

# ***MPEGator***

*Full featured real-time MPEG 1 encoder*

## **User's Guide**

**Rev. 2i**

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**Darim Vision Co., Ltd.**

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# 1. GENERAL INFORMATION

## 1.1 Introduction

Thank you for purchasing Darim's MPEGator! We believe that you will be impressed with its unparalleled features and performance. It offers you complete professional real time video and audio MPEG 1 capturing and encoding at a previously unthinkable price. Featuring state-of-the-art chips, based on the latest achievements in software technology and utilizing the fastest PCI bus, MPEGator will give you the opportunity to create full-length, full-motion digital movies with ease. Now, with MPEGator, you can compress your video and audio into MPEG from virtually any modern video editing application amazingly fast using the provided hardware accelerated compression drivers. The MPEGator software is specifically designed to work in the Windows 95 environment. The standard software package will be suitable for both the video industry professional and the home-grown amateur. It combines an intuitive, easy to use interface with a complete set of advanced programmable parameters to achieve the best possible results.

The following are the most important features of the MPEGator hardware and software:

### Hardware:

#### Video Capture Performance:

- Data Formats: MPEG 1 video-only (ISO/IEC 11172-2), MPEG 1 system layer (ISO/IEC 11172-1), VideoCD compatible (White Book)
- Frame Rate: NTSC (29.97 Hz), PAL (25 Hz)
- Frame Size: up to 352x240 (NTSC), 352x288 (PAL)
- Encoder Motion Estimation: up to  $\pm 48h \times \pm 20v$  with half-pel vectors
- Maximum Compressed Data Rate: 3 Mbits/sec (IPB frames encoding)

#### Audio Capture Performance:

- Data Format: MPEG 1 layer II (ISO/IEC 11172-3)
- Modes: Mono, Stereo, Joint Stereo
- Sampling Frequencies: 32 kHz, 44.1 kHz, 48 kHz
- Maximum Compressed Data Rate: 384 Kbits/sec

#### Video Input:

- Composite (RCA) and S-Video (4-pin mini-DIN), software selectable

#### Audio Input/Output:

- 3.5 mm stereo female mini-jack for each input and output
- 3-pin auxiliary stereo audio input connector

### Software:

- Easy to use yet powerful MPEG capture and playback application
- Hardware accelerated MPEG video and audio compression plug-in drivers for AVI file compatible Windows applications
- High quality live source video preview on the computer monitor
- Complete control over the source video and audio signals characteristics
- Provides control over basic and advanced MPEG encoding parameters
- Playback through the generic MCI MPEG driver

In addition to the standard software a sophisticated *MPEGator Software Development Kit (MSDK)* is provided for those who would like to develop their own custom MPEG capturing and encoding applications. MSDK provides several different levels of software interface targeting both experienced programmers and beginners. For more information on MSDK refer to the on-line *MPEGator programmer's reference guide*.

## **1.2 System requirements**

The minimum system requirements for the MPEGator package are:

- IBM PC/AT compatible computer with Pentium™ 90 MHz CPU.
- 16 MB of system RAM.
- For entry level video source preview an SVGA graphics adapter capable to display 256 colors at 640x480 resolution is required. For higher quality the capability of displaying 32K or 64K colors and DirectDraw support are recommended.
- 1 empty 32-bit PCI slot with bus mastering capabilities.
- Microsoft® Windows® 95.
- 5 Mb of free hard disk space for *typical* installation, 10 Mb for complete installation, including MSDK.

The following sections provide general installation and operating instructions for MPEGator. Be sure to read these sections carefully before proceeding with installation and operation.

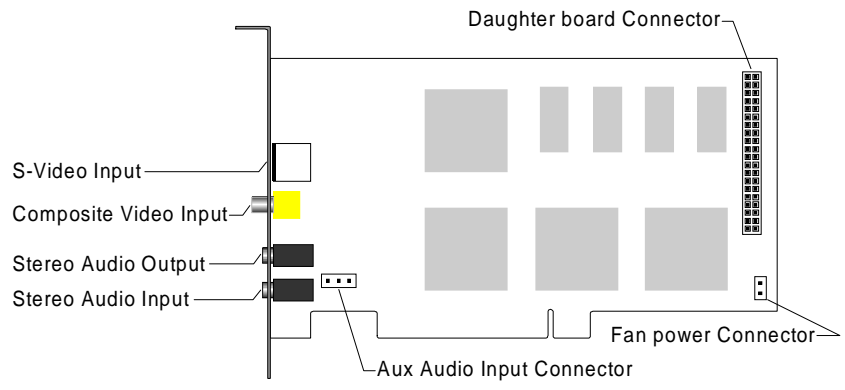
## 2. HARDWARE INSTALLATION

Hardware installation of MPEGator has been made easy due to the built-in Plug and Play capability of all PCI devices. There are no jumpers on the board that you have to worry about. Also, because of its short length, the MPEGator board will not be obstructed by any device on the mainboard located in line with the PCI slots (e.g. the CPU fan and heatsink). However, the MPEGator board has its own fan / heatsink and (optionally) audio daughter (piggyback type) board which increase the overall card depth. This may require some re-arrangements of the adjacent boards to free up the necessary space.

To install your MPEGator board:

1. Make absolutely sure that your PC power is **off**. Then proceed to open the cover of your PC to expose the interface slots on the motherboard.
2. Locate a group of the PCI slots on your computer mainboard. If possible, choose the slot where the MPEGator board will not be obstructed by other boards (such as a video graphics card). We suggest you to use the PCI slot adjacent to an ISA slot. This provides a wider space for the expansion boards.
3. Remove the screw and the backpanel plate for the selected PCI slot. Plug the MPEGator board into this slot. Push the card into the slot firmly. Make sure that the card is seated correctly as far into the slot as possible. Check that neither fan, heatsink nor daughter board (if any) touch any adjacent boards or devices in the system.
4. Secure the interface card to the computer case with the retaining screw and close the computer cover.

After you have successfully installed the MPEGator board in your computer, you must make the wiring connections to your video and audio source(s). The MPEGator interface card has two video and two audio connectors. Connections are shown in Figure 1. Connect the *Composite Video Input* and/or *S-Video Input* to your VCR, LDP or Camcorder video output. Whenever possible, try to use the S-Video connection. This will provide higher quality video from the start. Connect the corresponding audio cable from your audio source to the MPEGator audio input jack, which is closest to the mainboard. Connect the MPEGator audio output to an audio amplifier or active speakers. You may also use the *Auxiliary Audio Input* (for example, to connect an internal CD-ROM drive). In this case you will need a special cable which should be supplied with the CD-ROM drive or can be obtained separately.



**Figure 1. MPEGator board connectors**



### 3. SOFTWARE INSTALLATION

After the hardware installation is finished, turn on your computer and start Windows 95. You are now about to install the MPEGator software to your system. The software installation is performed in two simple steps. The first step is required to tell the system about the new hardware you have just installed. Since the MPEGator is truly Plug and Play, Windows 95 will automatically detect its presence and display the message shown in Figure 2.



**Figure 2. New Hardware driver installation dialog**

Select **Driver from disk provided by hardware manufacturer** and click *OK*. When prompted for the driver location, type in the path where you are installing the software from (e.g. A:\). Or click on the *Browse* button to locate MPEGator software using disk drives and directories tree. Clicking *OK* will finish the first step by copying and installing the low-level (Plug and Play) device driver.

**Important:** This phase of the installation is very critical for correct MPEGator software functionality. Failure to complete this step will lead to error messages to be displayed by MPEGator software and some of its functions disabled. Please refer to the *Installing the Plug and Play driver manually* and *TROUBLESHOOTING* sections for possible remedies.

If the installation has been performed exactly as described above, then skip the next section and proceed directly to the section 3.2

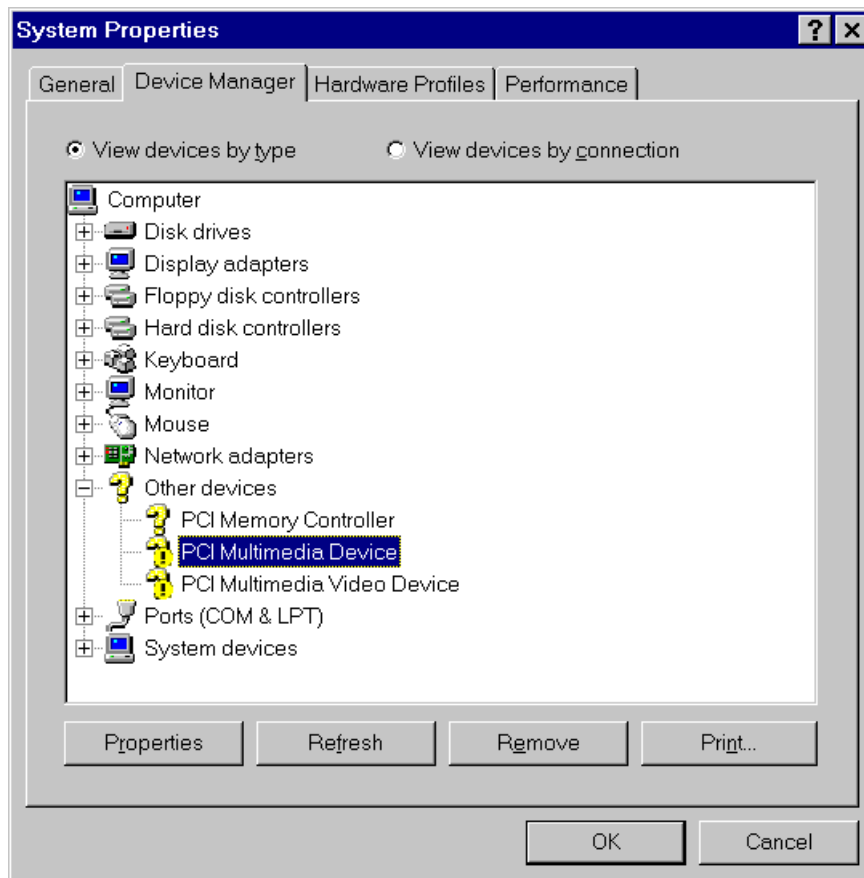
### **3.1 Installing the Plug and Play driver manually**

If the low level driver installation procedure was carried out correctly, there would be no need to know how to install the driver manually since this would be done automatically according to the process described above. However, in real life, things can go wrong, partially because of the fact that those devices which do not have the corresponding drivers supplied with Windows 95 still require some user interaction.

