PowerVCR™

CyberLink PowerVCR is a real-time MPEG-1 video recording software, which explore the fun of producing your own digital video. With CyberLink's break through video compression technology, video can be captured directly from PC cameras, camcorders, TV tuners, and VCRs, and records into high quality MPEG-1 format in real-time.

Currently, most digital video recording process requires raw video to be first captured into uncompressed AVI format files, then converted into MPEG-1 format in a non-real time process. By fully utilizing the power of Pentium the II processor, PowerVCR totally eliminates the inconvenience of the current method by recording video to MPEG-1 format directly, and saves a huge amount of storage space. Since AVI files are uncompressed, it takes up to 33GB disk space for a one-hour video file at 352x288 resolution. MPEG-1 occupies much less disk storage. It requires 650MB for the same video content. This is approximately the size of a CD-ROM, and is best for personal computer.

PowerVCR converts the files generated by capture devices (AVI format) into MPEG-1 format. MPEG-1 is an industry standard video format that maintains high quality audio and video information, so when the files are played on a computer the quality will be almost identical to the original. PowerVCR also offers cut and paste editing functions allowing users to produce video titles. Best for business applications and home hobbyists.

Main Features

- Real-time video encoding into MPEG-1 format up to 352x288 video resolution.
- Provide batch method to convert AVI files to MEPG-1 files.
- Provide cut & paste editing functions to edit MPEG-1 video clips.
- Adjustable video resolution
- Provide storage indicator for at-a-glance remaining hard disk capacity information
- Intuitive graphic user interface

Advanced Technical Specification

Video Specifications

MPEG-1, YV12, Y41P, YUY2, RGB16, RGB24, UYUY, YUY2, YUV9, and 1420 FourCC

176 x 144 (QCIF), 352 x 240 (SIF), 352 x 288 (CIF) and 320 x 240

30, 29, 97 fps selectable for NTSC

25 fps for PAL

24, 25, 12, 10 fps selectable for FILM

Video Preview and

Video Overlay modes

Audio Specifications

Input: PCM

Output: MPA (MPEG-1 Audio)

Selectable 8 or 16 bits sample bit rate

Selectable Mono, Stereo, Dual and Joint Stereo audio quality

MPEG Compression

- Selectable I/B/P frames, I/P frames and I-frames only recording options
- User defined number of P- and B-frames per GOP (Group of Pictures)
- Adjustable bit rate bandwidth allocation for I, P and B frames
- Provide VCD (fixed bit rate), fixed quality and user-defined recording profiles

Setting up a Digital Video Studio

With PowerVCR, video can be captured directly from PC cameras, camcorders, TV tuners, or VCRs and so on, and records into high quality MPEG-1 format in real-time.

The Computer

The computer, running Windows 95 or Windows 98 is the heart of PowerVCR video system. You need to prepare the following hardware devices to setup this system.

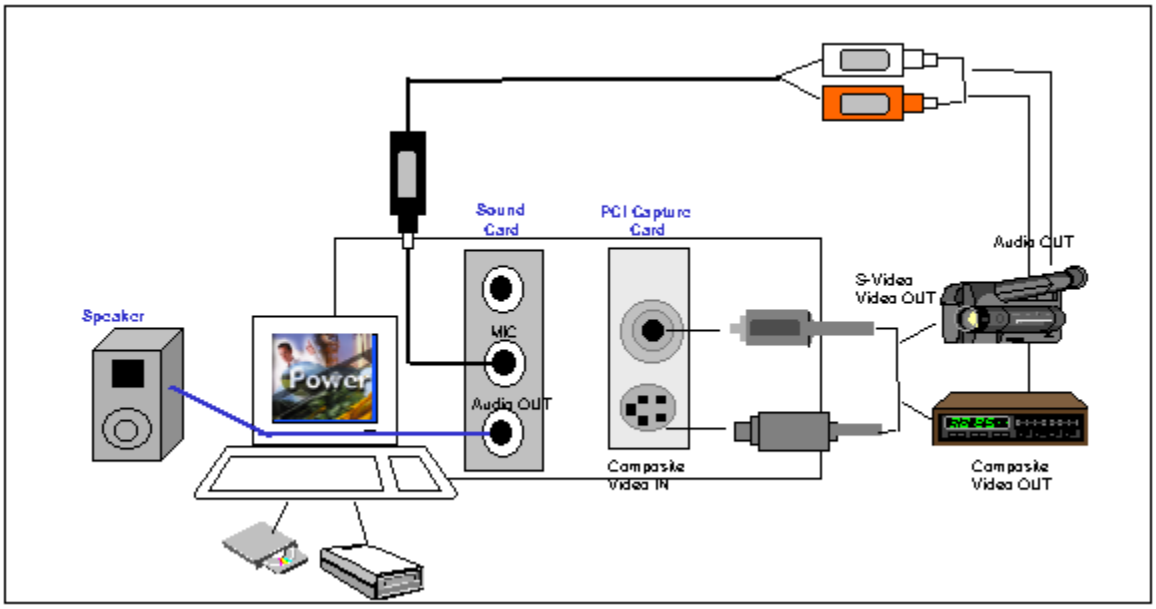
- Pentium II 300 or above for real-time recording; or Pentium 166 MMX or above for AVI conversion.
- A PCI video capture card. Many low-cost (under US$50) video capture cards are available. Usually a video capture card has S-video or Composite-video input jack. Some high-end devices has TV-tuner socket for receiving TV programs.
- An ISA or PCI sound card. This is used for audio input and output.
- A Speaker for audio playing.
- Cables for connecting video and audio devices to your computer.
- Hard Drives. Although MPEG-1 is a high-compressed video format, a one-hour MPEG-1 video file still needs 650MB for storage. And during video recording, you need to reserve at least twice of the hard disk space for temporary file swapping. Users who plan to process multimedia digital video should obtain a hard drive from 1 to 4 GB.
- RAM. Most digital video professionals start with between 32 and 64 MB of RAM. RAM is money in the bank, and you can never have enough.

The Process

Setting up a digital video desktop is the first step for video recording, processing, and even for further publishing. PowerVCR is a software product. Thus, before PowerVCR record video to MPEG file, you need to setup your computer and correctly connect video input devices (e.g., VCR, TV tuner, …) to capture raw video data to your computer. To complete the setup, you need to complete the following steps:

1. Correctly plug the video capture card on your PC motherboard. PowerVCR requires an PCI capture card for sufficient performance. Then install the associated video capture driver to your Windows 95 or Windows 98 system.
2. Connect your video source devices VCR, CCD cameras, TV (if TV-tuner is available on the video capture card) with a correct video cable (S-video or Composite-video).
3. Connect your audio card (or sound card) with the video source devices (audio input). And connect audio card with your speaker (audio output).

Video Capture Configuration



How to capture analog video to your PC?

How to capture analog video to your PC?

Types of hardware peripherals.

Video Capture Card: The Intel based PC requires a video capture card to capture analog video from video tapes or video cameras. PowerVCR supports 32-bit PCI bus capture card. Most video capture cards either have a composite-Video connector or an S-Video connector or both on the same card.

Most video capture cards only capture video. Audio capture is done through the sound card of the computer. PowerVCR supports both 16-bit ISA bus sound cards and 32-bit PCI bus sound cards.

TV Tuner Card: A number of companies market TV tuner cards for PC's. In this case you can feed the television radio frequency (RF) signal into the TV tuner card which will demodulate the NTSC, PAL, or SECAM signal. Use an associated video capture card to convert the demodulated composite analog video to an AVI files.

