MPEGIO

Realtime MPEG1/2/4 Hardware Encoder & Decoder

User Manual

Version 1.1.7.1

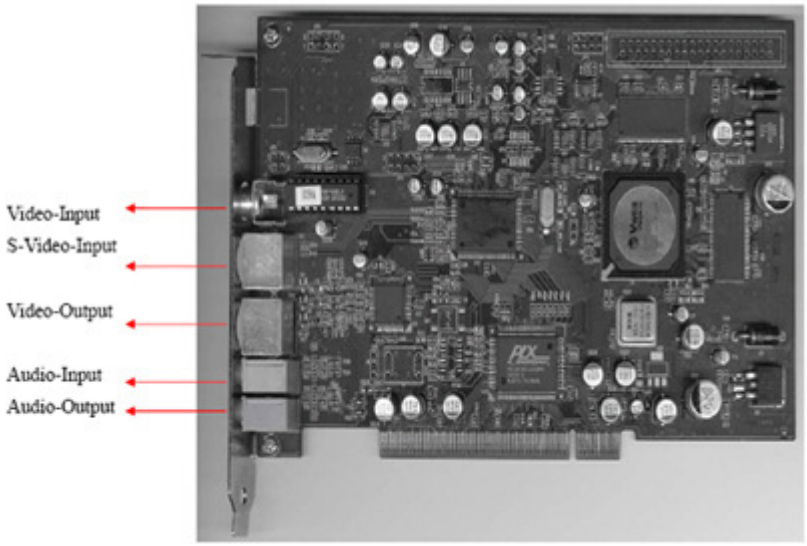


Table of Contents

1. Main Features & Functions:

MPEGIO is a realtime hardware MPEG video encoder & decoder PCI card with many powerful features:

- **Realtime Encode Incoming Video Signal as Superior-quality MPEG1, MPEG2, MPEG4(H.263) Video Files**
- **Realtime Decode High-quality Video to external TV through on-board video & audio output sockets**
- **Realtime Transcode (Convert) MPEG files to different parameters (bitrate, frame sizes, etc)**
- **Realtime Preview incoming or played-back video on PC screen in arbitrarily re-sizable window**
- **Act as Streaming Server to Realtime Stream Live Video or Video Files to Network (LAN/WAN/Internet)**
- **Act as Streaming Client to Realtime Decode/Transcode Network Video Received from Streaming Server**
- **Support up to 10 Cards on One PC to Simultaneously Record/Play/Stream Multiple MPEG video files**
- **Wide-Range Capture Data Rates 50Kbps~15Mbps for MPEG1, MPEG2 & MPEG4 formats**
- **Various Video Capture Frame Sizes from 176X120 to 720X576-Pixels**
- **Support Both Program Stream(PS) and Transport Stream(TS) MPEG Encoding, Decoding and Transcoding**
- **Allow Multiple Aspect Ratio Encoding: 4:3, 16:9(Wide-Screen), and Square PEL**
- **Multi-Frame-Rate Encoding/Decoding/Transcoding: 23fps, 24fps, 25fps, 29.97fps, 30fps, 50fps, 59.94fps, 60fps**
- **Forever Video & Audio Sync. during video preview, capture, playback, stream and in the recorded files**
- **Realtime Seamlessly Split Recording Video into Multiple Files at Different Size/Time without Any Data Loss**
- **User Data Can Be Realtime Inserted Unlimitedly during Video Encoding, Streaming and Transcoding**
- **User Data Inserted Can Come from Multiple Sources, inc. Serial (RS232) Port, Typed-in Text, Date/Time, etc.**
- **User Data Inserted Can Be Displayed as OSD during Video Playback**
- **Pause and Resume During Video Recording without Closing Recording File**
- **Instantly Start Video Capture at User's Request (Button press) without lengthy delays**
- **Start Video Capture as Video Signal Appears**
- **Stops Video Capture after Video Signal Disappears for a period of user-defined time**
- **Add OSD (On Screen Display) Text/Time/Date & Graphics at Decoding and Transcoding Time**
- **Live display Teletext pages and save them as text or graphics images**
- **Capture Still Images in BMP/JPG/GIF/TIF/PNG Format during Preview/Record/Decode/Transcode Times**
- **Still Images Can Be Auto-Grabbed using Timer, and Current Date/Time Can Be Printed on Grabbed Images**
- **Capture DVD-Compliant or arbitrary MPEG2, MPEG4 or MPEG1 video files**
- **Captured DVD-Compliant files can be used to burn DVD movie disk without re-compression**
- **Realtime preview incoming video and audio with video in sync with incoming signal**
- **Realtime preview incoming video and audio with video & audio perfectly synchronized**
- **PAL and NTSC video format are automatically detected and switched**
- **SVideo and Composite Video Input and Output**
- **Stereo Audio Input and Output**
- **Hardware-encoding chipset built-in, minimum PC resources required**
- **Support time-scheduled recording with user-definable file names**
- **Support live colour change on incoming video**
- **Automatic email-out of warning messages on signal loss, disk full and start/stop conditions**
- **Remote Management allows one PC to monitor & control unlimited MPEGIO via Internet or LAN**
- **Recorded video file name can contain multiple fields inc. recording date, time, vide length, video format, etc.**
- **Loop Disk and Split File Number Reset functions to automatically free disk space on pre-set conditions**
- **Arbitrarily Start or Stop Video Streaming at Preview, Encoding, Decoding or Transcoding time**
- **Allow Video Recording/Streaming to Start from Command Line Switches and Windows Messages**
- **Works on Windows XP PCs with PCI slot**
- **Comes with SDK for Software Development**
- **Optional Rapid-Application-Development SDK for fast software development**

2. Package Contents:

PCI Card
SVideo-RCA Conversion Cable for Video Output to RCA Socket
One Installation CD
One User Manual

3. Minimum System Requirement

Hardware: Pentium3, Pentium4 or AMD Athlon CPU based PC with free PCI slot.
Software: Microsoft Windows XP SP2, DirectX 9.0.

4. Hardware Installation

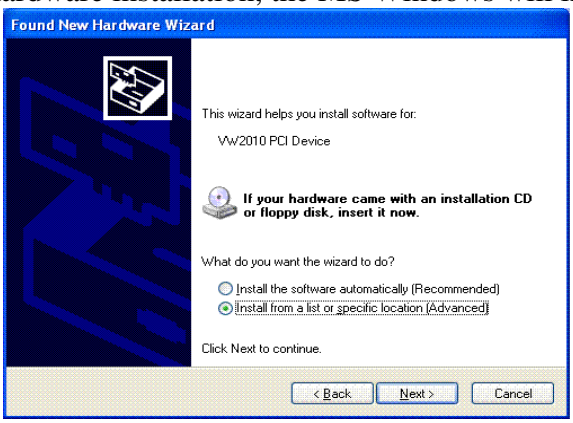
Un-plug the PC's power cable, open PC case, locate a free PCI slot, plug in the **MPEGIO** card and screw it firmly to the back-panel.

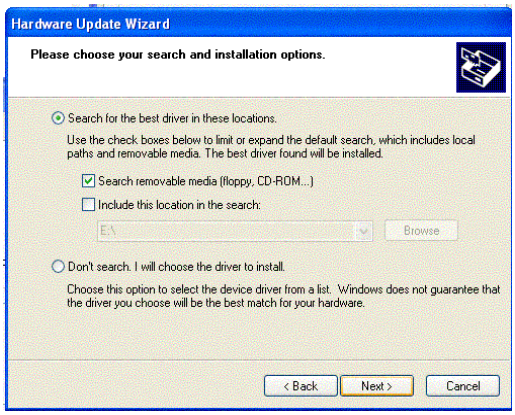
Plug in video/audio cables between the external video input/output devices and **MPEGIO**.
If output to external TV/VCR is through Composite (RCA) cable, the supplied SVideo-RCA Conversion Cable needs to be plugged onto the Video-Output socket of the **MPEGIO** card.

5. Software Installation

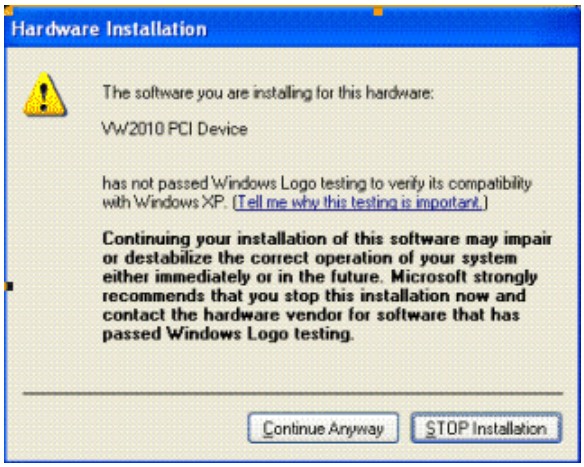
Software installation includes device driver and application software installation, either can install first.