Unfortunately, it can be rather difficult to correct a mistake during the initial installation. Listed below are some examples of mistakes that can be made:

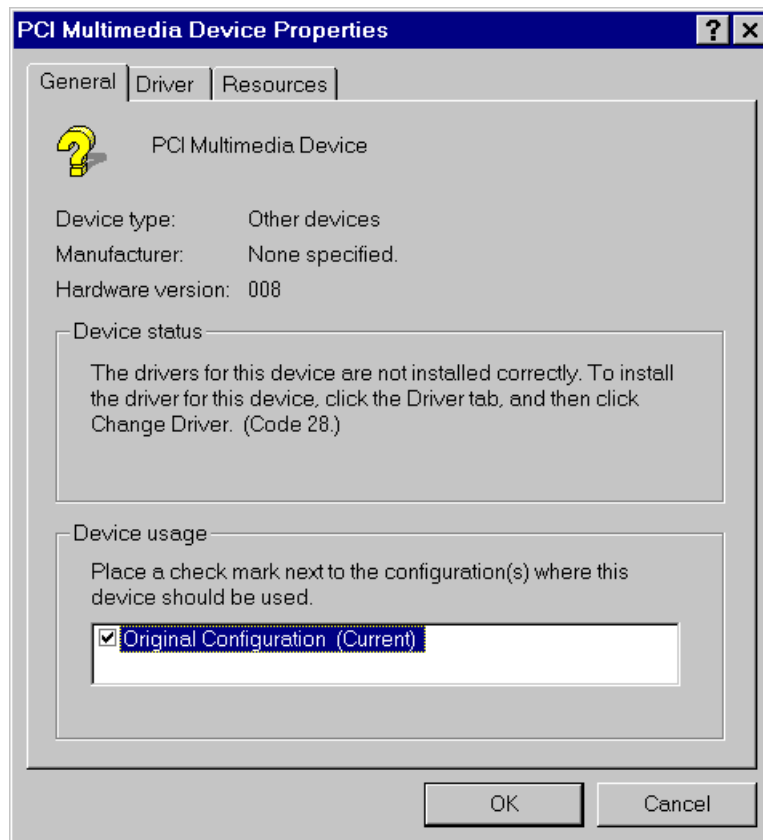
- You have chosen **Do not install a driver...** line.
- The installation diskette or CD-ROM was unavailable during Windows 95 startup, or the drive was not functioning properly.
- You have aborted the installation process by pressing the *Cancel* button.

In these cases, you need to help Windows locate and install the appropriate drivers because the New Hardware driver installation dialog shown in Figure 2 will appear only once - during the first installation. You can do this manually by performing the simple steps below:



**Figure 3. Locating an unidentified MPEGator hardware**

- Run Windows 95 *Control Panel* and double-click on the *System* icon.
- Click on the *Device Manager* tab to see a dialog similar to the one shown in Figure 3.
- Locate and double-click on the *Other devices* branch, shown with the yellow question mark (?). You should see a device labeled *PCI Multimedia Device* among the other devices in the group (see Figure 3). This is a generic name assigned to MPEGator by the system.
- Double-click on this line to bring up the device properties sheet (as shown in Figure 4).



**Figure 4 Unidentified MPEGator device properties sheet**

- Select the *Driver* tab and click on *Change Driver* button.
- When prompted to select hardware type select *Other devices* and click *OK*.
- Click on *Have Disk* button and specify the location of the MPEGator installation files. If necessary, use *Browse* button to locate the software.
- After the required files are located, choose the *MPEGator* line and click *OK* several times to install the driver and restart the system.

When the Plug and Play driver is installed the generic *PCI Multimedia Device* labeled with a question mark will disappear from the Windows 95 Device Manager's hardware list. Instead, the new device, named *MPEGator*, will appear in the *Sound, video and game controllers* branch. Should you ever need to view or change the properties of the MPEGator hardware in Windows 95, refer to this device line in the Device Manager's list. Normally, you will not need to do this, except during troubleshooting.


### 3.2 Higher level software installation

When Windows 95 has become aware of MPEGator's presence, proceed with the second installation step of installing the medium level drivers and application software. This can be accomplished by simply running the *SETUP* program from the MPEGator diskette or CD-ROM. You can do this in two ways:

#### Using the Windows Explorer:

1. Click on the drive icon containing the installation media (e.g. A:)
2. Find the program *SETUP.EXE* in the list of files in the directory window.
3. Double-click on it.

#### Using the *Run* command:

1. Click on the  button on the Windows 95 toolbar.
2. Select the *Run* command
3. In the *Command* field type in the drive letter of the installation media followed by colon, back-slash and *SETUP.EXE* (e.g. A:\SETUP.EXE) or use the *Browse* button to locate and select *SETUP.EXE*.
4. Press ENTER.

The setup program screens are self-explanatory. Follow the instructions to specify the destination directory and the software components to be installed (see the next section for details). The setup program will automatically create the MPEGator software group and the program items and will also update the system registry database with the necessary keys and values. Upon completion of the setup process, you need to reboot Windows to make all of the changes effective. You are now ready to run the installed MPEGator software.

**Note:** The *Typical* software installation includes basic MPEGator software and accelerated MPEG compression drivers. It allows you to quickly start using MPEGator for your tasks to capture, encode and play back video and audio. The *Compact* installation option installs only the required low and medium level drivers for the MPEGator. It does **not** install the MPEG capture and playback application, MPEG compression drivers, DirectX™ runtime, or MSDK. Select the *Custom* option to manually select which software components to install from the complete list.

### 3.3 Optional software components

Along with the required low and medium level driver software and the capturing and playback application (named *M-Coder*) several other software components are provided. They are:

- Hardware accelerated MPEG video and audio compression plug-in drivers.
- Microsoft DirectX™ 1.0 runtime (recommended for high quality live video preview capability)<sup>1</sup>.
- Darim MPEGator Software Development Kit (MSDK).

The MPEG video and audio compression drivers are a convenient tool for converting your existing animation or movie into the MPEG format. The drivers can work in conjunction with virtually all modern video editing or animation creation software which have capability to save to AVI format. One of the most important features of the drivers is that the calculation intensive tasks of the compression algorithm are off loaded from the CPU and performed by the MPEGator hardware. This yields significant compression speed improvement compared to conventional software-only encoders (typically about 15 times faster). Compression quality is usually higher too. For more information about MPEGator compression drivers refer to section 5.3 on page 30.

The DirectX™ runtime libraries, a very powerful addition to the Windows operating system, provide a direct interface for the software to take advantage of the advanced hardware capabilities of the modern display and sound adapters. One of its subsystems, the *DirectDraw*, allows for blazing fast image output to the screen without taking up significant CPU bandwidth.

Though DirectDraw is not required for the video preview to function, it is highly recommended in order to achieve high quality and live video preview on the screen. Systems with DirectDraw support installed will also have smoother and more realistic playback of MPEG files when using software MPEG players.

**Important:** DirectDraw libraries works in close cooperation with display adapter hardware and drivers. Its support is now built into most of modern display drivers by their manufacturers. Also, most of the currently available PCI based display adapters support at least the basic capabilities of DirectDraw in hardware. If your display adapter or driver does not support DirectDraw, contact your computer dealer or display adapter manufacturer for new software or hardware upgrade.

The MPEGator Software Development Kit (MSDK) is provided to let the independent software developers create their own applications utilizing unique MPEGator features. Refer to the supplied on-line *MPEGator Programmer's reference guide* for details. We at Darim, are encouraging such initiative and providing comprehensive technical support and assistance to independent developers.

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<sup>1</sup> Not supplied on floppy disks.

## 4. UNINSTALLATION

You can remove the MPEGator software from your computer and delete any “traces” that the hardware had ever been installed in your computer. It is recommended to uninstall MPEGator before each repeated installation to ensure that the Windows 95 registry does not get corrupted by remnant data of previous installations. Uninstallation can be done in two steps, which revert the steps performed during the installation. The first step is to uninstall the high level software which were installed. To achieve this, do either of the following:

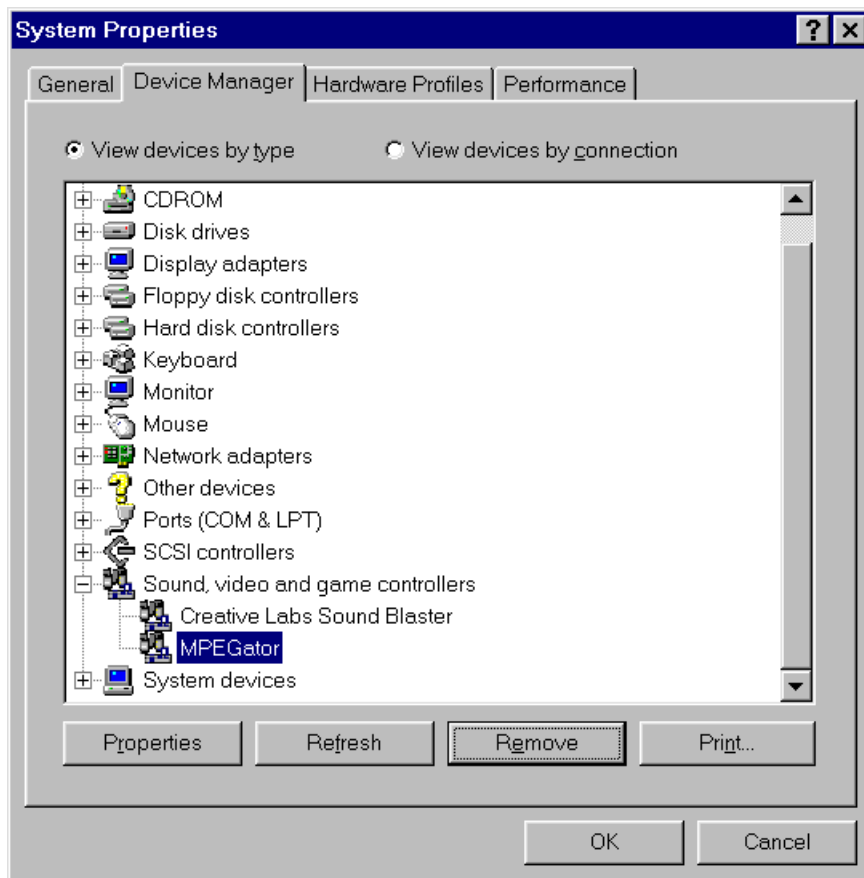
- From the Windows 95 *Control Panel* select the *Add/Remove Programs* icon and double-click on the *MPEGator* line among the list of the installed software.
- Simply click on the *Uninstall* icon in the MPEGator software folder.

