User's Guide

ZP-100

Real-Time Digital Audio Encoder

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Version 4.0

User's Guide

ZP-100

Real-Time Digital Audio Encoder

Important Safety Instructions

1. Read the safety and operating instructions before operating the ZP-100.
2. Keep this User's Guide for future reference.
3. Adhere to warnings and operating instructions.
4. Route power-supply cords so that they will not be walked on or pinched by items placed on or against them. Pay particular attention to cords at plugs, convenience receptacles, and the point where cords exit the equipment.
5. Ensure that the location of equipment provides proper ventilation. For example, the equipment should not be placed on a bed, sofa, rug, or similar surface that may block ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet, that may impede the flow of air through the ventilation openings.
6. Locate the equipment away from heat sources such as radiators, heat registers, stoves or other appliances (including amplifiers) that produce heat.
7. Do not use the equipment near water.
8. Clean the equipment by dusting with a dry cloth. Clean panel with cloth moistened with a window cleaner.
9. Service must be performed by qualified service personnel when the power cord or plug has been damaged, or objects have fallen on the equipment, or liquid has been spilled into the equipment, or the equipment has been exposed to rain, or the equipment does not appear to operate normally, or the equipment has been dropped.
10. Do not defeat the inherent design features of the polarized plug. Non-polarized line cord adapters will defeat the safety provided by the polarized AC plug.
11. **CAUTION: TO PREVENT ELECTRICAL SHOCK DO NOT USE A (POLARIZED) PLUG WITH AN EXTENSION CORD, RECEPTICAL OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.**

The lightning flash with arrowhead, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

CAUTION: TO PREVENT THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

Table of Contents

Preface

Thank you for purchasing the Zapex ZP-100 Real-Time Digital Audio Encoder.

This User's Guide describes how to install and use your ZP-100. Please read through it carefully. After you have finished reading this User's Guide, keep it handy for future reference.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

Special Note Concerning Use of Dolby Digital Trademark

Dolby Laboratories encourages use of the Dolby Digital trademark to identify soundtracks that are encoded in Dolby Digital. This is an effective way to inform listeners of the soundtrack format, and the use of a standard logo promotes easy recognition in the marketplace. However, like any trademark, the Dolby Digital logo may not be used without permission. Dolby Laboratories therefore provides a standard trademark license agreement for companies who wish to use Dolby trademarks. This agreement should be signed by the company that owns the program material being produced. Recording studios or production facilities which provide audio production or encoding services for outside clients generally do not require a trademark license. If you would like more information on obtaining a Dolby trademark license, please contact Dolby Laboratories Licensing Corporation. Information on trademark licensing plus instructions for using the Dolby Digital trademark and marking audio formats can also be found on-line at http://www.dolby.com. See Appendix D, "Use of Dolby Trademarks," for more information.

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http://www.dolby.com

CHAPTER 1

Hardware Description

Congratulations on purchasing your new ZP-100 Digital Audio Encoder. The ZP-100 comes in two or 5.1 channel Dolby Digital models. The 2 channel model can be upgraded, see your dealer for upgrade information. The ZP-100 also encodes MPEG Audio Layer 2 and captures PCM audio.

System Requirements

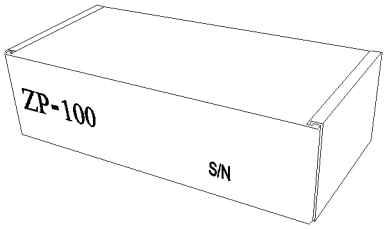
ZP-100 Encoder requires the following minimum system configuration:

- Microsoft Windows NT operating system version 4.0 with Service Pack 3 or higher
- Personal computer with an available full size PCI slot
- Pentium II 233 MHz or higher processor
- 32 megabytes (MB) of RAM (64 MB recommended)
- One 3.5-inch high-density disk drive
- Two hard disk drives
  - One system disk drive with 2 MB of free space for ZP-100 Controller
  - One Ultra Wide SCSI disk drive for capturing audio files
- PCM audio player for playing the source PCM audio stream
- Dolby® Digital (AC-3) and/or MPEG audio decoder for monitoring your work

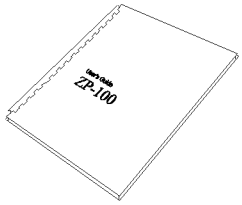
Package Contents

Your ZP-100 comes with following components. Check the contents to make sure they are included.

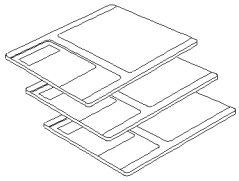
Shipping Container



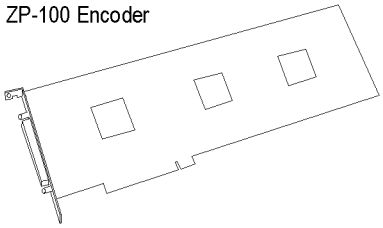
User's Guide



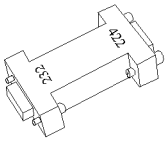
Installation and Utility Software Disks



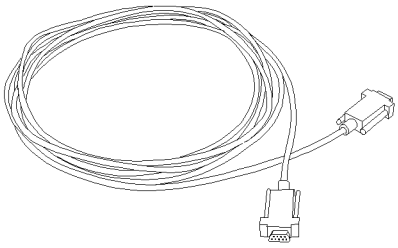
ZP-100 Encoder



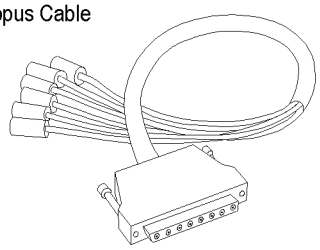
RS-232c/RS-422 Converter



Deck Control Cable

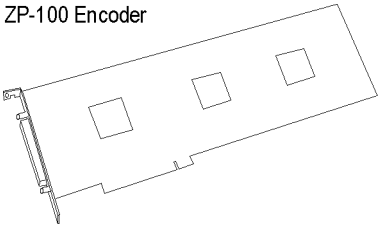


Octopus Cable



ZP-100 Encoder

ZP-100 Encoder



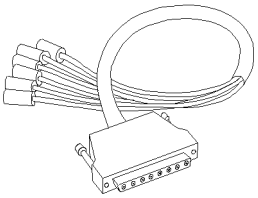
The ZP-100 Encoder is a full-size PCI card designed to fit inside a personal computer. It can receive a real-time PCM audio stream and encode it into three types of audio.

- Dolby® Digital (AC-3)
- MPEG Audio Layer 2
- PCM

The encoding parameters can be adjusted to meet your requirements using the ZP-100 Controller (described later).

ZP-100 Octopus Cable

Octopus Cable



The Octopus Cable connects a PCM audio player and an audio decoder to the ZP-100 Encoder. The audio decoder must be a Dolby® Digital (AC-3) and/or MPEG audio decoder.

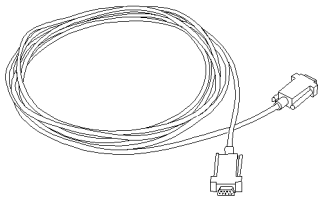
The Octopus Cable has 8 plugs for making the connections to a player and decoder. The table shown below describes each plug.

Plug Name	Description
Multipin Concentrator	This is the largest plug on the cable. It connects to ZP-100 Encoder.
Ch 1-2	This XLR plug connects to a PCM audio player and is the Channel 1 and Channel 2 audio inputs to the encoder.
Ch 3-4	This XLR plug connects to a PCM audio player and is the Channel 3 and Channel 4 audio inputs to the encoder.
Ch 5-6	This XLR plug connects to a PCM audio player and is the Channel 5 and

	Channel 6 audio inputs to the encoder.
Ch 7-8	This XLR plug connects to a PCM audio player and is the Channel 7 and Channel 8 audio inputs to the encoder.
SPDIF IN	This BNC plug connects to a PCM audio player and is the Channel 1 and Channel 2 audio inputs to the encoder. This plug can be used as an alternative for the plug labeled "Ch 1-2."
TC IN	This BNC plug connects to a PCM audio player and is the time code input to the encoder.
SPDIF OUT	This BNC plug connects to an audio decoder and is the audio output from the encoder. The audio decoder can be a Dolby® Digital (AC-3) and/or MPEG Audio player. The audio output is encapsulated in an IEC958 format.
XLR OUT	This XLR plug connects to an audio decoder and is the audio output from the encoder. The audio decoder can be a Dolby® Digital (AC-3) and/or MPEG Audio player. The audio output is encapsulated in an IEC958 format.

Deck Control Cable

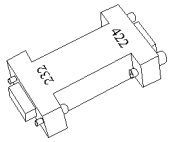
Deck Control Cable



The Deck Control Cable is used for connecting your personal computer to a PCM audio player. When connected to a Sony compatible remote control interface on the player, the ZP-100 Controller software can do semi-automatic and automatic encoding.

RS232c to RS422 Serial Converter

RS-232c/RS-422 Converter



The RS-232c/RS-422 converter connects your computer to the Deck Control Cable.

CHAPTER 2

Hardware and Software Installation

Installation Overview

The following procedures are required to install and configure your new encoding system.

- Installing the ZP-100 Encoder
- Connecting the ZP-100 Encoder
- Installing the Software
- Configuring the Encoder Settings
- Remote Control Setup

Installing the ZP-100 Encoder

The ZP-100 Encoder is designed to be installed into a personal computer (PC) with a free full-size PCI slot.

WARNING: Make sure that you are physically grounded to the personal computer in which the ZP-100 Encoder is to be installed and that the PC is disconnected from any power during the installation process.

To install the ZP-100 Encoder:

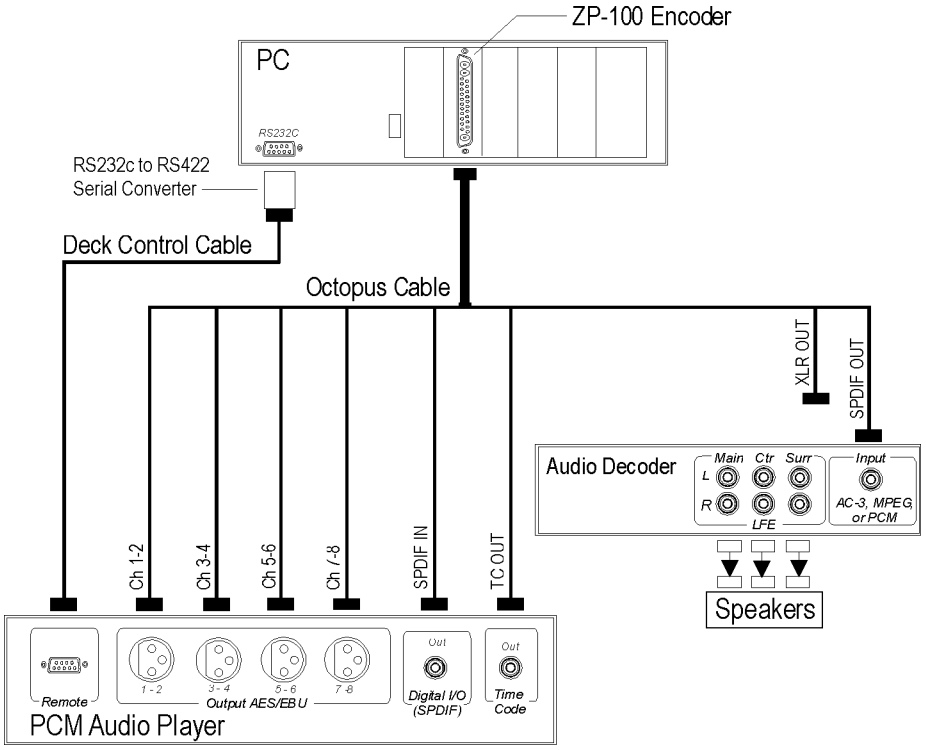
1. Turn your PC off and disconnect it from any power source.
2. Open your PC so that a PCI slot can be accessed. For detailed instructions, refer to the PC's user's guide.
3. Unfasten the back plane cover for the selected PCI slot by removing its sheet metal screw.
4. Insert ZP-100 Encoder into the free PCI slot.
5. Use the sheet metal screw to fasten the ZP-100 Encoder to the computer's back plane.
6. Replace the cover to your PC as described by its user's guide.

Connecting the ZP-100 Encoder

The diagram below illustrates how the Octopus Cable and Deck Control Cable connect the ZP-100 Encoder to a PCM audio player and an audio decoder. The decoder must be able to play Dolby® Digital (AC-3) and/or MPEG audio.

The ZP-100 Encoder simultaneously outputs a Dolby® Digital AC-3 or MPEG audio stream, in an IEC958 format, to the XLR OUT and SPDIF OUT plugs. Therefore, either one of these plugs can be connected to your decoder.

Caution: Before making any cable connections, make sure all units involved are turned off.



Installing the Software

The software disks have a setup program that checks your computer and asks you questions about how you want to install the software. The setup program installs the following software.

- ZP-100 Controller for Dolby® Digital Encoding
- ZP-100 Controller for MPEG Audio Encoding
- PlayAudio
- Drastic Deck Control Driver

Note: If you use a virus protection program on your system, turn it off before running the set up program of the ZP-100 controller. The ZP-100 controller may not work correctly if installed with your virus protection program turned on. After running Setup and completing the install, you can restart your virus protection program.