5.1 After hardware installation, the MS Windows will inform that new hardware is found:



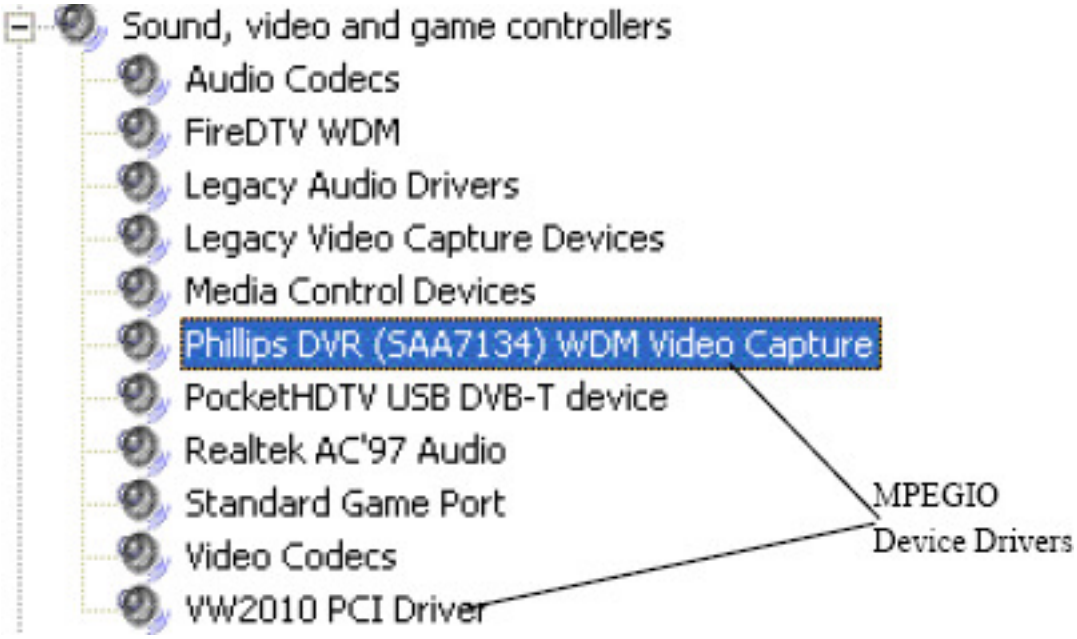


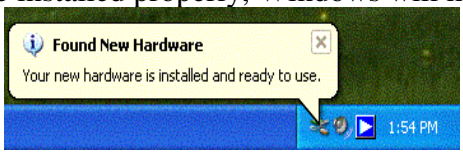
5.2 Put the installation CD into PC's CD/DVD drive, click "Next" button, let Windows search for device driver specifically from the CD ROM. During the driver installation, ignore those warnings claiming the device driver "has not passed Windows Logo testing…" etc, press "Continue Anyway" to keep going, until the driver is installed:



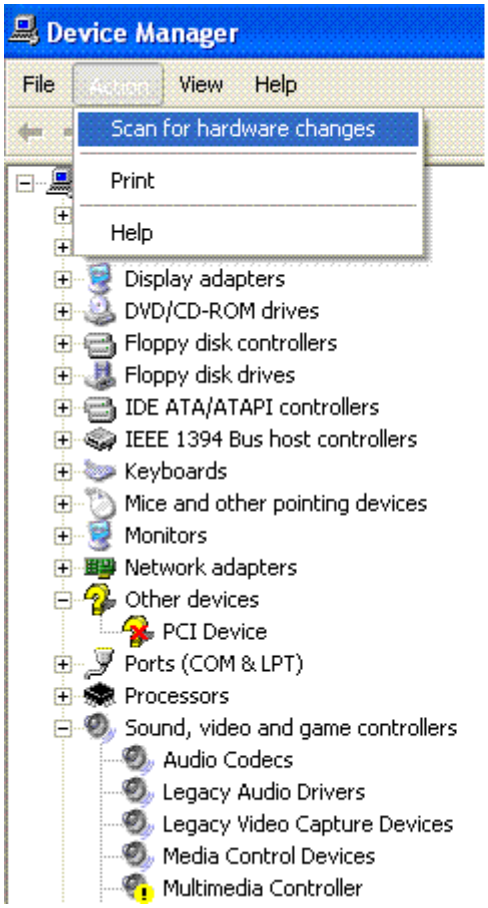
Installation of the other device driver "Phillips DVR" is similar as above. Alternatively, running the "**SetupDrivers**" program from the **Start->All Programs->Inventa->MPEGIO** program group after installing **MPEGIO** application software (See below) will have the same effect. Note the "**SetupDrivers**" program can also be used to re-install **MPEGIO** device drivers. Also note another installed program "**ResetDrivers**" can be used to reset the **MPEGIO** hardware if malfunction happens.

After both drivers are installed for all **MPEGIO** cards, check the MS Windows' **ControlPanel->System->Hardware->DeviceManager ->Sound, video and game controllers** category to make sure every **MPEGIO** card has one pair of "**Phillips DVR**" and "**VW2010 PCI**" drivers listed without question mark or exclamation mark:



After all device drivers are installed properly, Windows will have a pop-up message box at the lower right corner of the screen: 

Please note: after re-installing WindowsXP on a PC with **MPEGIO** card remaining seated in PCI slot, two un-recognized "Multimedia Controller/PCI Device" or similar items will appear in the Windows' **ControlPannel->System->Hardware->DeviceManager** window, preceded by a yellow question mark or exclamation mark, since WindowsXP can not install their device driver software. These items will need "update driver" operation (right-mouse click then select "Update driver…") or running the "**SetupDrivers**" program from **MPEGIO** program group to install the proper device driver, before the **MPEGIO** application software can work properly: run the "**SetupDrivers**" from **MPEGIO** program group, or delete these two items (right-mouse click them then select "Uninstall"), highlight the PC's name in the DeviceManager window then select "Scan for Hardware Changes", then follow the same steps as at the start of this section to install their device drivers:



5.3 To **install** the **Application Software**, first uninstall any existing software (See below), then click the "**Next>"** on the "**MPEGIO Setup Wizard**" window --- which normally starts up automatically after inserting the set-up CD, or will appear after double-clicking the "**Start.exe**" software on the set-up CD:

, then follow the on-screen instructions to install the application software.

5.4 To **uninstall** the **Application Software**, either click **Start->All Programs->Inventa->MPEGIO->Repair-or-Uninstall Application**, or click **Control Panel->Add or Remove Programs->MPEGIO->Remove.**

5.5 The Setup CD also has a separate software **MPEGIORM.exe** that can be copied to any PC

with or without **MPEGIO** card/software installed: this program is used to **remotely monitor and control MPEGIO** cards, details are in section 11 "**Remote Management Function".**

6. Starting the Software

After a successful application software installation, an "**MPEGIO 0**" shortcut icon 

will appear on the Windows' desktop. Mouse double-clicking this icon will start the software. The software can also be started from Window's "Start->Program Files->Inventa->MPEGIO" group. (The 0 in "MPEGO 0" means the first **MPEGIO** card, to simultaneously use **multiple MPEGIO cards**, see **Section 14**).

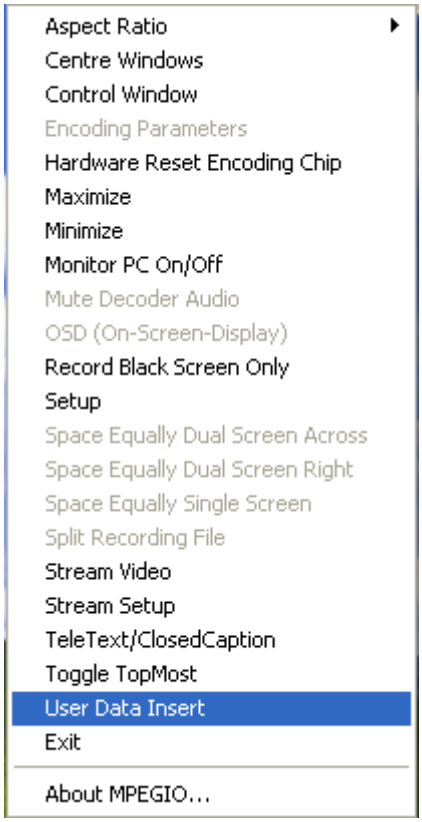
Please note: screen resolution 1024X720-Pixels or higher is needed to run the **MPEGIO** software properly, a warning message will appear if the screen resolution is lower than this.

7. User Interface

Once started, **MPEGIO** displays a **Video Window** with live video (if available) and a **Control Window**:

Pressing the Left-Mouse-Button inside either window then move the mouse cursor without releasing the mouse-button will drag the window around the screen --- releasing the left-mouse-button will place the window at the new screen location. The **Video Window** can be **re-sized** by using the left-mouse-button to drag its edges, while the **Control-Window** cannot be resized.

Double-Clicking inside the **Video Window(Maximize)** will toggle between **Full-Screen** or normal display mode. There is also a **Pop-Up Menu** through right-mouse-button clicking either the **Video Window** or the **Control Window**, where extra functions can be selected:



Most **MPEGIO** functions are accessed through the **function buttons** and **special control items** on the **Control Window**. Moving mouse cursor towards these buttons and control items will drop down a small yellow tool-tip prompt that explains the function of the button or control item:

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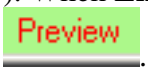
A group of **Keyboard-Short-Cuts** is also available for **MPEGIO** functions**,** see **Appendix 1** for details.

The **Control-Panel** displays **MPEGIO**'s current **Operation Mode** at its the lower-left corner:

, which can be one of **Preview**, **Encode**(Record), **Transcode**(Conversion), or **Decode**(Playback). When **MPEGIO** is manually started without the **R** or **S** command-line switches (see Section 15 on **Command Line Switches**), it always enters the **Preview** mode that simply displays the incoming video, if any, in the **Video Window**. **Encode, Transcode** or **Decode** mode can be entered by pressing their individual buttons, or when a user-defined **Windows Message** is received (see Section 15 on **Windows Messages** Sent to **MPEGIO**). When **Encode**, **Transcode** or **Decode** mode finishes the operation mode always returns back to **Preview:** 

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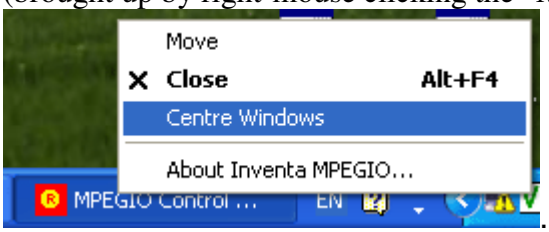
A **Video Streaming** function can be started while **MPEGIO** is in any of these operation modes: in **Preview** or **Encode** mode the live incoming video will be streamed out, in **Decode** mode the played back video file's content will be streamed out, in **Transcode** mode the transcoded video content will be streamed out. See **Section 8.4** for more details on **Video Streaming**.

