.7 Make Disc dialog

The final step in creating a DVD, after the title is authored and thoroughly checked in simulation, is to premaster the DVD disc. The process involves entering the disc name, setting the directories into which the DVD data will be written, and outputting DVD-Video and disc image files. You may also choose to write the disc image directly to a DVD-R. These steps are handled in the Make Disc dialog. Default settings for the dialog are set in the Layout Settings tab of the Project Settings dialog (see Section 3.3.6, “Layout Settings tab,” on page 3-13).

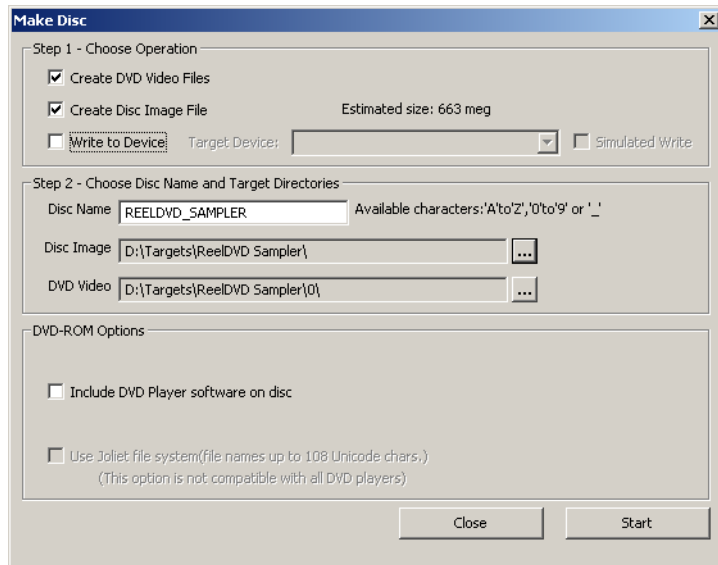


Figure 3-11 The Make Disc dialog

The operations covered in the Make Disc dialog are organized into three steps:

Step 1 – Choose Operation and Press Start

Create DVD Video Files Multiplexes the MPEG content and creates the VIDEO_TS directory in the target DVD-Video directory (specified in Step 2). This action must be completed before the following two may be performed. Activating this option enables the Step 2 options to be set. (Also known as performing a “layout.”)

Create Disc Image File Reads the DVD Video directory specified in Step 2 and any PC Files specified in Step 3 (including the bundled DVD Player software) and creates the disc image file in the Disc Image directory specified in Step 2. Activating this option enables the Step 3 options to be set. (Also known as “formatting.”)

Write to Device Writes the disc image file from the Disc Image directory to the specified DVD-R or DLT tape device.

Simulate Write If the target device specified in “Write to Device” is a DVD-R drive, the Simulate Write option allows you to check the system configuration by completing the output process without actually writing to the disc.

Verify Output If the target device specified in “Write to Device” is a DLT drive, the Verify Output option verifies that the data has been properly written to the DLT tape by performing a byte-for-byte comparison with the data on the hard disk. While this doubles the processing time of the output, it is recommended that the DLT output always be verified.

Step 2 – Choose Disc Name and Target Directories

Disc Name, Disc Image, and DVD Video Default settings for these parameters are set in the Layout Settings tab of the Project Settings dialog (see Section 3.3.6, “Layout Settings tab” above).

Step 3 – Set DVD-ROM Options

Include DVD Player software, and Use Joliet Default settings for these parameters are set in the Layout Settings tab of the Project Settings dialog (see Section 3.3.6, “Layout Settings tab” above).

SECTION 4

PLANNING & PREPARATION

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4.1 Overview of the DVD Production Process

Because DVD allows the combination of multiple media types, authoring a project with ReelDVD is a process of media integration. But authoring is one of the final steps in the overall process of creating a DVD-Video disc, because the various media assets (video, audio, subpictures and still images) must be properly prepared before they can be integrated. Also, because DVD is an interactive medium, a DVD title may be much more complicated than a program on a linear medium like videotape. So DVD projects must be very carefully planned to ensure that they actually turn out as envisioned.

As with similar processes for other interactive multimedia formats, the preliminary design steps for DVD-Video include the following:

- Creating a project plan, such as a script and/or flowchart, that illustrates the program flow of the DVD. The plan will define the content that is included, the menus that are needed, and the destination or consequence of activating each option on every menu (e.g. a given button begins playback of a given video clip, while another button takes you to a menu to set the soundtrack language).
- Creating a list showing all the individual assets (video, audio, stills and subpictures) that make up both the content and the menus defined in the plan.
- Preparing the assets in a way that makes them usable within the framework of the DVD-Video specification.

Once the planning is complete and the assets are prepared, ReelDVD makes the final authoring steps surprisingly fast and easy. These steps are explained in detail later in Sections 5 and 6. They include:

- Adding the video assets
- Adding audio streams to the video
- Adding captions or subtitles
- Inserting chapter breaks
- Creating slide or still shows
- Creating menus, and defining menu buttons and the button paths
- Adding navigational commands to menus and other assets

While it is easiest to explain these authoring steps in a linear order, the actual order in which they are executed is generally a matter of individual preference. At any stage in the process, you can simulate playback of your project or of individual assets using the built-in Preview Window.

4.1.1 Project Planning Rules

The DVD specification spells out exactly what kinds of data may be included in a DVD-Video title, and how that data is organized. ReelDVD also makes certain additional assumptions about the source assets used in a project. To ensure that a project will play back correctly on a DVD player, it's crucial to keep these rules in mind during title planning and development. The rules include:

No mixing of video encoding types in a project DVD-Video supports playback of motion video and still images encoded in either the MPEG-1 or MPEG-2 video format. But it is not allowed to mix the two video formats within a single project. (It is, however, acceptable to vary the encoding parameters—bit-rate, for instance—of visual content within a project.) Once video assets of one format have been imported into a project, ReelDVD will no longer accept assets of a conflicting format for that project.

No mixing of video frame sizes in a project All of the motion video and still images in a project must have the same frame size. Acceptable sizes for NTSC are 352x240, 704x480, or 720x480; for PAL they are 352x288, 704x576, or 720x576.

No mixing of video aspect ratios in a project All of the content in a project must be of the same aspect ratio, either 4:3 Standard or 16:9 Widescreen. It is not possible to mix content of different aspect ratios. Once video assets of a given aspect ratio have been imported into a project, ReelDVD will no longer accept assets of an alternate aspect ratio for that project.

No pan & scan video ReelDVD does not support the use of Pan & Scan video. Because few video encoders are capable of creating Pan & Scan content, this constraint rarely has any practical impact.

No mixing of audio formats or bit-rates in a stream ReelDVD supports up to three audio streams per Track, each of which is assigned a number (1-3). Once the audio format and bit-rate of a given stream is defined in any Track in the project, the audio streams of the same number in all the other Tracks of the project are reserved exclusively for audio in that same

format and bit-rate. For example, if the audio format of the first source-file assigned to stream #2 in any Track is Dolby Digital 2.0 encoded at 192Kbps, then whenever audio stream #2 is used in any other Track it must use Dolby Digital 2.0 encoded at 192Kbps. (This means it is not possible to include both Dolby Digital and Linear PCM in the same stream number in a project.) ReelDVD will generate an error message if you attempt to mix audio formats or bit-rates in a stream.

No gaps in audio or subpicture stream numbers In each Track, audio and subpicture streams must be used in ascending numerical order. In other words, for each stream type (audio or subpicture), a stream of a given number may only be used if the Track also uses streams of a lower number. For example, to use audio stream #3, you must also have data in streams #1 and #2. In situations where no actual data is needed in a given stream position, placeholder data (a few seconds of silence or a single transparent subpicture) may be used to comply with this requirement. During authoring, ReelDVD assumes that any gaps in stream numbers will be filled with additional stream data before the project is compiled. If gaps remain when the Make Disc operation is started, ReelDVD will abort the process and generate an error message.

Linear PCM or Dolby Digital audio data required for NTSC projects If a project using NTSC video contains any audio at all, the DVD specification requires that it contain at least one stream of audio in Linear PCM or Dolby Digital. The project may also contain an optional stream in MPEG Audio, but playback support for MPEG audio is not required of NTSC DVD players. If an NTSC project is created with only MPEG Audio, ReelDVD will abort the layout process and generate an error message. Note that PAL DVD players are required to support all three audio formats, and therefore one is allowed to create a PAL title using only MPEG Audio. However, due to reports of players that may not play back MPEG Audio correctly, its use is not widely recommended.

4.2 Preparing Assets

Preparing the assets for a given project means not only creating the individual media elements (videos, audio, still images and subpictures), but also ensuring that those elements are compliant with the requirements of the DVD-Video specification. The assets must also be in formats that can be used by the authoring application.

ReelDVD supports the following file and data formats:

Video	MPEG-1	NTSC .. 320x240 PAL..... 320x288 Bit-rate: Max 1.5 Mbps
	MPEG-2	NTSC .. 720x480, 704x480, 320x240 PAL..... 720x576, 704x576, 320x288 Bit-rate: Max. 9.8 Mbps
Audio	Dolby Digital (AC-3)	48 KHz, stereo, 5.1 ch
	AIFF, WAVE*	48 KHz, 16-bit or 24-bit, stereo
	MPEG Audio*	48 KHz, stereo
Still Images	MPEG-1, MPEG-2	One frame, same size as video
	BMP, JPEG, PICT, TIFF, Targa, Photoshop	NTSC .. 720x480, 704x480, 320x240 PAL..... 720x576, 704x576, 320x288
Subpictures	BMP, JPEG, PICT, TIFF, Targa, Photoshop	NTSC .. 720x480 (max.) PAL..... 720x576 (max.)

Note: ReelDVD can transcode PCM and MPEG Audio files to Dolby Digital 2.0 format. However, ReelDVD does not support LZW-compressed TIFF files.

Bit-rates and Bandwidth

Most of the file formats allowed by the DVD specification were chosen because they support data compression to reduce the *bit-rate* of the source media to fit within DVD's available *bandwidth*. In DVD, bandwidth and bit-rates are commonly expressed as megabits per second, or Mbps.

- **Bit-rate** - the amount of data in a given stream as measured over a given unit of time.
- **Bandwidth** - the maximum bit-rate that a given data storage or transmission system can read from the storage medium or transmit across a network.

In DVD, the maximum bandwidth available for program data is 9.8 Mbps. That means the combined bit-rates of the video stream and all audio and subtitle streams must fall within that limit. The more bandwidth allocated to audio, the less there is left for video, which may affect the quality of the video presentation.

There are two main areas in which you can affect the bit-rates of the streams you use in order to ensure that the total falls within the 9.8 Mbps limit:

- **Audio** - Both the format of the audio streams you use and the number of those streams have a big impact on total bit-rate. Two-channel audio can range from 0.192-1.5 Mbps or more. Using three audio streams at 1.5 Mbps each would mean that only about half of the available bandwidth would be left for video.
- **Video** - Video encoding systems allow you to specify the bit-rate of the encoded video. After the number and format of audio tracks is known, it is possible to determine how much bandwidth is left for video. Depending on the length of the video material and the capacity of the disc (650 MB for CD, 4.7 GB for DVD, etc.), the video bit-rate is generally set as high as possible without exceeding the remaining available bandwidth.

The following sections cover considerations involved in preparing various types of assets for use in ReelDVD.

4.2.1 Video Assets

The following table lists required encoding parameters for video used in ReelDVD projects.