After receiving a confirmation from you, the uninstaller will delete the application and some of the driver files, destroy the MPEGator software folder and remove all the registry keys which were created by MPEGator software.

**Note:** The uninstaller will **not** remove the Microsoft DirectX™ runtime components, since it might be used by another software. If you need to uninstall DirectX™ software, run its DXSETUP program and choose *Return Windows 95 drivers*.

The second step will be to clear the Windows’ memory of the MPEGator hardware. Perform the following actions:

- Launch the Windows 95 *Control Panel* and double-click the *System* icon.
- Select the *Device Manager* tab and expand the branch named *Sound, video and game controllers* by double-clicking on the corresponding line.



**Figure 5 MPEGator uninstallation**

- From the list of the installed multimedia devices choose **MPEGator** and click on the *Remove* button (as shown in Figure 5).
- Confirm your action and the MPEGator low-level software will be removed from your system.

To remove the hardware, shutdown Windows 95 now. Then open your computer case and carefully unscrew and remove the MPEGator board.

**Note:** If you do not remove the hardware after the described uninstallation, the next time when you start Windows 95 you will be prompted to install the MPEGator software again.



## 5. SOFTWARE OPERATION INSTRUCTIONS

The supplied MPEGator software consist of three distinctive parts each of them work using the common layer of low and medium level drivers. Every of these three parts is optional and not necessarily will present in your system. The common layer of drivers, however, should always present and is providing an interface between MPEGator hardware and any possible application software (including custom applications created by user).

All three parts of standard MPEGator software are described below in their respective sections. They are:

1. MPEG capture and playback application
2. MPEGator Control Panel applet
3. Accelerated MPEG compression drivers

### 5.1 MPEG capture and playback application

This section describes the operation of the MPEGator capture and playback application named *M-Coder*. The *M-Coder*'s user interface is quite simple and intuitive. Every button has a small tooltip assigned to it. Whenever you pass a mouse cursor over any of the buttons, you will see a short explanation about it.

The *M-Coder* application works in two main modes: *MPEG Capture* and *MPEG Playback*. The switching is done by pressing one of two buttons on the left. The two sections below describe each of the modes and show each of the control types available.

**Note:** The description below shows two different buttons for each control. One is classic, another is a bit fancy. You can choose the style of your preference by accessing the **Layout** menu and checking one of its items.

#### 5.1.1 MPEG Capture mode

Real time MPEG capturing and encoding is the main purpose of MPEGator. First, the output file and location can be specified using the **New** command from the **File** menu. The file name extension is attached or replaced automatically depending on the selected MPEG compression type (see the description of the **MPEG Basic** parameters dialog on page 20). If you did not set the output file name yourself, the default name will be used. In case the output file already exists, you will be prompted to confirm overwriting it and the asterisk (\*) will be displayed next to the file name in the application window caption.

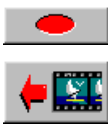
The last created file can be renamed using the **File / Save As** command. The current existing file will be renamed so that the output file name shown in the application window caption specifies a non-existing new file name.



Selects the MPEG capture mode. The application main panel changes as shown in Figure 6. The buttons shown below are active only in this mode. Note, that all control buttons functions can also be activated from the **Capture** menu.



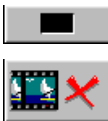
**Figure 6. M-Coder application in the capture mode**



Starts the MPEG capture process. The status bar (Figure 6) displays the elapsed capturing time in the *hours:minutes:seconds* format. The number of actually captured and dropped frames is shown in the **Frames** field separated by the division sign (/).



Pauses the MPEG capture process.



Ceases the MPEG capture process. Closes the output file.



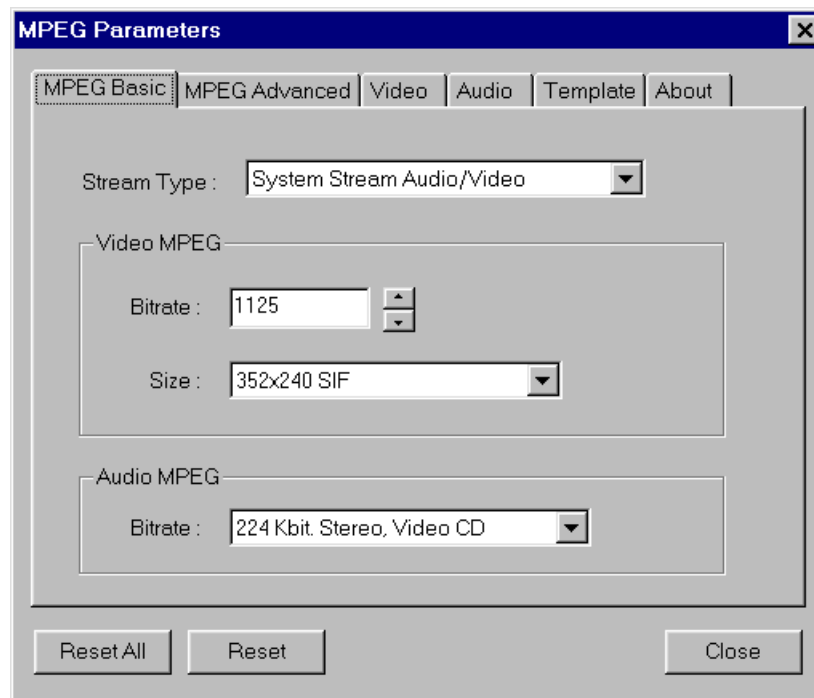
Brings up the MPEG Capturing and Encoding Parameters compound dialog (shown in the series of figures in the following sections). Allows you to adjust video and audio source characteristics as well as the full set of MPEG encoding parameters. See section 5.1.1.1 for the detailed description of each dialog's page.



Toggles the state of the video preview window and audio loopback connection. When enabled, displays live video preview on the computer screen. In this mode the incoming sound goes directly to the board's audio output, so it can be heard through the speakers attached to the MPEGator *Audio Output* connector.

### 5.1.1.1 MPEG Capturing and Encoding Parameters dialog

The MPEG Parameters compound dialog is shown in the figures below. By clicking on the corresponding tab you can access a different set of parameters, each of them described in greater detail below.



**Figure 7. MPEG Basic parameters dialog**

Select the **MPEG Basic** tab to set the basic MPEG capturing and encoding parameters. The **Stream Type** dropdown list selects the type of MPEG stream to be produced. The following types can be selected:

- Video Only
- System Layer with Video only

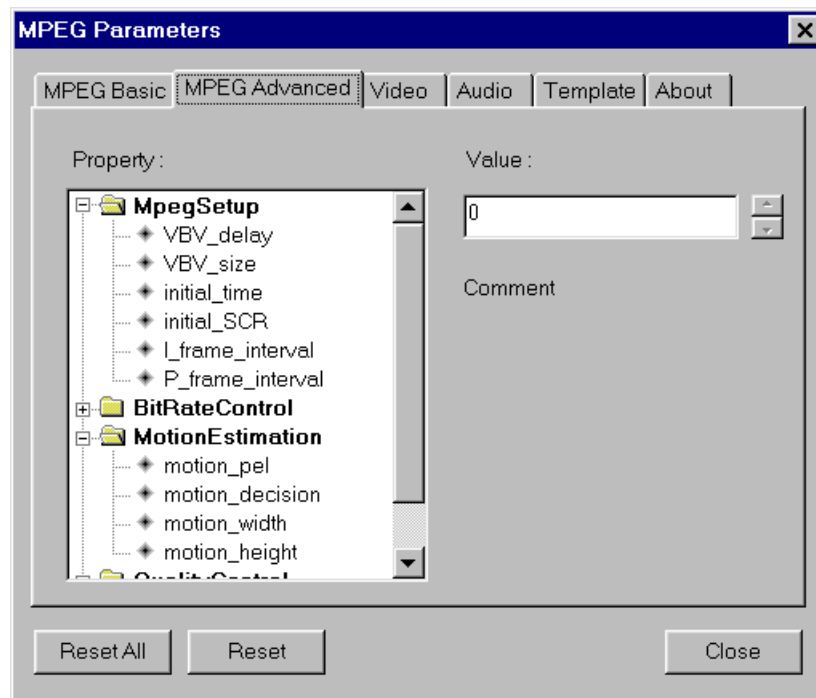
- System Layer with Video and Audio
- Video CD

This selection also determines the default extension that will be attached to the specified output file name automatically. The standard extension for Video Only file is *.MPV* and for all other MPEG file types it is *.MPG*.