Combo Card: TV-Tuner + Video Capture (may be + VGA device)

Sound Card: Sound cards usually have a Microphone input jack, a Speaker or Headphone output jack and, a Line input jack. Line input and the microphone input are not inter-changable. The input jacks use different electrical signals. Most users will use the microphone for input and speakers or headphone for output.

Video Format invokes a Video Format dialog box provided by the video capture driver; this dialog box differs depending on the capture card.

Video Capture Driver

How to get the capture driver information from your Windows 95/98 system, and to install or update the capture driver?

In Windows 95/98, users can view and configure the video capture driver by selecting 'System' in the Control Panel. Then select the 'Device Manager' tab. Each device has "Properties." Users can view and change the properties either by:

(1) Click once on the device icon in System|Device Manager to select the device.

(2) Click once on the Property Button in System|Device Manager.

Or

(1) Double-click on the device icon in Device Manager.

Users can usually determine the version of the device driver from the Driver tab of the Device Properties in System|Device Manager. The Driver tab usually lists all of the files installed on the system that make up the device manager. Use the Driver tab to install or update the video capture driver.

About Cables and Connectors

About Video Formats

About the PC Graphics Cards, and Video Overlay mode

About Cables and Connectors

Every video device uses its own type of cables. Cables are usually equipped with the video device. Most capture devices have connectors for both Composite-video and S-video jacks. Some high-end capture devices even comes with a TV-tuner jack.

Composite-video jack 

S-video jack 

Composite-video is for less expensive types of video devices that produces a single video signal. If you have a VHS camcorder or VCR, it is composite. S-video produces a separate video signal for better quality than composite-video. If you have an S-VHS or Hi-8 camcorder or VCR, it is S-video.

Also see About Video Formats

To appropriate connect your video device with the host computer, you will need:

- One video in/out cable per video device. For example, if you want to connect a VCR to your computer, you will need a composite-video cable to plug in the Video_Out jack of the VCR, and plug in the Video_In jack of the video capture card.
- Connect the Audio Line Out jack from the VCR to the Audio LINE IN jack on your sound card. Then Connect the Audio LINE OUT jack from your sound card to audio speakers.

On the horizon is a new input/output interface standard named FireWire, which is an implementation of the IEEE 1394 specification. FireWire offers a much higher transfer rate, and allows to be connected and disconnected without shutting down the host computer. FireWire connections are currently used with new digital (DV) camcorders. Several PCI-based computer boards will support FireWire connectors for video input.

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About the PC Graphics Cards, and Video Overlay mode.

PC Graphics Card

The current generation of graphics controllers for PCs incorporate a number of hardware features to improve playback of video. Video acceleration features have become standard in most chips.

Your computer's PC video card must be able to display at least 256 colors. Almost all current PCI and AGP video cards can support this requirement.

Video Overlay Mode

The ability to superimpose computer graphics over a live or record video signal and store the resulting video image on hard disk. Whether you'll be able to see the video in this manner depends on the type of PC Graphics card on your computer.

About Video Formats

Analog Video Formats

Composite-Video. A video signal format that includes the complete visual waveform, including: chrominance (color), luminance (brightness), blanking pedestal, field, line, color sync pulses and field qualizing pulses. The NTSC video signals are an example of composite signals. Composite signal is particularly prone to errors in reproducing exact colors due to the overlap of the chrominance and luminance signals.

S-Video. A video signal format used in Hi8, S-VHS and some laser-disc products. It transmits luminance and color portions separately, using multiple wires. S-video is generally superior to composite video in reproducing color correctly.

Analog Video Format Standards

There are currently 3 standards in the world for composite, color encoded video.

Standard	Description	Format
NTSC	NTSC stands for the National Television System Committee of the Electronics Industries Association, the organization which defined the standard format adopted by the FCC for broadcast television in the United States, Japan, Canada, and Mexico. This is also called "composite video" because all of the video information, luminance, and color combined into a single analog signal.	A color television format having 525 scan lines; a field frequency of 60 Hz; a broadcast bandwidth of 4 MHz; line frequency of 15.75 KHz; frame frequency of 1/30 of a second; and a color subcarrier frequency of 3.58 MHz
PAL	PAL stands for Phase Alternation by Line, the broadcast video standard used in West Germany, Great Britain and most Western European nations. By reversing the relative phase of the color signal components on alternate scanning lines, this system avoids the color distortion that appears in NTSC. Otherwise, PAL closely resembles NTSC. Based on the 50 Hz power system, PAL displays 625 lines interlaced at 50 fields per second (25 frames per second).	625 lines of resolution at 25 frames per second 768 x 576 = 442,368 pixels x 3 (RGB) = 1,327,104 Bytes/Frame 1,327,104 x 25 = 33.178 Mb/Sec
SECAM	SECAM stands for Sequential Couleur A Memoire" (sequential color with memory). Video format used in France, Eastern Europe, F.S.U and some Middle Eastern countries. Like PAL, SECAM is based on a 50 Hz power system, displaying interlaced lines at 50 fields per second. The color information is transmitted sequentially (R-Y followed by B-Y, etc.) for each line and conveyed by a frequency modulated sub-carrier that avoids the distortion arising during NTSC transmission.	625 lines of resolution at 25 frames per second

Digital Video Format Standards

A Four Character Code or FOURCC is a four byte code defined by Microsoft as part of Video for Windows to identify various types of digital video data.

Microsoft defined FOURCC to uniquely identify pixel layouts used in uncompressed image and video. For example, the FOURCC ‘YUY2’ identifies the layouts of pixels in YUV space (as opposed to RGB). These codes are used in interfacing with video capture and graphics cards.

About MPEG-1 Compression

MPEG-1 Video belongs to a family of ISO/IEC standards. The Moving Picture Experts Group (MPEG) has defined a bit-stream representation for synchronized digital audio and digital non-interlaced video, compressed to fit into a bandwidth of not more than **1.5 Mbps**.

About 1.1 Mbps are for video, 128kbps are for audio, and the remainder are for the MPEG system. MPEG-1 consists of several parts, of which **System, Video**, and **Audio** primarily interest us. The MPEG-1 system is responsible for multiplexing and synchronizing one video stream with one or multiple audio streams. Beyond simple playback, the MPEG system stream allows **random access, fast forward,** and **rewind**.

MPEG-1 provides a wide range of video resolutions and data rates. A major application of MPEG-1 is the storage of audio-visual information on the storage media such as CD-ROM and DAT, which have the corresponding data retrieval rate (1.2 Mbps). For 30 frames/second video at a display resolution of 352x240 pixels, the quality of compressed and decompressed video at this data rate is often expressed as similar to VHS recording.

MPEG-1 Video Architecture

MPEG-1 Audio Architecture

System Requirement

- Real-Time recording: Pentium II processor at 266 MHz, at least 32 MB RAM
- AVI conversion: Pentium II Processor at 166 MHz, at least 32 MB RAM
- PCI video capture card supporting Video for Windows interface
- Windows 95 or Windows 98

How to create an MPEG-1 video file?

PowerVCR System Setup

Recording an MPEG-1 video file directly from VCR, TV, CCD.

Converting AVI files to MPEG-1 format

Editing an MPEG-1 file from multiple video sources with cut & paste functions

Examine PowerVCR Status Panel

Recording an MPEG-1 video file directly from VCR, TV, CCD,...