System	Condition	Details
NTSC <i>29.97 frames/ second (see note)</i>	Encoding	MPEG-1, MPEG-2 (constant and variable bit-rates)
	Bit-rate	MPEG-1: 1.856 Mbps; MPEG-2: Max 9.8 Mbps
	GOP size	Max. 18 frames (36 fields), closed GOP
	Aspect ratio	4:3 or 16:9
	Image size	720x480, 704x480, 352x240 (for MPEG-1)
PAL <i>25 frames/ second</i>	Encoding	MPEG-1, MPEG-2 (constant and variable bit-rates)
	Bit-rate	MPEG-1: 1.856 Mbps; MPEG-2: Max 9.8 Mbps
	GOP size	Max. 15 frames (30 fields), closed GOP
	Aspect ratio	4:3 or 16:9
	Image size	720x576, 704x576, 352x288 (for MPEG-1)

Note: The 29.97 fps frame rate is required by the DVD specification when encoding NTSC data. 30 fps is commonly used in video, but will not work in DVD.

MPEG Encoding

The video *codec* (encoding/decoding system) used in the DVD-Video format is MPEG. The purpose of MPEG encoding is to reduce the amount of data required to store a series of frames while still allowing that series be reconstructed accurately by an MPEG decoder.

An MPEG encoder works by identifying picture information that is redundant from frame to frame, and converting that information into a code that can be stored more efficiently than the original signal. Depending on the degree of data-compression (how low a bit-rate is used), the encoder may also treat similarly-colored pixels that are adjacent as if they are the same color. That means that some color information from the original image is lost, which may lead to reduced detail and “blocky” artifacts that noticeably degrade picture quality.

In static scenes, where there is very little frame-to-frame change in the color value of each pixel, frame-to-frame redundancy is high. That makes it easy for an encoder to store the scene at a relatively low bit-rate without impacting picture quality. In fast-paced, visually complex scenes, less information is frame-to-frame redundant, so more bits are required to capture the details of the scene accurately.

CBR and VBR

MPEG-2 video may be encoded in one of two ways: either at a constant bit-rate (CBR) or a variable bit-rate (VBR). The situations in which each is used depends on the content of the video image, the length of the program material, and the size of the disc used (4.7 GB DVD-5, 8.5 GB DVD-9, etc.).

In CBR, the video is encoded at a consistent bit-rate over the entire length of the program, regardless of the complexity of the material being encoded. Thus the average and the maximum (peak) video bit-rate are the same.

In VBR, the bit-rate is varied depending on the complexity of the material, with bits conserved in simple, static scenes so that they may be allocated to complex images or fast-moving sequences. A program might be encoded at the same average bit-rate as with CBR, but the peak bit-rate in complex scenes might be far higher than the average. This generally yields superior image quality in complex scenes, without adversely impacting static scenes. VBR may alternatively be used to get comparable quality to CBR but at a lower bit-rate.

VBR offers an advantage over CBR only when the program material is beyond a certain length, determined by the overall capacity of the disc. On a DVD-5 (4.7 GB), for instance, if the program is shorter than about one hour, the average bit-rate (the data capacity available for video divided by the duration of the video) is limited by the DVD format's peak bit-rate of 9.8 Mbps, meaning that there are just as many bits available for complex scenes with CBR as with VBR. But as the length of the program increases, so too does the potential advantage of using VBR.

VBR encoding generally requires two (sometimes three) playback passes of the material being encoded. The encoder evaluates rate-of-change for each sequence of frames as peak, average, and minimum. After the system performs its analysis, the operator generally can intervene to perform final adjustments to the encoded results.

Aspect Ratios and 16:9 Content

The aspect ratio (proportion of horizontal to vertical) of a standard television screen is 4:3. Theatrical films, however, have been shot for decades in "widescreen" aspect ratios, and many consumer and professional video cameras also now support a 16:9 aspect ratio for playback on widescreen televisions. During recording, the 16:9 video is electronically converted into an "anamorphic" signal, with the image horizontally squeezed to fit the standard 4:3 proportions (making the image appear tall and skinny if it is viewed on a standard 4:3 television).

When anamorphic video is played back from DVD on a widescreen television, the image is stretched out by the television to its original 16:9 aspect ratio, giving the full widescreen experience. When the content is played from DVD and displayed on a normal 4:3 television, the DVD player is able to automatically "letterbox" the video. The vertical size of the image is reduced by the DVD player until the picture just fits the horizontal dimension of the screen while still maintaining the intended 16:9 aspect ratio. The extra vertical space above and below is filled with a black matte (the letterbox). The ability of DVD players to letterbox allows greater flexibility for playback of widescreen content.

In order for a DVD player to output video at the proper aspect ratio, it looks for a "flag" in the video stream that indicates whether the content is 4:3 or 16:9. The flag is set during the video encoding process.

The DVD specification does not allow content in two different aspect ratios to be mixed in the same title. So all the video in a given project must be encoded as either 4:3 Standard or 16:9 Widescreen. Similarly, all still images in a project will be flagged by the authoring tool as either 4:3 Standard or 16:9 Widescreen when they are imported.

Other Encoding Parameters

Many Encoders allow you to adjust other parameters of the MPEG encoding process. Below is a table of recommended values for such parameters. You should consult your encoder's documentation for a more complete description of the meaning of each parameter.

Parameter	Recommended Value
Frame Rate	NTSC 29.97 fps (required) PAL 25 fps (required)
GOP Size (N-value)	NTSC 15 frames (required <= 18 frames) PAL 12 frames (required <= 15 frames)
GOP Pattern (M-value)	IBP (M=2) or IBBP (M=3)
Sequence Headers	1 per GOP (required)
Closed GOP's	Yes (required)
VBV Size	112 x 16kb units (required)

Video Rules

Based on the above, we can see that while you may choose among many options for video assets, the rules for video require consistency in several areas once your choices are made. To recap, all video assets used in a given DVD title must be prepared with the same parameter settings in the following areas:

- The encoding type (MPEG-1 or MPEG-2).
- The TV system (NTSC or PAL).
- The aspect ratio (4:3 Standard or 16:9 Widescreen).
- The frame size (352x240, 704x480, or 720x480 for NTSC; 352x288, 704x576, or 720x576 for PAL).

4.2.2 Audio Assets

The following table lists the parameters for encoding audio for use with ReelDVD.

Type of audio	Parameter	Details
Dolby Digital (AC-3) <i>Can be used with NTSC/PAL</i>	Format	AC-3
	No. of channels	2 (stereo), 5.1
	Sampling frequency	48 KHz
	Bit-rate	192 Kbps stereo 448 Kbps surround
PCM audio <i>Can be used with NTSC/PAL</i>	Format	AIFF, WAVE
	No. of channels	2 (stereo)
	Sampling frequency	48 KHz
	No. of bits	16-bit or 24-bit
	Bit-rate	1.536 Mbps 16-bit 2.304 Mbps 24-bit
MPEG audio <i>Can be used with PAL</i>	Format	MPEG audio
	No. of channels	2 (stereo)
	Sampling frequency	48 KHz
	Bit-rate	224 Kbps

The types of audio supported for use in DVD-Video depend on the video system. NTSC players are required to support both linear PCM audio and Dolby Digital (AC-3) audio. PAL players also support MPEG Audio. Each of these formats may be used for mono, two-channel or multichannel (surround) sound, though few DVD players include multichannel outputs for PCM.

PCM Audio

Linear PCM (WAV and AIFF formats) is audio that has been digitized using Pulse Code Modulation. Because it is not data-compressed during the encoding process, PCM is the highest-fidelity audio option, but also has the highest bit-rate (leaving less bandwidth available for video).

Because PCM is an uncompressed data format, the bit-rate is determined by the following formula:

PCM data bit-rate (Kbps) = sample rate (48KHz) x no. of bits x no. of channels

Two-channel PCM audio at 16-bit/48KHz resolution has a bit-rate of about 1.5 Mbps.

Dolby Digital (AC-3)

Dolby Digital is a format that uses data compression to reduce the bit-rate required to deliver sound at acceptable fidelity. The most common channel configurations for the format are Dolby Digital 2.0 (two-channel) and Dolby Digital 5.1 (surround sound).

The bit-rate for Dolby Digital is specified during encoding. The recommended bit-rate for Dolby Digital 2.0 is 192 Kbps (or 0.192 Mbps). The rate for Dolby Digital 5.1 is commonly set to 384 Kbps, but 448 Kbps is preferred.

Dolby Digital's dialog normalization parameter should be set to -27 dB (note that certain DVD players may ignore this setting).

While Dolby Digital has a Karaoke mode, ReelDVD cannot be used to create Karaoke discs.

MPEG Audio

Unlike support for PCM and Dolby Digital, support for MPEG Audio is not required for all DVD players, particularly NTSC players. ReelDVD 2.0 supports the MPEG Audio format. However, if you have MPEG Audio content that you would like to use on an NTSC project, ReelDVD 2.0 is also able to automatically transcode the audio to the Dolby Digital 2.0 format. (See the Audio Encoding Type option on the Project tab of the Project Settings dialog, Section 3.3.1, "Project tab," on page 3-6)

Synchronizing Video and Audio Assets

In general, video source material is accompanied by synchronized audio. However, when the source material is digitized, the video and audio are broken into separate files, which must be resynchronized in the final program. In ReelDVD, one of two methods is used to achieve this synchronization:

- **Synchronization by timecode** - Dolby Digital audio files support embedded timecode information that can be used to synchronize their audio to timecode information in the video stream. (MPEG and PCM

audio files do not contain timecode information.) However, not all encoding systems actually put timecode in the Dolby Digital data they generate (or in the video). Refer to the documentation of your encoding system to see whether this capability is supported. If it is, use it. With timecode in both the video and audio, ReelDVD will be able to automatically synchronize the two (see Section 2.4.3, “Audio streams,” on page 2-12 for information on the Sync button in the Track window).

- **Synchronization by aligning the start of data** - If valid timecode is not available to sync audio and video, or the audio format is PCM, ReelDVD will assume that the audio and video will be in sync if they start at the same time. Manual adjustment of the audio against the timeline in the Track window may be needed to achieve proper sync.

Audio Rules

While you may choose among many options for audio assets, the rules for audio require consistency once your choices are made. The rules include:

- All the audio of a given stream number in a given project must be of the same format (either Dolby Digital, PCM or MPEG Audio) in all Tracks.
- An audio stream of a given number may not include both Dolby Digital 2.0 and Dolby Digital 5.1.
- All the data in an audio stream of a given number must be encoded at the same bit-rate.

4.2.3 Still Images

ReelDVD supports the following image formats:

Type	Description
Still images	Photoshop (renders flattened image), BMP, JPEG, PICT, TIFF*, Targa
	Image size NTSC ... 720x480, 704x480, 352x240 PAL 720x576, 704x576, 352x288
MPEG files	MPI (MPEG I-frame)
	Image size NTSC ... 720x480, 704x480, 352x240 PAL 720x576, 704x576, 352x288

Note: ReelDVD does not support LZW-compressed TIFF files.

The Safe Area

Television monitors are designed to *overscan* the screen area, meaning that the outer 5-10 percent of the picture on all sides (top, bottom, left and right) is not actually visible to the viewer. The degree of overscan varies depending on the individual TV. (Computer monitors do not overscan).

The *safe area* is the portion of a video picture that will definitely be seen when displayed on a television. When preparing images for DVD, it is important not to place menu buttons and subtitles beyond the safe area (in the 10 percent of the image area that is closest to the edges), where they will not be seen by the viewer. The safe area is not a concern for projects intended for viewing only on computer monitors.