The **Size** dropdown list allows the user to change the resolution of the destination MPEG video. The default resolution settings are *352x240 SIF* (the maximum for NTSC) or *352x288 SIF* (the maximum for PAL). The two **Bitrate** fields specify the target compressed data rate in Kbits/sec for video and audio streams respectively. Higher values usually produce better quality, while consuming more storage space. However, the difference becomes hardly noticeable after certain values, which are dependent on video or audio content. Note, that you can change the video bitrate to an arbitrary value within the allowed range from *50* to *3000* Kbits/sec. In contrary, the audio bitrate can be set only to several discrete values, as specified by MPEG standard (ISO/IEC 11172-3) for layer II audio compression (see the dropdown list for the allowed bitrate values and their meaning).

**Important notes:**

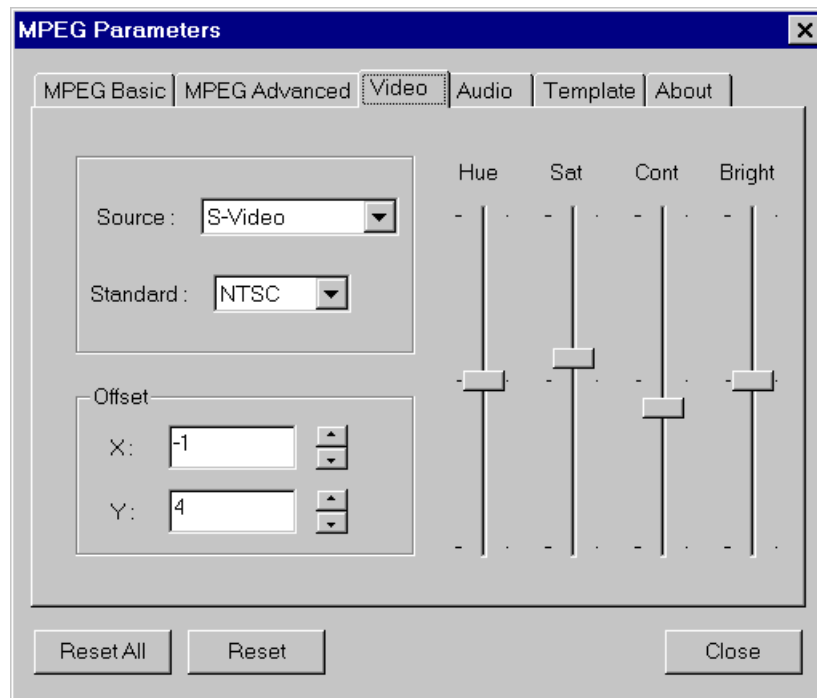
1. When the *Video CD Stream Type* is selected, both **Bitrate** and **Size** fields will be grayed (disabled). Video CD (White Book) specification restricts these parameters to certain pre-defined values.
2. The **Stream Type** dropdown list selection will *not* alter any of the parameters set in the other dialog pages. Therefore, if you have changed any parameters in the **MPEG Advanced** page and want to restore them to the values corresponding to one of the standard formats, do either of the following:
  - Select and load the corresponding template.
  - Reset the **MPEG Advanced** parameters manually in addition to selecting the desired stream type in the **Stream Type** dropdown list.



**Figure 8. MPEG Advanced parameters dialog**

The **MPEG Advanced** tab displays a tree-like structure of various advanced parameters of MPEG compression. The parameters' values and descriptions are shown when the cursor is positioned on them. Changing any of these parameters require the complete understanding of the MPEG encoding process and may create an output file which will not be playable by some or all of the available MPEG players. If you feel uncertain about any of the parameters, leave them at their default states.

**Important:** Some of the parameters' values here, or combination of them may produce unpredictable results and might even lead to system crashes. You can recover from this state by pressing the **Reset** button to restore all advanced parameters to their default values.



**Figure 9. MPEG Video parameters dialog**

The **Video** tab gives you complete control over the incoming video signal. First, you can choose either Composite or S-Video inputs by clicking on the **Source** dropdown list. Select the video standard that is used in your country by accessing the **Standard** dropdown list right below. Currently, two video standards are supported: **NTSC** and **PAL**.

The horizontal and vertical **Offset** fields allow you to shift the captured video region. You can customize these values, for example, to get rid of unwanted noise at the top or at the bottom part of the picture. Note, that the captured region size is always the same, only its position is shifted relatively to the top left corner of the video.

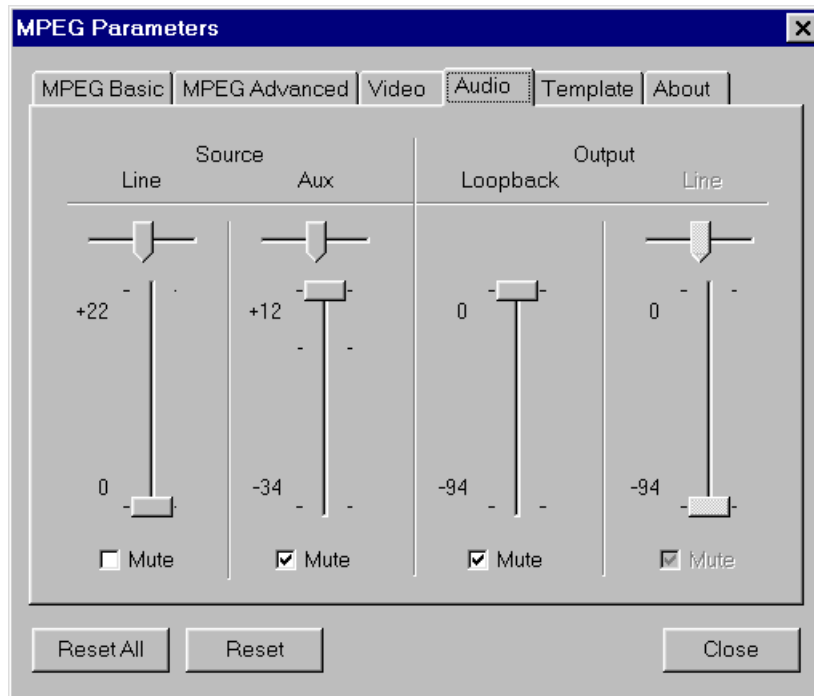
The sliders on the right allow for image adjustment of the incoming video. There are four controls:

- **Hue** -- allows you to adjust the phase of the signal's color. By moving this slider in both directions you can change the tone of the input video signal. Increase to make skin tones become greenish. Decrease to make skin tones become purplish. The default value of 128 corresponds to normal color tones. This control has effect only for NTSC video.

- **Saturation** -- adjusts the color intensity of the signal. Setting it to 0 will produce a Black & White picture. Setting to the maximum 511 will produce a picture with very bright (and often distorted) color spots. Default setting is 291.
- **Contrast** -- controls the difference between the brightest and darkest place of the picture. The minimum level of contrast (0) is a dark gray picture with indistinguishable details. The default level is 216 - medium contrast.
- **Brightness** -- adjusts the overall picture intensity. Has no effect on color. Affects only the 'gray' level of the picture, between minimum (0) - complete black and maximum (255) - almost white. The default value is 128.

You can always restore all settings to their default values by pressing the **Reset** button.

**Important:** Some of the video properties controlled by these sliders may strongly affect (both increasing and decreasing) the resulting visual quality of the MPEG stream for the same compressed video bitrate. So, if you are not satisfied with the visual quality of the just captured MPEG file, do not rush to increase the bitrate. Instead, try to change video brightness, contrast and saturation. It may lead to significant perceptual quality improvement.



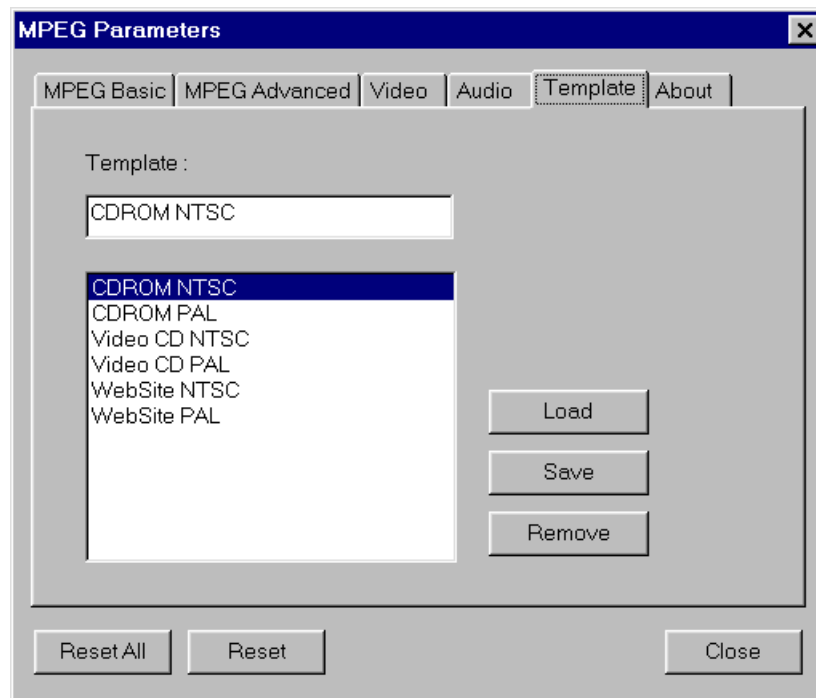
**Figure 10. MPEG Audio parameters dialog**

The **Audio** tab lets you select audio source, control input and output signal stereo balance and levels. The dialog's left part controls the audio input. MPEGator hardware has two audio input connectors, but only one of them can be active at a time. Select either **Line** or **Aux.** input by clearing the corresponding **Mute** checkbox beneath. Set the desired audio signal level by moving the amplification sliders. The sliders are calibrated in decibels (*dB*). Positive values increase the strength of the signal, the negative values decrease it, and the value of zero corresponds to the nominal signal level. Adjust the **Balance** slider to achieve the desired stereo effect.