Once you have correctly connected your video devices to the PC video capture card using either S-video or composite-video cable, and correctly connected the video devices with your PC sound card and audio output speaker, PowerVCR can start recording MPEG-1 video while the video is playing back. Please see Setting up a Digital Video Desktop.

Record Live Video Stream to MPEG-1 File

1. Before you record, please examine the available disk space on the PowerVCR working hard disk drive. For PowerVCR MPEG-1 real-time recording, the estimated hard disk space requirement is as the following table.

MPEG-1 Profile Type	Space required during recording process	Space required after making movie
Constant quality movie	44 MB for a one min video	22 MB for a one min MPEG-1 video file
VCD (NTSC)	18 MB for a one min video	9 MB for a one min MPEG-1 video file

2. Start PowerVCR main program, and the input video stream will be shown on PowerVCR's video display window. To start MPEG-1 recording, simply click <Record> button. Click <Stop> button to stop the recording process.
3. After the recording process is done, you may click on the <Play> button to view recorded video. Click on the <Maximize> button to playback the video.
4. PowerVCR will prompt the same window so you may specify the file destination. Note that

PowerVCR saves your video files with the .mpg extension. Now you may start another recording process. You may choose to append the new recording to the previously saved file by pressing the <Start> button. Or if you wish to record an indivudual video clip, press the <Clear> button to clear all temporary files in the PowerVCR working directory.

Scheduling PowerVCR Recording Tasks

1. Click on the <Timer> button to set the recording schedule, PowerVCR will start recording process automatically at the specified time.

Configure the MPEG-1 Recording Parameters (Profile)

PowerVCR provides the default MPEG-1 profile parameters for 'good quality' video recording. If you want to set other recording profile or define your own recording profile for special purposes, you may click on the <Profile> button to complete this task. Please see Defining the MPEG-1 video format for the information of MPEG-1 profile setting. Please refer to About MPEG-1 Video Compression to know more about MPEG-1 knowledge.

Configure the Video/Audio Device

If you want to configure the Video/Audio hardware device in order to adjust the input data stream, click on the <Config> button to do so. Please see Defining the captured video format for more information.

Converting AVI files to MPEG-1 format

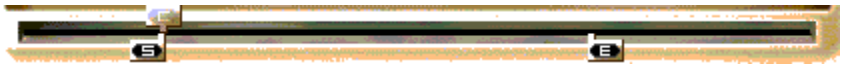
If you have AVI files and want to convert them to MPEG-1 files. PowerVCR provides the encoding (conversion) function to help complete your tasks. Converting AVI files to MPEG-1 allows lessening the storage requirement.

Keep in mind that the quality of your MPEG files can never exceed the quality of your source files. If the properties of your source file do not meet MPEG requirements, PowerVCR will adjust the file to bring it into compliance. For example, MPEG Frame Rates are 23.976; 25; 29.97; and 30 FPS. If your source file Frame Rate does not match one of these, PowerVCR will perform a Frame Rate conversion. Many other adjustments may will be made in order to produce the highest quality MPEG compliant file from your source file.

Steps of Encoding AVI File(s) to MPEG-1 File(s)

1. Click on <Program> button and choose <Video Converter> option.

2. Click on <Add Job> button to add your AVI file(s). At the PowerVCR lower-right 'Select Source File' screen to select an AVI file. Click the <Next> button.
3. Choose the MPEG-1 video recording profile at the 'Select Profile' screen. PowerVCR uses 'Fixed Quality' as the default profile for AVI to MPEG-1 recording. You may choose either one from the profile list. Click the <Next> button.
4. If you want to convert the whole AVI file, click on <Next> button directly. Or, if you want to record a part of the AVI file, scroll the <S> button to define the starting point and <E> button to define the ending point. Click on <Next> button.



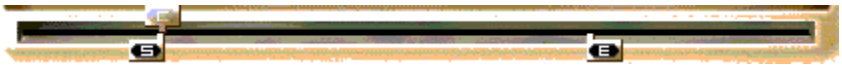
5. You may specify the path and file name for the target MPEG-1 file. And click <Save> button to confirm your setting. Click <Finish> button to complete the MPEG-1 file conversion setting.
6. If you have more AVI files to be converted, repeat the steps from 1 to 6. If you want to modify the MPEG-1 encoding setting for any AVI file, highlight that file name on the job list, click the <Edit Job> button to modify the recording contents.
7. After selecting AVI file(s) and setting their associated encoding parameters, highlight the source AVI file on the job list and click <Run> button to start the recording (encoding) process.
8. Having done the file conversion process, you may hit the <Play> tab and click on <Play> button to examine the AVI to MEPG-1 conversion result. This MPEG-1 file generated by PowerVCR can be played by any MPEG-1 player, including Microsoft Media Player.

Creating a Target MPEG-1 file from multiple MPEG-1 Video Sources

PowerVCR has the capability of frame **accessing** (frame accurate) in MPEG-1 video files. Such that you may select any portion of an existing MPEG-1 file and merge with other MPEG-1 files to create your own video titles.

Selecting MPEG-1 files and Merging

1. Click on <Program> button and choose <Video Editor> option.
2. Click on <Add Job> button to add an MPEG-1 source file (with 'mpg' as the file extension). At the lower-right 'Select Source File' screen to choose the source file. Click <Next> button.
3. If you want to select a portion of this source MPEG-1 file, scroll the <S> button to define the starting point, and <E> button to define the ending point. Click on <Finish> button to complete the video selection process.



4. If you want to merge several MPEG-1 files to a single one, repeat steps 1 to 3.
5. To remove an MPEG-1 file from the job list, highlight that file from the job list and click on <Del Job> button.
6. To reorganize the sequence of an MPEG-1 file on the job list, highlight that file and click on <Up>

or <Down> button to adjust the sequence.

7. Click on <Run> button to start the file merge process. Then PowerVCR will display a dialog box and ask you to enter the target path and file name. Press <Save> button to complete this job.
8. Having done the file merge process, you may hit the <Play> tab and click on <Play> button to examine the result. This MPEG-1 file generated by PowerVCR can be played by any MPEG-1 player, including Microsoft Media Player.