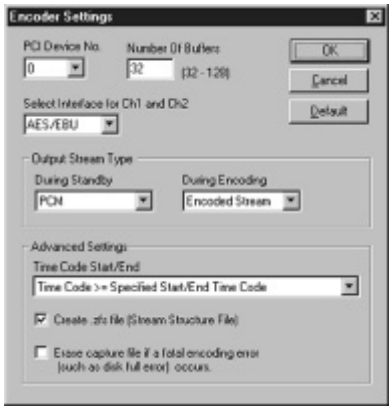
To install the software:

1. Insert Disk 1 into the floppy drive.
2. Click the Start button, then click Run.
3. Type **a:\setup** in the Run dialog box, then click **OK**.
4. Follow the instructions on your screen. These instructions will lead you through the installation process and prompt you to provide information, make some choices, and insert the succeeding setup disks.

Configuring the Encoder Settings

To configure the encoder settings:

1. From the Windows NT Taskbar, click **Start**, point to **Programs,** then to **ZP-100**, then select either the **Dolby Digital (AC-3) Encoder** or **MPEG Audio Encoder**. Please configure the encoder settings for both of the Dolby Digital (AC-3) and MPEG encoding controllers.
2. From the **Options** menu, select **Encoder Settings** to open the Encoder Settings dialog box.



3. Use the following table as a guide for configuring the Encoder Settings dialog box.

Control	Description
PCI Device No.	If two ZP-100 Encoders are installed, select **0** or **1** from the **PCI Device No.** drop-down list to assign a specific Encoder to the controller. Otherwise, accept the default value. Typically, the Encoder nearest your computer's CPU is identified as 0.
Number of Buffers	Personal computers with slow microprocessors may experience system crashes. To help resolve this problem, increase the computer's memory buffer size. If necessary, increase buffer size from the **Number of Buffers** text box. Each integer equals 64K of memory space with a maximum of 128 buffers.
Select Interface for Ch1 and Ch2	A two channel PCM audio stream can be accepted as an input to the ZP-100 Encoder at the plugs labeled *Ch 1*-2 or *SPDIF IN*. Depending on how the encoder is connected to the player, select **AES/EBU** if using the *Ch 1-2 plug*, or **SPDIF** if using the *SPDIF IN plug*.
During Standby	Standby mode is when the ZP-100 Encoder is monitoring a source

audio stream, but not encoding.

Use this drop-down list to configure the encoder's *output* at the XLR OUT and SPDIF OUT plugs during standby mode. Since both of these plugs supply an output to an audio decoder, select **PCM** if your decoder can play PCM audio, otherwise, select **Mute**.

Note: Located in the *Audio Service Configuration* tab of the ZP-100 Controller main window is the *Audio Coding Mode* drop-down list. If set to **1/0 Single** (mono), Channels 1 and 2 of the XLR OUT and SPDIF OUT plugs will supply mono audio.

During Encoding

Use this drop-down list to configure the encoder's *output* at the XLR OUT and SPDIF OUT plugs during encoding mode. Since both of these plugs supply an output to an audio decoder, select **Encoded Stream** if your decoder can play Dolby Digital (AC-3) and/or MPEG audio, otherwise, select **PCM**.

Note: Located in the *Audio Service Configuration* tab of the ZP-100 Controller main window is the *Audio Coding Mode* drop-down list. If set to **1/0 Single** (mono), Channels 1 and 2 of the XLR OUT and SPDIF OUT plugs will supply mono audio.

Time Code Start/End

When doing semi-automatic or automatic encoding, set the accuracy of the start and end time codes.

Select **Time Code >= Specified Start/End Time Code** to make the encoder automatically start or stop if it recognizes that a specific time code has appeared and/or passed. The encoder may not start and stop correctly because of a poor quality time code signal supplied by the PCM audio player.

Select **Time Code = Specified Start/End Time Code** to automatically start or stop encoding when encoder *actually* reads the specific time code. If a specific start time code was not received by the encoder for some reason, it will remain in standby, and if a specific end time code was not received, encoding will continue if this selection is used.

Create ZFS file

A ZFS file, also called a Stream Structure file, contains information about the AC3, MPEG, and PCM files. PlayAudio (described in chapter 4) displays information from this file in its main window. Select this checkbox to automatically create a ZFS file whenever you encode. The ZFS will have the same name, and be found in the same location as your captured file, but using the ZFS filename extension.

Although PlayAudio can create ZFS files when needed, it does not include *peak wave* data, the graphical representation of the captured file. Only ZFS files created by using this checkbox contain peak wave data.

Erase Capture file if... Select this checkbox if you want to delete your captured file if some fatal error occurs during the encoding session.

Remote Control Setup

If your PCM audio player supports the Sony RS-422 VCR Control Protocol, you can use the ZP-100 Controller to remotely control the player for automatic encoding sessions. To setup the remote control feature, you must connect the Deck Control Cable and configure the Drastic Deck Control Driver.

Connecting the Deck Control Cable

Connect the Deck control cable as described in the "*Connecting the ZP-100 Encoder*" section earlier in this chapter.

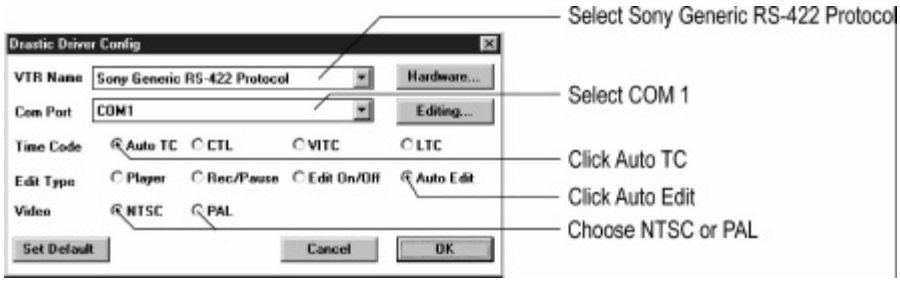
Configuring the Drastic Deck Control Driver

To configure the Multimedia Control Panel:

1. From the Windows NT taskbar, click **Start**, point to **Settings**, and then select **Control Panel**.
2. Double-click on **Multimedia** to open the Multimedia Properties.
3. Click the **Devices** tab to bring it to the front.

4. In **Media Control Devices** select **MCI Drastic RS-422 VCR Control**.
5. Click **Properties** to open the *MCI Drastic RS-422 VCR Control* properties window.
6. Click **Settings** to open the *Drastic Driver Config* dialog box.

7. From the *Drastic Driver Config* dialog box, make the following selections.
   - From the **VTR Name** drop-down list, select **Sony Generic RS-422 Protocol**.
   - From the **COM Port** drop-down list, select **COM 1** or the port that the Deck Control Cable is connected to.
   - Select the **Auto TC** radio button.
   - Select the **Auto Edit** radio button.
   - Depending on your needs, select the **NTSC** or **PAL** radio button.



8. Click **OK** to accept the changes.

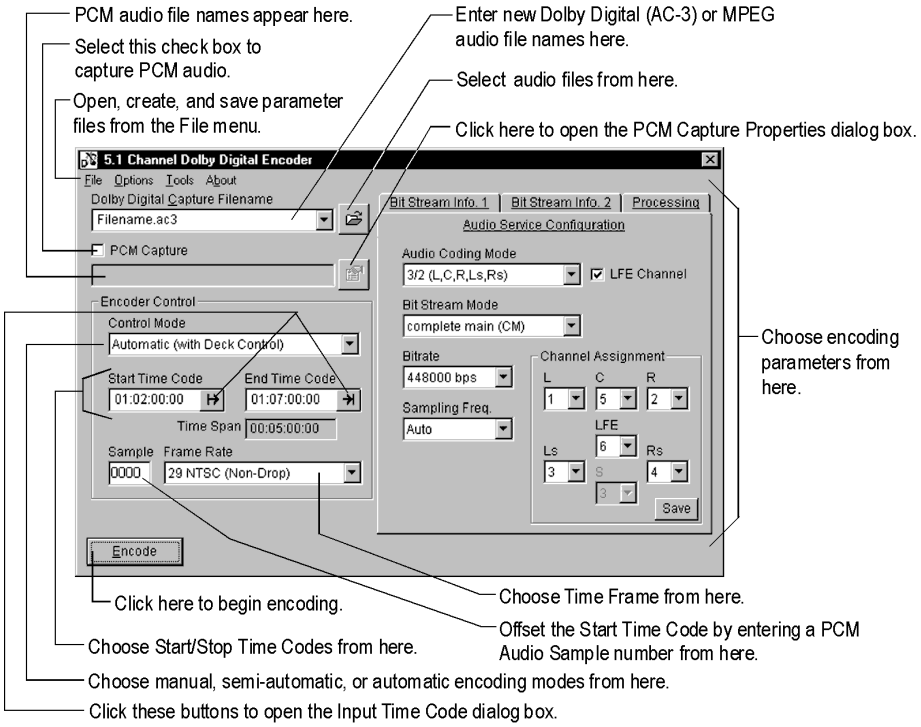
CHAPTER 3

Getting Started

This chapter describes the ZP-100 Controller main window and explains the procedures for Dolby® Digital (AC-3), MPEG Audio Layer 2, and PCM encoding, saving your work, and exiting the ZP-100 Controller.

The ZP-100 Controller Main Window

When you start the ZP-100 Controller, the main window appears. The following illustration identifies the major parts of the main window.



* Dolby Digital (AC-3) Encoder is shown.

Starting the ZP-100 Controller

To start the ZP-100 Controller:

From Windows NT Taskbar, click **Start**, point to **Programs**, then to **ZP-100**, then select **Dolby Digital (AC-3) Encoder** to open the ZP-100 Controller for Dolby® Digital (AC-3) encoding or **MPEG Audio Encoder** to open the ZP-100 Controller for MPEG Audio Layer 2 encoding. Both controllers can be used to capture PCM audio

Encoding

NOTE: Procedures in this section use illustrations from the ZP-100 Controller for Dolby® Digital (AC-3) encoding, however, they also apply to MPEG audio encoding. Detailed information about configuring Dolby® Digital (AC-3), MPEG, and PCM audio parameters are provided appropriately.

You can configure the ZP-100 Controller to manually, semi-automatically, or automatically encode.

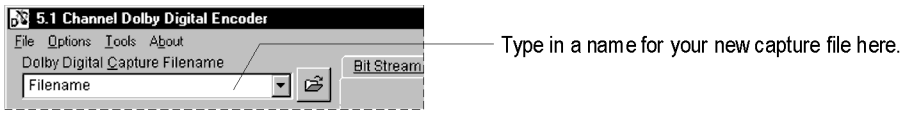
The ZP-100 operates in two modes, Dynamic Encoding mode and File Capture mode. Dynamic Encoding mode is used to create parameter files, and do Broadcast Encoding. Both Broadcast Encoding and the creation of parameter files require that a PCM source be encoded and played, but not saved as a file. File Capture mode is capturing a file to disk for playback later, like DVD.

Manual Mode

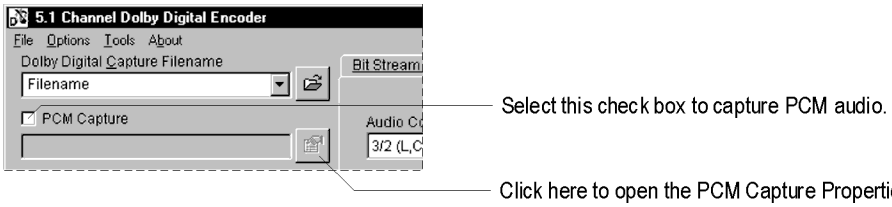
In manual mode, the ZP-100 will receive a PCM audio stream as it is played, then begin to encode when you click the encode button.

To encode using Manual Mode:

1. Type the name for your new Dolby Digital (AC-3) or MPEG audio file into the **Capture Filename** text box. If doing Dynamic Encoding, leave file name blank.

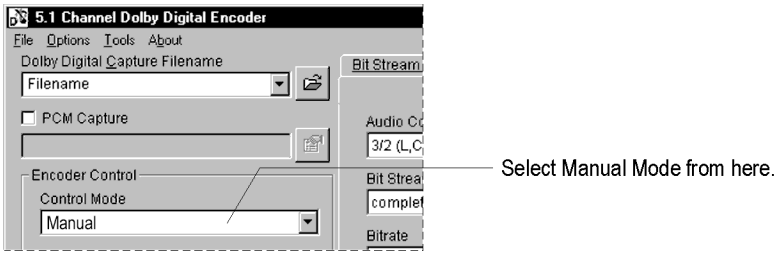


2. Select the PCM Capture check box if you also want to capture PCM audio.

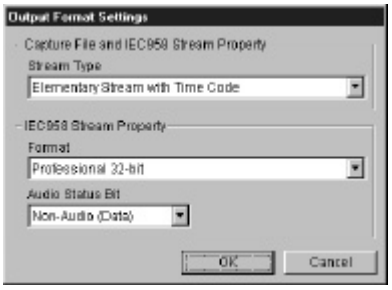


To change any PCM encoding parameters, click on the **PCM Properties** button to open the PCM Capture Properties dialog box. See "PCM Audio Encoding Parameters" in Appendix A for information about configuring the PCM Capture Properties dialog box.

3. From the **Control Mode** drop-down list, select **Manual**.



4. From the **Options** menu, select **Output Format Settings** to open the Output Format Settings dialog box.



5. From the **Stream Type** drop-down list, select the type of audio file you want to produce.

Dolby® Digital (AC-3) stream type options:

Selection	Description
Elementary Stream	Elementary stream (AC-3 file format)
Elementary Stream with Time Code	Elementary stream with time code (AC-3 file format)
IEC958 Stream Wave Format	IEC958 stream (WAVE file format)
IEC958 Stream Wave Format with Time Code	IEC958 stream with time code (WAVE file format)

NOTE: For Dolby® Digital (AC-3) encoding, if you select an item that contains time code, the encoder will include time code in the bit stream.