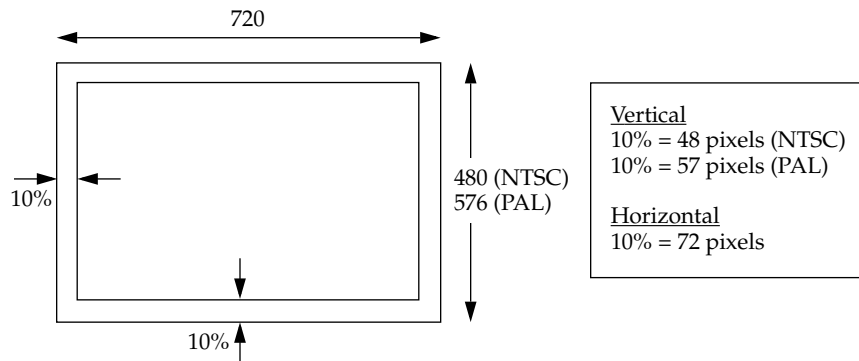


Figure 4-1 Safe Area

Still Images for 16:9 Widescreen

When creating still images for a 16:9 Widescreen project, special steps are required to ensure that your images appear correctly in the final product. You should create your images initially at a resolution of 854x480. Then, just before importing the image into ReelDVD, resize the image to 720x480, therefore recreating the anamorphic “squeezing” effect that is performed on the widescreen video. When the content is played back, it will be stretched back to its original widescreen aspect ratio.

Note that if you forget to resize your images before importing them, ReelDVD will do so automatically. However, any subpicture overlays you have created for these images may not align properly afterward. (See “Menu Subpictures for 16:9 Widescreen” on page 4-17 for more information.)

Layered Photoshop Image Files

Still images are generally created in graphics programs such as Adobe Photoshop that allow the artist to use multiple layers to create a composite image. These layers are often “flattened” before the final image is output. ReelDVD, however, allows you to use the layers in a layered Photoshop file (.psd) to automatically define subpicture overlay masks and button hotspots for a menu.

When a layered Photoshop file is imported into ReelDVD, all layers in the original Photoshop file that were set to visible in Photoshop will be flattened into the background image. But these layers will also be displayed in the Select Layers dialog (see Section 3.4, “Select Layers dialog”), where each layer may be used as a mask that defines the hotspot for one of the menu’s buttons.

Because ReelDVD will treat each *visible* layer in the Select Layer dialog box as one button, the way the Photoshop file is prepared will determine whether the buttons based on layers will turn out as envisioned. Follow these guidelines when preparing the files:

- Keep the elements of each button on separate layers (no layer should contain elements of more than one button).
- When the menu file is ready to be imported into ReelDVD, flatten the elements making up each button onto a single layer (no button should be composed of multiple layers).
- The layers should appear in Photoshop’s Layers Palette in the order in which you want ReelDVD to number the buttons on the menu. The lower the layer in the Palette, the lower its button # will be in ReelDVD.

4.2.4 Subpictures

A subpicture is an image that is overlaid on top of the program material (motion video or still image) in the video stream. Subpictures are used for menu button highlights and for subtitles.

On menus, subpictures are used in conjunction with a background to create the composited menu image seen by the viewer. For subtitles, subpictures are displayed in series, with multiple subpictures making up a subtitle stream.

In ReelDVD, each subpicture is categorized as one of three specific types: Menu, Simple and Infinite. See Section 2.4.4, “Subpicture streams,” on page 2-15 for a full description of subpictures and subpicture types.

Guidelines for Creating Subpictures

Several different file formats may be used when creating subpicture files for use on menus or as subtitles. The table below outlines some general guidelines:

Type	Item	Description
Still images	File types	Photoshop (renders flattened image), BMP, JPEG, PICT, TIFF*, Targa
	No. of colors	4 (red, blue, black and white)
	Image size	NTSC.... Max. 720x480 PAL..... Max. 720x576

Note: ReelDVD does not support LZW-compressed TIFF files.

Additional rules for creating subpictures include:

- The subpicture must be the same size as the background image.
- Up to four RGB colors may be used for subpicture images: red (255,0,0), blue (0,0,255), black (0,0,0), and white (255,255,255).
- Do not use anti-aliasing on subpicture images. Anti-aliasing smooths the jagged edges of curved or diagonal lines in a bitmapped image by changing the pixels around the lines to different shades of gray or some other color. Because each pixel in a subpicture image is converted to either a specific color or to black or white, when an anti-aliased image is converted the edges of the image become noticeably jagged and uneven.
- Position menu buttons so that there is no overlap (see Figure 4-2). If the buttons overlap, the button highlights may not appear as expected.

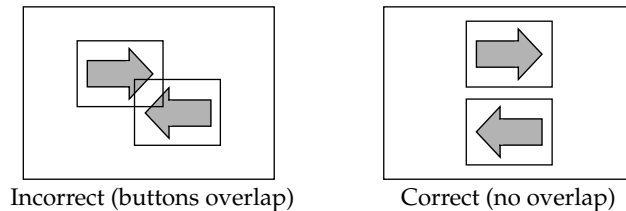


Figure 4-2 Correctly positioning menu buttons

Color Mapping for Subpicture Overlays

Each RGB pixel in the original subpicture mask overlay is mapped to a specified color and transparency for each of the three possible states of menu buttons: (1) menu display, (2) button selection, and (3) button activation.

Figure 4-3 illustrates how the button colors change depending on the button state. The Display Color settings are the initial settings used when the menu is first displayed. The Selection Color settings are used to highlight the selected button as the user navigates the menu; as each button is selected, the colors change only within the confines of the selected button's rectangular "hotspot" (the defined button area). Finally, when a selected button is activated, the colors used for the selected button change to the Action Colors.

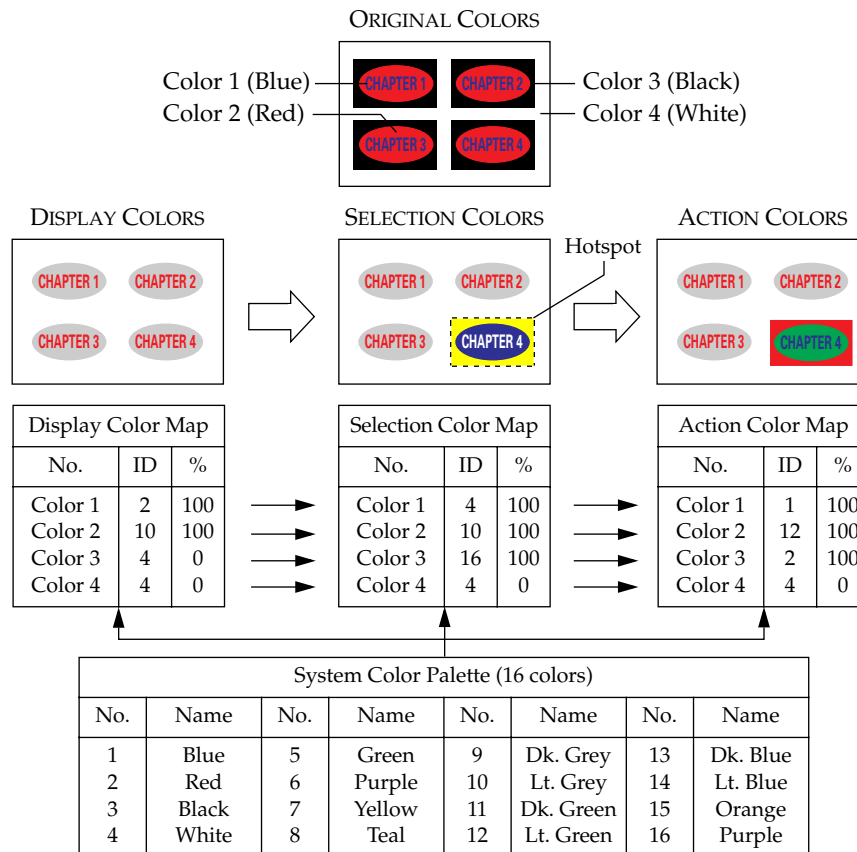


Figure 4-3 Color mapping for subpicture overlays on menus

Menu Subpictures for 16:9 Widescreen

As we learned earlier, a DVD player will automatically letterbox 16:9 video and still images for playback on a standard 4:3 television. However, DVD players do not letterbox widescreen subpictures. Instead, a letterboxed subpicture stream must be created during the authoring process.

If your project uses 16:9 video, ReelDVD will automatically create the required letterboxed subpicture stream by reducing the vertical resolution of the original (widescreen) subpicture image. This step is necessary to ensure that the subpicture image is properly aligned with the letterboxed video or still image when displayed on a 4:3 television, but some graphical data is lost in the process. To avoid potential problems with interlace flicker and lost horizontal lines, it is recommended that all horizontal lines in the original subpicture images be at least 4 pixels thick.

Note that the automatic generation of “letterboxed” subpicture streams is transparent to the ReelDVD 2.0 user, and does not use any of the three subpicture streams per Track that are available in ReelDVD projects. ReelDVD will automatically add one “letterboxed” subpicture stream for each of the three available streams you use.

4.2.5 Subtitles

Subtitles in DVD use the same subpicture overlay capabilities as menu subpictures, and the subtitle color mapping process is similar in principle to menu subpicture color mapping (described in Section 4.2.4, “Subpictures” above).

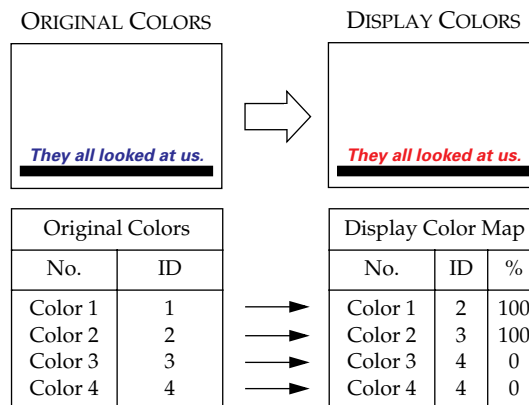


Figure 4-4 Color mapping for subtitles

Preparing Subtitle Data

In ReelDVD, subtitles may be added with the built-in Subtitle Editor, or they may be prepared as subpicture images in an external graphics application and then imported into the project. This section provides information on how to prepare external subpicture images for subtitles (see Section 3.6, “Create Subtitle dialog,” on page 3-19 for information on using the built-in Subtitle Editor).

Subtitle images are generally created in a graphics program such as Adobe Photoshop. The images need not actually be text; graphical images may also be displayed with DVD’s subtitling feature.

The following guidelines apply when creating subtitle images for import:

- Image size may not exceed 720x480 (NTSC) or 720x576 (PAL) pixels.
- Up to four RGB colors may be used for subpicture images: red (255,0,0), blue (0,0,255), black (0,0,0), and white (255,255,255).
- Do not use anti-aliasing on subpicture images.
- For each subtitle stream, save all the subpicture image files in the same file format. ReelDVD supports subtitle import from the following formats: BMP, JPEG, PICT, Photoshop (PSD), TIFF, or Targa. (See “Subtitle Naming Conventions” below for information on how to name the files.)
- For each subtitle stream, save all the subpicture image files in the same directory.
- Keep a record of the file names and corresponding start and end time-codes for each subtitle stream.