At the upper-left corner, **Control Window** lists the currently selected Video Source (Composite or Svideo), Video Signal (PAL, NTSC or None) and Video Encoding Type (MPEG1/2/4, DVD, VCD, etc): the type MPEG2**P**/MPEG4**P** indicate Program Stream, while MPEG2**T**/MPEG4**T** indicate Transport Stream.

Both the **Video Window** and the **Control Window** can be **centred instantly on PC's screen** by selecting the "**Centre Windows**" item either from the **Pop-Up Menu** (brought up by right-mouse clicking the video or control window), or from the system menu of the "MPEGIO Control Window" on the Windows' task bar (brought up by right-mouse clicking the "MPEGIO Control Window" icon on the task bar):

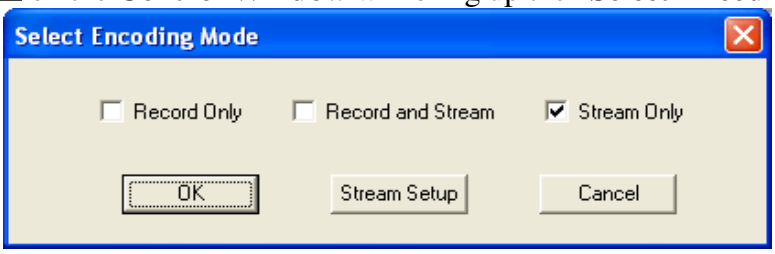


8. Main Functions

8.1 Record (Capture Video)

Click "**Rec.**" button 

on the **Control Window** will bring up the "**Select Encoding Mode**" window:



Select the "**Record Only**" mode will start video recording into a disk file using the current settings defined in the "Video Recording" section of the **Setup** window(see Section 9.1 below). Depending on the setting, a file name prompt will pop up either before or after the recording, or a pre-defined file name will be used silently. The recorded file name including the full path will be displayed at the lower-left corner of the **Control Window** during the recording process, and a ".mpg" extension will always be appended at the end if that has not been supplied by the user.

Select the "**Stream Only**" mode will stream the encoded video to the TCP/IP address defined in the "**Stream Setup"** dialog window (see **Section 8.4** for details), without creating a file on hard disk. Similarly as in the "**Record Only**" mode, the streamed video is encoded using the current settings in the **Setup** window.

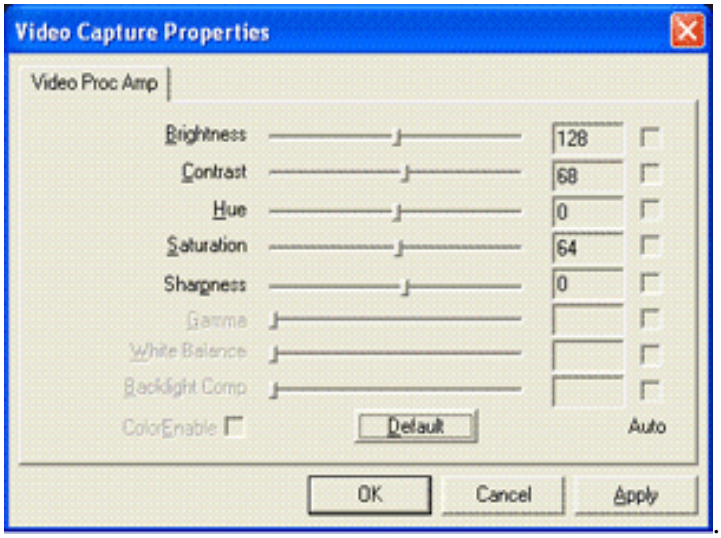
Select the "**Record and Stream**" mode will save file and stream video simultaneously.

The "**Stream Setup**" button can be used to set up video streaming TCP/IP addresses(see **Section 8.4**).

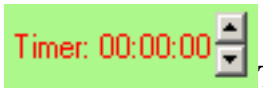
During video recording process, several actions can be taken:

---- **Colour Adjustment**: click the **Color** button 

will show the colour adjusting window:



Once adjusted and **OK** button clicked, **MPEGIO** hardware will keep the changed values, even when the **MPEGIO** software or the PC has been shutdown and re-started, until the colour values are changed again from this window. If colour values are changed during video encoding time, the new values will be reflected in the recorded video file and/or streamed-out video data immediately.

---- **Recording Timer**: 

Timer length can be adjusted throughout the recording process by clicking the up/down arrow in a minute unit.

---- **Split File**: 

Clicking this button (or select "Split Recording File" from the Drop-down menu) will close the current recording file and start a new file name for all subsequent recordings, until this button is clicked again. The split file will be named after the very first file with a 4-digit serial number appended to the file name, and this 4-digit number can be either ever-increasing or repeated within a pre-defined range (see **Section 9.1** on the "**Reset Split File Number When Reaching**" check box).
This file-splitting action can also automatically happen if the recorded file reaches a certain size(e.g. 4.3GB) or time: these can be set up from within the **Setup Window**.
File splitting is done **seamlessly**: no binary data is lost between any two adjacent files. If all split files during one recording are binary copied back as one single file, that single file will be exactly the same recording as if no splitting has been done during that recording time.

---- **Stream Video:** If "**Record Only**" mode was selected when recording was started, select the "**Stream Video**" item from the **Pop-Up Menu** will start streaming video. If video streaming has already started (the "**Stream Video**" item in the **Pop-Up Menu** has been ticked: 

), selecting this menu item will stop the video streaming (the tick will disappear).

---- **Minimize the Video Window**: 

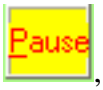
Click this will toggle between minimizing and restoring the **Video Window.**

---- **Picture(Still-Image) Grabbing**: Click 

Button, See **Section 8.5** below for details.

---- **User Data Insertion:** Select **"User Data Insert"** from the **Pop-Up Menu**, details in **Section 8.6.**

---- **Pause/Resume Recording:** Once recording is started, the **Rec.** 

button becomes **Pause** button 

, clicking **Pause** button will pause the recording without closing the current recording file but changing the button into **Rec.** 

again: clicking the **Rec**. button after pausing will resume recording video data into the current recording file. Continuously toggling between **Rec.** and **P**ause status will record video into the same file with multiple sections of the original video removed.

---- **Stop Recording:** Click 

button, or when the timer expires, or the **MPEGIO** software exits.

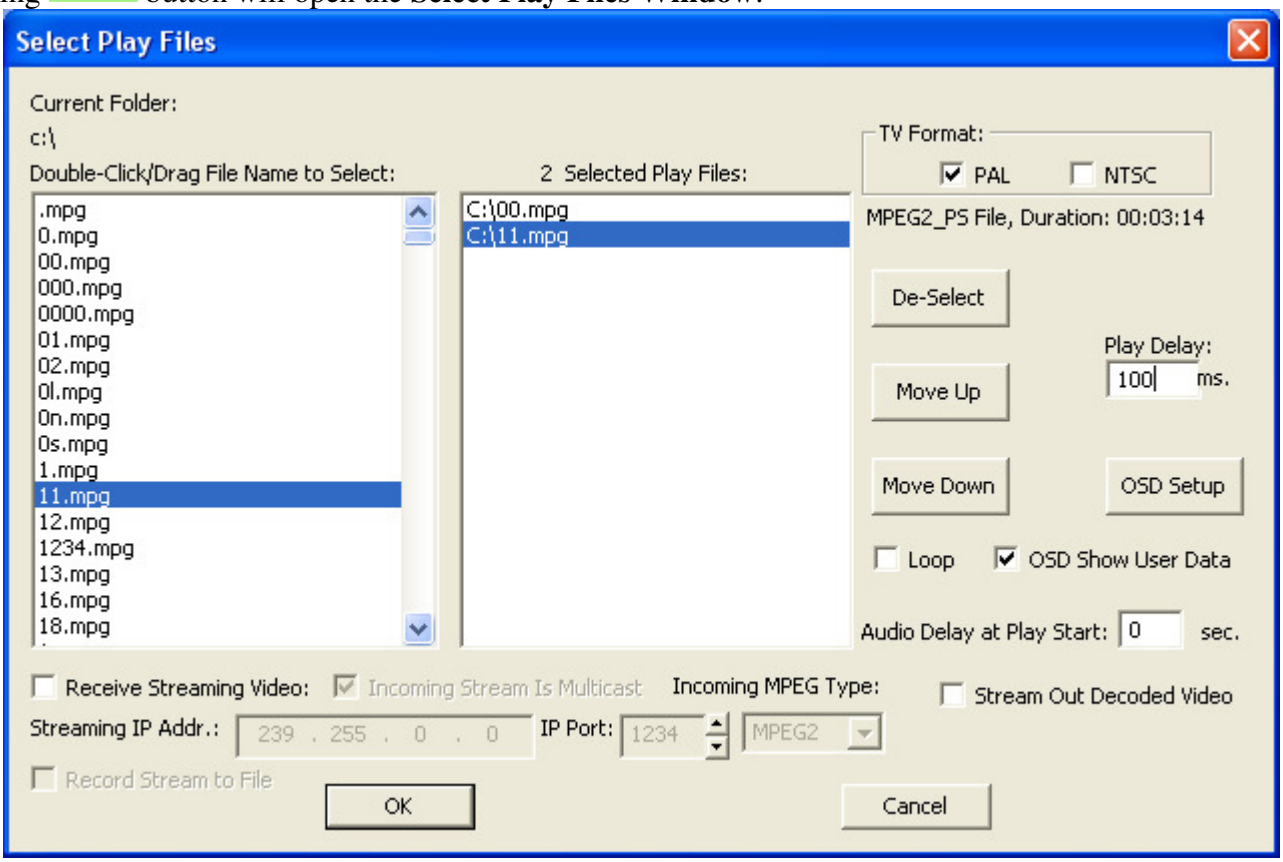
8.2 Play(Decode Video) & Instant RePlay

Although video files recorded by **MPEGIO** can be played back by many software, including Windows' MediaPlayer, CyberLink PowerDVD, VideoLan (VLC media player), etc., only **MPEGIO** software itself can display the played-back video on external TV and on PC's screen simultaneously: all other software display the video only on PC's screen.