**Important:** Certain audio sources may output analog signal at levels much higher than allowed by MPEGator specification. The symptom is that even at the minimum amplification, a very noticeable distortion of the compressed audio will occur. The solution is to lower the output audio level using the on-source controls or obtain an external attenuator. For example, Betacam VTRs typically output audio signal at *+4 dB*, while the nominal level, expected by the MPEGator hardware is *-10 dB*. Therefore, you need to lower the signal level by *-14 dB* to achieve optimal audio quality.

The dialog's right part controls the audio output. The **Loopback** (or pass-through) channel is provided to allow you to control the incoming audio signal which is ported to the MPEGator Audio Output connector. Enable or disable the pass-through audio by clearing or checking the **Loopback Mute** checkbox. Adjust the sound volume by moving the attenuation slider. Note, that the pass-through audio can be heard only when preview is active and when it is unmuted.





**Figure 11. MPEG Template selection dialog**

The **Template** tab allows you to use standard templates and create new ones. The templates contain the complete set of parameters and are stored in the Windows registry. Select one of the existing templates to **Load** or **Remove** it. Loading a template replaces **all** parameters for the **entire** MPEG Parameters dialog. Type in the new template name and press the **Save** button to store the current values of all parameters for later use.

**Important:** Since the templates hold the complete set of parameters (including video brightness, contrast, etc.) it is advisable to find the optimal values and store them into a separate template for each particular working material.

**Common note:** You can press the **Reset All** button at anytime to restore all parameters under all tabs to their default values. Press the **Reset** button to restore all parameters only under the current tab. Finally, press **Close** when done to memorize all the values.

## 5.1.2 MPEG playback mode

The MPEGator software offers you a very flexible way of playing back MPEG files. The *M-Coder* application does this through any of the available MPEG MCI playback drivers. They can be either software-only or hardware-assisted. Once the *M-Coder* application is in Playback mode, you can select the particular MCI driver from the program's **Device** menu. It displays the list of the MCI drivers capable of playing back MPEG video and audio files. When you run the *M-Coder* for the very first time, it collects the data about all MCI drivers in the system and stores the list in a private registry entry, so the next time it will start up faster and use only those devices that respond positively to the query.

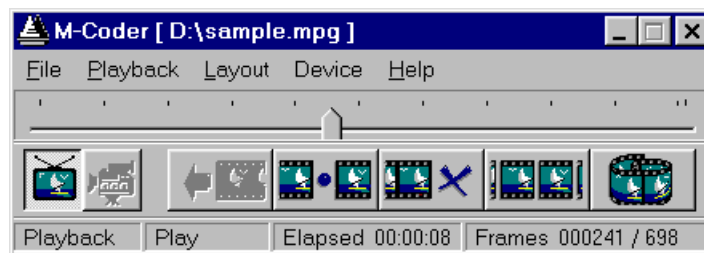
**Important:** It is possible that one or more MCI devices will cause a protection fault during the query operation. In this case, *M-Coder* will be terminated also. Simply restart the application, and the next time it will avoid using the faulty MCI device.

You can permanently disable any unwanted MCI driver by accessing *Control Panel*, *Multimedia* icon, *Advanced* tab, *Media Control Devices* branch. Then double-click on the MCI driver name, select *Do not use this Media Control device* and click *OK*. You may need to restart Windows in order to make the changes take effect.

To force *M-Coder* to re-scan all MCI devices (for example, if you have added a new one) use the *Update device list* command from the **Device** menu.



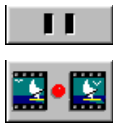
Selects the MPEG playback mode. The application main panel changes as shown in Figure 12. The just captured MPEG file, if any, is opened for playback by default. You may open other files using the **Open** command from the **File** menu.



**Figure 12.** *M-Coder* application in the playback mode



Starts the MPEG playback process. The status bar (Figure 12) shows the elapsed playback time in the *hours:minutes:seconds* format. The frame counter on the right displays the current frame number and the total length of the movie.



Pauses the MPEG playback process. It can be resumed from the next frame by clicking on the *Play* button.



Stops the current playback process and resets to the first frame.

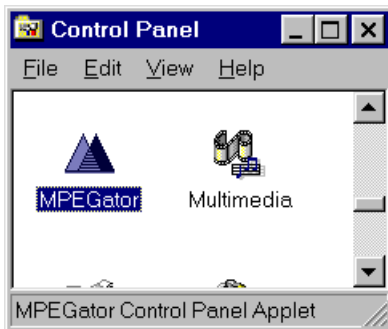


Allows frame-by-frame advance of the MPEG file.



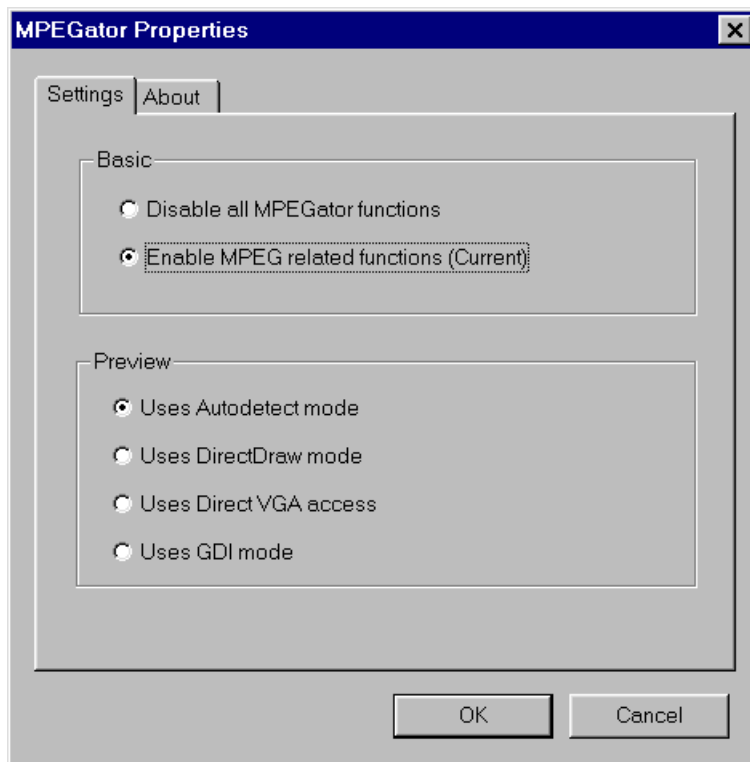
Toggles the auto repeat playback mode. This mode enables the current MPEG file to be repeated automatically from the beginning when its end is reached.

## 5.2 MPEGator Control Panel applet



The MPEGator Control Panel applet allows users to control the global, application-independent modes of operation. The MPEGator applet is typically invoked from the Windows *Control Panel* application. Locate the familiar MPEGator icon among other standard Control Panel applets and double-click on it. It will display the dialog shown in Figure 13.

The **Basic** section of the dialog allows you to enable or disable some or all of the MPEGator functions. The **Enable MPEG related functions** line is selected by default. It switches on MPEG video and audio capturing and encoding routines in the low level drivers and enables normal operation of the standard MPEGator higher level software and any custom third party MPEG capturing and encoding application developed for MPEGator.



**Figure 13. MPEGator Global Properties dialog**

The only reason you may want to choose **Disable all MPEGator functions** line is to conserve some memory that is normally allocated and reserved for MPEGator during Windows startup. But doing this will prevent you from using any MPEGator related functions.

Note, that if you change any settings in this dialog section, you will have to restart your system for changes to become effective.

The **Preview** section allows you to change the method for displaying video on the computer screen during video source preview. The **Autodetect mode** is selected by default. In this mode the MPEGator software automatically uses the best displaying mode based on the detected video adapter capabilities. First, it checks if the DirectDraw support is enabled (runtime libraries and corresponding video drivers are installed correctly). If yes, it will take advantage of it, since DirectDraw allows for dramatic preview quality and performance improvements. Otherwise, the preview displaying will be performed using standard Windows functions. This mode is significantly slower and does not always provide the desired quality, but works in all of the cases. In the rare event when the auto-detection algorithm fails to determine the proper preview displaying mode, you can always override it and select either **DirectDraw mode** or **GDI mode** manually.

**Important notes:**

- If you experience any strange things during the preview or other incompatibilities, select **GDI mode**. It is slower but always safe.
- The mode changes will take an effect only after you close and re-open the preview window.

Users who have high-end display adapters (for example, Matrox MGA Millennium) which provide hardware and software support for video data transfer directly to the card's frame buffer may wish to select **Direct VGA access** line. This mode, a special feature of DirectDraw runtime and drivers, allows for the highest possible preview performance and introduce almost no CPU overhead for image transfer. However, you may experience some undesirable side effects when using direct frame buffer access, depending on concrete implementation of this capability in display drivers provided by the manufacturer.

Consider the following list, when selecting the preview displaying mode manually:

1. **Direct VGA access** - fastest, least compatible
2. **DirectDraw mode** - fast, more or less compatible
3. **GDI mode** - slow, always compatible

Again, the **Autodetect mode** should work on a vast majority of systems. Use manual override only for troubleshooting or if you are absolutely sure about your display subsystem capabilities.

### **5.3 Accelerated MPEG compression drivers**

One of the remarkable components of the MPEGator software package is the convenient plug-in MPEG video and audio compression drivers (simply *MPEGator Encoder*) accelerated by the enormous processing power of the MPEGator hardware. These drivers are intended to be used in conjunction with almost any of the available video editing and animation creation packages which save to the AVI format. Examples include Adobe Premiere, Ulead Media Studio, Autodesk Animator Studio and many more. In general, any application which supports AVI files output using the standard Microsoft's Video for Windows™ interface will be able to produce MPEG files directly. One example of software that does *not* support standard AVI creation procedure is Newtek's LightWave 3D 4.0. You can not select *any* compression options for AVI files and, therefore, limited to create only uncompressed RGB AVI files. Direct MPEG files creation is also impossible in this case.