Subtitle Naming Conventions

The names you give to individual image files in a series of subtitles is important. The name of a subtitle identifies the image, its location within the subtitle sequence, and the type of image it is. ReelDVD creates a subtitle asset folder and registers the subtitle images sequentially.

Use the following convention for naming subtitle images:

ImageName.subpicture#.ImageFormat

Example: a motion video clip with the file name *Twilight* has one subpicture stream, a series of 150 subtitles. All of the images have been created in the TIFF image format. The images would be named:

Twilight.1.tif
 Twilight.2.tif
 Twilight.3.tif
 ...and so forth.

The 150th subtitle file would be named Twilight.150.tif.

Creating a Subtitle Script File

To determine which subtitle settings to use for a particular sequence of subtitle images, ReelDVD looks at a subtitle script file (.sst). You can create the script in any text editor. A typical subtitle script file is shown in Figure 4-5.

```
st_format 2
Display_Start    non_forced
Pixel_Area      (2 479)
Display_Area    (0 2 719 479)
Color           (1 3 4 4)
Contrast        (0 15 15 0)
E2              (0 0 255 ==)
E1              (255 0 0 ==)
PA              (0 0 0 ==)
BG              (255 255 255 ==)
Directory       D:\QST_Assets\subtitles
#####
SP_NUMBER  START      END      FILE_NAME
1          00:01:17:00 00:01:19:05 subtitle.1.tif
2          00:01:19:06 00:01:21:09 subtitle.2.tif
3          00:01:21:10 00:01:23:20 subtitle.3.tif
4          00:01:23:21 00:01:26:10 subtitle.4.tif
5          00:01:26:11 00:01:28:17 subtitle.5.tif
```

Figure 4-5 A subtitle script file

About the Script File Settings

The definitions for the script file settings are as follows:

- st_format** The identifying number of the subtitle data stream. ReelDVD currently supports subtitle format 2 only.
- Display_Start** The options are Forced or Non_Forced. When set to Forced the subtitles are always On; Non_Forced means the SUBTITLE ON/OFF feature on the DVD player remote control can be used to turn subtitles On or Off.

Pixel_Area	The size of the background area for the subtitle image. For NTSC, set to (2, 479). For PAL, set to (2, 576).
Display_Area	The location of the subtitle image within the background area. For NTSC, set to (0 2 719 479). For PAL, set to (0, 2, 719, 574).
Color	Color codes for the four colors available for subtitle images, selected from the 16 colors in the color palette. Each number corresponds directly to a color in the palette. (See Section 3.3.5, "Color Palette tab," on page 3-12 for how to define the color palette in the Project Settings dialog.)
Contrast	The degree of subtitle color contrast. The range is 0 to 15, where 0 is transparent and 15 is opaque.
E2 E1 PA BG	The colors you use in the original subtitle graphic are identified by ReelDVD and mapped to the colors specified in the color setting. Each of these four colors correspond to a subtitle color used in ReelDVD, as follows: E2 [Outer Edge] Color 1 E1 [Inner Edge] Color 2 PA [Face] Color 3 BG [Background] Color 4 Set the definition as follows: E2 (0 0 255 ==) E1 (255 0 0 ==) PA (0 0 0 ==) BG (255 255 255 ==) The first three positions are the RGB settings, respectively. The "==" (equals) signs in the fourth position of the setting tell ReelDVD that the color must match exactly.
Directory	The directory path to the subtitle image files. Note that if the directory path is changed after the subtitle script file is created (if the subtitle folder is moved to a new location), ReelDVD will not be able to locate the subtitle folder. In that case, you will need to edit the directory path in the subtitle script file to set the correct path.

separator	The separator line separates the settings from the list of subtitles. You must use at least two # signs in this line.
Subtitle list	This is the actual list of subtitles that ReelDVD imports into the subpicture stream. Note that START and END timecodes should not overlap, and that subtitles should not cross chapter breaks in a video track.
SP_NUMBER	The number of the subtitle in the subtitle stream.
START	The start time of the subtitle. 00:01:05:00 = hour:minute:second:frame
END	The end time of the subtitle. 00:01:07:05 = hour:minute:second:frame All subtitles that have an end time are defined as Simple subtitles; place a "-" (dash) instead of a timecode in the END field to set a subtitle to Infinite . See Section 2.4.4, "Subpicture streams," on page 2-15 for a description of the Simple and Infinite settings.
FILE_NAME	The name of the subtitle image. Note that there is a naming convention you must use when creating subtitles. See "Subtitle Naming Conventions" on page 4-18 for details.

Subtitles in 16:9 Widescreen Content

Simple and Infinite subtitles (see Section 2.4.4, "Subpicture streams") generally contain text, which tends to become distorted and difficult to read when resized. These subtitle types also do not require exact positioning with respect to the background. For these reasons, in Widescreen 16:9 projects ReelDVD handles Simple and Infinite subpictures for subtitles differently than it handles Menu subpictures (see "Menu Subpictures for 16:9 Widescreen" on page 4-17).

For subtitles, ReelDVD does not automatically create an additional subpicture stream containing subtitle images that have been resized for letterboxed display. That means that when subtitles are viewed on a 16:9

Widescreen television, the subtitles will tend to be wider than normal because their pixels are stretched to a 16:9 aspect ratio. (This distortion has far less impact on readability than would resizing the images.)

SECTION 5

ASSET IMPORT & AUTHORIZING

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5.1 Importing Assets and Authoring

Once a project's assets are prepared, the assets are imported into ReelDVD, where the project is authored and output in the DVD-Video format. DVD authoring involves not only defining the content of a project's Tracks—the video, still images, audio and subpictures—but also defining the title's behavior and navigational flow.

Asset import steps include:

- Importing a video or still image asset to make a Track
- Adding audio to a Track
- Adding subpictures to menus
- Adding subtitles

Authoring means executing the decisions made in the project plan about the flow of program, links from menus to content, and the DVD player's response to user input via the remote control.

DVD authoring steps include:

- Defining chapters
- Defining menu buttons
- Creating Track-to-Track links
- Defining button commands

While it is easiest to explain these importing and authoring steps in a linear order, the actual order in which they are executed is generally a matter of individual preference. Assets may be imported into many of a project's Tracks first, and then the behavior of the Tracks authored later. Or each Track may be populated with assets and authored before moving on to the next. At any point, you may simulate playback of the current state of your project using the built-in Preview Window.

5.2 Importing Assets

As described in Chapter 2, the content that makes up a DVD title is grouped into linear playback units known as Tracks. The core stream that defines each Track is its video stream, which may be motion video or one or more still pictures. A Track may also include audio, subpicture and

button highlight streams. The data that makes up these streams comes from the files of assets prepared for the project (see Section 4.2, “Preparing Assets”).

Note that in an existing Track, the source file for any stream may be replaced with a different file. Select the stream by clicking on it in the Track Window. Then click the browse button (“...”) next to the filepath field at bottom. This brings up the Select File dialog, which you may use to change the source file.

5.2.1 Importing Video

Each Track is built around a single video stream, which may be either motion video or one or more still images. See Section 2.4.1, “Motion Video streams,” on page 2-9 for a full discussion of motion video streams.

To bring a video asset into ReelDVD, drag the icon of the video file from the Explorer Window into the Storyboard area. This creates a new Track icon (see Section 2.4.1, “Motion Video streams,” on page 2-9) and places the video asset into the Track’s video stream in the Track Window.

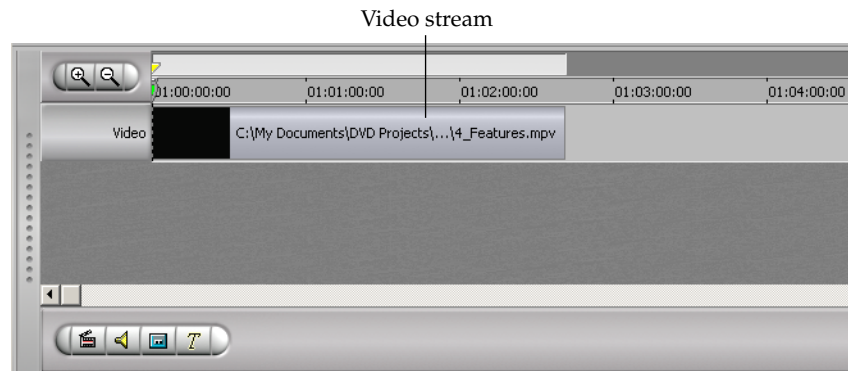


Figure 5-1 A newly created video stream in the Track Window

5.2.2 Importing Still Images

As explained above, the core stream of a ReelDVD Track may be one or more still images rather than motion video. In DVD, still images are used for one of three different purposes: as backgrounds for still menus, in Still

Shows and in Slide Shows. See Section 2.4.2, “Still Image streams,” on page 2-10 for a full discussion of still image streams, including Still Show and Slide Show definitions.

Still Shows, Slide Shows and Menus are each created by dropping a still image source file (see Section 4.2.3, “Still Images,” on page 4-12 for supported file formats) into the Storyboard area. A dialog box asks which type of Track you wish to create: Still Menu, Still Show, or Slide Show.

Still Shows and Slide Shows

While Still Menus are based on a single still image (the menu backdrop), Still Show and Slide Show Tracks generally contain multiple images. After the Track is created, additional images are added by dragging source file icons from the Explorer Window directly into the Track’s video stream. The images will appear in the video stream in the order that they are imported. Once the images are in the stream, however, their order may be modified by dragging.

By default, each still image in a Slide Show is set to display for 10 seconds (Still Show images have no defined duration). You can change an image’s duration by dragging the end of the image’s thumbnail in the stream. For greater precision, durations may also be set by selecting the thumbnail and entering values in the start time and duration attribute fields at the bottom of the Track Editor. The start times of the next and/or previous slide images will be adjusted automatically.

Importing Layered Photoshop Images

To import a layered Photoshop file, drag the file’s icon from the Explorer Window into the Storyboard area. A prompt will appear asking what type of still Track you wish to create. Choose “Still Menu with Sub-picture” or “Slide Show with Sub-picture” (which will allow you to create a menu that includes audio). The Select Layers dialog will appear when you click OK. See Section 3.4, “Select Layers dialog,” on page 3-16 for information on the specific elements and usage of the Select Layers dialog.

The bottom-most *visible* layer in the Select Layers dialog box will correspond to button #1 in the menu. In a DVD menu, button #1 is the default button selected when first entering a menu. In addition to creating button hotspots, ReelDVD will also define standard links between the button hotspots based on their location with respect to one another. These hotspots and links can be subsequently modified in the Preview Window, just as any other menu’s buttons.

5.2.3 Importing Audio

ReelDVD supports up to three streams of audio per Track. See Section 2.4.3, “Audio streams,” on page 2-12 for a full discussion of audio streams, including the rules governing audio usage, synchronizing audio with video, and setting audio languages.

ReelDVD can automatically assign a stream number to each audio asset as it is added to the Track. You may wish, however, to control the stream number to which a given source file is assigned. That’s because all the audio of a given stream number (1, 2, or 3) in a project must be the same format and language across all the Tracks in the project. (See “Audio Rules” on page 4-12.)