MPEGIO can decode/display MPEG video either from recorded MPEG files or from incoming network video stream. Previously recorded MPEG files can be either **drag-and-dropped** from Microsoft Windows' Explorer, or can be selected from the **Select Play Files Window**, while incoming network video stream details can only be defined from within the **Select Play Files Window**.

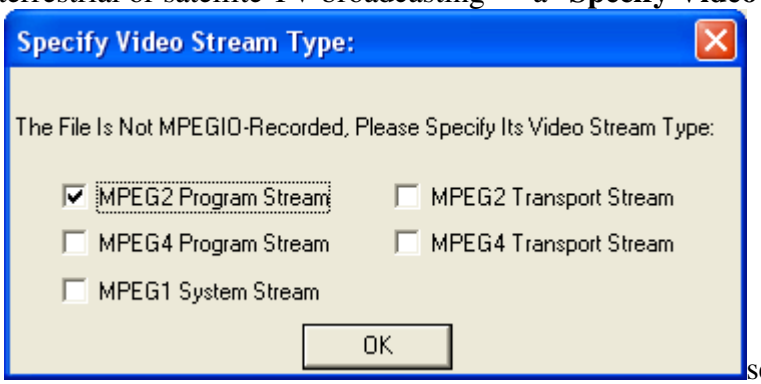
Clicking 

button will open the **Select Play Files Window**:



From the left file list box, double-clicking any **MPEGIO .mpg** file will select it into the right file list box. Multiple files can be selected and played back sequentially. Ticking the **Loop** box will play back the selected files repeatedly. The **Move Up** and **Move Down** buttons will adjust the position of the highlighted file name in the playback list, and the "**De-Select"** button will remove a selected file. The **TV Format** selection **must** match the selected MPEG files' recording TV format(either PAL or NTSC), and all selected files must have the same TV Format.

If the selected file was not recorded by **MPEGIO** compatible hardware **---** e.g., MPEG2 files recorded from digital terrestrial or satellite TV broadcasting **---** a "**Specify Video Stream Type**" window will appear:



select the correct stream type then continue.

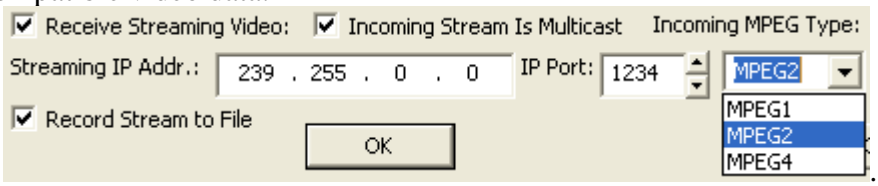
If the current Video Encoding Stream is **Transport Stream** (see Section 9 below), files selected to play must be Transport Stream(TS) MPEG files, including TS files created by non-MPEGIO hardware or software: they will be indicated as "MPEG2_TS" or "MPEG4_TS" files to the right of the "**Selected Play Files**" List Box --- non-Transport Stream (i.e. System Stream or Program Stream) files will be indicated as MPEG1_SS, MPEG2_PS or MPEG4_PS files. Similarly, if the current Video Encoding Stream is **Program Stream** (see Section 9 below), Transport Stream (TS) files will not be accepted for playback.

If the "**Audio Delay at Play Start**" value is non-zero, audio will be muted for that amount of seconds at the beginning of each file playback, to avoid some noise happening on some motherboard sound card.

If the "**Stream Out Decoded Video**" is checked, the decoded video will be streamed out while it is been displayed. The "**Stream Setup**" button can be used to set up streaming destination addresses. In this situation **MPEGIO** is acting as a **Video Streaming Server**.

If the "**Play Delay**" value is non-zero mille-seconds, each file playback will delay this amount of time at the start, sometimes useful to overcome corrupted video image problem during playback.

If the "**Receive Streaming Video**" box is checked, instead of disk files, video to be decoded will be incoming network data continuously streamed into this PC through local or wide-area network from some remote video streaming server, that can be another **MPEGIO** card, an Inventa **MPEGIOPro** card, or any device that streams **MPEGIO**-compatible video data:



In this situation the **MPEGIO** is acting as a **Video Streaming Client.** Note the "**Incoming MPEG Type**" (MPEG1, MPEG2, or MPEG4) must match the one used by the remote video streaming server, as well as the "**TV Format**"(PAL/NTSC).

If the "**Incoming Stream Is Multicast**" is cleared, the "Streaming IP Addr" field will disappear since the incoming video will be streamed at this PC's IP address only, therefore the "**IP Port**" value will be the only needed identification to receive incoming video --- this is called "**Unicast**" streaming which guarantees only one PC (or other streaming client) can receive the streamed video, as against the "**Multicast**" streaming where multiple PCs (or other streaming clients) --- each has its own IP address --- can receive the same streamed video simultaneously, by using the same Source IP-address/Port-number as the "Streaming IP Addr" and "IP Port" values that are used by the remote video streaming server. The **Multicast** or **Unicast** addressing method must be the same between **MPEGIO** as video streaming client and the remote video streaming sever (e.g. another **MPEGIO** card that is streaming out its video).

If the "**Record Stream to File**" box is ticked together with the "**Receive Streaming Video**", the incoming stream video will also be recorded to disk file as named in the "**Setup**" Window(see Section 9), during this time **Split File** will also be allowed in the same way as in the video recording time described in Section 8.1.

Making **MPEGIO** card to act as both **Streaming Client** and **Streaming Server** simultaneously, i.e., to receive incoming network video and to stream out this received video (to a different IP address/port) at the same time, is possible, but high-performance PC will be required or jitter will happen in the streamed-out video.

Note: In network video playback, same as in local video file playback, the Video Encoding Stream (Program Stream or Transport Stream) of the **MPEGIO** card and the incoming video must match: if the incoming network video is in Transport Stream format, **MPEGIO** must select Transport Stream encoding from the **Setup Window**. If the incoming network is not in Transport Stream format, the **MPEGIO** must select Program Stream (MPEG2/4) or System Stream (MPEG1).

After selecting files or incoming streaming IP address and port, pressing **OK** will start video display in both the **Video Window** and external TV connected to the "Video Output" port of the **MPEGIO** card. Audio can be heard from both PC's speakers and the speakers connected to the "Audio Output" port of the **MPEGIO** card. During playback process, the **Play** button becomes **Pause** button 

that allows switching between Pause and Resume the video playing/decoding until **Stop** is pressed or video file end is reached, then the **Preview** mode is returned. If the incoming streaming video is used as playback source and no network-streamed video is received at the IP address, total black screen is displayed.

Selecting the "**OSD Setup**" button will start **On Screen Display** set-up window for adding text/time/date and graphics overlay to video being displayed, details on **OSD** can be found in **Section 10** of this manual.

If the "**OSD Show User Data**" box is ticked, and there is any "**Show User Data**" OSD item defined (See Section 10), then the video decoding process will display any User Data Text present in the decoded video stream.

On the **MPEGIO**'s Control Window, clicking the **Instant Re-Play** button 

plays back the last recorded video file instantly, if such a file exists. **MPEGIO** will remember the last recorded file even between software exit/re-start. However, if the last recorded file has been deleted no replay will happen. Slowly moving the

mouse cursor into the **RPlay** button, the drop-down tooltip window will show the last recorded file name if it exists: 

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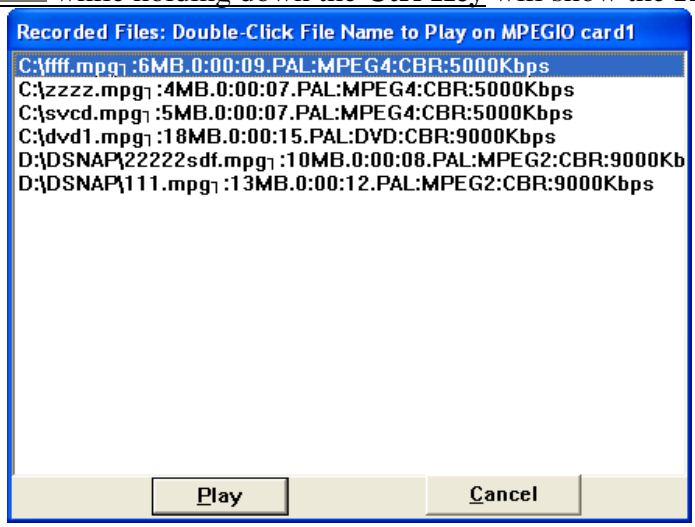
If the "Create Log" option is on (see Section 9) and the **MPEGIO.log** has logged some recording file names, clicking the Re-Play button 

while holding down the **Ctrl Key** will show the **Recorded Files Window:**



Recorded Files Window

Double-clicking any file will start playing it instantly. Note on multi-**MPEGIO** cards PCs the **Recorded Files Window** will contain file names recorded by all **MPEGIO** cards, not just the current card.