MPEG Audio Layer 2 stream type options:

Selection	Description
Elementary Stream	Elementary stream (MPEG Audio Layer 2 file format)
IEC958 Stream Wave Format	IEC958 stream (WAVE file format)

6. From the **Format** drop-down list, select the type of IEC958 stream.

   The tables shown below indicate which formats are Professional or Consumer mode, and 32-bit or 16-bit mode.

   Dolby® Digital (AC-3) format options:

Selection	Description
Professional 32-bit	Bit stream on Channels 1 & 2
Professional 16-bit Ch 1 Data Packing	Bit stream on Channels 1
Professional 16-bit Ch 2 Data Packing	Bit stream on Channels 2
Consumer	Bit stream on Channels 1 & 2

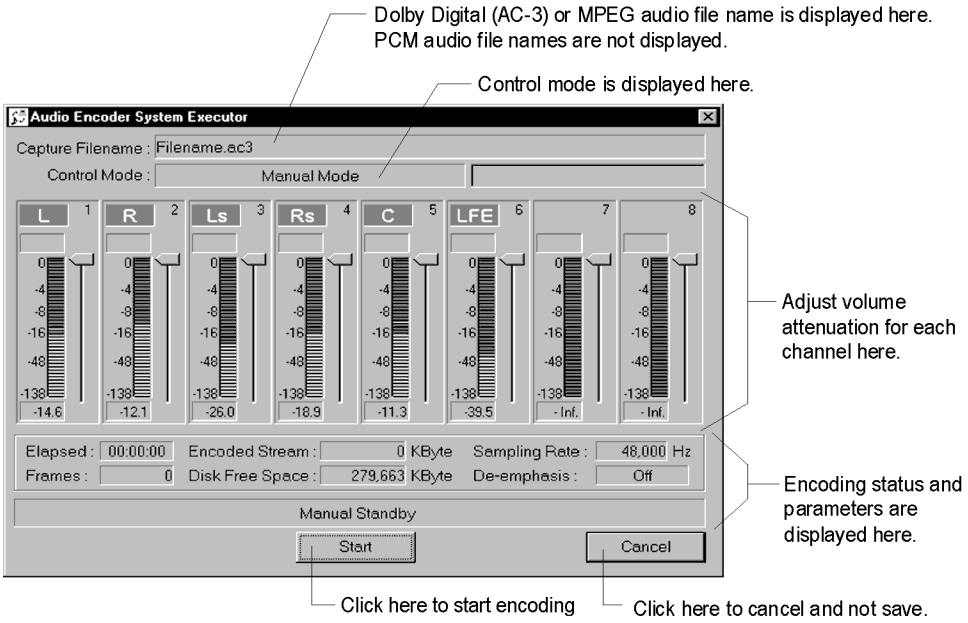
   MPEG Audio Layer 2 format options:

Selection	Description
Professional 32-bit	Bit stream on Channels 1 & 2
Consumer	Bit stream on Channels 1 & 2

7. From the **Audio Status Bit** drop-down list, select **Non-Audio (Data).** If the ZP-100 is connected to a decoder that only accepts streams where the **Audio Status Bit** is audio, select **Audio**.
8. Click **OK** to close the *Output Format Settings* dialogs box.
9. Accept the default encoding parameters shown in the Audio Service Configuration, Bit Stream Info 1, Bit Stream Info 2, and Processing tabs.

   If you want to learn how to adjust the encode parameters in these tabs, see Appendix A, "Dolby Digital (AC-3) Encoding Parameters" and "MPEG Audio Encoding Parameters".

10. Click **Encode** to open the Audio Encoder System Executor window.



11. When Manual Standby appears in the status bar, begin playing the PCM audio stream.
12. The attenuation for each input channel can be manually adjusted with the slide bar.
13. Click **Start** to begin encoding.
14. Click **Stop** to stop encoding.
15. If you specify the filename into the Capture Filename text box in Step 1, an audio file will automatically be saved. If you leave the filename blank, an audio file will not be saved.

NOTE: Audio, parameter, and log files will be created; for more information, see “Files produced by the ZP-100” later in this chapter.

Semi-Automatic Mode

NOTE: Procedures in this section use illustrations from the ZP-100 Controller for Dolby® Digital (AC-3) encoding, however, they also apply to MPEG audio encoding. Detailed information about configuring Dolby® Digital (AC-3), MPEG, and PCM audio parameters are provided appropriately.

REQUIREMENT: For this feature to work, the ZP-100 needs to have the TC IN connected to the PCM audio player's time-code out connection.

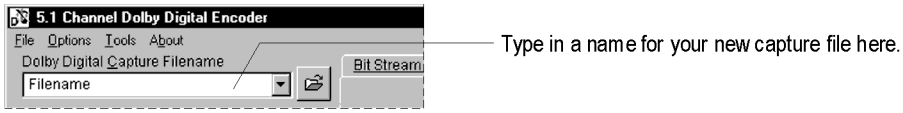
The ZP-100 operates in two modes, Dynamic Encoding mode and File Capture mode. Dynamic Encoding mode is used to create parameter files, and do Broadcast Encoding. Both Broadcast Encoding and the creation of parameter files require that a PCM source be encoded and played, but not saved as a file. File Capture mode is capturing a file to disk for playback later, like DVD.

ZP-100 Controller can semi-automatically encode from a specific block of PCM audio. A block of PCM audio stream is defined as having a specific *start* and *stop* time code.

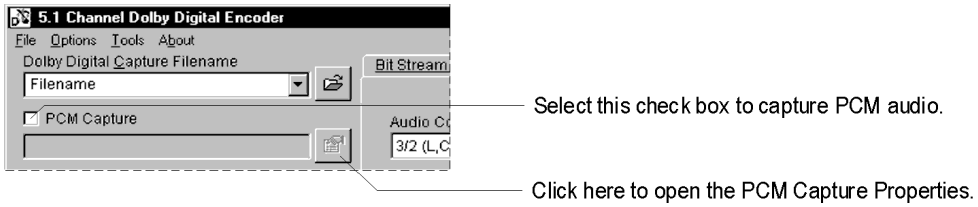
Semi-automatic mode requires that you manually start and stop your PCM audio player. However, ZP-100 will read the time code as it is played and automatically start and stop encoding based on start and stop time codes you have selected.

To encode semi-automatically:

1. Type the name for your new Dolby Digital (AC-3) or MPEG audio file into the **Capture Filename** text box. If doing Dynamic Encoding, leave filename blank.

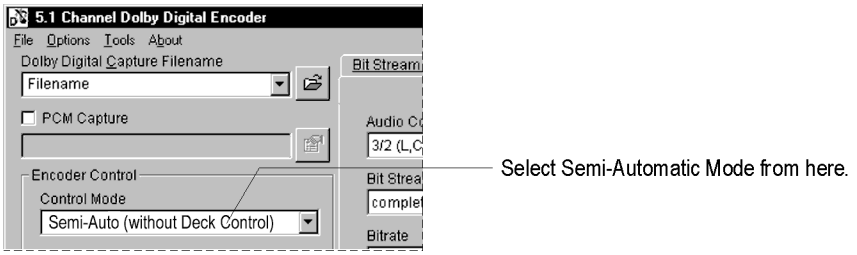


2. Select the PCM Capture check box if you also want to capture PCM audio.

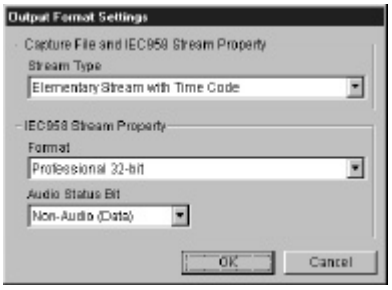


To change any PCM encoding parameters, click on the **PCM Properties** button to open the PCM Capture Properties dialog box. See "PCM Audio Encoding Parameters" in Appendix A for information about configuring the PCM Capture Properties dialog box.

3. From the **Control Mode** drop-down list, select **Semi-Auto**.



4. From the **Options** menu, select **Output Format Settings** to open the Output Settings dialog box.



5. From the **Stream Type** drop-down list, select the type of audio file you want to produce.

Dolby® Digital (AC-3) stream type options:

Selection	Description
Elementary Stream	Elementary stream (AC-3 file format)
Elementary Stream with Time Code	Elementary stream with time code (AC-3 file format)
IEC958 Stream Wave Format	IEC958 stream (WAVE file format)
IEC958 Stream Wave Format with Time Code	IEC958 stream with time code (WAVE file format)

NOTE: For Dolby® Digital (AC-3) encoding, if you select an item that contains time code, the encoder will include time code in the bit stream.

MPEG Audio Layer 2 stream type options:

Selection	Description
Elementary Stream	Elementary stream (MPEG Audio Layer 2 file format)
IEC958 Stream Wave Format	IEC958 stream (WAVE file format)

6. From the **Format** drop-down list, select the type of IEC958 stream.

   The tables shown below indicate which formats are Professional or Consumer mode, and 32-bit or 16-bit mode.

   Dolby® Digital (AC-3) format options:

Selection	Description
Professional 32-bit	Bit stream on Channels 1 & 2
Professional 16-bit Ch 1 Data Packing	Bit stream on Channels 1
Professional 16-bit Ch 2 Data Packing	Bit stream on Channels 2
Consumer	Bit stream on Channels 1 & 2

   MPEG Audio Layer 2 format options:

Selection	Description
Professional 32-bit	Bit stream on Channels 1 & 2
Consumer	Bit stream on Channels 1 & 2

7. From the **Audio Status Bit** drop-down list, select **Non-Audio (Data).** If the ZP-100 is connected to a decoder that only accepts streams where the **Audio Status Bit** is audio, select **Audio**.
8. Click **OK** to close the *Output Format Settings* dialog box.
9. Enter your desired *start* and *stop* time code using the HH:MM:SS:FF syntax. Time codes can be entered by clicking on a specific time field, then typing a numeric value.

   Time codes may also be entered by clicking on the Start Time Code and Stop Time Code buttons, located next to the time code text boxes, and using the Input Time Code dialog boxes.

10. As an option, type a sample number into the **Sample** text box.

    One video frame may be divided into a number of PCM audio samples. The number of PCM audio samples in a video frame is dependent on the PCM sampling frequency and video frame rate. For example, when the PCM sampling frequency is 48 kHz and the video farm rate is 24 fps, there are 2000 PCM audio samples in a video frame. Therefore, this parameter allows you to narrow down your start time to a specific start sample within a video frame. The default value is zero.

11. From the **Frame Rate** drop-down list, select a frame rate.

12. Accept the default encoding parameters shown in the Audio Service Configuration, Bit Stream Info 1, Bit Stream Info 2, and Processing tabs.

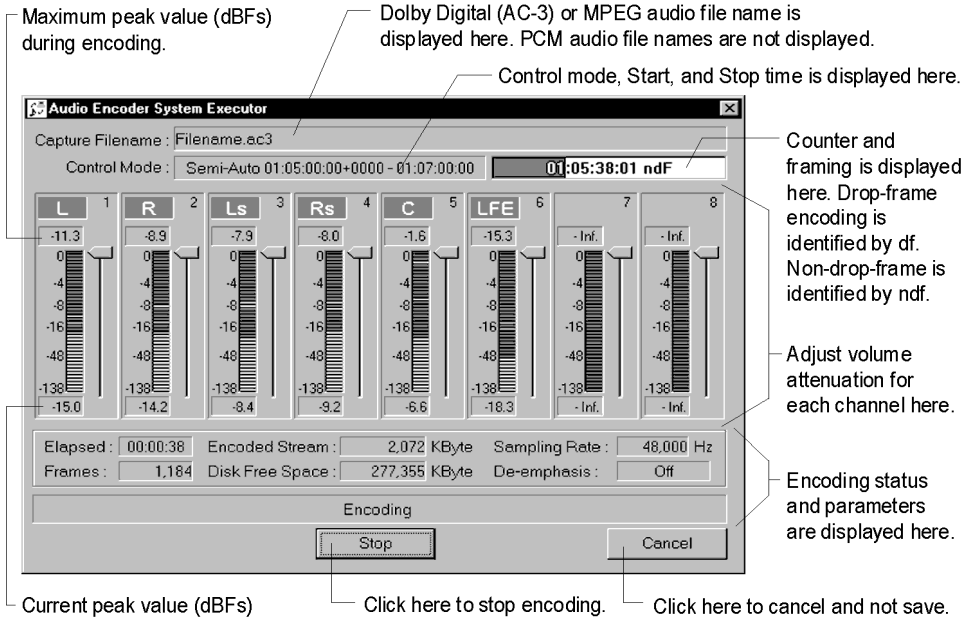
    If you want to learn how to adjust the encode parameters in these tabs, see Appendix A, “Dolby Digital (AC-3) Encoding Parameters” and “MPEG Audio Encoding Parameters”.

13. Click **Encode** to open the Audio Encoder System Executor window.
14. Queue your PCM audio player to at least 10 seconds before the start time code you have set in the ZP-100 Controller main window.
15. Begin playing the PCM audio stream.
16. When 5 seconds have passed since the PCM audio stream was started, click **Standby**.

    When ZP-100 reads the start time code, it will begin encoding the PCM audio stream into a Dolby® Digital (AC-3) or MPEG audio bit stream. When it reads your selected stop time code, it will automatically stop encoding.

    To stop the encoding process before the Stop Time Code arrives, click the **Stop** button and what has been encoded will be saved.

    If the **Cancel** button is clicked, the encoding process will stop and stream will not be saved.