There are several methods for importing audio assets into a Track:

- To assign a source file to a specific stream, select the destination Track in the Storyboard Area. Then click the New Audio Stream button in the Track Window tool bar at lower left. This will create a new empty stream in the Track Window. (You can clear this stream by selecting it in the Track Window and clicking the Clear button on the main tool bar, pressing the Delete key, or choosing Clear from the Edit menu.) Then drag the icon of the source file from the Explorer Window onto the empty stream (see Figure 5-2).
- To add an audio stream in the Storyboard Window, drag the icon of the source file from the Explorer Window onto the icon of the Track in which you want the audio file to be a stream. This method will not work if there are already three streams in the Track, even if one or more of those streams is empty.
- To add an audio stream in the Track Window, use the Storyboard Window to select the Track in which you want the audio file to be a stream. Then drag the icon of the source file from the Explorer Window into the Track Window. This method will not work if there are already three streams in the Track, even if one or more of those streams is empty.

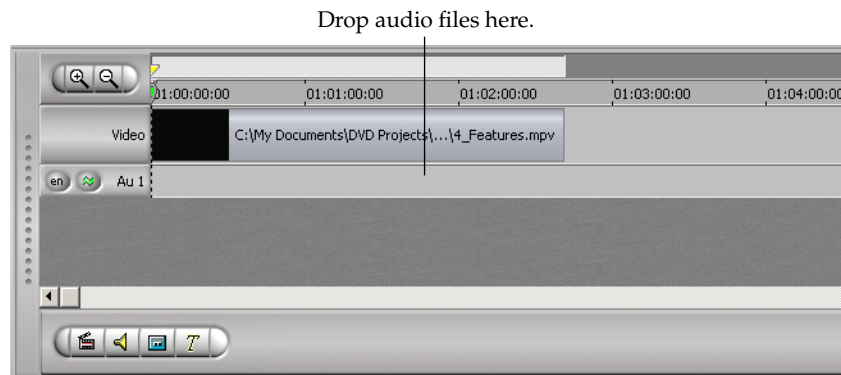


Figure 5-2 Importing audio to a specific stream in the Track Window

Once an audio asset is assigned to a stream, you may not change its stream number by dragging and dropping it from one stream to another. You may, however, remove (clear) the asset from its current stream. And you may change the source file for any stream by selecting the stream and then clicking the browse button (“...”) to bring up the Select File dialog.

Multiple audio clips may be imported and assembled into a single audio stream (drag the icon of each source file from the Explorer Window onto the stream). However, there can be no empty spaces between the audio clips in the stream. The duration of an individual clip in the stream may be trimmed by dragging on the edges of the clip’s segment in the stream’s display in the Track Window.

Language Codes and Sync with Video

ReelDVD assigns each audio stream a language code as it is created. The language code for a given stream may be changed with the Language button (see “Audio Languages” on page 2-14). The default language code assigned to new streams by ReelDVD may be changed on the Languages tab of the Project Settings dialog (see Section 3.3.2, “Languages tab,” on page 3-8).

ReelDVD has the capability to automatically sync audio files to video timecode as the audio is imported, if the audio file contains timecode information that overlaps with that of the video. See “Sync with Video” on page 2-13 for more information on synchronization.

5.2.4 Importing Subpictures and Subtitles

As described earlier, ReelDVD supports up to three streams of subpictures per Track. Each subpicture is categorized as one of three specific types: Menu, Simple and Infinite. Menu subpictures are used for menu button highlights, while Simple and Infinite subpictures are used for subtitles. See Section 2.4.4, “Subpicture streams,” on page 2-15 for a full description of subpictures and subpicture types.

Subpictures may be imported into ReelDVD as individual files or in a batch using a subtitle script. Subtitles (but not menu subpictures) may also be created directly within ReelDVD using the built-in subtitle generator (see Section 3.6, “Create Subtitle dialog,” on page 3-19).

ReelDVD can automatically assign a stream number to each subpicture asset as it is imported into the Track. You may wish, however, to control the stream number to which a given source file is assigned. That’s because all the subpictures of a given stream number (1, 2, or 3) in a project must be assigned the same language code across all the Tracks in the project. (See “Subtitle Languages” on page 2-16.)

There are several methods for importing subpicture assets into a Track:

- To assign a source file to a specific stream, select the destination Track in the Storyboard Area. Then click the New Subpicture Stream button in the Track Window tool bar at lower left. This will create a new empty stream in the Track Window. (You can clear this stream by selecting it in the Track Window and clicking the Clear button on the main tool bar, pressing the Delete key, or choosing Clear from the Edit menu.) Then drag the icon of the source file from the Explorer Window onto the empty stream.
- To add a subpicture stream in the Storyboard Window, drag the icon of the source file from the Explorer Window onto the icon of the Track in which you want the subpicture file to be a stream. This method will not work if there are already three streams in the Track, even if one or more of those streams is empty.
- To add a subpicture stream in the Track Window, use the Storyboard Window to select the Track in which you want the subpicture file to be a stream. Then drag the icon of the source file from the Explorer Window into the Track Window, and drop it *outside* of any existing streams. This method will not work if there are already three streams in the Track, even if one or more of those streams is empty.

Once a subpicture asset is assigned to a stream, you may not change its stream number by dragging and dropping it from one stream to another. You may, however, remove (clear) the asset from its current stream. And you may change the source file for any stream by selecting the stream and then clicking the browse button (“...”) to bring up the Select File dialog.

Importing Subtitles

For subtitles, multiple subpicture images may be imported and assembled into a single subtitle stream. Subtitle import may be manual, or in a batch using a subtitle script (see below). In general, when more than a few subtitles are involved, it is more efficient to import subtitles in a batch.

When a subpicture stream is first created using the manual import method, the type of the first subpicture added will always default to Menu. If a new subpicture is subsequently added to that subpicture stream, the type of the original subpicture changes to Infinite, and the type of the new picture defaults to Simple. Alternatively, you may select the first subpicture in the Track Window and then change it to Simple or Infinite using the drop-down menu at the bottom right. The duration of an individual subtitle in the stream may be trimmed by dragging on the edges of the subtitle’s segment in the subpicture stream.

Importing a Series of Subtitles

As described earlier, ReelDVD allows you to import a series of subpicture images using a subtitle script (.sst) file. The preparation of subtitles for import as part of a series is described in Section 4.2.5, “Subtitles,” on page 4-17.

To import the images referred to in a subtitle script file, drag the script file from the Explorer Window onto the Track in the Storyboard area for which the subtitles have been prepared.

Note that if the actual path to the folder containing the subtitle images is different from the path indicated in the subtitle script file, ReelDVD will not be able to locate the subtitle folder. Edit the directory path value in the subtitle script file to set the correct path.

5.3 Authoring DVD Behavior

Once a project is populated with Tracks, it is possible to author playback flow and user navigation. This involves executing the decisions made in the project plan about the order of content playback, the links from menus to content, and the DVD player's response to user input via the remote control.

5.3.1 Defining Chapters

ReelDVD supports DVD-Video's ability to navigate directly to individual chapters in a video track. Chapters are accessible through links, and viewers may also navigate chapter-by-chapter using the Skip Forward and Skip Backward keys on the DVD player remote control.

Chapters are created with the New Chapter button on the Track Window tool bar (lower left). The new chapter starts at the start of the nearest MPEG *Group of Pictures* (GOP) to the current location of the green timeline indicator. (GOP's generally occur once every half second throughout the video, and usually begin with an MPEG I-frame.) A new chapter marker (yellow triangle) will appear in the display area at this location, and a vertical dashed line will appear across the streams in the Track Window to show the chapter break.

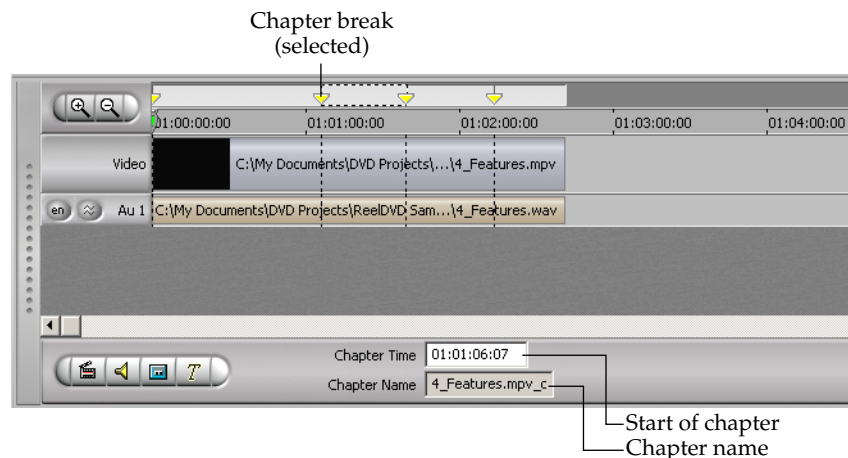


Figure 5-3 A video stream with chapter breaks in the Track Window

Chapter markers may be moved by dragging them on the timeline. If it is difficult to position the marker precisely, try zooming in with the Zoom button to stretch out the timeline display.

Chapter breaks may be removed. Click to the right of the marker for the chapter break you wish to remove. Then click the Clear button on the main tool bar, press the Delete key, or choose Clear from the Edit menu.



DVD-Video does not support adding chapters to Stills, Slide Shows or Still Shows. Also, some DVD players may have trouble playing tracks with greater than 72 chapters defined, although the DVD specification allows for up to 99.

5.3.2 Creating Menu Buttons

Visually, a menu is made up of a background image and a subpicture overlay that are composited to create the menu image seen by the viewer. A menu also includes a button highlight stream containing both the hotspot definitions and the commands for on-screen buttons (see Section 2.4.5, “Button highlight stream,” on page 2-17).

After the background image and corresponding subpicture have been imported into a menu Track, the button hotspots (up to 36 for 4:3 Standard, 18 for 16:9 Widescreen) and commands are defined in the Preview Window.

- A **hotspot** is the rectangular area of the screen that is assigned to a given menu button. This rectangle determines the area that will be affected by Selection and Activation colors when the viewer uses the UP/DOWN/LEFT/RIGHT and ENTER keys on the remote control. If the DVD is played in a computer-hosted DVD-ROM drive, a button’s hotspot defines the area of the screen within which that button will respond to mouse rollovers and clicks.
- Button **commands** tell the DVD player what to do when a given button is activated. Buttons created in ReelDVD may link to another Track, link to a Chapter within a Track, or may have “No Operation” (“Nop”).

To create a button hotspot, start with the Track selected and the Preview Window in Design mode (see Section 2.5.1, “Design mode,” on page 2-19). Click the Create Button tool on the Preview Window tool bar, which sets the cursor to New Button mode. Click and drag in the Preview Window display to define the rectangle of the new button hotspot. The hotspot area you define will normally correspond to graphical elements in the background image and/or the subpicture overlays.

Note that buttons are numbered by ReelDVD in the order they are created. The first hotspot you define should be for the button that you want selected by default when the viewer arrives at the menu.

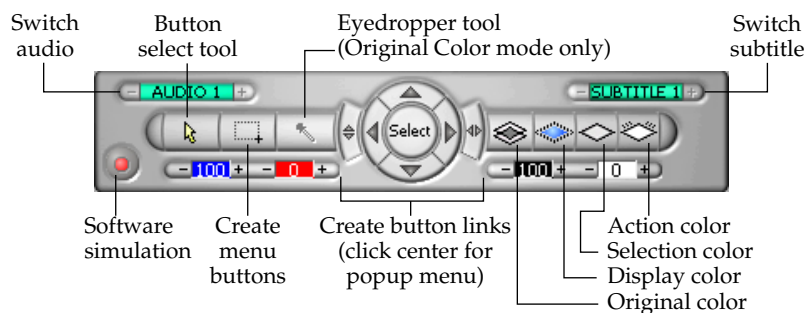


Figure 5-4 The Preview Window tool bar

Defining Button Paths

Paths between buttons define the order in which button selection moves around the menu in response to the UP, DOWN, LEFT and RIGHT keys on the remote. To define these paths, choose the link type (Up, Down, Left or Right) from the button link tools in the center of the Preview Window's tool bar. Then click within the hotspot of one button and drag to the hotspot of the destination button. See "Button Link Tools" on page 2-21 for more information on button paths.