MPEGator Encoder drivers work in much the same way as other 'standard' video and audio CODEC (COmpression-DECompression) drivers like Radius' Cinepak®, Intel Indeo™ for video and Microsoft ADPCM for audio. However, the MPEGator drivers have two distinctive features compared to the other CODECs:

- They produce an MPEG file along with a dummy AVI file, which can be safely discarded afterwards.
- They are one-way drivers, i.e. they can only compress and never decompress.

Since *MPEGator Encoder* is only a pair of plug-in drivers, not a standalone application, its usage should be described from within a particular host program. This is why the relevant commands and procedure differ from application to application. However, the general procedure is the same and outlined in the section 5.3.2.

### 5.3.1 Simple usage example

As an example, consider one of the most popular video editing packages, Adobe Premiere 4.0. For the scope of this manual we assume that the Adobe Premiere 4.0 is already installed on your computer. You should also have some knowledge about Premiere's menus and dialogs. If necessary, consult your Premiere's *User's Guide* for details.

The following is a step-by step instruction on how to create an MPEG file containing mixed video and audio. The procedure for most other video editing software packages should be very similar. See section 5.3.2 for a general guidelines of the MPEGator Encoder usage.

- STEP 1. Run the *Premiere* application. Load any existing project or create a new one. Refer to the *Premiere's User's Guide* for detailed description how to do this. For this example we assume that your project contains both video and audio tracks.
- STEP 2. From the *Make* menu choose *Make Movie* command to begin the MPEG movie creation process. The dialog shown in Figure 14 will appear.

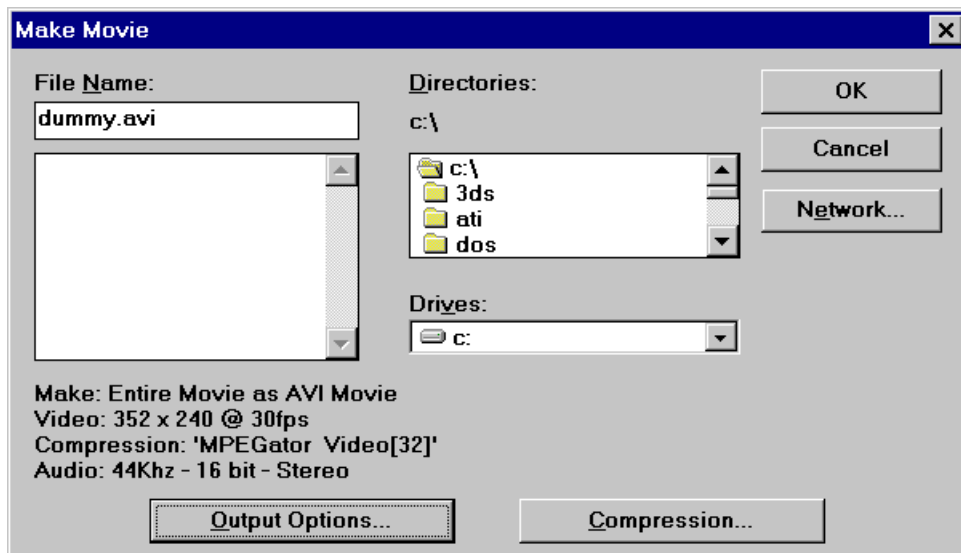


Figure 14. Adobe Premiere 4.0 Make Movie, AVI file selection dialog

STEP 3. Click on the **Output Options...** button to set basic movie output parameters. You will see the dialog shown in Figure 15. Determine which portion of you project will be converted into the MPEG file. Choose either **Entire Project** or **Work Area** using the top left dropdown list. Always set **AVI Movie** as a destination in the top right dropdown list, because the video and audio compression work together only during creation of AVI files. This allows for transparent, direct data compression into MPEG, while only a small auxiliary AVI file will be created for standard's compatibility sake.

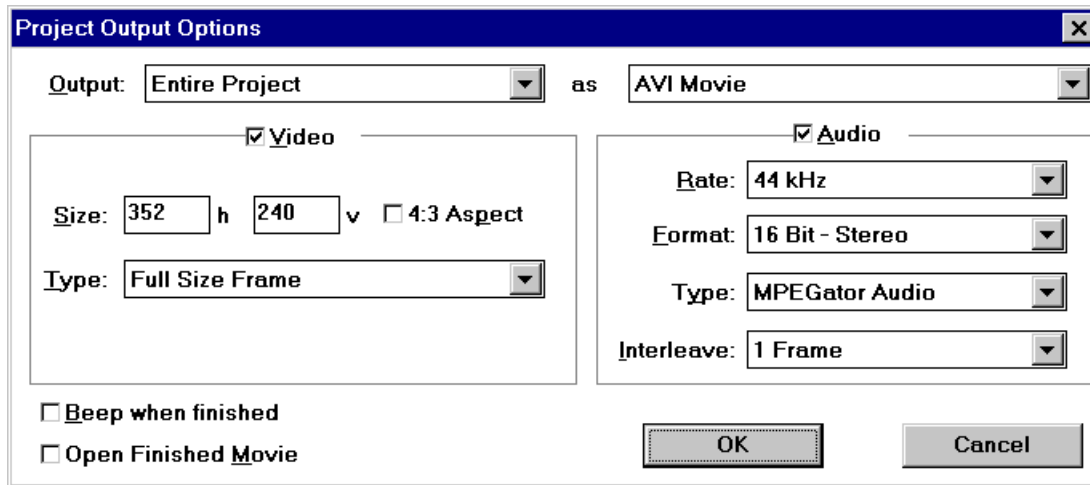


Figure 15. Adobe Premiere 4.0 Project Output Options dialog

Check the **Video** check box to enable video output. Set the **Size** fields according to your needs.

**Note:** The maximum allowed image sizes for MPEG 1 files are **352x240** for NTSC and **352x288** for PAL. Both formats use rectangular pixels, not square, so the **4:3 Aspect** check box should be cleared.

Select **Full Size Frame** from the **Type** dropdown list, since MPEG 1 operates only with progressive (non-interlaced, single filed) images.

Check the **Audio** check box to enable and set up audio output for this project. First, click on the **Type** dropdown list. You will see a list of the available audio compressors. Choose *MPEGator Audio*. Set the **Interleave** parameter to the lowest possible value of *1 Frame* to improve video and audio synchronization. Now modify the **Format** and **Rate** values.

**Note:** A very critical thing here is to select *Mono* or *Stereo* audio according to the desired audio bitrate (for example, the Figure 17 shows selection for *224 Kbits/sec, Stereo*, so you need to select *Stereo* format here as well). Other parameters, such as 8 or 16 bits per sample and sample rate in kHz, are not important and can be set to any possible value.

Set the two remaining check boxes at the bottom left corner to whatever state you prefer, they are not important for this example. However, **Open Finished Movie** is a convenient feature, so you may want to check it.

Finally, when you have made all the settings, press *OK* to return back to the dialog on Figure 14.

- STEP 4. Click on the **Compression...** button to configure the video compression. A dialog similar to that shown in Figure 16 will appear. First of all, select the *MPEGator Video* line from the **Compressor Method** list. This will reform the dialog so some of the controls will become disabled (gray). These parameters are not applicable for the MPEG compression and can be ignored. Set the **Frames per second** field according to the desired video standard, *30* for NTSC and *25* for PAL (see Figure 17). Leave other fields at their present state. Note that color **Depth** field has been set to *Millions* (or 24-bit) automatically and can not be changed, because the MPEG compression works only with truecolor video data.



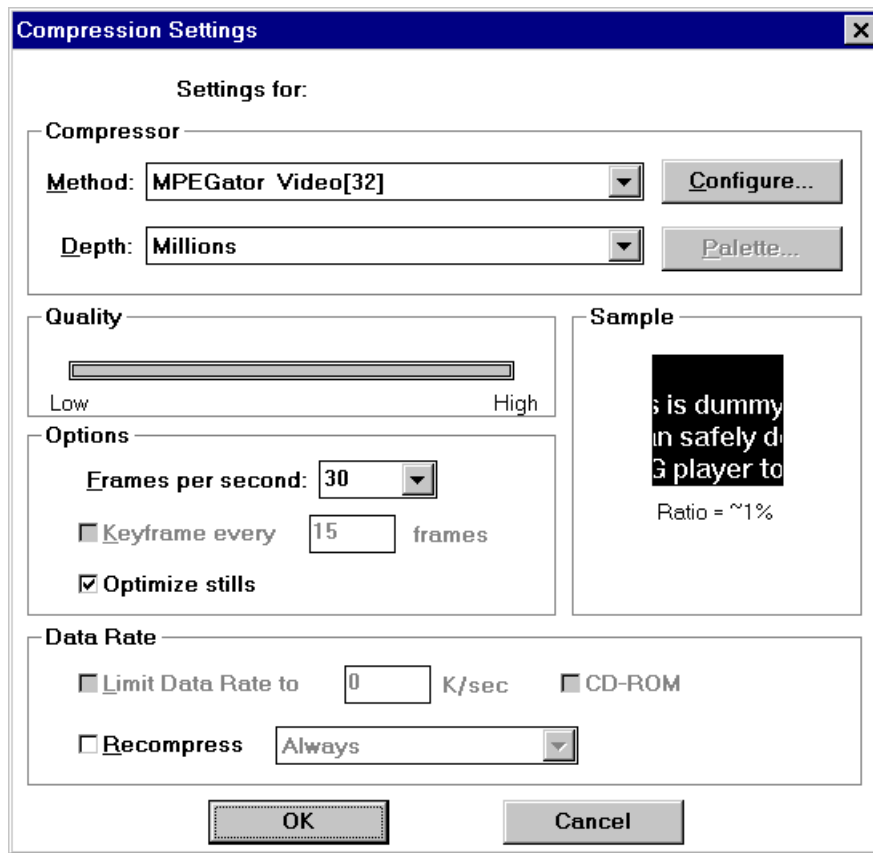
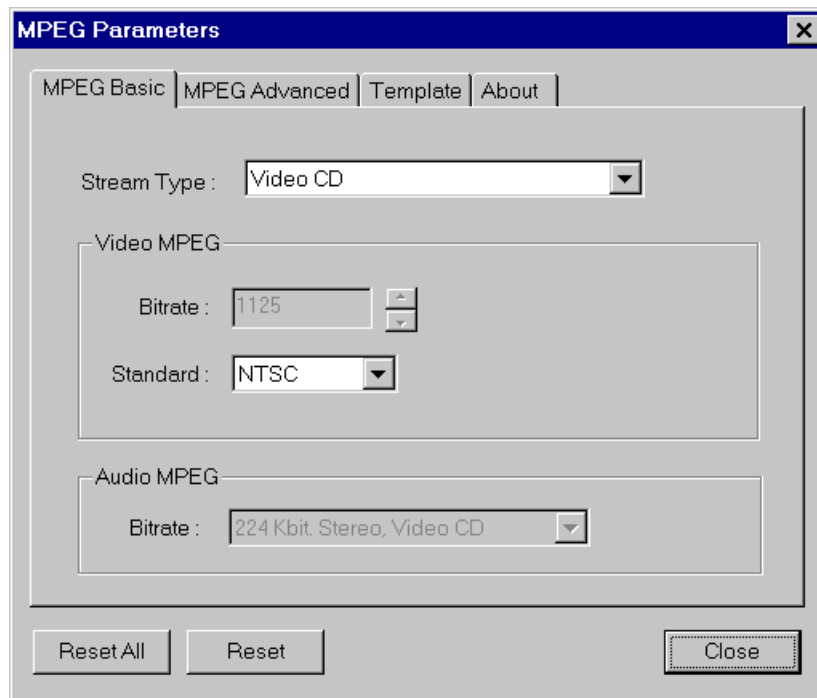