17. If you specified a filename in the Capture Filename text box in Step 1, an audio file will automatically be saved. If you leave the filename blank, an audio file will not be saved.

NOTE: Audio, parameter, and log files will be created; for more information, see "Files produced by the ZP-100" later in this chapter.

Automatic Mode

NOTE: Procedures in this section use illustrations from the ZP-100 Controller for Dolby® Digital (AC-3) encoding, however, they also apply to MPEG audio encoding. Detailed information about configuring Dolby® Digital (AC-3), MPEG, and PCM audio parameters are provided appropriately.

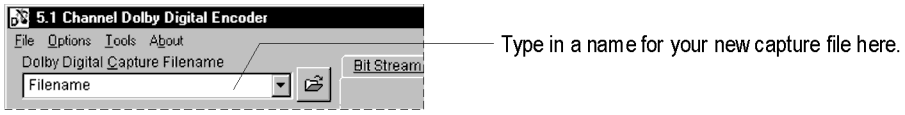
REQUIREMENT: For this feature to work, your PCM audio player must use the Sony P2 Protocol (also known as Sony 9-Pin Protocol) and also needs to have the time-code out connected to the TC IN on the ZP-100's Octopus Cable.

The ZP-100 operates in two modes, Dynamic Encoding mode and File Capture mode. Dynamic Encoding mode is used to create parameter files, and do Broadcast Encoding. Both Broadcast Encoding and the creation of parameter files require that a PCM source be encoded and played, but not saved as a file. File Capture mode is capturing a file to disk for playback later, like DVD.

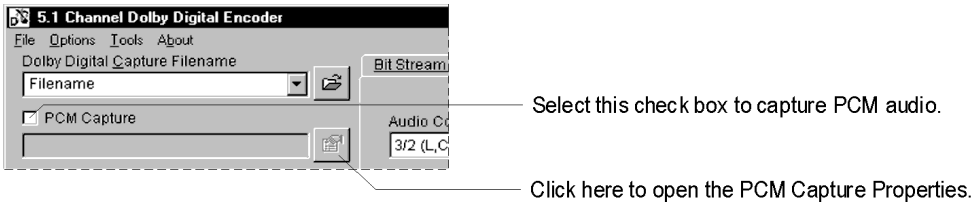
The ZP-100 can automatically encode a specific block of PCM audio stream. Automatic mode only requires that you enter *start* and *stop* time codes, then click **Encode**. The ZP-100 Controller will automatically perform the entire encoding process. There is no need to start, stop, or queue up your PCM audio player.

To encode automatically:

1. Type the name for your new Dolby® Digital (AC-3) or MPEG audio file into the **Capture Filename** text box. If doing Dynamic Encoding, leave filename blank.

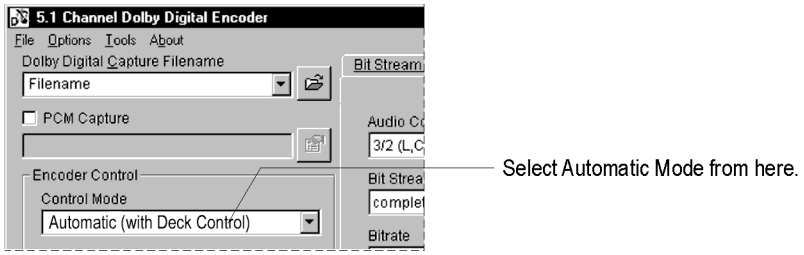


2. Select the PCM Capture check box if you also want to capture PCM audio.

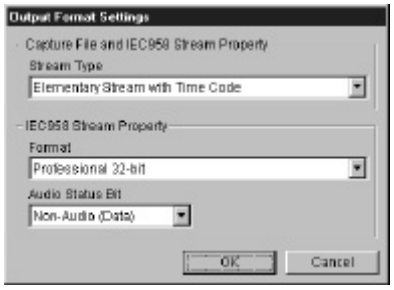


To change any PCM encoding parameters, click on the **PCM Properties** button to open the PCM Capture Properties dialog box. See "PCM Audio Encoding Parameters" in Appendix A for information about configuring the PCM Capture Properties dialog box.

3. From the **Control Mode** drop-down list, select **Automatic**.



4. From the **Options** menu, select **Output Format Settings** to open the Output Settings dialog box.



5. From the **Stream Type** drop-down list, select the type of audio file you want to produce.

Dolby® Digital (AC-3) stream type options:

Selection	Description
Elementary Stream	Elementary stream (AC-3 file format)
Elementary Stream with Time Code	Elementary stream with time code (AC-3 file format)
IEC958 Stream Wave Format	IEC958 stream (WAVE file format)
IEC958 Stream Wave Format with Time Code	IEC958 stream with time code (WAVE file format)

NOTE: For Dolby® Digital (AC-3) encoding, if you select an item that contains time code, the encoder will include time code in the bit stream.

MPEG Audio Layer 2 stream type options:

Selection	Description
Elementary Stream	Elementary stream (MPEG Audio Layer 2 file format)
IEC958 Stream Wave Format	IEC958 stream (WAVE file format)

6. From the **Format** drop-down list, select the type of IEC958 stream.

   The tables shown below indicate which formats are Professional or Consumer mode, and 32-bit or 16-bit mode.

   Dolby® Digital (AC-3) format options:

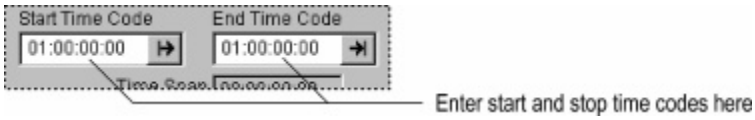
Selection	Description
Professional 32-bit	Bit stream on Channels 1 & 2
Professional 16-bit Ch 1 Data Packing	Bit stream on Channels 1
Professional 16-bit Ch 2 Data Packing	Bit stream on Channels 2
Consumer	Bit stream on Channels 1 & 2

   MPEG Audio Layer 2 format options:

Selection	Description
Professional 32-bit	Bit stream on Channels 1 & 2
Consumer	Bit stream on Channels 1 & 2

7. From the **Audio Status Bit** drop-down list, select **Non-Audio (Data).** If the ZP-100 is connected to a decoder that only accepts streams where the **Audio Status Bit** is audio, select **Audio**.
8. Click **OK** to close the *Output Format Settings* dialog box.
9. Enter your desired *start* and *stop* time code using the HH:MM:SS:FF syntax. Time codes can be entered by clicking on a specific time field, then typing a numeric value.

   Time codes may also be entered by clicking on the Start Time Code and Stop Time Code buttons, located next to the time code text boxes, and using the Input Time Code dialog boxes.



10. As an option, type a sample number into the **Sample** text box.

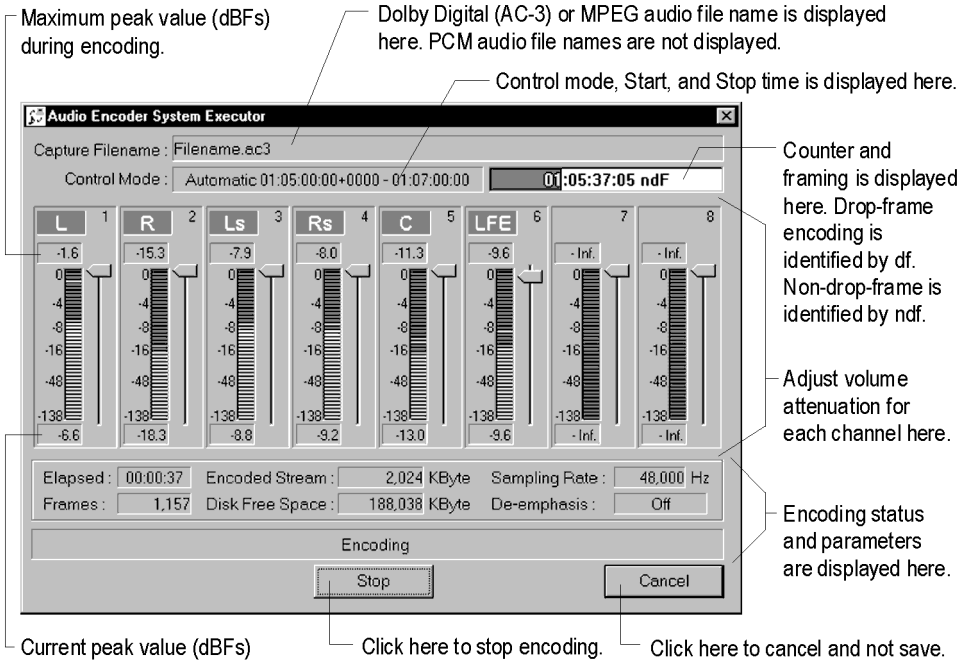
    One video frame may be divided into a number of PCM audio samples. The number of PCM audio samples in a video frame is dependent on the PCM sampling frequency and video frame rate. For example, when the PCM sampling frequency is 48 kHz and the video frame rate is 24 fps, there are 2000 PCM audio samples in a video frame. Therefore, this parameter allows you to narrow down your start time to a specific start sample within a video frame. The default value is zero.

11. From the **Frame Rate** drop-down list, select a frame rate.

12. Accept the default encoding parameters shown in the Audio Service Configuration, Bit Stream Info 1, Bit Stream Info 2, and Processing tabs.

    If you want to learn how to adjust the encode parameters in these tabs, see Appendix A, "Dolby Digital (AC-3) Encoding Parameters" and "MPEG Audio Encoding Parameters".

13. Click the **Encode** button. The Audio Encoder System Executor window appears and the default parameters begin downloading to the encoder.



When the download is complete, the ZP-100 Controller queues your PCM audio player to the start time code. When the Start Time code is reached, it will begin encoding the PCM audio stream into a Dolby® Digital (AC-3) or MPEG Audio bit stream.

When the ZP-100 reads the Stop Time Code, it will automatically stop encoding and stop your PCM audio player.

If the **Cancel** button is clicked, the encoding process will stop and the bit stream will not be saved. If the **Stop** button is clicked, the amount that was encoded will be saved.

14. If you specified a filename in the Capture Filename text box in Step 1, an audio file will automatically be saved. If you leave the filename blank, an audio file will not be saved.

NOTE: Audio, parameter, and log files will be created; for more information, see the next section, “Files produced by the ZP-100”.

Files Produced by the ZP-100

The ZP-100 can produce four types of files during an encoding session:

- Parameter File
- Log File
- Stream Structure File (ZFS)
- Audio File

Parameter Files

A parameter file is used for storing encoding parameters. There are two types of parameter files. One is for Dolby® Digital (AC-3) encoding, and has the ZEP file name extension. The other is for MPEG audio encoding, and has the ZMP file name extension. An encoding session may use a default parameter file, or a unique one can be created and configured to meet your encoding requirements. To learn how to create a unique parameter file, see “Parameter Files” in Appendix A, “Encoding Parameters.”

Log File

A log file uses the LOG filename extension and is used for storing information about a single encoding session. Each encoding session writes over the information contained in the LOG file, so if you want to save this information, copy the log file to a separate directory.

Depending on the type of encoding that is performed, the location of the LOG file can change. When producing an audio file, the LOG file is in the same directory as the audio file. It will have the same filename as the audio file, but with a “LOG” extension.

In Dynamic Encoding mode (For more information, see Appendix B, “Optimizing the Encoding Parameters”), the LOG file will have the same filename as the parameter file, but with a “LOG” extension. This type of LOG file can be found in the same directory as the parameter file. However, if no *unique* parameter file is created during Dynamic Encoding mode, a log file will be created using the name of the default parameter file (A_TMP.LOG), and can be found in the ZP-100 directory.

Stream Structure File (ZFS)

A Stream Structure file is used for storing basic information about a captured file. Information in these files is displayed in the PlayAudio main window.

Stream Structure files can be created by the ZP-100 or by PlayAudio. However, only a ZFS created by the ZP-100 will contain *Peak Wave* data. PlayAudio uses Peak Wave data to graphically display the audio file. These files have the ZFS file name extension.

Audio Files

The ZP-100 can produce three kinds of audio files:

- Dolby® Digital (AC-3) file
- MPEG Audio Layer 2 file
- PCM audio file

Dolby® Digital (AC-3) audio files are produced using the ZP-100 Controller for Dolby Digital (AC-3) encoding. Dolby® Digital audio files have the AC3 file name extension.

MPEG Audio Layer 2 files are produced using the ZP-100 Controller for MPEG audio encoding. MPEG Audio Layer 2 files have the MP2 file name extension.

PCM audio files are produced using the ZP-100 Controller for both Dolby Digital (AC-3) and MPEG audio encoding. PCM audio files have the WAV file name extension.

Quitting the ZP-100 Controller

If you are finished working with the ZP-100 Controller, quit by choosing **Exit** from the **File** menu.

Playing Your Audio File

Included with your ZP-100 is PlayAudio. It can be used for playing your AC-3, MPEG, or WAV files. See the next chapter for information about using PlayAudio.