Defining the captured video format

Video Configuration

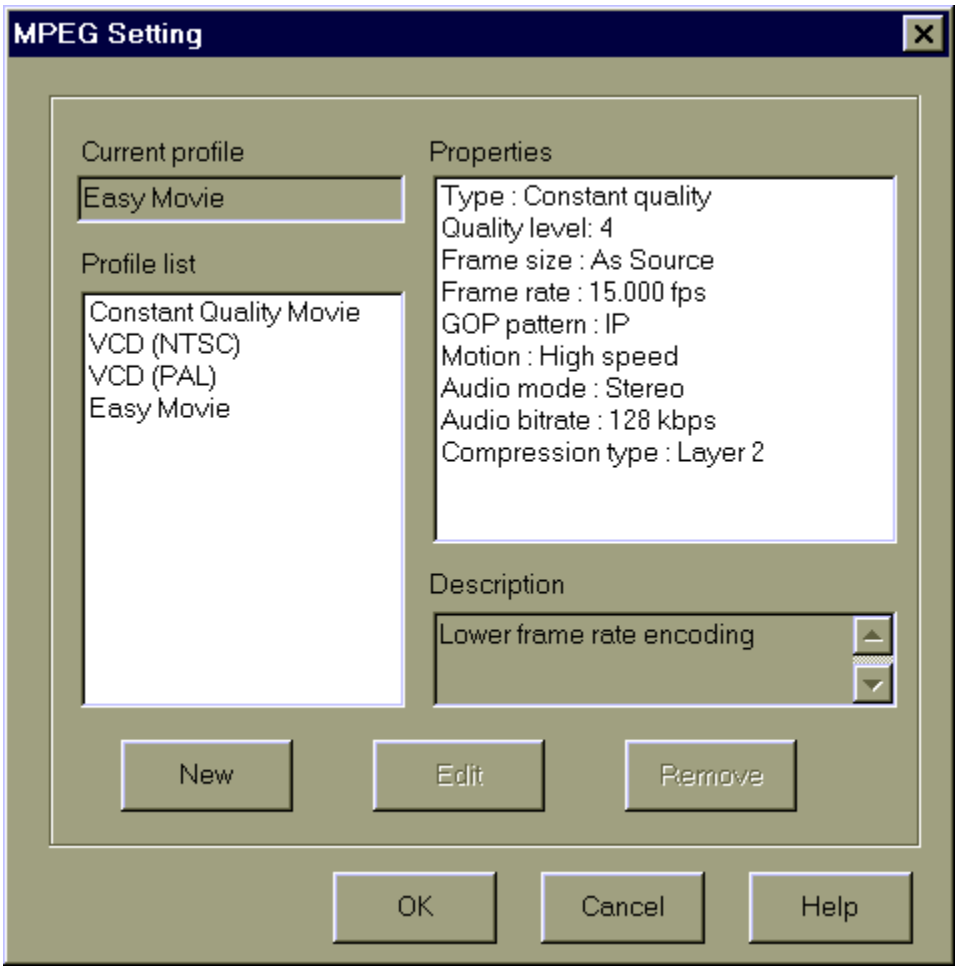
Audio Configuration

Advanced Configuration

Defining the MPEG-1 Video Profile

PowerVCR allows you to configure MPEG-1 video profile for recording or converting video files. PowerVCR provides the following 4 standard video profiles for standard publishing requirements. If you have other special requirements, you may also define your own recording profile by clicking on the <New> button to define your own recording profile .

Please refer to About MPEG-1 Compression for the MPEG-1 video architecture.



MPEG-1 System Stream Profile Specification

3	NA		4
Depending	1152 kbps	1152 kbps	Depending
As source	SIF (352x240)	CIF (352x288)	As source
24 fps	29.970 fps	25.000 fps	15 fps
IBBPBBPBBP	IBBPBBPBBP	IBBPBBPBBP	IP
High speed	High Speed	High speed	High speed
Stereo	Stereo	Stereo	Stereo
384 kbps	224 kbps	224 kbps	128 kbps

Layer 2 Layer 2 Layer 2 Layer 2

For defining the MPEG-1 profile, you may either choose ‘fixed bit rate’ or ‘fixed quality’ for video recording. For the bit rates of ‘fixed quality’ profiles (such as ‘constant quality movie’ and ‘easy movie’) are not fixed; whereas PowerVCR guarantees the recording quality. For VCD profiles (NTSC, and PAL), the bit rates are fixed, and thus you may estimate the required disk space for any given lengths. However, the recording quality will not be guaranteed.

PowerVCR defines 4 levels of quality encoding levels (from 1 to 4, 1 is the best and 4 is acceptable). High quality recording requires more video data which translates to more disk space.

Video Configuration

Video configuration is to configure the video input of your video capture device of the computer. Thus, the configuration screen is dependent on the hardware driver types. The example listed below is the configuration screen of Brooktree Bt848 Capture Driver. If your capture driver is not this one, the screen displayed will be different.

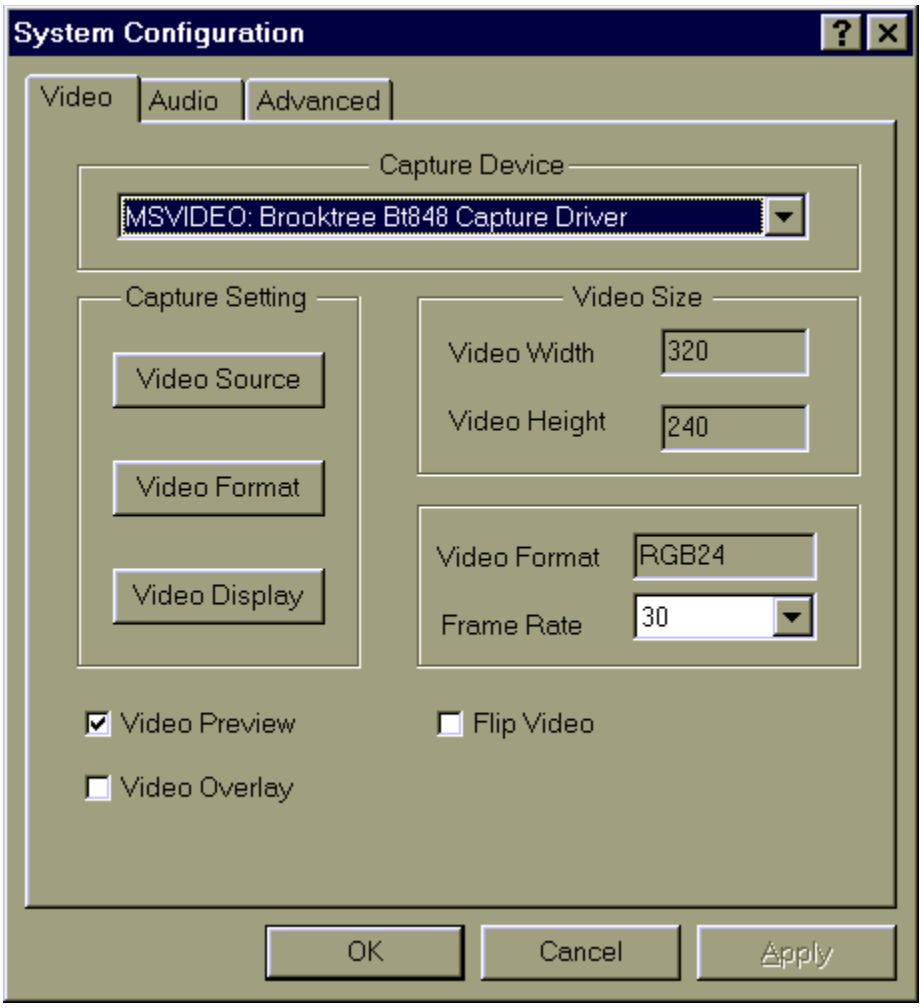
Video Source defines the type of PowerVCR active video source. If you have several video sources connected to your computer (e.g., VCR, CCD Camera), you may have to specify one active source for PowerVCR to record video.

Video Format defines the video input dimension (also named as Video Size) and the image format. The image format is usually expressed as 'Four Character Code or FOURCC' format. Please see About Video Formats for more details. If the video format which you choose is also supported by PowerVCR system, the configuration will also be displayed at Video Format field at the lower right side of the screen. For this example, the selected video format is RGB24. If the format chosen from the hardware driver screen is not supported by PowerVCR, an error message 'This video format is not supported by PowerVCR' will be displayed.

Video Display purely is the configuration for hardware device. PowreVCR will not take these parameters for video recording.