To **grab still images** during playback process, the **Pic** button 

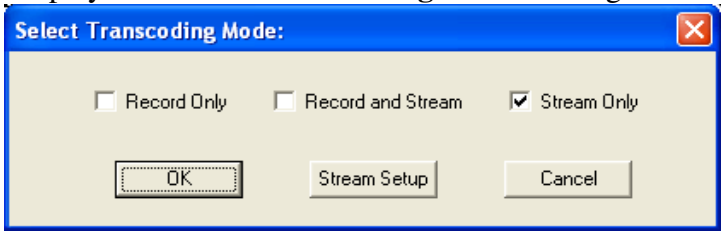
must be clicked **BEFORE** starting the **Play** operation so that the "**Capture Still Images**" window appears together with the **Video** window --- do not dismiss this "**Capture Still Images**" window until the **Play** operation finishes if you wish to grab still images throughout the entire video playback process. See Section 8.5 for details on still image grabbing window.

When **MPEGIO** is in **Preview** mode, **Drag** valid MPEG video files from Windows' File Explorer and **Drop** them into **MPEGIO**'s **Control Window** will also start playing the dropped files: any previously selected play files will be replaced by the newly drag-and-dropped files. In Program Stream encoding mode, the Drag and Dropped MPEG file names must have extension ".mpg", in Transport Stream encoding mode, the file names can have .mpg or .ts extension.

8.3 Convert(Transcode) Video

Pressing 

button will display the "**Select Transcoding Mode**" dialog window:

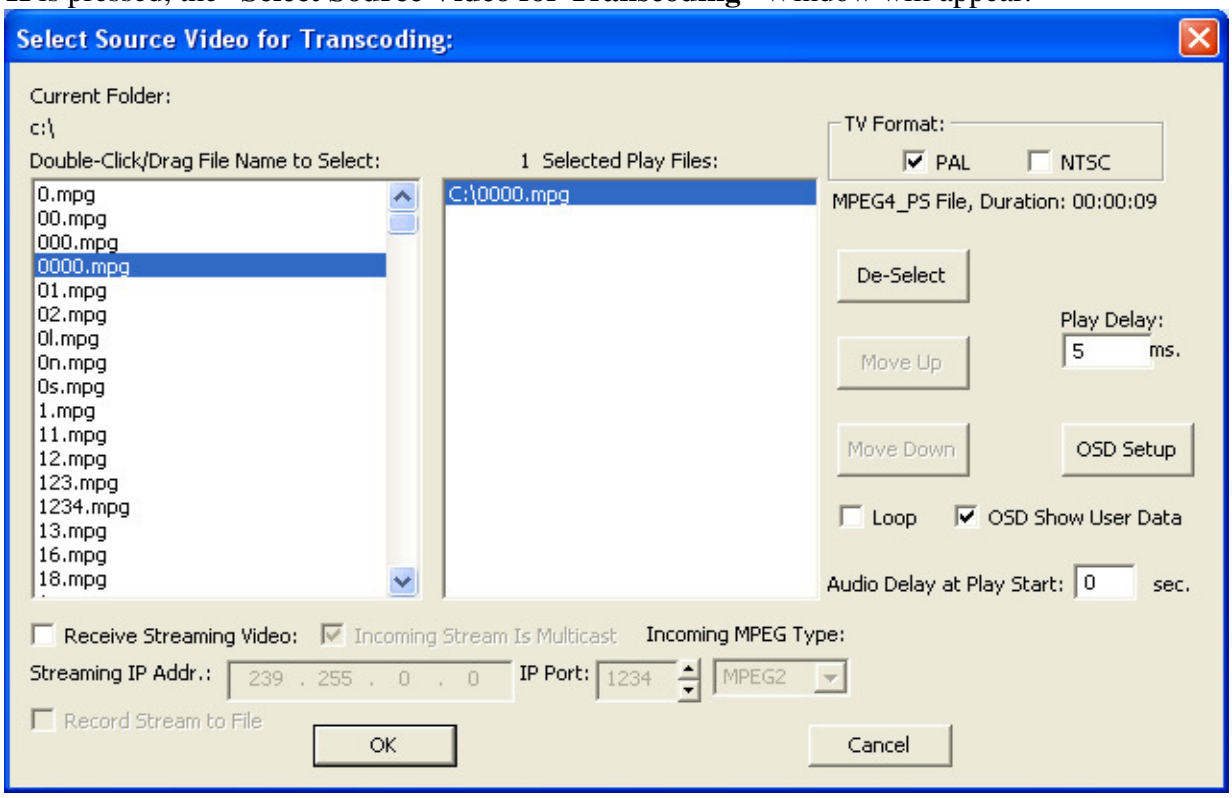


Check the "**Record Only**" box then select **OK** will convert an existing MPEG file(to be selected next) to a new MPEG file without streaming. If **OSD** is enabled (see **Section 10**), live text/time/date/graphics overlay can also be recorded onto the new MPEG file. The new MPEG file's encoding parameters are set in the "**Video Recording**" section from the **Setup Window**(see Section 9.1).

Check the "**Stream Only**" box and select **OK** will stream out the transcoded video from a MPEG File (to be selected next) to TCP/IP addresses defined in the "**Stream Setup**" window, without creating new MPEG file. The streamed video will have the new encoding parameters as defined in the **Setup Window** (see Section 9.1). If OSD(see Section 10) is enabled, OSD will also be streamed out.

Check the "**Record and Stream**" box will start both new MPEG file creation and video streaming.

Once **OK** is pressed, the "**Select Source Video for Transcoding**" Window will appear:



This window is exactly the same as the "**Select Play File**s" window described in the **Section 8.2** previously, except the "Stream out Decoded Video" box and "Stream Setup" button are removed (since if streaming out the transcoded video has been selected in the previous dialog before this window is displayed). Either one MPEG file or incoming network video stream can be selected as the source for transcoding. Similarly as in "**Select Play File**s" window, if the selected file was not recorded by **MPEGIO** compatible hardware, the "**Specify Video Stream Type**" Window will appear.

Video Transcoding(Conversion) is done in realtime through **MPEGIO**'s on-board hardware to first decode the existing video file or network video stream, then simultaneously convert/transcode the decoded content to new format. During this process, the decoded video is played in the **Video Window** and the external TV in normal speed, and the converted new file (if not in "**Stream Only"** mode) will start and finish a few seconds later after the decoding stops. If not in "**Stream Only**" mode, both "Play" and "Record" time progress will be displayed during video conversion: 

.

Please note that Conversion will use the **TV Format(PAL** or **NTSC)** selected in the "**Select Source Video for**

Transcoding" window(at the upper right corner) rather than the current input signal's **TV Format** specified in the **Setup** window(see Section 9 later): this Conversion **TV Format** must be the same as the **TV Format** of the selected MPEG file – i.e., the TV Format used when the selected MPEG file was previously being recorded. However, if currently there is a live input video signal at the input socket with a different TV Format than the selected MPEG file's TV Format, the Conversion will fail with a warning dialog window appearing. Also note during the Conversion the **Name Recording File** method will be forced into "**Pre-Named as**:".

If the source selected is incoming network video and no network video data is available at the selected IP address+Port, the Transcoding will abort immediately, returning back to **Preview** mode.

If **Stop** button is clicked during conversion, conversion will stop and the already transcoded content will remain in the closed disk file --- when using network video as source this is the only way to stop conversion process since even when the incoming network video data has stopped to arrive (after arriving successfully for some time), the conversion will not stop but simply wait for possible new data to arrive. When using existing MPEG file as source the conversion can be either manually stopped by pressing the **Stop** button, or be automatically stopped when the whole file has been transcoded, i.e., when the end of file is reached.

If **OSD**(see Section 10) is enabled, the **OSD** result will be either recorded in the converted file(Record_Only mode), or streamed out with the transcoded video(Stream_Only mode), or in both the converted file and streamed out video(Record_And_Stream mode)

When not in "**Stream Only**" mode, transcoding will allow "**File Splitting**" the same way as in **Video Recoding** Process: recording file splitting can happen manually or according to recording time or file length as defined in the **Setup Window** (see Section 9 below).

To **Grab Still Images** during **Transcoding** process, the **Pic** button 

must be clicked **BEFORE** starting the **Transcoding** operation so that the "**Capture Still Images**" window appears together with the **Video** window --- do not dismiss this "**Capture Still Images**" window until the **Transcoding** operation finishes if you wish to grab still images throughout the entire **Transcoding** process. See Section 8.5 for details on still image grabbing window.

User Data can be inserted during transcoding, same as during video encoding process, details in Section 8.6.

8.4 Stream Video

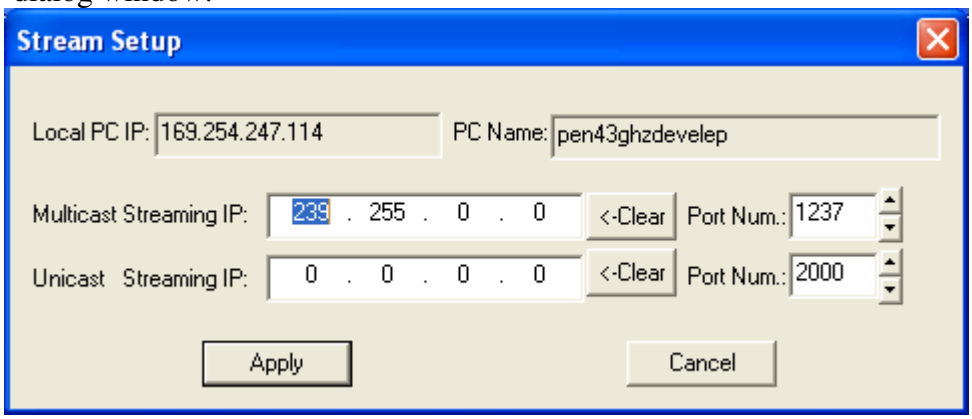
"**Stream Video**" means to send the MPEG video data --- either encoded live from the incoming video signal or decoded from a pre-recorded MPEG file --- to some TCP/IP network addresses, in the hope they can be received by another **MPEGIO** card, or by some video playback software --- such as VideoLan (http://www/videolan.org), MPEG4IP (http://mpeg4ip.sourceforge.net/) , or by some stand-alone video streaming client devices --- such as Amino (http://www.aminocom.com/) , on the LAN or Internet network. **MPEGIO** streams video in a connectionless mode called "UDP" mode, which does not require any receiving end to respond or exist, therefore how the streamed out video data is processed by any receiving party, or no receiving party exists at all, will not affect the operation of the streaming **MPEGIO** card.