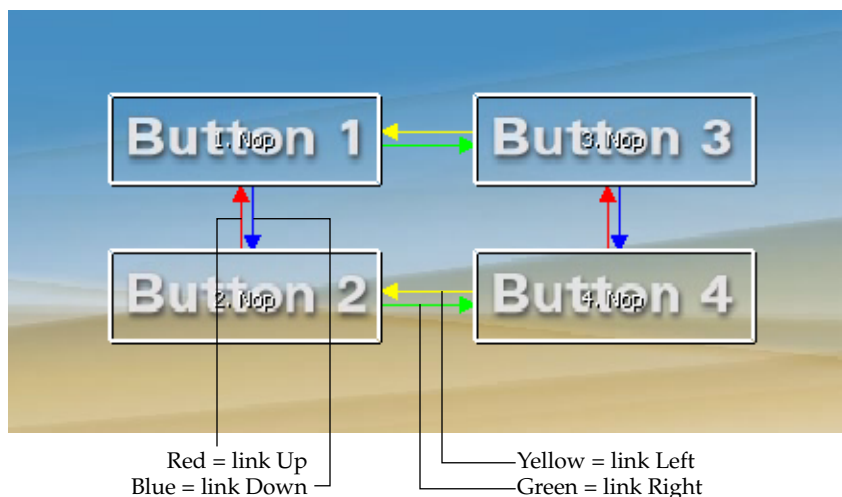


Figure 5-5 A menu with button links

Defining Subpicture Colors

In DVD's subpicture system, each of the four colors in a subpicture image file is used as a mask to define a complex region of the screen, much like a video color key mask. The actual color that appears in each of these four areas during playback, as well as the contrast value (opacity) of each color, defaults to values set in the Highlight colors tab of the Project Settings dialog (see Section 3.3.4, "Color tab," on page 3-11). The same is true for the colors and contrast used within button hotspots when a button is selected and when it is activated.

The default color and contrast values may be modified for any given menu using controls in the Preview Window as follows:

- Use the color mode buttons in the right part of the Preview Window tool bar to select Display, Selection or Action mode (see "Viewing Modes and Color/Contrast Settings" on page 2-22).
- To change the color mapping for a given color (1 through 4), click on the indicator for that color (below the Preview Window tool bar) and select a new color from the pop-up palette defined on the Color Palette tab of the Project Settings dialog (see Section 3.3.5, "Color Palette tab," on page 3-12).
- To increase or decrease the contrast, click the "+" and "-" buttons on either side of the color indicator. The DVD specification supports sixteen contrast levels ranging from 0% (transparent) to 100% (opaque).

Note that areas of the subpicture that are not within any button hotspot will not be affected by the settings in the Selection or Action modes.

5.3.3 Defining Program Flow

The core of DVD authoring is defining the flow of the program. This includes designating special Title and Menu Tracks and defining the playback order of content (motion video, Still Show, and Slide Show Tracks) and menus.

Much of the work of defining program flow is done in the Storyboard area. Before you begin, it's recommended that you organize the Tracks in a way that corresponds visually with your intended program flow as defined in the project plan.

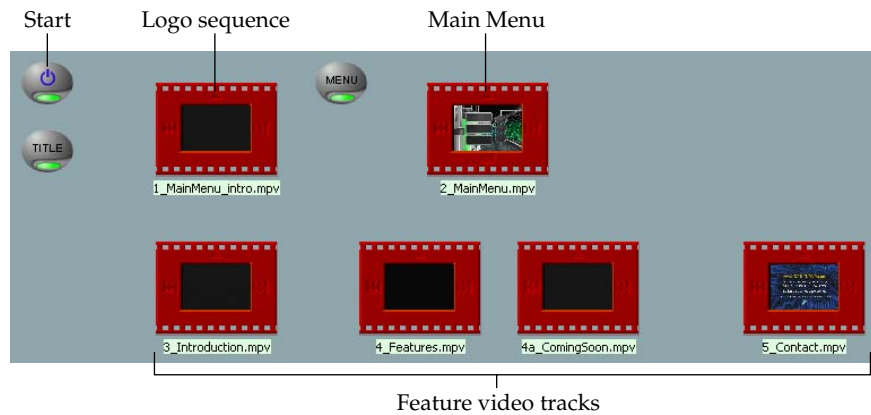


Figure 5-6 Layout of a typical project in the Storyboard area

AutoPlay, Title and Menu Tracks

ReelDVD's Storyboard area contains three special icons (AutoPlay, Title, and Menu), each of which is used to define Tracks that have a special function in the program flow (see also Section 2.3.2, "AutoPlay, Title, and Menu icons," on page 2-6):

- The AutoPlay Track is automatically defined by ReelDVD as the first Track created in the project. (If that Track is cleared, the Track that was created next becomes the AutoPlay Track.) A yellow arrow from the AutoPlay icon to the Track indicates that this Track will play automatically when the disc is first inserted into the player or drive. The AutoPlay Track is usually used for the opening sequence, copyright notices and other important introductory information.
- To designate the Track that will play when the viewer presses the TITLE key on the remote control, position the cursor over the bottom of the oval Title icon. The word "CMD" (command) will appear next to the cursor. Drag a link from the icon to the Track you want to designate.
- To designate the Track that will play when the viewer presses the MENU key on the remote control, position the cursor over the bottom of the oval Menu icon. The word "CMD" (command) will appear next to the cursor. Drag a link from the icon to the Track you want to designate.

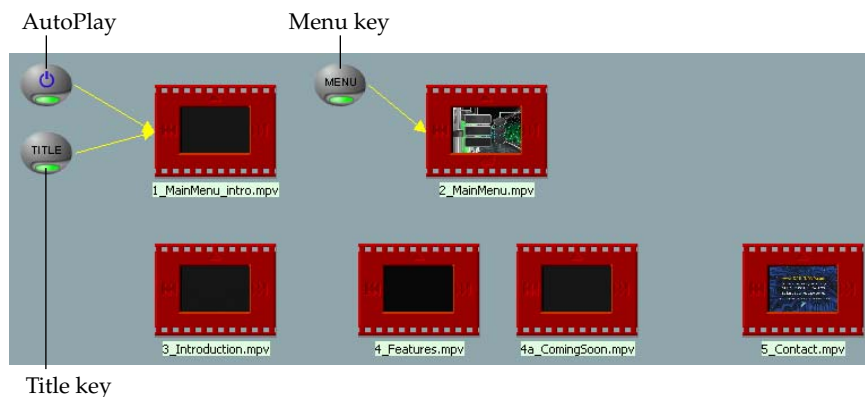


Figure 5-7 The AutoPlay, Title and Menu icons in the Storyboard area

Track-to-Track Links

A DVD title may include a series of video segments that are intended to go from one to the next without any action by the viewer, or to go from the end of a video segment directly to a menu. This flow is achieved by adding Next Track links to the Track icons that represent the DVD's video content in the Storyboard area. In addition, Previous, Next, and Return Track links are used to define the project's behavior when the viewer presses various keys on the remote control (see also Section 2.3.1, "Track icons," on page 2-5):

- To create a Next Track link (blue Link Arrow) position the cursor over the right side of the current Track icon. The word "NXT" (next) will appear next to the cursor. Drag a link from the icon to the Track (content or menu) that you want playback to jump to when the current Track ends. This is also the Track that the player will jump to when the viewer presses the SKIP FORWARD key on the remote control.
- To create a Previous Track link (red Link Arrow) position the cursor over the left side of the current Track icon. The word "PREV" (previous) will appear next to the cursor. Drag a link from the icon to the Track you want the player to jump to when the viewer presses the SKIP BACKWARD key.
- To create a Return Track link (green Link Arrow) position the cursor at the top of the current Track icon. The word "UP" (go up/return) will appear next to the cursor. Drag a link from the icon to the Track you want the player to jump to when the viewer presses the RETURN key.

Note that deleting a Track will clear all links to and from that Track.

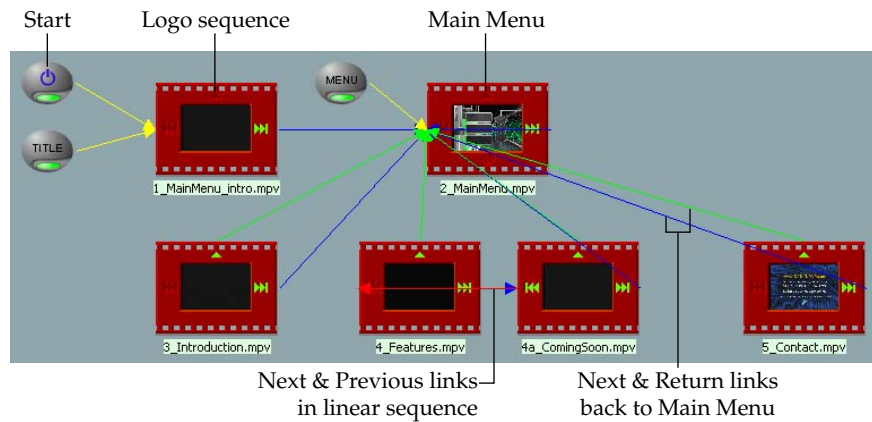


Figure 5-8 Next, Previous, and Return links in the Storyboard area

5.3.4 Defining Button Commands

Another aspect of defining the flow of the program is to define button commands. A button command may link from the current Track to another Track (magenta Link Arrow) or to a chapter within a Track (orange Link Arrow). Until its command is defined, a button is referred to as having No Operation (“Nop”).

When one or more buttons are created in a Track (see Section 5.3.2, “Creating Menu Buttons”), the Command (CMD) Track link indicator appears at the bottom of the Track icon.

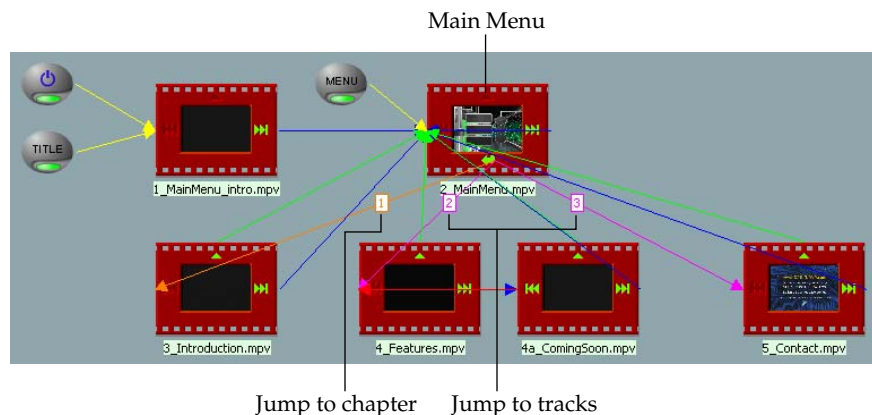


Figure 5-9 Button command links in the Storyboard area

To create a link from a button in the Track to another Track or a chapter within a Track:

- Position the cursor over the indicator at bottom, center of the Track icon. The word “CMD” (command) will appear next to the cursor.
- Drag a link from the Track icon (the originating Track) to the Track you want playback to jump to when the viewer activates the button by pressing the ENTER key on the remote (the destination Track).
- If the destination Track has more than one chapter, the Select Chapter dialog will appear (see Figure 5-10); otherwise the Choose Command Button dialog will appear (see below). The Select Chapter dialog lists the chapters in the Track. Select the destination chapter by clicking on its thumbnail in the list. (To link to the beginning of the Track, click on the first thumbnail.) The Select Chapter dialog will close.
- The Choose Command Button dialog will appear, showing the menu’s background image with the hotspot areas of all the menu’s buttons.
- Click within the hotspot of the button that you want to use for the link. The dialog will close and a Link Arrow will appear in the Storyboard area showing the path of the link from the originating Track to the destination track. The button’s number will be shown on the arrow.