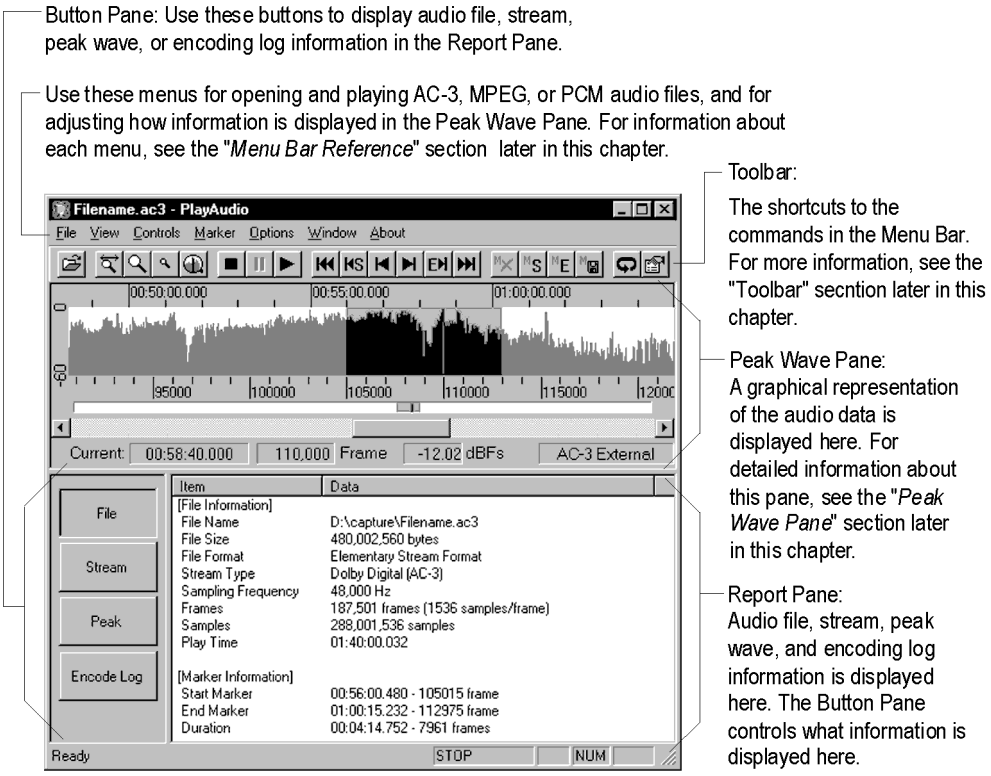
CHAPTER 4

Playing Your Audio File

Included with ZP-100 is PlayAudio. Use it for playing Dolby Digital (AC-3), MPEG Audio Layer 2, PCM audio files. This chapter describes the PlayAudio main window and how to use PlayAudio.

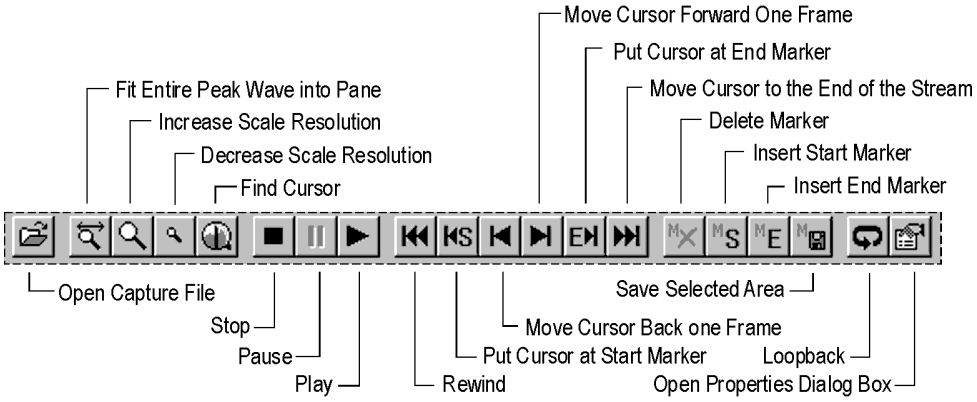
PlayAudio Main Window

Shown below is an illustration that describes the PlayAudio main window.



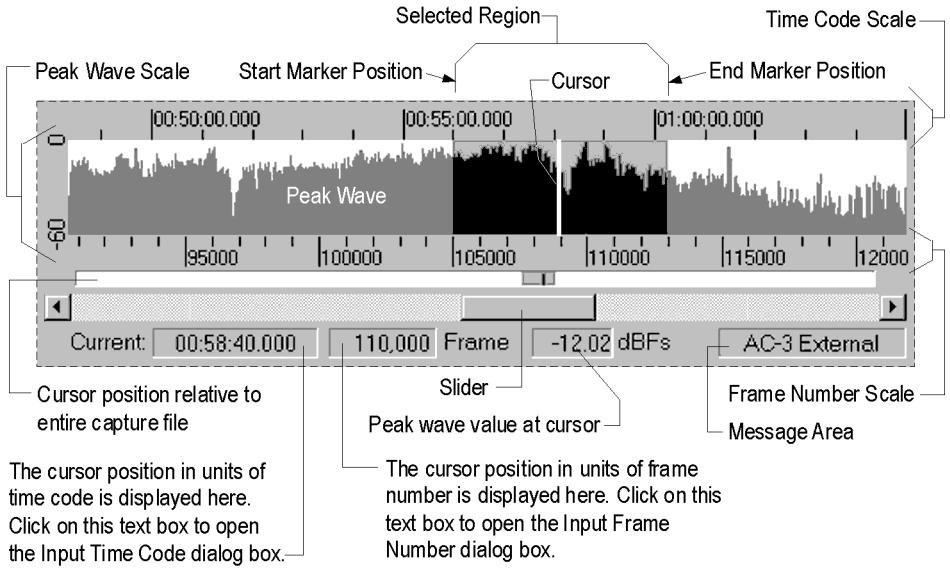
Toolbar

The Toolbar provides shortcuts to the same commands that are located in the Menu Bar. The illustration shown below describes each button on the Toolbar.



Peak Wave Pane

The Peak Wave Pane is located in the top-half of the PlayAudio main window. Use it for viewing and selecting regions of an audio file. Selected regions can be saved as individual audio files. Shown below is a diagram of the Peak Wave Pane.



Peak wave information is supplied by Stream Structure Files (ZFS file). These files can be created with ZP-100 Encoder while capturing a file, or by using PlayAudio. However, only Stream Structure Files (ZFS file) created by the ZP-100 Encoder contain peak wave data.

Starting PlayAudio

Three methods can be used to start PlayAudio.

To start PlayAudio, use one of the following methods:

- Click on the Windows NT **Start** button, point to **Programs**, then to **ZP-100**, then select **PlayAudio** to open the PlayAudio main window.
- Move to the ZP-100 Controller main window, then from the **Tools** menu, select **PlayAudio** to open the PlayAudio main window.
- Double-click on any AC3 or MP2 file to open the PlayAudio main window.

After PlayAudio has started, you may have to select an output device.

Selecting an Output Device

PlayAudio sends the audio stream to the ZP-100, which then sends it to an external audio decoder using either the SPDIF OUT or XLR OUT connectors of the Octopus Cable.

Your ZP-100 card is the default output device. Therefore, unless you want to send the audio stream to a second ZP-100 or sound card, you do not have to select an output device.

To select an output device:

1. Click the **Options** menu, and select **Device** to open the Output Device dialog box.

2. Select which device will be used for playing your audio file.

   Select the **ZP-100 Card** radio button if you want to use your ZP-100 Encoder. If you have two ZP-100 Encoders installed, select **0** or **1** from the **Device No.** drop-down list to choose the one you want to use. When two encoders are installed, the one nearest the computer's CPU is typically identified by **0**.

   Select the **Sound Card** radio button if you want to use a sound card. If you have multiple cards installed, select the card from the **Device** drop-down list to choose the one you want to use.

3. Click **OK** to save the configuration.

Opening an Audio File

PlayAudio can open AC3, MP2, or WAV files.

To open an audio file, use one of the following methods:

- From the **File** menu, select **Open** and the Open dialog box will appear. Use the dialog box to select the audio file, then click **Open**.
- Drag an audio file from Windows NT Explorer into the PlayAudio main window.
- Click the open audio file button  on the tool bar.

  If there is no ZFS file for the PCM audio, the *Select Frame Size* dialog box will appear. Select **1536 samples/frame** if you want to open the PCM audio file using AC-3 framing, or select **1152 samples/frame** if you want to open the PCM audio file using MPEG framing.

Playing an Audio File

If an audio file is opened, it can be played at any time.

To play an audio file:

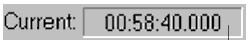
1. From the **Controls** menu, select **Play** to begin playing or click the play button  on the tool bar.

2. Select **Stop** from the **Controls** menu or click the stop button  on the tool bar if you want to stop playing before the end of the stream is reached.

Selecting a Region of the Audio Stream

If peak wave data can be seen in the PlayAudio main window, you can select a specific region of the audio stream, then play it.

To select a region of the audio stream:

1. Click on the **Current** text box 

to open the *Input Time Code* dialog box, and type in a time code where you want the selection to begin, or click the Peak Wave Pane where you want the selection to begin

NOTE: This same method applies to the **Frame** text box 

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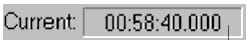
2. From the **Marker** menu, select **Set Start** to create a start marker or click the start marker button  on the tool bar.
3. Click on the **Current** text box 

to open the *Input Time Code* dialog box, and type in a time code where you want the selection to end or click the Peak Wave Pane where you want the selection to end.
4. From the **Marker** menu, select **Set End** to create an end marker or click the end marker button  on the tool bar.

Playing a Region of the Audio Stream

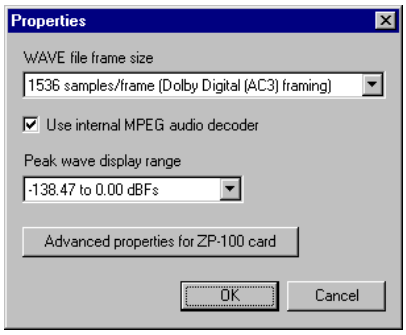
1. Select a region. See “Selecting a Region of the Audio Stream”.
2. From the **Controls** menu, select **Play** to begin playing or click the play button  on the tool bar.

Saving a Region of the Audio Stream

1. Select a region. See “Selecting a Region of the Audio Stream”.
2. From the **Marker** menu, select **Export** to open the *Save As* dialog box or click the export button  on the tool bar.
3. In the **File name** text box, type in a name for your new audio file.
4. Click **Save** to save the file.

Properties Dialog Box

Use the *Properties* dialog box to set the basic input and output playing parameters. It can be opened by selecting *Properties* from the *Options* menu or clicking the Properties button  on the tool bar.



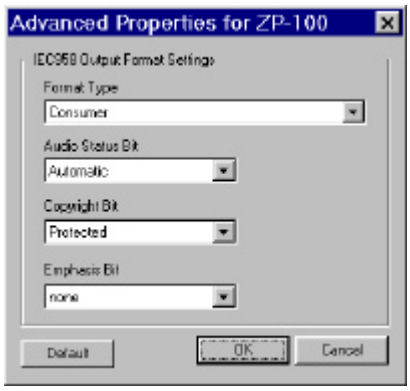
The table shown below describes the commands in the Properties dialog box.

Parameter	Description
WAVE File Frame Size	Use this drop-down list for framing the input audio file. Select **1536 sample/frame** for AC-3 framing. Select **1152 samples/frame** for MPEG framing. Note, if a ZFS file exists, this control is not available.
Use Internal MPEG Decoder	Select this check box if you want PlayAudio to decode the MPEG audio file into a PCM format, then pass it through the ZP-100 card or sound card, to a PCM audio player. Clear this check box if you want the played MPEG audio to pass through the ZP-100 card or sound card, and out to a MPEG audio decoder.
Peak Wave Display Range	This drop-down list controls the dB scale in the Peak Wave Pane. Select **-138.47 to 0.00 dBFs** if you want to view the peak wave using a full scale. Select **–60.00 to 0.00 dBFs** to view the upper portion of the peak wave.
Advanced Properties for ZP-100 Card	Opens the Advanced Properties for ZP-100 Card dialog box. For more information, see *the "Advanced Properties for ZP-100 Card Dialog Box"* section later in this chapter.

Advanced Properties for ZP-100 Card Dialog Box

Use the *Advanced Properties for ZP-100 Card* dialog box to configure the IEC958 Format properties. Use the following table as a guide.

This dialog box can only be opened when the *ZP-100 Card* radio button is selected from the *Selecting an Output Device* dialog box.



The table shown below describes the commands in the Advanced Properties for ZP-100 Card dialog box.

Parameter	Description
Format Type	Use this drop-down list to configure the output audio as one of the following. ▪ **Professional 32-bit** *[use for AC-3, MPEG, and PCM audio]* ▪ **Professional 16-bit Ch1 Data Packing** *[use for AC-3 audio]* ▪ **Professional 16-bit Ch2 Data Packing** *[use for AC-3 audio]* ▪ **Consumer** *[use for AC-3, MPEG, and PCM audio]*
Audio Status Bit	Use this drop-down list to set the audio status bit as *Automatic*, *Non-audio (data)*, or *Audio*.
Copyright Bit	Use this drop-down list to set the copyright bit of the output audio. *Protected* or *Not Protected* can be selected.
Emphasis Bit	Use this drop-down list to set the emphasis type of the output audio. *None*, *50/15 microseconds*, or *CCITT J.17* can be selected.

Report Pane Information

The Report Pane of the PlayAudio main window displays audio file information that was generated during the encoding session. The information displayed in the pane is dependent on which button is selected in the Button Pane. The table shown below describes the information displayed in the Report Pane by those buttons.