The **MPEGIO** streamed video data is in the raw format as they are encoded/decoded by the **MPEGIO** hardware, no encapsulation data will be added: if the receiving parties save the received **MPEGIO** video data as MPEG files, they will be exactly the same as an **MPEGIO** card can record/decode on the remote site: thus if **MPEGIO** is encoding or decoding a DVD-compliant video, the streamed video data can be used to create DVD movie disk immediately by the receiving end.

As mentioned previously, **MPEGIO** card streaming out video is acting as a **Video Streaming Server**, while **MPEGIO** card or other device receiving incoming video will be acting as a **Video Streaming Client**. It is possible to make **MPEGIO** to act as both **Streaming Server** and **Streaming Client** at the same time: e.g., decoding an incoming network video and streaming it out simultaneously to a different IP address/Port, but PC resource consumption (CPU / Memory usage) will be quite high for this to operate smoothly.

MPEGIO allows video streaming at any time: simply selecting the "**Stream Video**" from the **Pop-Up Menu** will always start or stop video streaming. When the video recording, playback or transcoding operation is started manually, users can always select if streaming will start together with these operations.

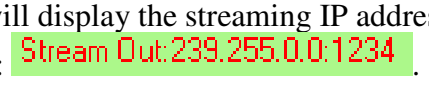
The video streaming destination is defined as TCP/IP addresses and port numbers, as displayed in the "**Stream Setup"** dialog window:



The TCP/IP addresses can be entered as either "**Multicast**" or "**Unicast**" type: address range 224.0.0.0 ~ 239.255.255.255 normally are counted as "**Multicast**" addresses, while the rest will be counted as **"Unicast**" ones. If a valid Multicast address is used, the streamed video can be received by any host machines (PCs or non-PCs) having access to that Multicast address, and multiple streaming clients (software like Vlc.exe/MPEGIO4IP, video streaming client cards like MPEGIO, IP Video Set-top boxes etc) can receive the video simultaneously. If a valid Unicast address is used, only the host machine that has that particular IP address as indicated by the Unicast address can receive the streamed video, and only one software (or one MPEGIO card, one Vlc.exe, etc) can actively receive that video at any time.

Supplying both Multicast and Unicast IP addresses requires **MPEGIO** software to send out twice the encoded/decoded video data, therefore requires powerful PC performance, otherwise the receiving end will experience intermittent data loss etc. problems.

To stream across wide area network such as Internet, the receiving end must configure its router's TCP/IP port through the **Network Address Port Translation** (**NAPT**) function using **"UDP**" protocol: see **Section 11** for details on **NAPT** configuration, note in this case the "**Protocol**" for **NAPT** must be "**UDP**", not "**TCP**".

When streaming is in progress, **MPEGIO** will display the streaming IP address and port number at the lower-left corner of the **Control Window**, such as: 

.

User Data can be inserted during video streaming, same as video encoding process, details in Section 8.6.

8.5 Capture Still Images

On the **MPEGIO Control Window**, clicking 

button will start **Capture Still Image** window:

Capture Still Image Window

The captured image file type can be selected among **.bmp, .gif, .jpg, .png** and **.tif**, the captured file name can be user-modified in the Edit box next to the "**Capture:**" text, and the captured file path can be changed and kept differently from the video recording path. The resolution of the images captured will be 720X576-Pixel for PAL, and 720X480-Pixel for NTSC video signal, switched automatically according to the current input video's signal type.

When images are continuously captured, image files will be named with a counter suffix increased one per new file automatically, therefore if the very first file captured is named AB00000000.jpg, the following files captured will be AB00000001.jpg, AB00000002.jpg, etc. However, if the "**R**eset Counter" button is clicked, the next captured files will again be AB00000000.jpg, AB00000001.jpg, AB00000002.jpg, etc. When new image files are created, existing files with the same names will be overwritten without warning.

Tick the "**Auto Capture on Timer**" box and supply a non-zero timer value will see continuous grabbing happening automatically without user intervention, one image at every timer second. Clear the "Auto Capture" box or set timer to zero will stop auto grabbing.

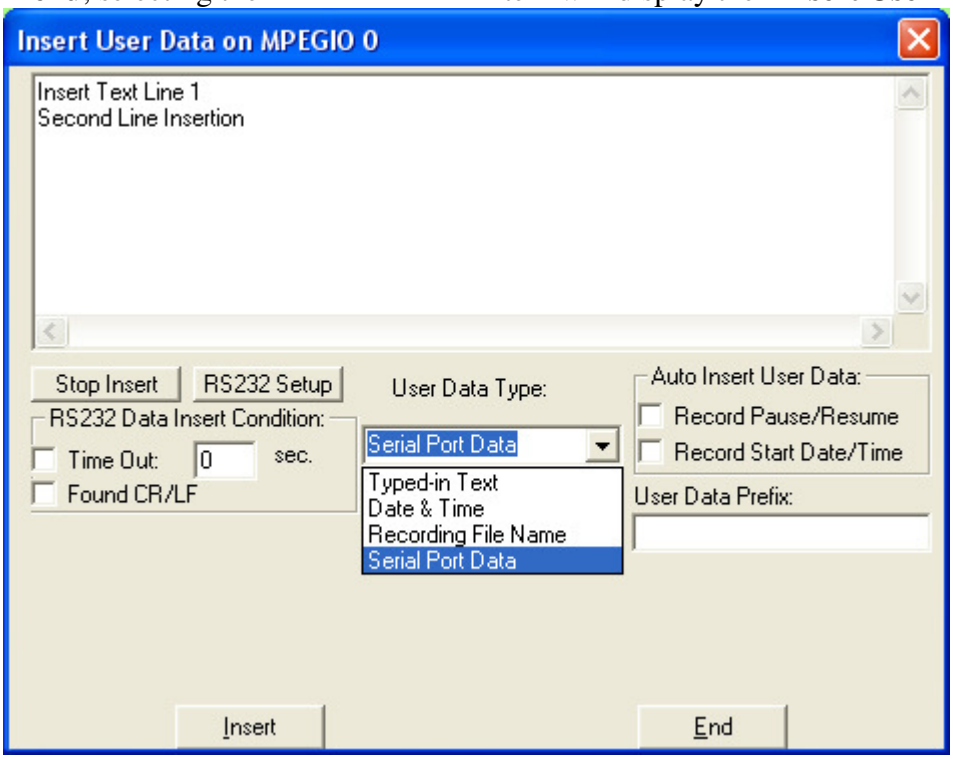
If the "**Write Time on Image**" box is ticked, any captured still image file will bear the time and date text at the image grabbing time, with the X/Y positions defined by the user as indicated on screen. The font used to display the time on the captured image can be changed by clicking the "**Time Font**" button, where font size, colour, type face etc parameters can be defined and remembered by the **MPEGIO** software.

Picture Grabbing can be started during any of the Preview, Record, Play, and Transcode operation mode. In particular during the **Play** (Section 8.2) and **Transcode** (Section 8.3) mode: grabbing image from live played or transcoded video needs starting the "**Capture Still Image**" Window (clicking the "**Pic**" button) **Before** starting either the Play or Transcode operation. Once the Play or Transcode operation has started, pressing the "**Capture Image**" button or check the "**Auto Capture**" box will grab images. During **Play** or **Transcode** operation, if OSD (Section 10) is enabled, the grabbed image file will bear the OSD content as well.

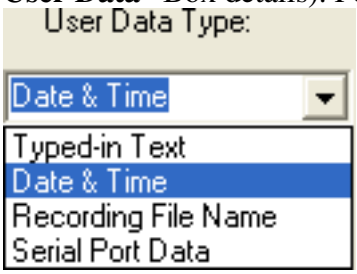
Dismissing the "**Capture Still Image**" Window during Play or Transcode operation will not allow this window to re-appear again, until the Play or Transcode operation ends.