Note that deleting a Track will clear all links to and from that Track.

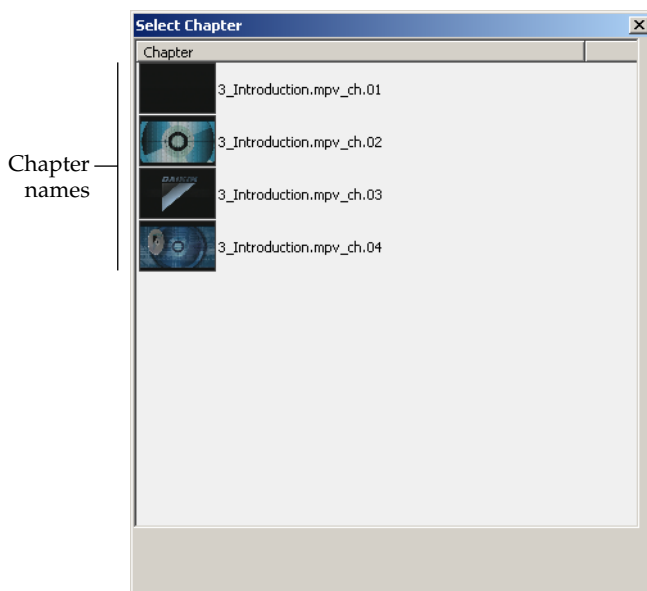


Figure 5-10 The Select Chapter dialog

5.3.5 Using Templates in ReelDVD

Templates allow the reuse of a project's structure, but with different content. This can be a tremendous time-saver, allowing you to easily create multiple discs that have a similar navigational flow and menu organization, without having to re-author each time. Any existing ReelDVD project may be saved as a template.

Creating a Template

To save a ReelDVD project as a template:

- With the project open in ReelDVD, choose **Save As...** from the File menu.
- When the Save As dialog appears, choose Storyboard Template (*.stt) in the "Save as type" drop-down list. The directory shown in the "Save in" drop-down list will automatically change to the Project Templates folder in the ReelDVD installation directory. Templates must be stored in this folder to be automatically recognized by ReelDVD.
- Type a name for the template file in the "File name" field. Note that names longer than 14 characters may be truncated when the file name is later displayed in the New Project dialog box.

Opening an Existing Template

To use a ReelDVD project template:

- Press the New Project button on the Tool Bar, choose New from the File menu, or press Ctrl-N on the keyboard. If any templates have been saved to the Project Templates subdirectory, the New Project dialog will open; if not, ReelDVD will automatically default to a blank project.
- Each template in the Project Templates subdirectory will be displayed as an icon in the New Project dialog, along with an icon for "Blank Storyboard." Click on an icon to select a template, then click OK. The dialog will close and ReelDVD will open the template.

Opening a template is essentially like opening a copy of the project on which the template is based. The new project may be modified in any way—including the deletion of Tracks and changing of links—without modifying the template itself or the project on which it is based.

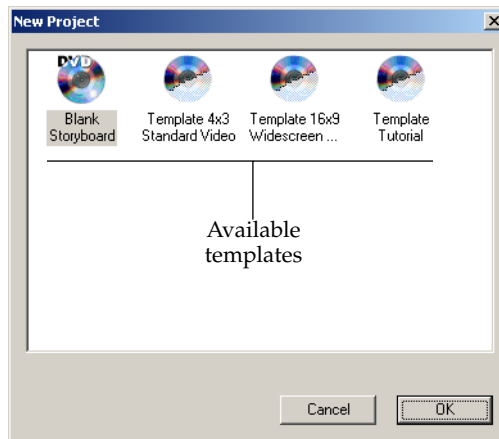


Figure 5-11 The New Project dialog

Substituting Assets within a Template

When a template is opened in ReelDVD, all of the file references from the project on which the template is based will still be intact. To use the template with different content, you replace those references with references to new source files prepared for the new project. Asset references are substituted on a track-by-track basis as follows:

- Select a Track in the Storyboard area.
- In the Track Window, select an asset in the video stream (if the Track is a Slide Show or Still Show, there may be multiple assets in the stream; repeat the steps below for each asset).
- Click the Browse button ("...") next to the filepath field at the bottom of the Track Window. The Select File dialog will appear. Use the dialog to choose a replacement source file.
- Repeat the steps above as needed for each audio and subpicture asset in the Track.

Note that you may not need to replace all the assets in the project. For instance, if the main menu of the new project offers the same choices as the main menu of the project on which the template is based, the references for that menu Track need not be modified.

SECTION 6

SIMULATION & WRITING

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6.1 Simulation, Testing and Output

When all of a project's Tracks are populated and the navigational flow is entirely defined with links, the project should be thoroughly tested to confirm that it behaves as intended. Before taking the time to compile the project, you can get a good idea of how the project behaves by using the simulation mode in the Preview Window.

Once you have corrected any problems you find during simulation, you can create the DVD Video files and play them off the hard disk using the bundled WinDVD 2000 software DVD player. This allows you to further test the project, and demonstrate it to clients or co-workers, if necessary.

Finally, you can create a disc image and write it to your output medium of choice: CD-R/RW, DVD-R, or DLT tape. Even if the project has been through thorough simulation and testing in WinDVD, it is always a good idea to also check the project's behavior from disc by testing it in multiple consumer DVD players if you plan to distribute the project on DVD-R or replicated disc.



Not all consumer set-top DVD players support DVD-R media, but most will playback such content satisfactorily. At the time of this writing, the 3.95 GB (Version 1.0) media appears to have the fewest compatibility problems with consumer players and DVD-ROM drives.

6.2 Playback Simulation

The purpose of simulation is to allow you to see and navigate the program as if you were playing it back from a set-top DVD player. This allows you to thoroughly test the project from the end-user's point of view.

Because simulation is integrated directly into ReelDVD, any problems you uncover during simulation can be corrected as soon as they are found (unless they result from improper asset preparation). In fact, simulation is normally used continually throughout the authoring process to spot-check the effect of authoring decisions as they are made.

6.2.1 Using Simulation Mode

Simulation in ReelDVD takes place in the Preview Window, which has two modes: Design and Simulation. To switch between modes, click on the “LED” at the bottom left of the Preview Window. In Simulation mode, the LED is green, and the panel contains all the same keys found on a DVD-Video remote control. See Section 2.5.2, “Simulation mode,” on page 2-23 for a complete explanation of Simulation mode controls.

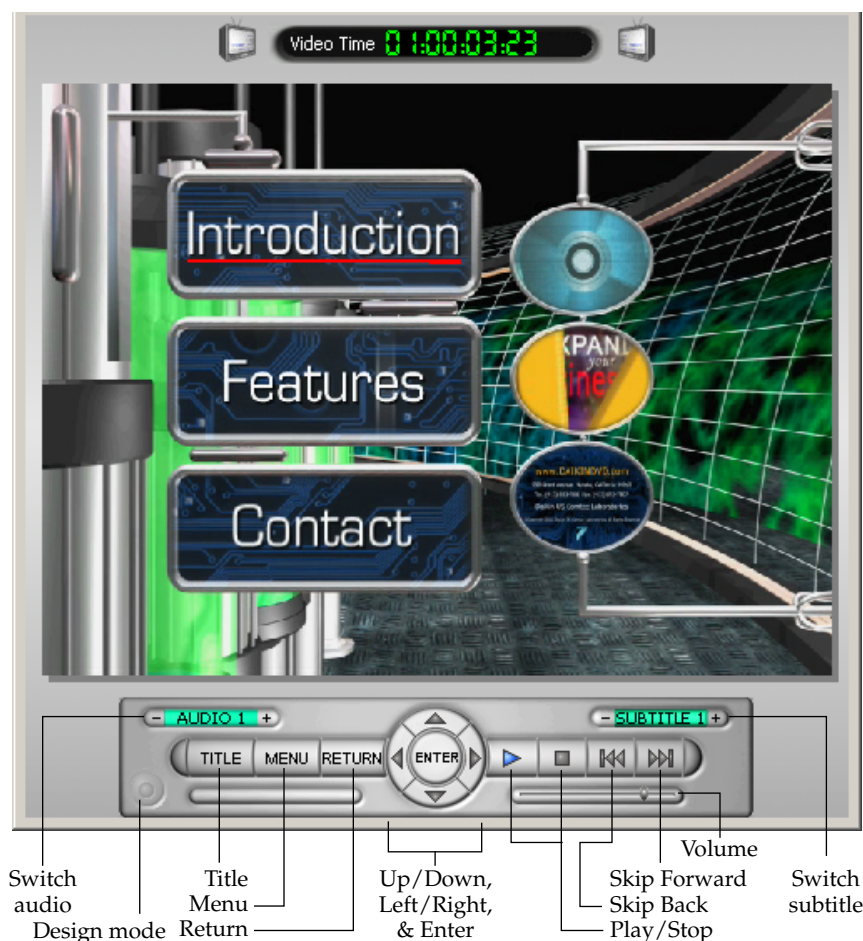


Figure 6-1 Simulation Mode in the Preview Window

For a thorough simulation of the project, do the following:

Check the program flow. In the Storyboard area, select the first Track in the project (indicated by the yellow arrow from the AutoPlay icon). Then switch the Preview Window to Simulation mode and click PLAY on the on-screen remote control. The project will begin playing through the Tracks. In the Storyboard area, a silver “reel” icon will appear at the lower right of the Track icon for the currently playing Track. When playback reaches a menu, click SKIP FORWARD on the Preview Window’s on-screen remote control to continue the simulation. If a Track appears out of the desired order, check the Next Track link of the preceding Track.

Check the project’s response to keys on the remote control. For each Track in the project, confirm that playback responds as intended when you click the keys on the on-screen remote control. See “DVD Remote Keys” on page 2-24 for a list of the keys to check and their functions.

Confirm the positioning and color/contrast settings of menu subpictures. For each menu, confirm that the subpictures are correctly positioned with respect to the background image. Also check that the desired colors and contrast levels are set for the Display, Selection and Action button states.

Confirm the location of button hotspots on menus. For each button on each menu, confirm that the position of the hotspot corresponds with the background and subpicture graphics that indicate the presence of the button to the viewer.

Confirm the destinations of all menu links. For each menu, confirm that each button takes project playback to the desired Track or chapter in a Track.

6.2.2 Checking Language Selection

DVD-Video players have the capability to automatically play back the appropriate audio and subpicture streams of a Track based on the language code assigned to the streams and the language preference settings in the player’s setup menu.

A DVD player checks the language preference setting for audio when it starts playing a disc. If an audio stream exists in the DVD title that matches this setting, it will be selected for playback. If not, audio stream #1 (Au 1) will be used by default.