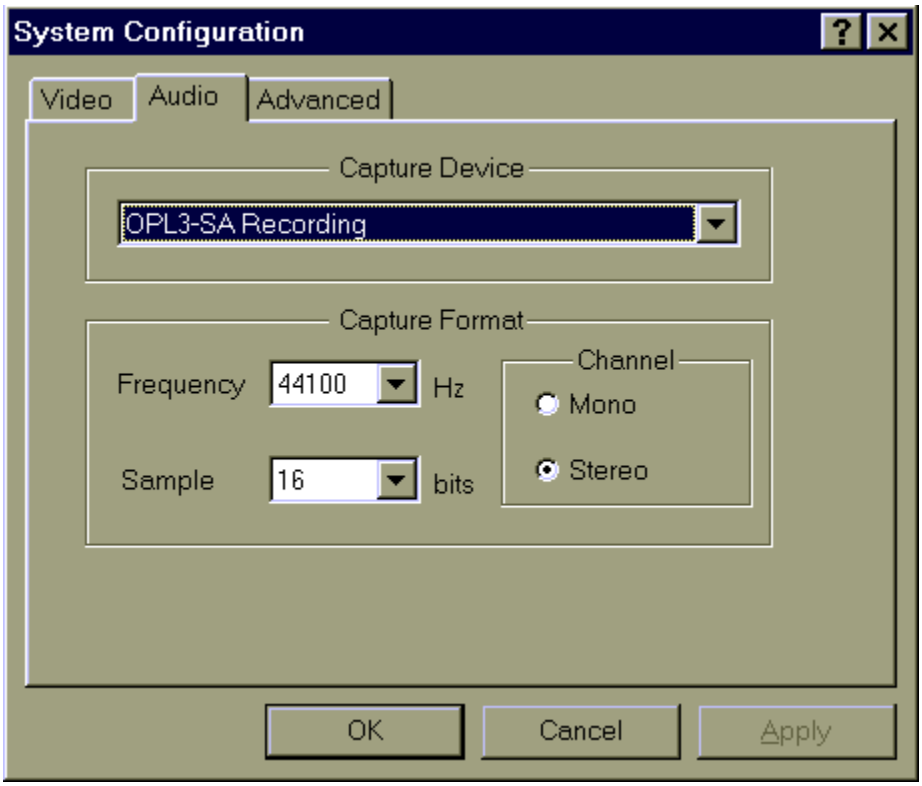
Flip Video. Certain video format (such as YUY2) provided by hardware capture device might be displayed as 'up-side-down' mode during recording. You may check this option to correct the video display to a normal mode.

Video Preview/Video Overlay mode. Video Overlay mode has the ability to superimpose computer graphics over a live or record video signal and store the resulting video image on hard disk. Whether you'll be able to see the video in this manner depends on the type of PC Graphics card on your computer. It happens that some graphic boards may not display video properly if the Video Overlay mode is chosen. This is sometimes caused by the conflict between hardware capture device and the graphic board driver. If this happens, please check the 'Video Preview Mode.'


System Configuration
Video
Audio
Advanced
Capture Device
MSVIDEO: Brooktree Bt848 Capture Driver
Capture Setting
Video Source
Video Format
Video Display
Video Size
Video Width
320
Video Height
240
Video Format
RGB24
Frame Rate
30
Video Preview
Flip Video
Video Overlay
OK
Cancel
Apply

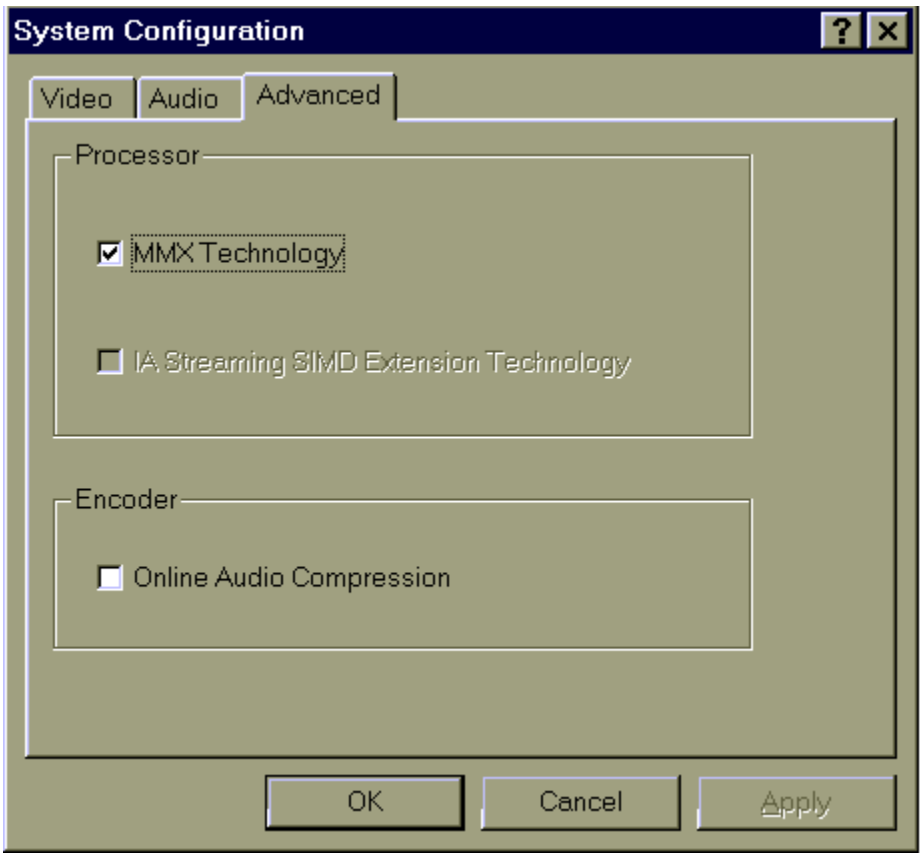
Audio Configuration

Audio configuration is to configure the audio card installed on your computer. The configuration screen is dependent on your audio card driver. The example displayed below is the audio configuration for 'OPL3-SA Recording' driver. To configure the audio captured format, please refer to the user manual or the audio board driver, and also see the MPEG-1 Profile Audio Definition.



Advanced Configuration

PowerVCR fully optimizes Pentium CPU computation power to accelerate and improve the video processing performance and quality. PowerVCR automatically detects your system's configuration and enables the suitable computation instructions. If your CPU is Pentium III or implements 'SIMD Extension commands, the recording performance will be further optimized.



CyberLink Company Profile

CyberLink Corporation, incorporated in 1994, is one of the world leaders in providing Video/Audio software products. CyberLink has developed several multimedia software products such as "VCD PowerPlayer" (a MPEG-1/VCD2.0 software decoder), "CDWizard" which can play all types of CD formats, including VCD, photo CD, audio CD, CD-Plus and CD-ROM, "LinkTEL" (a software H.324 video conferencing system that support telephone line/Internet/Intranet/ISDN communications), and VideoLive Mail which can encode you video and voice into a .exe file which can be sent through email system. CyberLink has also developed software MPEG-2/DVD player, PowerDVD, which can playback DVD titles on Pentium-II PCs. MPEG-1 Encoder software, PowerVCR, which is a real-time software-only MPEG-1 encoder and can turn your PC into an interactive VCR, plus edition functions.

Experienced Management Team

The founder of CyberLink is Dr. Jau Huang who is also a full professor of the Computer Science Department of National Taiwan University. Dr. Huang has extensive experience in distributed multimedia systems such as video server and video conferencing systems and is currently in charge of product planning for the company. The CEO CyberLink of CyberLink is Ms. Alice H. Chang, who was previously Executive Vice President of Trend Micro Incorporated (Trend is the world's leading virus protection software company) and has many years of experience in the software industry. Ms. Chang holds an MBA degree from UCLA and is an expert in marketing and sales of software products worldwide. In addition, the staff members of the sales and marketing departments all have more than 5-years related experience in the software industry.