8.6 Insert User Data

From the **Pop-Up Menu**, selecting the User Data Insert item will display the "**Insert User Data**" Window:



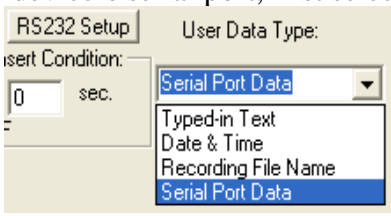
MPEGIO hardware allows arbitrary **User Data** to be inserted into the encoded MPEG stream: these data will not disturb the encoding/decoding of the MPEG video stream, but can be used for any application-specific purposes mutually agreed between the encoding and decoding processes. The **MPEGIO** application software implements a simple **User Data** insertion/interpretation mechanism: during video Encoding, Streaming or Transcoding, printable text strings inc. user-typed characters, time and date strings etc, or text received live from PC's serial port (also called COM port, RS232 port), can be inserted into the encoded MPEG video stream. During the **MPEGIO** decoding process, the text inserted during the Encoding or Streaming time will be displayed as OSD text, if any OSD field has "**Show User Data**" box ticked (See Section 10 for the "**Show User Data**" Box details). For example, if the user keeps inserting the "Date & Time" strings



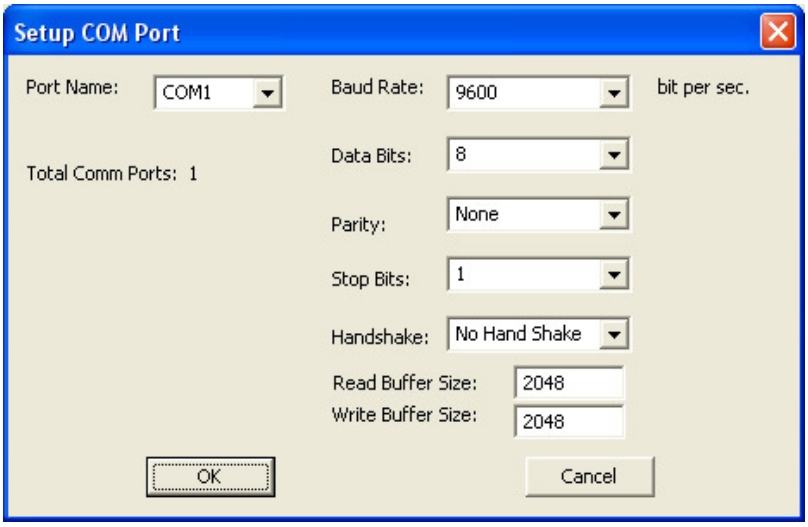
during a video encoding process, the encoded MPEG file will have multiple **User Data** fields bearing the Date/Time at various encoding times. If this MPEG file is decoded by **MPEGIO** card with some OSD fields defined as "**Show User Data**", these inserted Date & Time text will be displayed together with the MPEG video. Similarly, if the encoded MPEG video is streamed out live and received live by another **MPEGIO** card where "**Show User Data**" OSD fields have been defined, the receiving video stream will show the inserted Date & Time text on the displayed live streaming video. To fully implement some application-specific **User Data** mechanism, **MPEGIO Application SDK** will be needed.

User Data inserted into encoded MPEG video stream depends on the selection of the "**User Data Type**", which can be one of the following:

(1) **Typed-in Text:** any text user typed into the edit box at the upper portion of the window
(2) **Date & Time:** the date and time when "**Insert**" button is clicked, prefixed by text "Recorded at:"
(3) **Recording File Name**: the current recording file name without the leading path
(4) **Serial Port Data:** realtime data received from the currently configured serial port.

To configure PC's serial port connected to an external device's serial port, first select the "Serial Port Data" **User Data Type**, then click the **RS232 Setup** button: 

, the "**Setup COM Port**" Window will appear:



Select the COM port's name, then match baud rate, data bits, parity, stop bits and handshake parameters with the values of the external device's port, click OK to save the settings. Once **MPEGIO** is in recording, streaming or transcoding mode, clicking the **Insert** button once on the **Insert user Data** Window will start receiving serial port data. Clicking the **Stop Insert** button there will stop receiving serial port data.
Serial port data received will be inserted into current encoding video stream when one of the "**RS232 Data Insert Condition**" happens, these include:

(1) "**Time Out**" seconds as defined by the user --- every time this amount of seconds elapses, all the received text, if any, will be inserted
(2) "**Found CR/LF**" – whenever CR (Carriage Return Character 0x0D) or LF (LineFeed Character 0x0A) is found in the received serial data, all data received until now will be inserted
(3) if the length of the received text plus the "User Data Prefix" reaches 120, they will be inserted

If the "**User Data Prefix**" string -- must be between 4 to 10 bytes -- is defined, it will be added before any inserted user data: e.g., if "Inventa:" is supplied as "**User Data Prefix**", it will be added at the start of each insertion.

If the "**Record Pause/Resume**" box inside the "Auto Insert User Data" group is ticked, user data "Resumed at: Date/Time" will be inserted whenever recording to file is resumed after being paused.

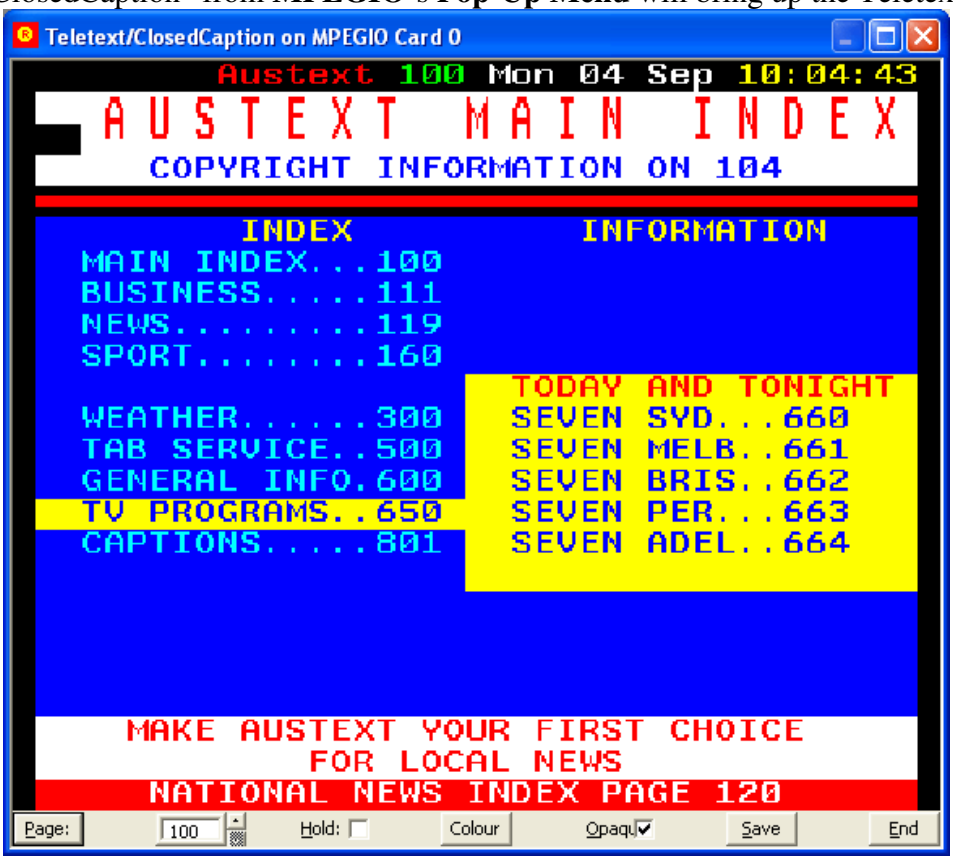
If the "**Record Start Date/Time**" box inside the "Auto Insert User Data" group is ticked, user data "Recorded at: Date/Time" will be inserted at the start of the recorded file.

User Data inserted by **MPEGIO** software needs to meet these conditions:

1. Maximum 120 bytes (inc. User Data Prefix) can be inserted each time
2. Insertion rate cannot be faster than encoded video frame rate
3. Inserted byte number must be multiples of 4: if not, space characters (ASCII 0x20) will be padded
4. The first byte's ASCII code must be >= 0x20 (Space) or they might not be picked up during decoding

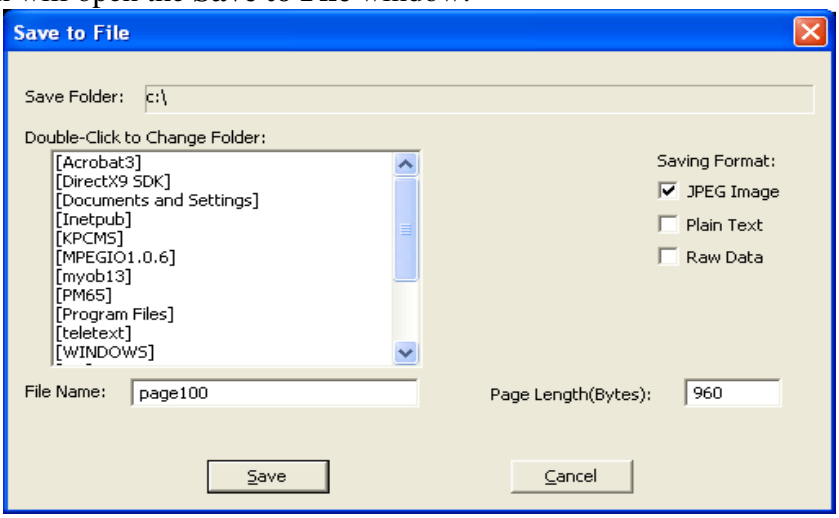
8.7 Teletext (Windows XP SP2 & DirectX9.0c Required)

Select "TeleText/ClosedCaption" from **MPEGIO**'s **Pop-Up Menu** will bring up the Teletext window:



Changing Teletext pages can be done by typing the page numbers in the editing box next to the "**Page**:" button then clicking the "**Page:**" button, or pressing the "Enter" key. Clicking the up/down arrow will change to the next or previous page. When mouse cursor focus is at the Up/Down arrow box next to the page editing box(by clicking mouse at the arrows or inside the Teletext window), pressing up/down/left/right arrow keys will also change the page numbers.