Likewise, the DVD player will attempt to select a subpicture stream based on the player setup. If there is no subpicture stream on the disc with a matching language, then subpicture stream #1 (Sp 1) will be used by default.

You can test the automatic selection of audio and subpicture streams in your project as follows:

- Use the Languages tab of the Project Settings dialog (see Section 3.3.2, “Languages tab,” on page 3-8 to define the player setup that you want to test): Choose Project Settings from the Edit menu. When the Project Settings dialog appears, switch to the Languages tab. Set the Simulation Defaults for the audio and subpicture streams to the languages that you want to test.
- Set the Preview Window to Design mode.
- Select the AutoStart icon in the Storyboard area.
- Switch the Preview Window to Simulation Mode. When the PLAY button is pressed, simulation will begin, and you can confirm that the appropriate audio and subpicture streams are playing.

6.3 Using WinDVD to Test the Project

If you have installed the WinDVD 2000 software DVD Player from the ReelDVD Installation CD, you can use it to further test your project by playing the compiled data off of the hard drive before burning a disc. This process is typically referred to as “emulation” and is better suited for checking synchronization, subtitle timing, and playback performance.

6.3.1 Emulating the Project in WinDVD

The following procedure describes how to play compiled content from the hard drive as if it were playing from a DVD-Video disc:

1. **Use ReelDVD to create a VIDEO_TS directory using the “Create DVD Video Files” option on the Make Disc dialog.**

See Section 3.7, “Make Disc dialog,” on page 3-20 for instructions on how to use the Make Disc dialog.

2. Use the DOS **Subst** command to assign a new drive letter to the project's DVD Files directory.

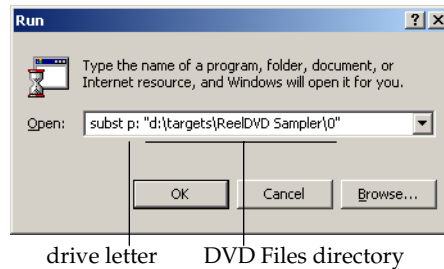


Figure 6-2 Assigning a drive letter to the DVD Files directory

In the above example, the drive letter P: is being assigned to a project's DVD Files directory (the folder that contains the VIDEO_TS subdirectory). You can use any drive letter, as long as it is not already in use.

3. Launch the WinDVD 2000 software DVD player.
4. Open the **Properties...** dialog and set the **Default DVD Drive** setting to the drive letter used in Step 2, above.

Only drive letters of CD and DVD-ROM drives installed in the machine and hard drives that have a VIDEO_TS directory at the root level will appear in the list.

5. Click OK, and then click the Play button on the controller to begin.

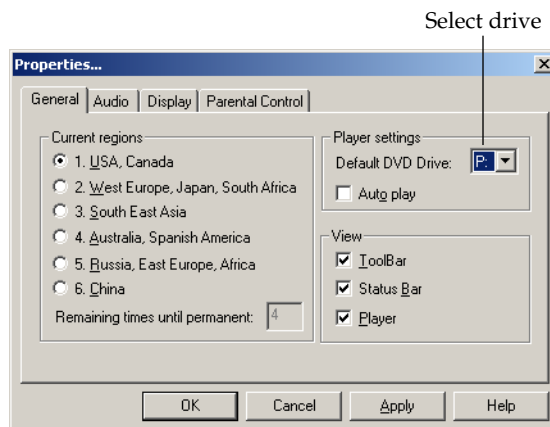


Figure 6-3 Selecting the drive in the WinDVD Properties dialog

To later remove the drive letter association, use the **/D** option of the DOS **Subst** command (e.g. SUBST /D P:).

6.3.2 Tests to Perform in WinDVD

For a thorough emulation of the project in WinDVD, do the following:

Confirm level and fidelity of all audio streams. For each Track in the project, listen to each audio stream. Switch between streams using WinDVD's audio stream selector. Check for satisfactory fidelity and consistent audio levels throughout the project.

Confirm synchronization of all audio streams. For each Track in the project, listen to each audio stream, checking for proper synchronization between the audio and video data. (On less powerful machines, audio and video synchronization may drift slightly in software players such as WinDVD.)

Confirm the positioning, color/contrast settings, and timing of all subtitle streams. For each Track in the project that has subtitles, look at each subtitle stream. Switch between streams using the subtitle stream selector. Make sure that the subtitles are positioned within the safe area of the display (see "The Safe Area" on page 4-13), and that all subtitle text is clearly legible.

It is also a good idea to use this opportunity to further test the navigation of the project outside of ReelDVD.

6.4 Outputting the Project

After checking a project in Simulation mode, and perhaps in WinDVD, the next step is to premaster a DVD disc. There are two stages to this process. One involves setting the disc name and creating the disc image file, and the other involves writing that disc image to CD media (CD-R or CD-RW), DVD-R (a recordable DVD), or DLT tape (a master tape for replication).

In ReelDVD, the premastering process is handled in the Make Disc dialog. Default settings for the dialog are set in the Layout Settings tab of the Project Settings dialog (see Section 3.3.6, "Layout Settings tab," on page 3-13).

To open the dialog, choose “Make Disc...” from the File menu or press the Make Disc button on the Tool Bar. The operations covered in the Make Disc dialog are organized into three steps:

1. **In Step 1 – Choose Operation, check the desired operations (Create DVD Video Files, Create Disc Image File, and Write to Device), and select an output device if Write to Device is selected.**

If you have previously performed the Create DVD Video Files operation, and have not made any subsequent changes to the project, you may skip this operation. ReelDVD will use the existing DVD Video files.

2. **In Step 2 – Choose Disc Name and Target Directories, enter the disc volume name and select the output directories for the project data.**

If you have previously set default layout settings in the Project Settings dialog, they will automatically appear here in the Make Disc dialog. (See Section 3.3.6, “Layout Settings tab,” on page 3-13 for more information on setting layout defaults.)

3. **In Step 3 – Set DVD-ROM Options, check the PC Files, Include DVD Player software if you wish to include the single-title-play version of WinDVD on the disc.**
4. **Finally, click Start to begin.**

See Section 3.7, “Make Disc dialog,” on page 3-20 for further explanation of these steps and of the Make Disc dialog.

6.4.1 Writing to CD Media

ReelDVD allows you to write a project to a DVD-R or a DLT. However, if the project is small enough, you may also output to CD-R or CD-RW. By outputting to CD media and including the free single-title-play version of InterVideo’s WinDVD 2000 (see Section 3.3.6, “Layout Settings tab,” on page 3-13), you can distribute your DVD-Video content on CD for playback on Windows computer systems that are equipped with either a CD-ROM or a DVD-ROM drive.



*DVD Video content written to CD media will **not** play on a vast majority of consumer set-top DVD players. For these discs to work on computers, a minimum 8X CD-ROM or 2X DVD-ROM drive is recommended.*

ReelDVD itself does not write to CD media, but the NTI CD-Maker 2000 Professional software that is bundled in the ReelDVD package can write disc image files to CD-R or CD-RW. To do so, use the following steps:

1. Use the **Create Disc Image File** operation in the **Make Disc** dialog to create a DVD disc image file, but do not select **Write to Device**.
2. When processing completes, launch the NTI CD-Maker 2000 Professional software and choose **Custom CD** to write the DVD disc image.

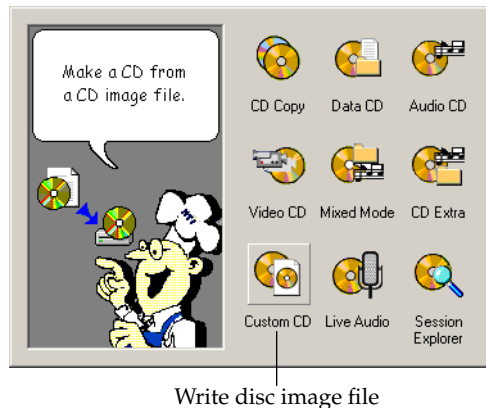


Figure 6-4 Using Custom CD to write a disc image file

3. Choose **Add...** from the **Track** menu in CD-Maker 2000, and select the file **DiscImage.dvd** from **Disc Image** directory specified in ReelDVD.

The file should appear as the only track in the track list, with mode set to Mode 1, and a block size of 2,048 bytes.

4. Insert a blank CD and click the red **Record** button in the tool bar to begin writing the image file to disc.

For more information about the CD writing process, choose **Help Topics...** from the **Help** menu in CD-Maker 2000.

6.4.2 Writing to DVD-R Media

If you want to create just a few copies of your project for playback in consumer set-top DVD players, as well as on computers, you can output your project to DVD-R media. Although some players do not support DVD-R media, most will playback content from DVD-R to a satisfactory degree.

Use the following steps to output your project to DVD-R:

1. Click the **Make Disc** button in the tool bar, or choose **Make Disc...** from the File menu.
2. In Step 1 – Choose Operation, check all three operations: **Create DVD Video Files**, **Create Disc Image File**, and **Write to Device**.

If you have previously performed the Create DVD Video Files operation, and have not made any subsequent changes to the project, you may skip this operation. ReelDVD will use the existing DVD Video files.

3. Select the DVD-R recorder from the Target Device list.

Check the **Simulate Write** option if you would like to test the output process without actually burning a disc.

4. Set the desired parameters in the Step 2 and Step 3 sections of the **Make Disc** dialog.
5. Click **Start** to begin.

You will be prompted immediately to insert a blank DVD-R disc.

When the output process is complete, ReelDVD will indicate a successful disc creation. If, however, there are any errors during the process, a corresponding error message will appear in the Information Window, and ReelDVD will indicate that the output failed.

6.4.3 Writing to DLT Tape

If you want hundreds or thousands of copies of your project, you will want to have the DVD's manufactured at a replication plant. To do so, you will need to provide the plant with a master for your project.

The standard format on which plants accept projects for replication is DLT (most plants currently will not accept masters on DVD-R). The DVD disc image is written to tape, which is then read at the plant. Because the tape is prepared in accordance with the DDP 2.0 disc description protocol, it is sometimes referred to as a “DDP Master.”

To output a project to DLT tape, you need a DLT tape drive connected to the computer. ReelDVD works with Quantum DLT2000, DLT4000, DLT7000, DLT8000 or equivalent tape drives. Valid tape drives will automatically be detected by ReelDVD and appear in the Target Device drop-down list of the Make Disc dialog box. Check the Write to Device option and choose the DLT drive from this list.

Use the following steps to output your project to DLT tape:

1. **Click the Make Disc button in the tool bar, or choose Make Disc... from the File menu.**
2. **In Step 1 – Choose Operation, check all three operations: Create DVD Video Files, Create Disc Image File, and Write to Device.**

If you have previously performed the Create DVD Video Files operation, and have not made any subsequent changes to the project, you may skip this operation. ReelDVD will use the existing DVD Video files.

3. **Select the DLT tape drive from the Target Device list.**

Check the **Verify Output** option if you would like ReelDVD to perform a byte-for-byte comparison of the completed DLT with the source image on the computer’s hard drive. Although this doubles the time required for the output process, it is recommended because it ensures that the tape is valid and ready for replication. Finding problems with the master before hundreds or thousands of discs are replicated can result in a significant savings in both time and money.

4. **Set the desired parameters in the Step 2 and Step 3 sections of the Make Disc dialog.**
5. **Click Start to begin.**

You will be prompted immediately to insert a blank DLT tape.

When the output process is complete, ReelDVD will indicate a successful tape creation. If, however, there are any errors during the process, a corresponding error message will appear in the Information Window, and ReelDVD will indicate that the output failed.

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