Strong R&D Capability

CyberLink has a very strong R&D team headed by Dr. Jiun Hsu and Dr. Johny Tseng who both received their Ph.D. degrees in computer science with deep understandings of technologies in digital signal processing and data compression. All other engineers in the R&D department have master degrees in computer science, specializing in audio and video compression. Presently in the R&D department there are 4 engineers holding Ph.Ds and another 15 engineers holding Master degrees. In addition, CyberLink has three partners actively involved in all projects. Among them, Professor Wu specializes in digital signal processing and data compression; Professor Ouhyoung specializes in speech processing, 3-D graphics and virtual reality; and Professor Chen specializes in Internet applications and multimedia database systems. With the full support of these partners, CyberLink will continue to provide top quality Video/Audio software products to our customers.

Technical Support Information

Before contacting Technical Support, you should check your manual and the Help system. If you still can not solve the problem, you can obtain product support in several ways:

E-mail

Ask questions and receive answers from the Technical Support Department via the Internet. Just send e-mail addressed to the account listed below. You will receive a reply via e-mail.

powervcr@cyberlink.com.tw

Note: Technical Support is provided for registered users. Be sure to include your product CD-Key in the e-mail.

Fax

You can also fax your questions. You will receive a response via fax.

CyberLink Corporation Technical Support Fax: 886-2-8667-1300

Note: Technical Support is provided for registered users. Be sure to include your CD-Key in the fax.

Telephone

You can reach CyberLink Corporation Technical Support by phone between 9:00 A.M. and 5:00 P.M. Monday through Friday. When you call, you should be at your computer and have your documentation at hand. Be prepared to provide the following information:

- Product CD-Key used for registration.
- Product version number.
- The type of hardware you are using.
- The exact wording of any messages that appear on your screen.
- What happened and what you were doing when the problem occurred.
- How you tried to solve the problem.
- Technical Support Phone: 886-2-8667-1298

Note: Technical Support is provided for registered users. Be sure to have your product CD-Key ready.

Dealer

Contact the CyberLink Corporation Dealer/Distributor in the country where you bought your product.

MPEG-1 Video Architecture

The MPEG-1 architecture is based on a sequence of pictures, each of which contains the data needed to create a single displayed image. Note that the order of transmission of pictures in the data stream may not be the same as the order in which pictures will be displayed.

There are four different kind of pictures, depending on how each picture is to be encoded. I frames, P frames, B frames and D frames.

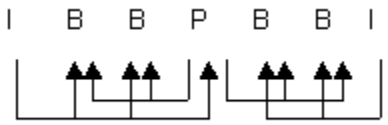
I frames (intracoded frames) are coded without any reference to other image. MPEG makes use of JPEG for I frames. They are points for random access in MPEG streams and can be used as a reference for the coding of other images.

P frames (predicted frames) which are coded using Motion Estimation from a previous I or P frame.

B frames (bidirectionally predictively coded frames) are interpolated frames, which are coded by interpolating between the previous and the following I or P picture. This process is sometimes referred to as bidirectional prediction.

D frames (DC coded frame) are encoded intraframes which are a special format. This is only used for implementing fast search modes.

Display Order:



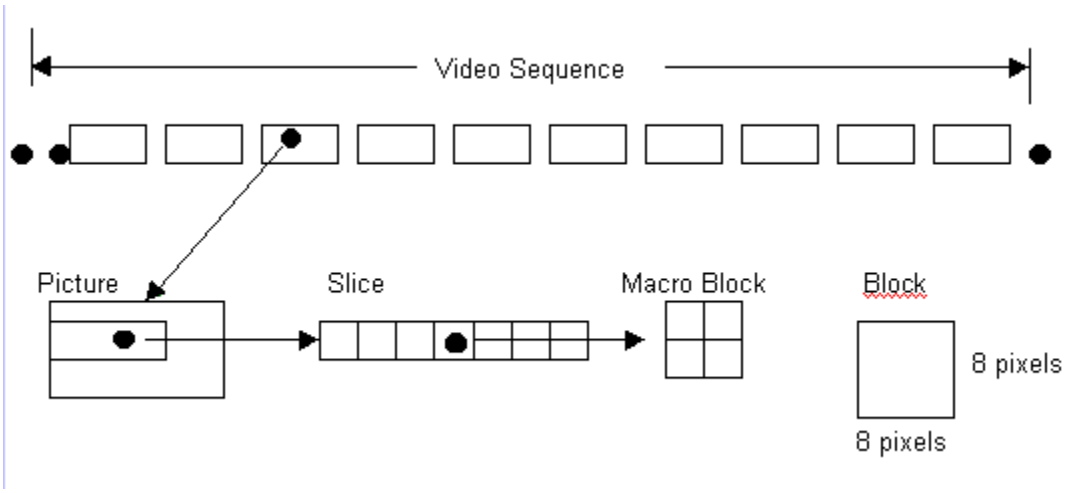
Transmission order: I P B B I B B

See Advanced topics:

Group of Pictures (GOP) and GOP Intervals

Slice Intervals

Data Hierarchies of MPEG Video Streams


Video Sequence
Picture
Slice
Macro Block
Block
8 pixels
8 pixels

Motion Estimation

The extraction of motion information from a video sequence is called motion estimation. If we use the block matching technique, the motion vector is obtained by minimizing a cost function measuring the mismatch between a block and each predictor candidate. The search range V of the possible motion vectors and the selection of the cost function are left to the implementation. Exhaustive searches, where all the possible motion vectors are considered, are known to give good results, but at the expense of a very large and complex of computation of large ranges.

Group of Pictures (GOP) and GOP Intervals

An important data structure in the data hierarchies of MPEG-1 Video is the GOP. A GOP contains a fixed number of consecutive frames and guarantees that the first picture of each GOP is an I frame. A GOP gives an MPEG encoder information as to which picture should be coded as I, P, B frame and which frames should serve as references.

GOP sets the frequency of "I" frames based on the GOP definition. For example, an entry of 15 causes an "I" frame to occur every 15 frames. The maximum value for GOP is **128**. If you set the GOP too low, you will have a high overhead of headers. If you set the GOP too high, seeking (random access) will be limited to large increments within your file. For example, an entry of 128 limits a seek to 4 second increments.

SubGOP sets the frequency of "P" (Predicted) and "B" (Bi-directional) frames based on the MPEG SubGroup size definition. For example, an entry of 3 causes a P reference frame to occur every third frame within the GOP. The maximum value for SubGOP is 6. The SubGOP should be divisible into the GOP.

Slice Intervals

Slice Interval sets the number of macroblocks between MPEG slice headers in each frame. The maximum value for Slice Interval is 1200.

MPEG-1 Audio Architecture

MPEG-1 Audio/PowerVCR Audio

PowerVCR audio compression supports MPEG-1 layer1 and layer2 model. **Layer 1** best suits bit rates above 128kbps, but should not encode at higher compression rates than 384. For example, Philips Digital Compact Disc Cassette (DCC) uses layer 1 compression at 192 kbps per channel.

Layer 2 has a target bit rate of 128 kbps per channel. It uses more efficient code for the representation of the bit allocation. Possible applications for this layer are the storage of audio sequences on CD-ROM and the audio track of the Video CD.

The MPEG-1 audio standard defines a bit stream that can support one or two audio channels: **a single channel, two independent channels, or one stereo signal**. The two channels of stereo signal can be processed either independently or as joint stereo to exploit stereo redundancy.