File Button	Stream Button (AC-3 Mode)	Stream Button (MPEG Mode)	Stream Button (PCM Mode)	Peak Button	Encode Log Button
File Name	Frame Number	Frame Number	Frame Number	Peak Max	Parameter File
File Size	Frame Size	Frame Size	Frame Size	Peak Min	Processing Time
File Format	Time Stamp Info	ID	Sampling Frequency	Ch1 Peak min/max	Capture File
Stream Type	Frame Rate	Layer	Quantization	Ch2 Peak min/max	PCM File
Sampling Frequency	Drop Frame Flag	Protection Bit	Number of Channels	Ch3 Peak min/max	Sampling Frequency
Frames	Audio Coding Mode	Bitrate		Ch4 Peak min/max	Standby Emphasis
Samples	LFE Channel	Sampling Frequency		Ch5 Peak min/max	Encoded Frames
Play Time	Bit Stream Mode	Padding Bit		Ch6 Peak min/max	Encoded Size
Start Marker	Bitrate	Channel Mode		Ch7 Peak min/max	Error/Warning Messages
End Marker	Sampling Frequency	Mode Extension		Ch8 Peak min/max	Version
Duration	Dolby Surround Mode	Copyright Bit			
	Center Mix Level	Original/Copy			
	Surround Mix Level	Emphasis			
	Copyright Flag	Ancillary Bit Length			
	Original Stream				
	Mixing Level				
	Room Type				
	Dialog Normalization				
	Compression Gain				
	Dynamic Range				

Menu Bar Reference

The Menu bar is located at the top of the PlayAudio main window. It has commands for opening, playing, and selecting regions of an audio file. This section describes the commands in each menu.

File Menu

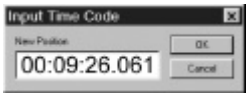
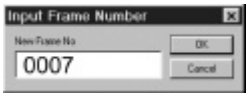
Menu Item	Description
Open 	Use to open AC3, MP2, and WAV files.
Exit	Use to exit Play Audio.

View Menu

Menu Item	Description
Toolbar	Hides or shows the Toolbar.
Status Bar	Hides or shows the Status Bar.
Split	Activates the split pointer so that a Split bar that separates two panes can be moved using the arrow keys of a keyboard.
Fit Mode 	Adjusts the scale of the peak wave so that the entire wave can be seen in the Peak Wave Pane.
Zoom In 	Increases the resolution of the peak wave scales.
Zoom Out 	Decreases the resolution of the peak wave scales.
Center Cursor 	Finds the peak wave cursor.

Controls Menu

Menu Item	Description
Stop 	Stops playing the audio file.
Play 	Plays the audio file.
Rewind 	Rewinds
Last Frame 	Move the cursor to the last frame of the audio file.
Pause 	Pauses the play.
Loop Playback 	Repeats playing.
Next 	Advances the cursor one frame.

Previous	Returns the cursor one frame.
Jump to	Opens a submenu with the following commands. **Start Marker**: moves the cursor to a *Start Marker*. **End Marker**: moves the cursor to an *End Marker*. **Time**: opens the *Input Time Code* dialog box.  **Frame**: opens the *Input Frame Number* dialog box. 

Marker Menu

Menu Item	Description
Clear	Deletes a marker.
Undo Clear	Reverses a deletion of a marker.
Set Start	Creates a Start marker where the cursor is positioned.
Set End	Creates an End marker where the cursor is positioned.
Export	Saves a selected region of a stream as an individual audio file.

Options Menu

Menu Item	Description
Device	Opens the Output Device dialog box. See the "*Selecting an Output Device*" section earlier in this chapter for more information.
Properties	Opens the Properties dialog box. See the "*Properties Dialog Box*" section later in this chapter for more information.

Window Menu

Menu Item	Description
File Information	Displays audio file information in the Report Pane.
Stream Information	Displays stream information in the Report Pane.
Peak Information	Displays peak wave information in the Report Pane.
Encode Log Information	Displays encoding information in the Report Pane.

APPENDIX A

Encoding Parameters

The ZP-100 controller allows you to configure the encoding parameters according to your needs and requirements. The parameters can be saved as a file that may be used for future encoding sessions.

Appendix Outline

This chapter begins by describing all the encoding parameters, then describes the different types of parameter files that can be created. A discussion of how to open, create, and save parameter files is also provided. Listed below is an outline of this chapter.

- Dolby Digital (AC-3) Encoding Parameters
- MPEG Audio Encoding Parameters
- PCM Audio Encoding Parameters
- Parameter Files
- Opening a Parameter File
- Creating a Unique Parameter File
- Saving Your Changes

Dolby Digital (AC-3) Encoding Parameters

The Dolby® Digital (AC-3) encoding parameters are located in four tabs of the ZP-100 Controller Main Window.

- Audio Service Configuration Tab
- Bit Stream Info 1 Tab
- Bit Stream Info 2 Tab
- Processing Tab

NOTE: For detailed technical information about Dolby® Digital (AC-3) encoding parameters, see the ATSC standard AC-3 document at *www.atsc.org/stan&rps.html*.

Audio Service Configuration Tab

Use the Audio Service Configuration parameters to adjust the most basic Dolby® Digital (AC-3) encoding parameters.

AUDIO CODING MODE

Use this parameter to configure the channel format and the number of audio channels to encode. The table shown below explains each type of mode that can be selected.

Audio Coding Mode	Description
1/0 (C)	Encodes a monaural center channel.
2/0 (L,R)	Encodes left and right channels.
3/0 (L,C,R)*	Encodes left, right, and center channels.
2/1 (L,R,S)*	Encodes left, right, and surround channels.
3/1 (L,C,R,S)*	Encodes left, right, center, and surround channels.
2/2 (L,R,Ls,Rs)*	Encodes left, right, left surround, and right surround channels.
3/2 (L,C,R,Ls,Rs)*	Encodes left, right, center, left surround, and right surround channels.

* Only available for 5.1 channel encoders.

OTHER AUDIO SERVICE CONFIGURATION PARAMETERS

The table below describes the remaining Dolby® Digital (AC-3) parameters found in the Audio Service Configuration tab.

Parameter	Description
Bit Stream Mode	Use this parameter to select the type of service that the Dolby Digital (AC-3) bit stream conveys. The service types are *Complete Main (CM)*, *Music and Effects (ME)*, *Visually Impaired (VI)*, *Hearing Impaired (HI)*, *Dialog (D)*, *Commentary (C)*, *Emergency (E)*, and *Voice Over (VO)/Karaoke*. Most streams will use *Complete Main*. For karaoke, use *Voice Over (VO)/Karaoke*.
Bit Rate	Use this parameter to select a bit rate to encode. The table shows what bit rates can be used for specific audio coding modes.
Sampling Frequency	Use this parameter to select the sampling frequency of the source PCM audio stream: *32 kHz*, *44.1 kHz*, *48 kHz*, *or Auto*. If *Auto* is selected, the ZP-100 will automatically detect the sampling frequency of the source PCM audio stream.
LFE Channel	Use this parameter to include a LFE Channel in the stream. This parameter is only available for 5.1 Channel encoders.
Channel Assignment	Use these parameters for assigning a specific source PCM audio channel to a specific Dolby Digital channel. A source channel is one that can be physically transmitted across one of the AES/EBU or SPDIF connectors of the Octopus cable. Since 8 source channels can be sent to the ZP-100, each Dolby Digital channel can be assigned any one of those 8 channels.
Save	Use this button for saving the channel assignment for a specific Audio Coding Mode. A unique configuration can be saved for each mode.

Audio Coding Mode	Bit Rate Range
1/0 (C)	56000 to 640000 bps
2/0 (L, R)	96000 to 640000 bps
3/0 (L, C, R)	128000 to 640000 bps
2/1 (L, R, S)	128000 to 640000 bps
3/1 (L, C, R, S)	192000 to 640000 bps
2/2 (L, R, Ls, Rs)	192000 to 640000 bps
3/2 (L, C, R, Ls, Rs)	224000 to 640000 bps

Bit Stream Info 1 Tab

Use the *Bit Stream Info 1* parameters to add data to specific information fields of the Dolby® Digital (AC-3) bit stream.

Parameter	Description
Dolby® Surround Mode	Use this parameter to indicate whether or not the Dolby® Digital (AC-3) bit stream is conveying a Dolby® Surround encoded program. This parameter is available only using Audio Coding Mode 2/0. The parameter can be set to *Dolby Surround encoded*, *Not Dolby Surround encoded*, or *not indicated*. The Dolby® Surround Mode information is not used by Dolby® Digital decoders, but may be used by Dolby® Surround decoders.
Surround Mix Level	Use this parameter to set the nominal down-mix level of the surround channel(s) with respect to the left and right channels. This parameter is available when the *Audio Coding Mode* is set to *2/1*, *2/2*, *3/1*, or *3/2*. Values of *0.707 (-3.0dB)*, *0.500 (-6dB)*, and *0 (-Inf. dB)* can be selected. This parameter is only available for 5.1 channel encoders.
Center Mix Level	Use this parameter to set the nominal down-mix level of the center channel with respect to the left and right channels. This parameter is available when the *Audio Coding Mode* is set to *3/0*, *3/1*, or *3/2*. Values of *0.707 (-3.0dB)*, *0.596 (-4.5dB)*, and *0.500 (-6dB)* can be selected. This parameter is only available for 5.1 channel encoders.
Copyright Bit	Use this parameter to copyright protect the Dolby® Digital (AC-3) bit stream.
Original Bit Stream	Use this parameter to flag the Dolby® Digital (AC-3) bit stream as original material.

Bit Stream Info 2 Tab

The remaining parameters for adding data to specific information fields of the Dolby® Digital (AC-3) bit stream are located in the *Bit Stream Info 2* tab.

Parameter	Description
Audio Production Information	This parameter indicates whether or not the Dolby® Digital (AC-3) bit stream contains *mixing level* and *room type* information. **Mixing Level:** Use this parameter to select the acoustic sound pressure level of the dialog during final audio mixing. Values from *0 (80 dB)* to *31 (111 dB)* can be selected. **Room Type:** Use this parameter to select the type and calibration of the mixing room used for the final audio mixing. Values of *Not Indicated*, *Large Room*, and *Small Room* can be selected. If the source PCM audio is to be encoded for a movie theater, choose *Large Room*. If the source PCM audio is to be encoded for consumer equipment, choose *Small Room*. If the encoding program is unknown, chose *not indicated*. The *Room Type* is not typically taken into account in Dolby® Digital (AC-3) decoders, but may be used by other audio reproduction equipment.
Dialog Normalization	Use this parameter to select the average dialog sound pressure level. Values from *-1 dB* to *–31 dB* can be selected. Be aware that Dolby® Digital (AC-3) decoders automatically adjust the average dialog level to –31dBFs. For example, if –27 dB is used for dialog normalization, the sound pressure level of the dialog will be reduced by 4 dB by the decoder. If 0 dB is used, the sound pressure level of the dialog will be reduced by 31 dB by the decoder. If –31 dB is used, the sound pressure level of the dialog will not be reduced by the decoder.

Processing Tab

Use the processing parameters to adjust the dynamic range compression and preprocessing for your Dolby® Digital (AC-3) bit stream.

DYNAMIC RANGE COMPRESSION PARAMETERS

Parameter	Description
Compression Setting	Use this parameter to select the type of dynamic range compression for your Dolby® Digital (AC-3) bit stream. The types of compression that can be selected are *None*, *Film Standard*, *Film Light*, *Music Standard*, *Music Light*, *Speech*.
RF Over Modulation	Use this parameter to prevent over modulation if heavy compression is needed. Heavy compression is targeted for listening situations such as movie delivery to a hotel room or airline seat. A Dolby® Digital (AC-3) decoder will use the dynamic range compression and RF over-modulation protection information to reduce the audio program's dynamic range unless the feature is disabled on the decoder by the end user.

PRE-PROCESSING PARAMETERS

Parameter	Description
Channel Bandwidth Low-pass Filter	Use this parameter to apply a low-pass filter to the main input channels (PCM input signals). The filter cut-off frequency will be automatically set. Since the low-pass filter reduces high frequency signal information, the reduction in signal information increases encoding efficiency, achieving better sound quality at lower bit rates.
LFE Low-pass Filter	Use this parameter to apply a 120 Hz low-pass filter to the Low Frequency Effects input channel. If the LFE input signal does not contain higher frequency components than 120 Hz, the LFE Low-pass Filter should not be used. This parameter is available only for 5.1 channel encoders.
DC Filter	Use this parameter to apply a DC filter to all input channels. Since the removal of a DC component in PCM input signal increases the encoding efficiency, the quality of the sound will increase.
Surround Channel 90° Phase Shift	Use this parameter to apply a 90° phase-shift to the surround channel(s). This feature is useful for generating multi-channel Dolby® Digital (AC-3) bit streams which can be down-mixed in an external

2-channel decoder to create a true Dolby® Surround compatible output. This parameter is only available for 5.1 channel encoders.

Surround Channel 3 dB Attenuation

Use this parameter to apply a 3 dB attenuation to the surround channel(s). Apply this parameter if the Dolby® Digital (AC-3) bit stream is targeted for movie theaters. Do not apply this parameter if the stream is targeted for consumer equipment. This parameter is only available for 5.1 channel encoders.

Digital De-emphasis

Use this parameter to apply a digital de-emphasis filter to all input channels. If the PCM audio stream is emphasized, it should be de-emphasized before it is encoded.

If *Auto* is selected, the ZP-100 will automatically detect whether or not the PCM audio stream is emphasized. If the PCM audio stream is emphasized, the ZP-100 will automatically activate the digital de-emphasis filter.

MPEG Audio Encoding Parameters

The MPEG Audio Layer 2 encoding parameters are located in three tabs of the ZP-100 Controller Main Window.

- Basic Parameters Tab
- Header Info Tab
- Processing Tab

Basic Parameters Tab

Use the basic parameters to adjust the most fundamental MPEG encoding parameters.

Audio Coding Mode

Use this parameter to configure the channel format and the number of audio channels to encode.