Figure 16. Adobe Premiere 4.0 Video Compression Setting dialog

STEP 5. Now it's time to set MPEG specific parameters. Press the **Configure...** button to bring up the dialog shown in Figure 17. It looks very similar to the dialog accessible via *M-Coder's Settings* button (see Figure 7 on page 20). The only difference is that you can not set the resolution here, since it has to be defined by the host application. Instead, you will need to specify the video **Standard** here. Currently, NTSC (29.97 frames/sec) and PAL (25 frames/sec) are supported. All other parameters in this dialog (including **MPEG Advanced** and **Template** tabs) are exactly the same as shown on pages 20, 22 and 26. Please refer to the section 5.1.1.1 for their detailed description.

Finally, when you have set all the necessary parameters, press *Close* and return back to the Premiere's Video Compression settings dialog (Figure 16).



**Figure 17. MPEGator Encoder MPEG Parameters dialog**

- STEP 6. Press *OK* to return back to the AVI File selection dialog (Figure 14). Take a look at the summary of current output settings. If necessary repeat steps 3 and 4 to make changes. Note, that MPEG specific parameters (the dialog on Figure 17) are not displayed.

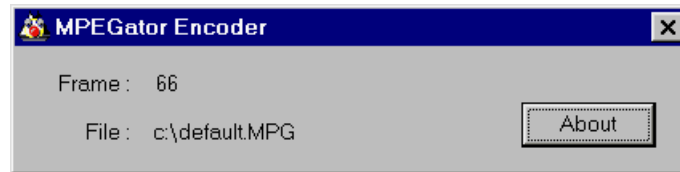
**Tip:** If you intend to use MPEG compression frequently, you may want to save all settings made during steps 3 and 4 to a preset or template, so you will not need to go through these steps again. Consult the corresponding product's documentation for the correct procedure.

Finally, you need to specify the name and location of the output AVI file. This file has no useful information in it, and can be safely discarded afterwards. Consider using the same file as a place holder (e.g. *C:\TEMP\DUMMY.AVI*) for all MPEG compression operations. The AVI file is required only to satisfy the Video For Windows™ standard. When done, press *OK* to start the MPEG compression process.

- STEP 7. During the compression process two kinds of status windows will appear. The first one is application specific. Adobe Premiere 4.0 shows the progress bar and the estimated time to complete the task. The second status window is displayed by MPEGator Encoder (as

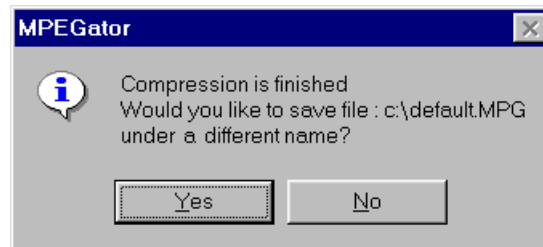
shown in Figure 18). It shows the number of frames currently compressed and the name of the temporary file where the MPEG output is being written.

**Note:** The actual compression speed depends on many different factors. Even though the MPEG compression task itself is performed just a few times slower than real-time, the host application usually spends a significant amount of time for internal video and audio data processing (e.g. scaling, applying filters and special effects, etc.).



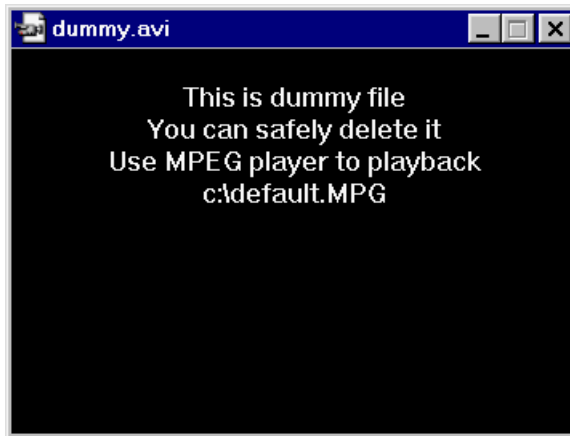
**Figure 18. MPEGator Encoder status panel**

STEP 8. When the MPEG compression is done, you will see the confirmation message similar to one shown in Figure 19. Since the MPEG output was stored in the temporary file, it is a good idea to save it under a different name. If you answer *Yes*, you will see a standard *File Save* dialog which allows you to specify drive, directory and name of the output file. The temporary file will be renamed or moved to the specified location and name. If you answer *No*, then the temporary file will remain at the same place untouched. You can still use it as any other MPEG file. But beware that it will be overwritten during the next compression session unless it is renamed or moved to another location.



**Figure 19. MPEGator Encoder output file renaming confirmation**

The compression has now been completed. If you attempt to playback the AVI file produced during the MPEG compression (or you have checked the **Open Finished Movie** check box in the Premiere's Output Options dialog) you will see the output shown in Figure 20.



**Figure 20. Dummy AVI file playback window**

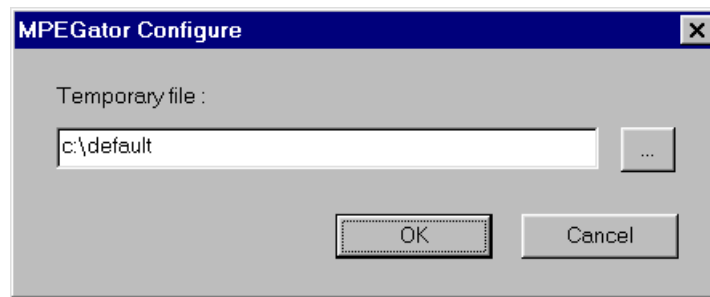
You can view the resulting MPEG file using any available MPEG playback software or hardware. For example, you can use the *M-Coder* application in conjunction with any available MPEG MCI playback driver to play it (see section 5.1.2 for details).

#### ***5.3.1.1 Configuring MPEGator Encoder from Windows Control Panel***

This section describes the procedure to configure MPEGator Encoder using *Control Panel*. Normally, you do not have to configure MPEGator Encoder using this method, because its default settings should work in all the cases.

However, if you want to change any of the default parameters, it can be done as follows:

- Run *Windows 95 Control Panel* and double click on the *Multimedia* icon.
- Click the *Advanced* tab. You will see a tree-like structure of various kinds of multimedia drivers.
- Expand the branch labeled *Video Compression codecs* and double-click on the *MPEGator Video* line.
- Press the *Settings* button. The dialog shown in Figure 21 will appear.



**Figure 21. MPEGator Encoder temporary output file selection**

The only parameter currently available here is the **Temporary file** name, which will be used to redirect MPEG video and audio output during the compression process. Note, that the file name does not have an extension, because it will be automatically attached depending on the MPEG stream type selected (see Figure 17 and description on the page 20 for more information).

No matter what temporary file name is used, it is a good idea to always rename it at the end of the compression process if you want to preserve your data from being inadvertently overwritten in following sessions.

### **5.3.2 The MPEGator Encoder and other video editing/animation software**

The usage of the MPEGator Encoder with other video editing software is quite similar to that described above. However, the appearance of the application specific dialogs will be different. In general, to perform MPEG compression from any Video For Windows™ compatible editing software you have to do the following:

- 1) Access the editing software *AVI output configuration* dialog. The exact procedure is application specific. Some examples are: **Render... AVI**, **Save As... AVI**, **Create Video... AVI**, **Make Movie... AVI**, etc.
- 2) Set the output video color depth to 24 bit (Millions of colors) if necessary.
- 3) Specify the desired video frame resolution and rate (e.g. 352x240, 30 frames/sec). You can ignore settings for **Data Rate**, **Key Frame every**, **Quality** parameters as they are not applicable.
- 4) Select the *MPEGator Video* compressor from the list of the available video compression methods.
- 5) Access MPEGator Encoder configuration dialog (usually by clicking the **Configure** button) and set all MPEG compression parameters for audio and video as required by your project. Press *OK* when done.
- 6) Back in the editing program dialog, enable or disable the audio compression depending on the MPEG format chosen.
- 7) If audio compression is desired, access the application's audio configuration dialog (a typical one is shown in Figure 22) and select the *MPEGator Audio* compressor from the list of the

allowed audio compression methods. Make absolutely sure that *Mono* or *Stereo* audio attributes specified here match the **output** audio format specified by audio bitrate.