Mono is a single channel of audio. Use the Mono setting with mono sources or when you need the lowest possible bit rates.

Stereo includes two independent channels. The total bit rate remains constant, but the split between the channel can vary. The encoder uses this flexibility to improve quality by allocating more bits to the channel with more dynamic signal. Use the Stereo for best quality stereo audio at higher bit rates.

Joint Stereo shares certain bits between high frequency left and right channels. This improves compression efficiency at a slight loss of stereo separation. Lower frequencies are treated as normal stereo. Select the subband at which the transition to joint coding occurs: 4 bands, 8 bands, 12 bands, 16 bands, or 32 bands. Lower transition yields a stronger joint stereo effect. At lower bit rates, a setting of 32 bands is indistinguishable from normal stereo. Use Joint Stereo to obtain the best quality over mid to lower bit rates.

Dual Channel includes two completely independent channels (left/right), each with half the total bit rate. Dual is generally used for multi-lingual audio programs.

PowerVCR System Setup

To setup PowerVCR to your computer is simple. Simply click (or double click) on the program 'Setup.exe', and the installation process will automatically be invoked.

Before you install PowerVCR to your computer, you need to make sure the available disk space of the drive of which PowerVCR's working directory is defined. For PowerVCR MPEG-1 file real-time recording, the estimated hard disk space requirement is as the following table.

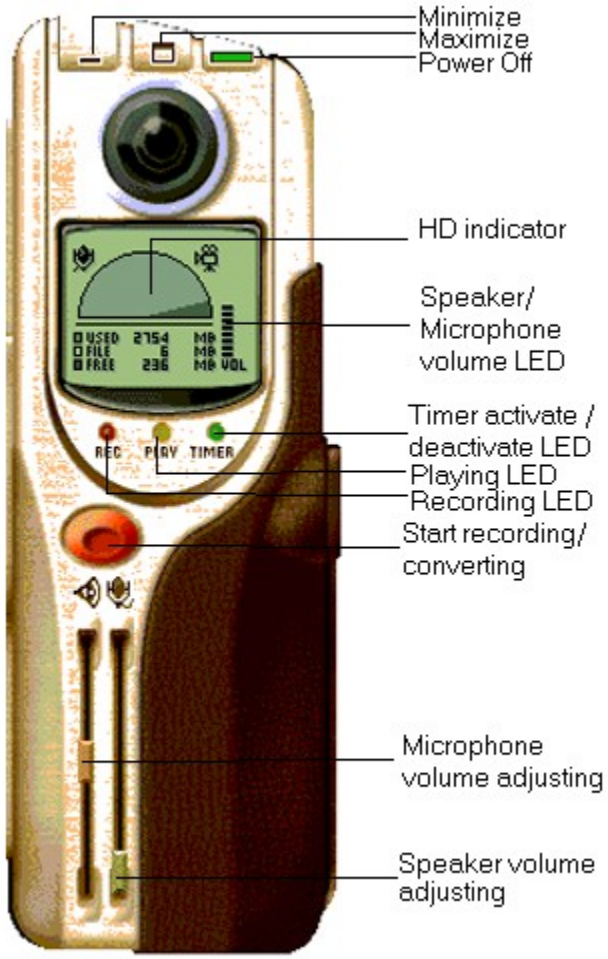
MPEG-1 Profile Type	Space required during recording process	Space required after making movie
Constant quality movie	44 MB for a one min video	22 MB for a one min MPEG-1 video file
VCD (NTSC)	18 MB for a one min video	9 MB for a one min MPEG-1 video file

Note that PowerVCR's working directory is not necessarily the same as PowerVCR's installed directory. During the installation process, the setup program will ask you to define the following paths:

1. PowerVCR's installation directory. The default directory is 'c:\Program Files\CyberLink\PowerVCR'.
2. PowerVCR's working directory. Please specify the hard disk drive with the largest free space.

Examine PowerVCR Status Panel

During MEPG-1 recording, PowerVCR displays the system status at the right side system panel to indicate the recording process as well as the hard disk available space. "HD indicator" shows the available disk space of the working hard disk is available.



Defining Your Own Recording Profile

If you are familiar with MPEG-1 video architecture, you may define the MPEG-1 recording profile. For the MPEG-1 video information, please see the About MPEG-1 Compression.

Defining Your Own MEPG-1 Profile

To define an MPEG-1 profile needs to configure Video and Audio system parameters. For the audio profile definition, please see the MPEG-1 Profile Audio Definition.

For the 'Video' configuration, you have to configure the following parameters:

- Video Quality. You may choose either 'Constant Quality,' or 'Constant Bitrate.' PowerVCR provides 4 quality levels, from 1 to 4 (1 for the best quality, 4 for the acceptable quality). If you choose 'Constant Quality,' the recording quality is guaranteed, but the bit rate is not fixed. If you choose the 'Constant Bitrate,' the quality is not guaranteed, but you can estimate how much disk space will be used for a certain length of video. Figure A is for the 'Constant Quality' configuration. For the constant bit rate, please see Figure B.