Mode	Description
1/0 Single (C)	Encodes a center monaural channel
1+1 Dual (L/Ch1, R/Ch2)	Encodes a left (Ch1) & right (Ch2) channel
2/0 Stereo (L, R)	Encodes left and right channels

Bit Rate

Use this parameter to select a bit rate for the MPEG Audio bit stream. The table shows what bit rates can be used for specific audio coding modes.

Mode	Bit Rate Range
1/0 Single (C)	56000 to 192000 bps
1+1 Dual (L/Ch1, R/Ch2)	112000 to 384000 bps
2/0 Stereo (L, R)	112000 to 384000 bps

Sampling Frequency

Use this parameter to select the sampling frequency of the source PCM audio stream: *32 kHz, 44.1 kHz, 48 kHz, or Auto*. If *Auto* is selected, the ZP-100 will automatically detect the sampling frequency of the source PCM audio stream.

Channel Assignment

Use these parameters for assigning a specific source PCM audio channel to a specific MPEG channel. A source channel is one that can physically be transmitted across one of the AES/EBU or SPDIF connectors of the Octopus cable.

Since 8 source channels can be sent to the ZP-100, each MPEG channel can be assigned any one of those 8 channels.

Save

Use this button for saving the channel assignment for a specific Audio Coding Mode. A unique configuration can be saved for each mode.

Header Info Tab

Use the header information parameters to add data to specific information fields of the MPEG Audio bit stream

Parameter	Description
CRC	Use this parameter to activate the CRC check. If selected, CRC check word will be generated and buried into MPEG Audio bit stream
Private Bit	Use this parameter to set the private bit value within the MPEG Audio bit stream. If selected, a bit of value '1' is set. If not selected, a bit of value '0' is set.
Copyright	Use this parameter to copyright protect the MPEG Audio bit stream.
Original Bit Stream	Use this parameter to flag the MPEG Audio bit stream as original material.
Emphasis	Use this parameter to select the emphasis type of the PCM input signal. If *Auto* is selected, ZP-100 will automatically detect the emphasis type of the PCM input signal. ZP-100 supports three emphasis types: *None*, *50/15 microseconds*, and *CCITT J.17*.

Processing Tab

Use the processing parameters to optimize the sound qualities of the MPEG audio encoding.

Parameter	Description
Joint Stereo	Use this parameter to apply ZP-100's dynamic joint stereo coding algorithm. Joint Stereo coding utilizes the cross-correlation between left and right channel data to provide better sound quality. Higher cross-correlation increases sound quality. Therefore, the increase in sound quality by Joint Stereo coding depends on how much left and right channel data are correlated. However, in general, it provides better sound quality for low bit rates. Three modes can be used: *Auto*, *On*, and *Off*. If *Auto* is selected, ZP-100 will dynamically activate or deactivate Joint Stereo coding depending on the characteristics of PCM input signal, sampling frequency, bit rate, and so on. If *On* is selected, Joint Stereo coding is always activated. If *Off* is selected, Joint Stereo coding is always deactivated.

Bandwidth Limiting Low-pass Filter

Use this parameter to apply a bandwidth limiting low-pass filter to the PCM input signal. The filter cut-off frequency will be automatically set depending on the sampling frequency, bit rate, and so on. At higher bit rates (greater than 80,000 bps per channel for 44.1 kHz and 48 kHz), the filter is not activated. In case of 32 kHz, the filter is never activated.

Since the low-pass filter reduces high frequency signal information, the reduction in signal information increases encoding efficiency, achieving better sound quality at lower bit rates.

PCM Audio Encoding Parameters

Use the PCM Capture Properties dialog box to configure all the PCM parameters. To open the dialog box from the ZP-100 Controller Main Window, click on the PCM Properties button. Described below are all the PCM encoding parameters.

Parameter	Description
Sampling Freq.	This text box indicates that the sampling frequency of the source PCM audio data will be automatically detected. Rates of 48 kHz, 44.1 kHz, and 32 kHz can be detected.
Quantization	Use this parameter to select the quantization length of the PCM sample. Quantization can be set to 16, 20, or 24 bits per PCM sample.
Channels	This text box automatically displays which channels will be captured. The channels captured depend on the item selected from the *Audio Coding Mode* drop-down list. The drop-down list is located in the ZP-100 Controller main window. ZP-100 can capture a mono center channel or a left and right channel.
Synchronize AC3/MPEG Audio Frame	When automatically stopping an encoding session, the end time code most probably will be somewhere in the middle of a Dolby® Digital (AC-3) or MPEG audio frame. Clear this check box if you want to stop capturing PCM audio (at the specific end time code) before the end of a Dolby® Digital (AC-3) or MPEG audio frame arrives. Select this check box if you want the encoder to continue capturing past the end time code until it reaches the end of the frame.

PCM File Name Generate Mode

Select this parameter to make the ZP-100 automatically name your PCM capture file. Although dimmed, the name and its path can be seen in the **PCM Capture File** Name drop-down list.

Clear this check box to type in a unique file name in the drop-down list. A name can be assigned to the file by clicking on the **Save As** button located next to the drop-down list.

Parameter Files

Parameter files are used to store all the parameter settings for a specific encoding session. When the ZP-100 controller is commanded to encode a PCM audio stream into a Dolby® Digital (AC-3) or MPEG Audio bit stream, it sends all the parameters defined in the currently open parameter file to the ZP-100. Encoding then begins based on the configuration of each parameter.

All parameters are managed and configured in the ZP-100 Controller Main Window. The ZP-100 Controller uses three types of parameter files: default and unique.

Default Parameter File

A default parameter file is used to store a specific set of encoding values, so when you start the ZP-100 Controller, these values will automatically populate the encoding parameters. Initially, there is no default parameter file. To create one, configure parameters to suit your needs, then from the *File* menu, select **Save As Default Parameter File**.

Unique Parameter Files

The ZP-100 controller allows you to adjust the parameters for a specific encoding session. If you desire to save those adjusted settings for a future session, save them as a unique parameter file. When a unique parameter file is in use, its name is shown in the title bar of the ZP-100 controller main window.

Unique parameter files have two types of file name extensions.

- ZEP for Dolby® Digital (AC-3) files
- ZMP for MPEG Audio files

Opening a Parameter File

To open a parameter file:

1. Select **File** from the main menu.
2. Click on **Open Parameter File** to display the **Open** dialog box.
3. Select the parameter file you want to open.

4. Click the **OK** button.

Creating a Unique Parameter File

To save your unique parameters as a file:

1. Configure the parameters to values you require.
2. Select **File** from the main menu.
3. Click on **Save As New Parameter File** to display the **Save As** dialog box.
4. In the **Save in** drop-down list, select a folder where the file is to be saved.
5. Type the name for the parameter file into the **File name** drop-down list. The ZP-100 controller will automatically apply the correct filename extension.
6. Click the **Save** button.

Saving Your Changes

You may save your encoding session parameters anytime to a currently open parameter file.

To save your parameters to a currently open parameter file:

1. Select **File** from the main menu.
2. Click on **Save Parameters**.

A P P E N D I X B

Optimizing the Encoding Parameters

Optimizing Your Selection of Encoding Parameters

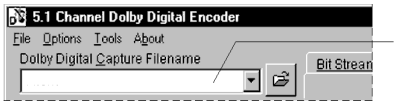
The ZP-100 Controller allows you to change the values for specific encoding parameters while the ZP-100 is encoding This feature gives you immediate audible feedback based on your adjustments, thus allowing you to quickly optimize your parameter values. Once you have optimized your parameters, you can save them for future encoding sessions.

NOTE: Procedures in this chapter use illustrations from the ZP-100 Controller for Dolby® Digital (AC-3) encoding, however, they also apply to MPEG audio encoding.

To optimize a set of encoding parameters:

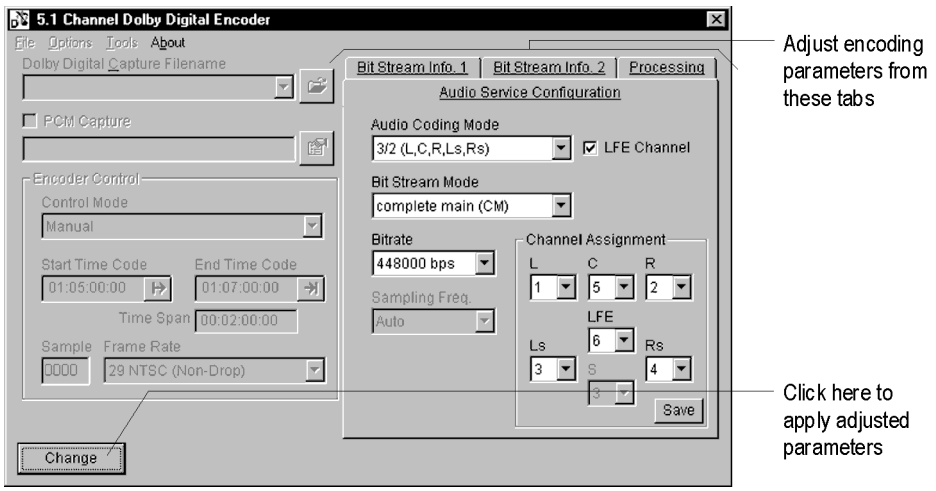
1. Start the ZP-100 controller.
2. The default parameter file will automatically load.

   If you want to use an existing unique parameter file, use the **File** menu to select **Open Parameter File**. Use the **Open** dialog box to select a parameter file. Unique parameter files will have the ZEP file name extension for Dolby® Digital (AC-3) parameter files and ZMP file name extension for MPEG Audio parameter files.
3. Ensure that the **Capture Filename** text box should be clear.



4. Begin playing the PCM audio stream.
5. Click the **Encode** button. The **Encode** button will then be renamed to **Change**.
6. Begin listening to the decoded bit stream.

7. Based on your aural inspection, make adjustments to parameters that do not meet your requirements.



8. Click the **Change** button to apply all your adjusted parameters.
9. If you are not satisfied with the sound quality, repeat steps 7 and 8. If you are satisfied with the sound quality, you may save the new parameter values as described in the next section.

Saving Your New Parameter Values

You may save your new parameter values to a currently open parameter file or save them as a new parameter file.

To save your adjusted parameters to a currently open parameter file:

1. Click the **File** menu item.
2. Click on **Save Parameters**.

To save your parameters to a new parameter file:

1. Click the **File** menu item.
2. Click on **Save As New Parameter File** and the Save As dialog box will appear.
3. Type the name for your new parameter file in the **Save in** drop-down list. The ZP-100 Controller will add the default file name extension ZEP for Dolby Digital files or ZMP for MPEG audio files.
4. Click on the **Save** button.

Note: When a parameter is adjusted, the text will change color and an asterisk (*) will appear in the title bar. Saving or encoding removes the asterisk and color change.

APPENDIX C

The Main Menu

This chapter describes all the commands located on the main menu.

File Menu

The **File** menu is used for creating and managing parameter files. When a parameter file has been selected, its name is displayed in the title bar of the main window.

Open Parameter File

Use this command to open an existing parameter file.

Save Parameters

Use this command to save all parameter settings to the currently open parameter file.

Save As New Parameter File

Use this command to save an open parameter file as a new parameter file with a new filename. The original parameter file and its name will not be deleted.

Save As Default Parameter File

Use this command to over-write the default parameter file.

Exit

Use this command to close ZP-100 controller. This command will not automatically save changes to your parameter files.

Options Menu

Output Format Setting

Choosing this menu item opens the Output Format Settings dialog box.

Use the **Stream Type** drop-down list to select the type of audio file you want to produce.

Dolby® Digital (AC-3) stream type options:

Selection	Description
Elementary Stream	Elementary stream (AC-3 file format)
Elementary Stream with Time Code	Elementary stream with time code (AC-3 file format)
IEC958 Stream Wave Format	IEC958 stream (WAVE file format)
IEC958 Stream Wave Format with Time Code	IEC958 stream with time code (WAVE file format)

NOTE: For Dolby® Digital (AC-3) encoding, if you select an item that contains time code, the encoder will also include time code in the bit stream.

MPEG Audio Layer 2 stream type options:

Selection	Description
Elementary Stream	Elementary stream (MPEG Audio Layer 2 file format)
IEC958 Stream Wave Format	IEC958 stream (WAVE file format)

Use the **Format** drop-down list to select the type of IEC958 stream.

The tables shown below indicate which formats are Professional or Consumer mode, and 32-bit or 16-bit mode.

Dolby® Digital (AC-3) format options:

Selection	Description
Professional 32-bit	Bit stream on Channels 1 & 2
Professional 16-bit Ch 1 Data Packing	Bit stream on Channels 1
Professional 16-bit Ch 2 Data Packing	Bit stream on Channels 2
Consumer	Bit stream on Channels 1 & 2

MPEG Audio Layer 2 format options:

Selection	Description
Professional 32-bit	Bit stream on Channels 1 & 2
Consumer	Bit stream on Channels 1 & 2

From the **Audio Status Bit** drop-down list, select **Non-Audio (Data).** If the ZP-100 is connected to a decoder that only accepts streams where the **Audio Status Bit** is audio, select **Audio**.

Encoder Settings

This menu item opens the Encoder Settings dialog box. The following table describes each control.