Figure 22. Generic Audio Format dialog box with *MPEGator Audio* format selected

- 8) In the output file selection, specify a dummy output AVI file name and start rendering or converting.

## 6. TROUBLESHOOTING

The MPEGator hardware and software are designed to be almost trouble free. Hardware conflicts are almost eliminated by using Windows 95 and PCI bus Plug and Play capabilities. Most of the MPEGator software error message are self-explanatory and do not have to be described thoroughly. However, some cases (mostly concerning the proper software installation and first-time operation) are covered in this section to help solve potential problems.

### 6.1 Possible system bottlenecks

Please consider the following list of system-wide problems that are not directly related to MPEGator, but will significantly deteriorate its performance and cause other undesired effects.

#### **The hard disk is working in MS-DOS compatible (16-bit) mode**

The hard disk controller is *not* configured correctly or has improper drivers installed (the hard disk controller line in the Windows 95's *Device Manager* window is marked with the yellow exclamation mark (!)). Consult your computer's manual or contact the manufacturer's technical support on how to correct the problem. Usually it involves changing some jumpers on the motherboard or settings in the computer's CMOS Setup and sometimes requires obtaining newer, updated drivers from the manufacturer.

This problem causes general disk performance slowdown and directly affects the capturing performance of MPEGator.

#### **The computer is equipped with an obsolete PCI chip set**

Some motherboards are built around cheaper, low-performance chip sets which basically do not cause problems during normal computer operation, but could be simply too slow for advanced multimedia devices, such as MPEGator. The symptoms of this problem include preview or capturing process instability when both are working at the same time. However, each of the preview and capturing processes works fine when other is disabled. The solution is: **turn the video preview off**. This means that an obsolete PCI chip set causes a very serious limitation of the PCI bus throughput which, certainly, affects other system devices as well. Even though, the processor is fast enough the overall system performance is hampered by slow PCI bus. Consider replacing the low performance motherboard to a newer one. See the supplied *README* file or contact Darim for the most up-to-date list of the faulty chip sets.

## **6.2 Common problems and solutions**

This section addresses the common problems which may arise during the installation and first-time operation. Please read this section carefully before contacting Technical Support.

### **The New Hardware ... window did not appear upon the Windows 95 startup**

This could happen if, for some reason, you have failed to supply the proper driver software when you were asked during the first time after power up installation. Refer to the section 3.1 for a detailed description on how to correct this problem.

### **The hardware can not be detected or initialized properly (including Error 102)**

Run Windows 95 *Control Panel*, double click on the *System* icon and then click on the *Device Manager* tab. You will see the structured list of hardware installed in your computer. Normally the window shows only existing device classes (e.g. *Display Adapters*, *Hard Disk Controllers*, etc.) hiding the devices themselves. However, some devices may be preceded with a yellow exclamation mark (!). That means either hardware conflict, malfunction, or in some cases, software drivers error has occurred. Check if *MPEGator* is displayed in this way. If it is, then the system could not allocate enough resources for the MPEGator hardware. The most scarce PC's resource are IRQ numbers. Windows 95's failure to allocate one for the MPEGator means that either all physical IRQs are occupied by other devices or (most likely) the number of IRQs available for the PCI bus is not sufficient (should be greater or equal to the number of PCI slots in the system). First, try to pull out one of the cards from your computer and see if it helps (start with the sound card, as they sometime take two different IRQs). If this does not help, access your computer's CMOS Setup program. Go to the menu concerning the PCI devices and select automatic assignment of IRQs for them (if applicable). For a detailed description how to do this, consult your computer's manual or the manufacturer's technical support.

### **A message saying Plug and Play installation was not performed correctly... appear**

Refer to the previous two descriptions for remedies.

### **I see no error messages, but neither preview nor capture work**

First, make sure that the MPEGator line in the *Device Manager* list has no yellow exclamation mark (!), and the '*Device is working properly*' (after double-clicking on it to see the properties sheet). Refer to the previous solution for details.

If everything looks all right, then the problem comes from an incorrect IRQ sharing between ISA and PCI device, and the ISA device has a higher priority on the IRQ line usage. Formally, the IRQ has been allocated for MPEGator hardware and Windows 95 does not report any conflict, but the physical IRQ signal is never received by the MPEGator card.



In this case, you need to shutdown Windows 95 and access your computer's CMOS setup to correct the problem. Use the following check list as guidelines:

- Make sure that the *Plug and Play OS* parameter is set to *Yes*
- Go to the PCI devices configuration section and see if there are any IRQ numbers labeled as '*Used by ISA bus*'. Change at least one of these lines to '*PCI*' or '*Available*'.
- Save your CMOS settings and run Windows 95 again. If the problem persists, make one more IRQ available for the PCI devices by repeating the described steps again.

Note, that the above procedure may be required for computers equipped with some versions of AMI (American Megatrends Inc.) and Phoenix BIOSes.

### **I have got a message saying *Video buffer overflow...***

This message usually appears when the video source is too noisy (contains too many high frequency components) to be compressed efficiently. There are two possible ways to correct this problem:

1. Try to use a different type of video source. Always use video signal of the highest possible quality. Keep in mind the famous "*garbage in, garbage out*" rule. An S-Video signal, such Hi-8 or Super-VHS should be considered as a minimum. Of course, when possible, a professional format such as Betacam or D-2 is ideal.
2. If the other source is unavailable, you have to manually lower the quality threshold (normally maintained by the MPEGator software) to allow the video to be compressed. You can achieve this by doing either of the following:

- Select *Noisy Video* template from the **Template** dialog (see page 26). Note that since templates store *all* settings, selecting this template may overwrite some of the currently effective parameters. If this is not desired, use the next method.
- Select the **Advanced** tab of the MPEG Parameters dialog and expand the *Real Time Control* parameters branch. Use the list below to set the specified parameters to the values more suitable for this case:

```
I_initial_quant = 9    P_initial_quant = 10    B_initial_quant
= 11
I_minq = 6             P_minq = 6             B_minq = 6
I_maxq = 16           P_maxq = 32           B_maxq = 32
```

These parameters set the quantization range and the initial values effective during compression of I, P and B frames respectively.

Note, that the first way is highly recommended. Use the second one only as a temporary workaround, since you can never get good quality of MPEG out of poor video source.

### **The video preview does not work properly**

Access the MPEGator Control Panel applet and select **Preview / Uses GDI mode**. Refer to the corresponding section on the page 28 for details. The GDI mode uses standard Windows

functions to display images and is compatible with all systems. This mode will even work, albeit with poor quality, with display adapter settings of 256 colors or less.

### **The video preview is distorted (similar to Figure 23), but the captured data is fine**

The video preview data is not being transferred fast enough through the PCI bus. Normally, the amount data corresponding to single video frame (*165 Kbytes*) is supposed to be transferred within roughly *16 milliseconds* (both numbers refer to NTSC). It means that the required bus throughput is about 10 Mbytes/sec. Some of the older computers built around obsolete PCI chip sets have serious performance problems when transferring large amount of data within certain, very limited time interval. One possible remedy is to try to increase the speed of the PCI bus by accessing your computer's CMOS Setup. Select the *Chipset features setup* or similar menu and set *PCI Bursting*, *PCI Streaming*, *PCI Concurrency* parameters to the *Enabled* state. If necessary, please consult your computer's manual or contact the manufacturer's technical support for assistance.



**Figure 23. Preview image is tiled vertically**

### **The number of dropped frames during capture is too high**

The disk performance is too low or some other concurrently running software has taken up significant system bandwidth. To check for this, do the following:

- Run Windows 95 *Control Panel*, double click on the *System* icon and then click on the *Performance* tab. Make sure the **File System** and **Virtual Memory** lines in the information window both read **32-bit**. If not, your hard disk controller is *not* configured correctly or has improper drivers installed (the hard disk controller line in the *Device Manager* window is marked with the yellow exclamation mark (!)). Consult your computer's manual or contact the manufacturer's technical support on how to correct the problem.
- Terminate or suspend the applications that perform any disk-intensive or time-critical tasks (such as anti-virus, data protection or monitoring software, etc.). These applications may be

preventing the MPEGator software from using the necessary amount of your system resources.

- Defragment your hard disk using standard Windows 95 *Disk Defragmenter* utility or any compatible third party program.
- Finally, disable the video preview during capture.

### **I always get MMSYSTEM296 ... error whenever I'm trying to playback an MPEG file**

This message is produced by Windows 95 multimedia subsystem, not by the MPEGator software. It means that you do not have any MCI driver suitable for MPEG files playback (or the driver has failed the initialization). The solution is to install (or re-install) any appropriate MCI driver for MPEG files playback.

If none of the above describes or solves your problem, contact Darim technical support for assistance.

## **6.3 How to get software updates and technical support**

The software supplied with the MPEGator is being constantly improved. To find the most updated versions, visit our WWW home page or anonymous FTP site. The addresses are as follows:

Darim Vision WWW home page:

<http://www.darvision.com/> - in USA  
<http://darvision.kaist.ac.kr/> - in South Korea

MPEGator update files location:

<ftp://ftp.darvision.com/pub/mpegator> - in USA  
<ftp://darvision.kaist.ac.kr/pub/mpegator> - in South Korea

Technical support team can be reached via

Phone: (213) 637-1703 - for North and South America  
+82-42-828-6341 - for Europe and Asia

Fax: (213) 637-1705 - for North and South America  
+82-42-828-6339 - for Europe and Asia

E-mail: [techsup@darim.kaist.ac.kr](mailto:techsup@darim.kaist.ac.kr)

Please note, that technical support personnel will be able to help you more efficiently if you include the following information in your question:

- The basic computer configuration (CPU model and clock speed, amount of the physical RAM).
- The video adapter information (model, amount of video memory, display mode used)
- The program settings which led to the error
- All other details as necessary

Darim technical support team will be happy to provide you with the best quality assistance to make you completely satisfied with Darim's MPEGator.