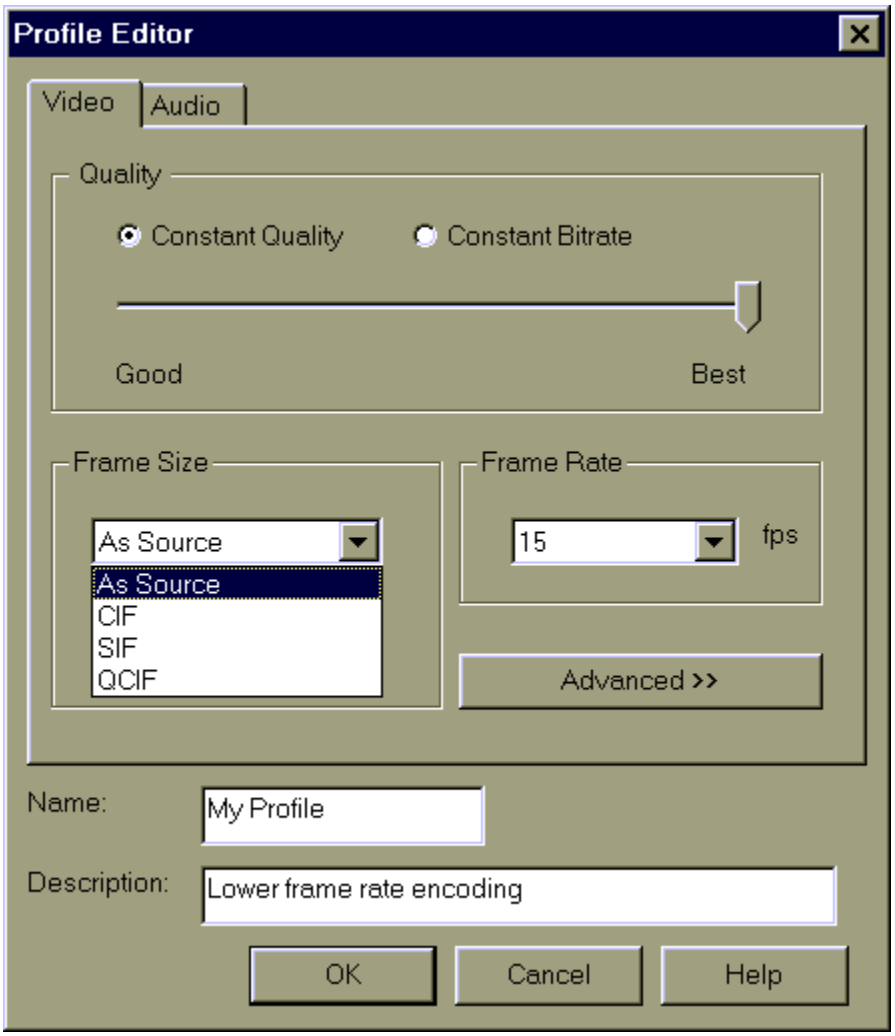


Figure A

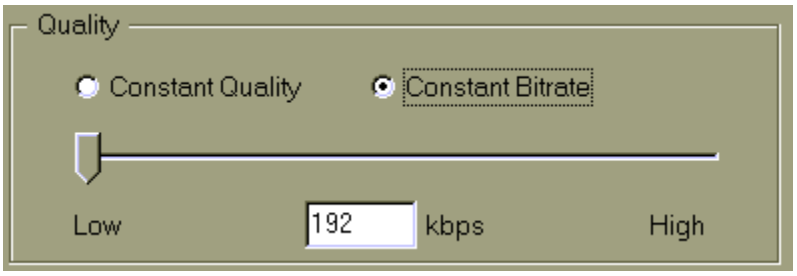


Figure B

- Frame Size. Frame size is defined by pixels on screen. You may choose either the same as the video source, CIF (352x288), SIF (352x240), or QCIF (146x144).
- Frame Rate. Frame rate are defined as the number of frames displayed per second (fps). If the frame rates of your video input devices or original AVI files are lower than the number defined in the recording profile, PowerVCR will automatically insert dummy frames to the recorded video to make the frame rate the same as profile.

If you want to configure the MPEG-1 video architecture, click on the <Advanced> button for further configuration. Please see MPEG-1 Profile Advanced Setting.

MPEG-1 Profile Audio Definition

PowerVCR audio compression supports MPEG-1 layer1 and layer2 models.

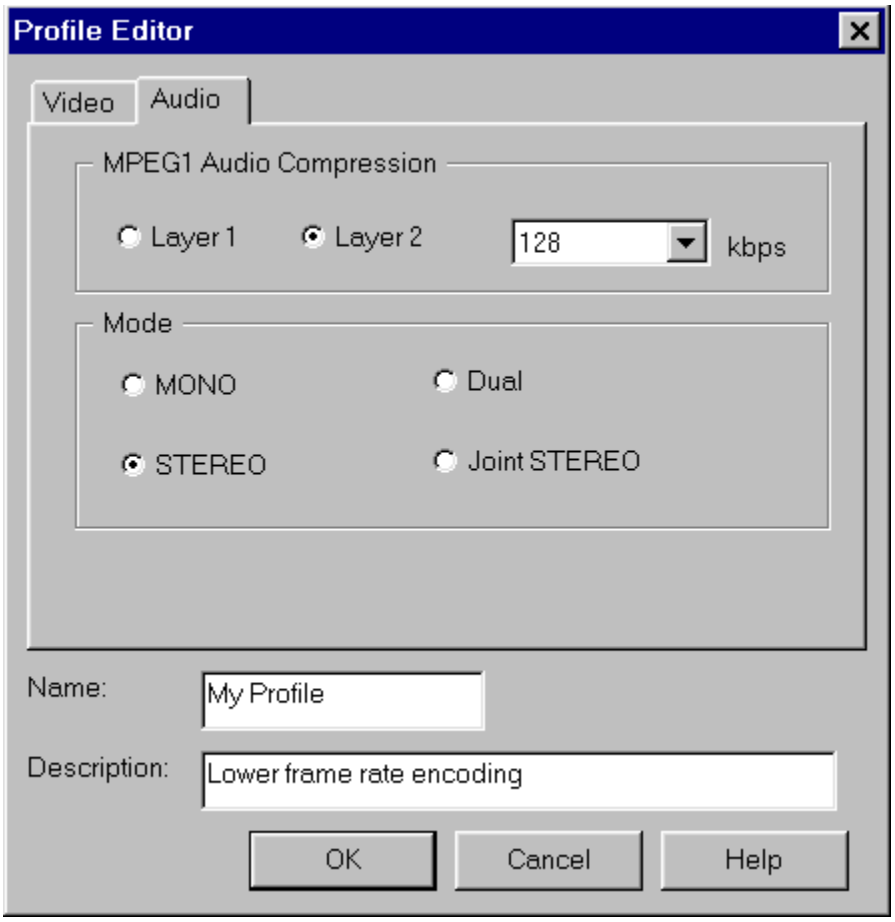
MPEG-1 Audio Compression

- **Layer 1** best suits bit rate above 128kbps, but should not encode at higher compression than 384. For example, Philips Digital Compact Disc Cassette (DCC) uses layer 1 compression at 192 kbps per channel.
- **Layer 2** has a target bit rate of 128 kbps per channel. It uses more efficient code for the representation of the bit allocation. Possible applications for this layer are the storage of audio sequences on CD-ROM and the audio track of the Video CD.

Audio Mode

The MPEG-1 audio standard defines a bit stream that can support one or two audio channels: **a single channel, two independent channels, or one stereo signal**. The two channels of stereo signal can be processed either independently or as joint stereo to exploit stereo redundancy.

- **Mono** is a single audio channel. Use the Mono setting with mono sources or when you need the lowest possible bit rate.
- **Stereo** includes two independent channels. The total bit rate remains constant, but the split between the channel can vary. The encoder uses this flexibility to improve quality by allocating more bits to the channel with more dynamic signal. Use the Stereo for best quality stereo audio at higher bit rates.
- **Joint Stereo** shares certain bits between high frequency left and right channels. This improves compression efficiency at a slight loss of stereo separation. Lower frequencies are treated as normal stereo. Select the subband at which the transition to joint coding occurs: 4 bands, 8 bands, 12 bands, 16 bands, or 32 bands. Lower transition yields to a stronger joint stereo effect. At lower bit rates, a setting of 32 bands is indistinguishable from normal stereo. Use Joint Stereo to obtain the best quality over mid to lower bit rates.
- **Dual Channel** includes two completely independent channels (left/right), each with half the total bit rate. Dual is generally used for multi-lingual audio programs.


Profile Editor
Video
Audio
MPEG1 Audio Compression
Layer 1
Layer 2
128
kbps
Mode
MONO
Dual
STEREO
Joint STEREO
Name:
My Profile
Description:
Lower frame rate encoding
OK
Cancel
Help

MPEG-1 Profile Advanced Setting

To configure the MPEG-1 profile advanced setting, you need to have good knowledge of MPEG-1 architecture. Please refer to About MPEG-1 Compression for MPEG-1 video format.

Defining the Advanced MPEG-1 Video Setting

For the video setting, you need to define the following MEPG-1 properties.

- **Frame Properties.** If you choose 'I Frame only', the video will be similar to Motion JPEG video file. This setting generates very good quality of video output; whereas the storage space and the recording performance are the tradeoffs. The quality levels ranges from best to good are ordered as follows: 'I-frame only,' 'IP frame only,' then 'IPB frame.'
- **Motion Estimation** . The search range V of the possible motion vectors and the selection of the cost function are left to the implementation. Exhaustive searches which result in high quality video but at the expense of a very large complexity of computation for large ranges.
- **Preprocessing.** If this option is checked, PowerVCR will check the input video stream before compression in order to guarantee the recording quality. This is at the expense of recording performance.