Control	Description
PCI Device No.	If two ZP-100 Encoders are installed, select **0** or **1** from the **PCI Device No** drop-down list to assign a specific Encoder to the controller. Otherwise, accept the default value. Typically, the Encoder nearest your computer's CPU is identified as 0.
Number of Buffers	Personal computers with slow microprocessors may experience system crashes. To help resolve this problem, increase the computer's memory buffer size. If necessary, increase buffer size from the **Number of Buffers** text box. Each integer equals 64K of memory space with a maximum of 128 buffers.
Select Interface for Ch1 and Ch2	A two channel PCM audio stream can be accepted as an input to the ZP-100 Encoder at the plugs labeled *Ch 1*-2 or *SPDIF IN*. Depending on how the encoder is connected to the player, select **AES/EBU** if using the *Ch 1-2 plug*, or **SPDIF** if using the *SPDIF IN plug*.
During Standby	Standby is a mode when the ZP-100 Encoder is monitoring a source audio stream, but not encoding. Use this drop-down list to configure the encoder's *output* at the XLR OUT and SPDIF OUT plugs during standby mode. Since both of these plugs supply an output to an audio decoder, select **PCM** if your decoder can play PCM audio, otherwise, select **Mute**.
	Note: Located in the *Audio Service Configuration* tab of the ZP-100 Controller main window is the *Audio Coding Mode* drop-down list. If set to **1/0 Single** (mono), Channels 1 and 2 of the XLR OUT and SPDIF OUT plugs will supply mono audio.

During Encoding

Use this drop-down list to configure the encoder's *output* at the XLR OUT and SPDIF OUT plugs during encoding mode. Since both of these plugs supply an output to an audio decoder, select **Encoded Stream** if your decoder can play Dolby® Digital (AC-3) and/or MPEG audio, otherwise, select **PCM**.

Note: Located in the *Audio Service Configuration* tab of the ZP-100 Controller main window is the *Audio Coding Mode* drop-down list. If set to **1/0 Single** (mono), Channels 1 and 2 of the XLR OUT and SPDIF OUT plugs will supply mono audio.

Time Code Start/End

When doing semi-automatic or automatic encoding, set the accuracy of the start and end time codes.

Select **Time Code >= Specified Start/End Time Code** to make the encoder automatically start or stop if it recognizes that a specific time code has appeared and/or passed. The encoder may not start and stop correctly because of a poor quality time code signal supplied by the PCM audio player.

Select **Time Code = Specified Start/End Time Code** to automatically start or stop encoding when encoder *actually* reads the specific time code. If a specific start time code was not received by the encoder for some reason, it will remain in standby, and if a specific end time code was not received, encoding will continue if this selection is used.

Create ZFS file

A ZFS file, also called a Stream Structure file, contains information about the AC3, MPEG, and PCM files. PlayAudio displays information from this file in its main window. Select this checkbox to automatically create a ZFS file whenever you encode. The ZFS will have the same name, and be found in the same location as your captured file, but using the ZFS filename extension.

Although PlayAudio can create ZFS files when needed, it does not include *peak wave* data, the graphical representation of the captured file. Only ZFS files created by using this checkbox contain peak wave data.

Erase Capture file if...

Select this checkbox if you want to delete your captured file if some fatal error occurs during the encoding session.

Display ATSC

Check this command if want the ZP-100 controller to display the ATSC naming conventions in the Bit Stream Info 1 and Bit Stream Info 2 tabs.

Tools Menu

The Tools menu lists your current audio files. Selecting any of the files automatically starts PlayAudio.

About Menu

About

This command opens the About Window that shows what version of the ZP-100 controller you have.

APPENDIX D

Default Encoding Parameters

Dolby® Digital Default Parameters

Listed below are the default parameter values used for Dolby® Digital (AC-3) encoding.

Encoding Parameter	Value for 5.1 Ch	Value for 2 Ch
Audio Coding Mode:	3/2	2/0
LFE Channel:	On (checked)	N/A
Bit Rate:	448000 bits/s	192000 bits/s
Bit Stream Mode:	Complete Main	Complete Main
Sampling Frequency:	Auto	Auto
Left Channel Assignment:	1	1
Right Channel Assignment:	2	2
Left Surround Channel Assignment:	3	N/A
Right Surround Channel Assignment:	4	N/A
Center Channel Assignment:	5	1
LFE Channel Assignment:	6	N/A
Surround Channel Assignment:	3	N/A
Dolby Surround Mode:	Not Indicated	Not Indicated
Surround Mix Level:	0.707 (-0.3dB)	N/A
Center Mix Level:	0.707 (-0.3dB)	N/A
Copyright Bit:	On (checked)	On (checked)
Original Bit Stream:	On (checked)	On (checked)
Audio Production Info. Exists:	Off (clear)	Off (clear)
Dialog Normalization:	-27 dB	-27 dB
Dynamic Range Compression Setting:	Film Standard	Film Standard
RF Over Modulation Protection	On (checked)	On (checked)
Channel Bandwidth Low-pass Filter:	On (checked)	On (checked)
LFE Low-pass Filter:	On (checked)	N/A
DC Filter:	On (checked)	On (checked)
Surround Channel 90° Phase-Shift:	On (checked)	N/A
Surround Channel 3dB Attenuation:	Off (clear)	N/A
Digital De-emphasis:	Auto	Auto

MPEG Audio Default Parameters

Listed below are the default parameter values used for MPEG Audio encoding.

Encoding Parameter	Value
Audio Coding Mode:	2/0 Stereo
Bit Rate:	22400 bits/sec
Sampling Frequency:	Auto
Left Channel Assignment:	1
Right Channel Assignment:	2
Center Channel Assignment:	1
CRC:	On (checked)
Private Bit:	Off (clear)
Copyright Bit:	On (checked)
Original Bit Stream:	On (checked)
Emphasis:	Auto
Joint Stereo:	Auto
Bandwidth Limiting Low-pass Filter:	Off (clear)

APPENDIX E

Batch Encoding

Batch encoding involves creating two or more parameter files, then running a program that automatically runs the ZP-100 Controller by using the parameter files. The following is an example of batch encoding.

To do batch encoding:

1. Create a directory, *d:\Batch*.
2. Configure and save the encoding parameters in *d:\Batch* directory.
3. Repeat step 2 for as many parameter files as you want to create.
4. Open a common text editor, for example, Notepad.
5. Type the following commands.

```
@echo off
aexecute /pd:\batch\parameterfilename1.zep
aexecute /pd:\batch\parameterfilename2.zmp
aexecute /pd:\batch\parameterfilename3.zep
```

6. Save as a text file with the BAT file name extension in the ZP-100 install directory, for example, *c:\program files\zapex\ZP-100*.
7. From the Windows NT taskbar, click **Start**, point to **Programs**, then select **Command Prompt** to open the *Command Prompt* window.
8. Move to the ZP-100 install directory (*c:\>cd c:\ program files\zapex\ZP-100).*
9. Type in the name of your batch file you saved, then press Enter to begin the batch encoding session.

APPENDIX F

Regulatory Approvals

Radio Frequency Interference (RFI) Ratings

FCC Class A, CE (EN 55022A, EN 50082-1), VCCI Class A

FCC Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15, subpart B, of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

Modifications or changes to this product not expressly approved by Zapex Technologies, Inc. could void the user's authority to operate the equipment.

To insure compliance with FCC non-interference regulations, shielded interface cables should be used to attach all peripherals.

If this equipment does harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- In case of TV or radio interference, turn the antenna until the interference stops, or consider installing an antenna with coaxial cable lead-in between the antenna and TV.
- Consult Zapex Technologies, Inc. technical support.

VCCI

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

CE Statement

Marking by the symbol CE indicates compliance of this device to the EMC directive of the European Community. Such marking in indicative that this Zapex system meets or exceeds the following technical standards:

CISPR 22 (EN 50082-1)

"Electromagnetic compatibility - Generic immunity standard Part 1: Residential, Commercial and Light industry."

EN 55022

"Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."

IEC 801-2

"Electromagnetic compatibility for industrial-process measurement and control equipment Part 2: Electrostatic discharge requirements." - Severity level 3, performance criterion B.

IEC 801-3

"Electromagnetic compatibility for industrial-process measurement and control equipment Part 3: Radiated electromagnetic field requirement." - Severity level2, performance criterion A.

IEC 801-4

"Electromagnetic compatibility for industrial-process measurement and control equipment Part 4: Electrical fast transient/burst requirements." - Severity level 2 performance criterion B. A "Declaration of Conformity" in accordance with the above standards has been made and is on file at Zapex.

APPENDIX G

Physical and Environmental Specifications

Electrical:	100 to 240 VAC, 50/60Hz
Operating Temperature:	+10°C to +35° (+50°F to 95°F)
Storage Temperature:	-20°C to +50°C (-4°F to 122°F)
Humidity:	Less than 80% (non-condensing)
Altitude:	0 to 3048m (0 to 10,000ft.)

Agency Approvals:

Emissions:	FCC Class A, CE (EN 55022A, EN 50082-1), VCCI Class A

APPENDIX H

Use of Dolby Trademarks for Audio

Introduction

Dolby Laboratories owns the trademarks “Dolby” and the double-D symbol “ 2 ,”which are registered in over 90 countries in the world. The marks are used on a variety of professional noise reduction products, cinema equipment and signal processor manufactures and sold by Dolby Digital Laboratories, Inc.

Use of the Dolby Trademarks is licensed to manufacturers of audio and video equipment. The appearance of one or more of the trademarks on a licensed product indicates that the product contains technology developed by Dolby Laboratories and that it meets performance standards set by Dolby Laboratories Licensing Corporation (DLLC).

Use of the Dolby Trademarks is also licensed to prerecorded audio and video companies whose products are made using technology developed by Dolby Laboratories. The appearance of any of the Dolby Trademarks on prerecorded media indicates that it was produced using one or more Dolby technologies and that it meets performance standards set by DLLC. Examples of the Dolby Trademarks available to licensees for identifying the specific technologies used in production and manufacturing are:

Dolby Trademark Logo:	For soundtracks recorded using:
1	Dolby Digital (AC-3) audio coding
3	Dolby Surround or when the soundtrack have been transferred from a Dolby theatrical release
6	Dolby Net audio coding
	For audio tapes recorded using:
! or s	Dolby B-type noise reduction
# or t	Dolby S-type noise reduction
& or u	both Dolby B-type noise reduction and Dolby HX Pro headroom extension
* or v	both Dolby S-type noise reduction and Dolby HX Pro headroom extension

Trademark and Standardization Agreements

Like any material property, a trademark may not be used by others without permission of the trademark owner. Also, if a trademark is licensed to others, the trademark owner must set quality standards and see that they are adhered to so that the use of the trademarks by others does not undermine the good reputation of the marks. In addition to these rather straightforward requirements, trademark law also demands that trademarks be used in somewhat restricted ways.

So that it and its licensees can comply with requirements of trademark licensing law, DLLC provides Trademark and Standardization Agreements for companies who wish to use the Dolby Trademarks on their audio and video media. These Agreements are royalty-free, and as a special incentive to promote the use of the Dolby Surround, Dolby Digital, and Dolby Net Trademarks, there is currently no processing fee for those trademark licenses. All other trademark licenses require a one-time $300 fee for processing the trademark license application. This fee is reduced to $250 in the case of audio cassettes manufactured by a Dolby Approved Duplicator.

A separate Agreement must be signed for each technology prior to use of the corresponding Dolby Trademark. The main points of the Agreements are as follows:

1. An authorization for the licensee to use the Dolby Trademarks on prerecorded media produced with Dolby noise reduction and/or Dolby HX Pro headroom extension, Dolby Surround, Dolby Digital or Dolby Net technologies;
2. Specifications for the correct use of the Dolby Trademarks and for acknowledging the ownership of the marks;
3. Specifications of the quality control arrangements, which involve the licensee providing occasional samples for quality appraisal.

WHO SHOULD SIGN THE TRADEMARK AND STANDARDIZATION AGREEMENT

A company that owns the rights to a piece of music or other recording, and is involved in the preparation, production and sale of prerecorded media incorporating Dolby technology must sign an Agreement if it wishes to use the Dolby Trademarks on the media released under the company's own labels.

A company which, under contract, simply manufactures prerecorded media for one or more customers (Dolby licensees), and/or is only involved in the preparation of artwork (labels, boxes, jackets, insert cards) need not sign an Agreement.

Responsibility for the quality of recordings and proper trademark usage rests with the licensee.

LICENSING PROCEDURE

A company interested in using Dolby Trademarks on its prerecorded video or audio media should contact DLLC for licensing information and to request a license.

DLLC sends a questionnaire and the appropriate Agreements to licensee for review and completion.

Licensee returns the completed questionnaire, signed Agreements and the appropriate processing fee (payable to Dolby Laboratories Licensing Corporation) to DLLC. In the case of tape-based formats such as audio and video cassette, a sample recording must also be submitted for quality evaluation. Test samples are acceptable, but only if they are manufactured using the same processes and equipment as the product which will eventually be distributed to the public. Samples of non-tape formats may be sent later, once the final product has been completed.

DLLC countersigns and returns one copy of each Agreement along with the appropriate trademark artwork.

Subsequent to signing an Agreement, we ask that licensees provide us with sample copies of materials which incorporate the Dolby Trademarks, such as discs, cassettes, insert cards, catalogs and advertisements, so that we can verify that our trademarks are being used correctly. If licensees have any doubts about correct trademark usage, we ask that they please contact us. We are always happy to check drafts of material to be printed or used in advertising and promotion, and to give advice on the correct use of our trademarks. We may also require the licensee to periodically submit product samples so that we may check the soundtrack quality and verify proper trademark use.

A NOTE TO REPLICATORS AND STUDIOS

Your clients may not be aware of the fact that a license Agreement with DLLC is required before Dolby Trademarks may be used on their products. Strictly speaking, it is our responsibility to provide information to new customers, but we need to know who those customers are. Accordingly, if your clients wish to use our trademarks we must rely on your cooperation to refer them to us so that licensing formalities can be completed.

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