Clicking "**Save**" button will open the **Save to File** window:

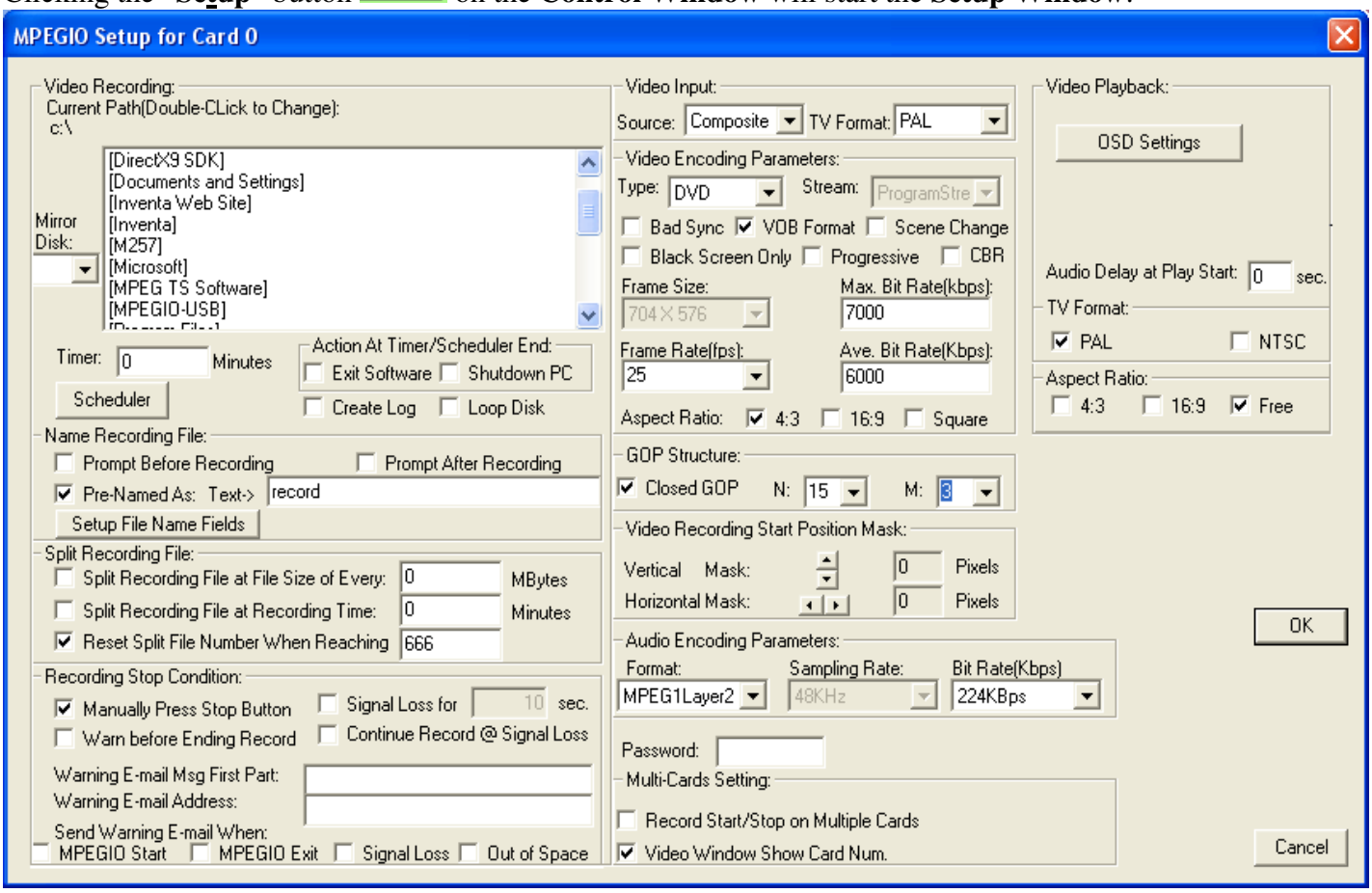


The "Page Length" is only used when saving as plain text or raw data format.

9. Set-up Parameters

Clicking the "**Setup**" button 

on the **Control Window** will start the **Setup Window**:



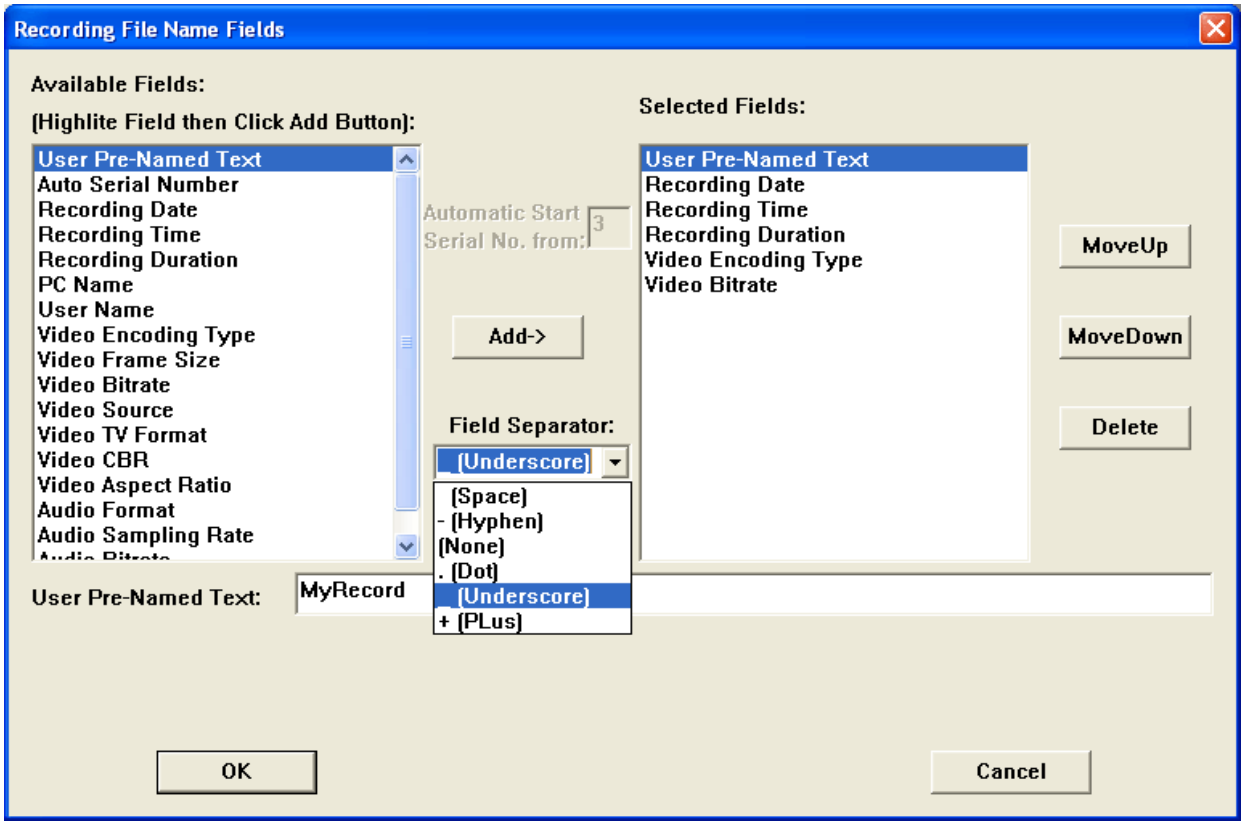
The Setup Window

9.1 Video Recording Set-ups

The "**Current Path**" is the folder where all recorded or converted video files will be placed. Left-mouse double-clicking any path or drive name will select it as new "**Current Path**". Note if **MPEGIO** software starts up with a previously recorded "**Current Path**" that does not exist anymore (e.g. the folder has been deleted), the current Windows' "SYSTEMDRIVE" will be used as "**Current Path**", this normally is C:\.

If a "**Mirror Disk**" drive letter is selected (must be one of the fixed hard disk drives different from the current recording path's drive), each video recording will create an identical mirrored file on the "Mirror Disk" with the same file name and path.

The recorded or converted video files can be named each time before recording starts, each time after recording ends, or pre-named. If the "**Pre-Named as**:" box is ticked, you can either supply a fixed name typed in the field next to "Text->:", or press the "**Setup File Name Fields->"** button to open the "**Recording File Name Fields**" window:

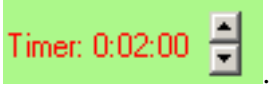


Recording File Name Fields Window

In this window you can select fields that will form the recorded video file name: each field can appear at most once, at least one field must be selected. Fields are separated by the "**Field Separator**" as shown in the middle of the dialog window. Double-click any "**Available Fields**" item will add that field into the "**Selected Fields"** list-box, where the fields can be moved up and down to form their relative positions in the recorded file name. The "**User Pre-Named Text"** field will contain any text typed in the text box in the lower part of the window. If this field contains nothing, **MPEGIO** will automatically assign "mpeg.mpg" as its contents.
The "**Auto Serial Number"** field will increase its value by one each time a new file is recorded, its initial value can be assigned in the "**Automatic Start Serial No. from**:" box when this item is highlighted in the "**Available Fields**" list box.

If the "**Recording Duration"** field is selected, during the recording this field will have content "0H00M00S", and this content will change to the actual recording time when recording stops, such as "0H30M00S"(30Min). As an example, using the selected fields in the above screenshot, a 3-Min 15-Sec. recording will be named as: MyRecord_20070130_164720_0H03M15S_DVD_Video7000Kbps.mpg

Before recording, if the named file already exists, a warning dialog will appear before overwriting the file.

Recording can have a **Timer**, as indicated by the "**Timer**:" field. Zero value timer, combined with the ticked "Manually Press Stop Button" box, means endless recording until the "**Stop**" button on the **Control Window** is clicked or **MPEGIO** software stops. Once recording is started, the recording timer can still be adjusted from the vertical scrollbar control next to the timer indicator on the **Control Window**: 

. When recording stops as the timer expires, the **MPEGIO** software can be setup to either exit, or shutdown PC, or continue video preview(this is the default action, with both "Exit-Software" and "Shutdown-PC" boxes cleared). The Exit or Shutdown-PC action is only useful when the recording is un-attended, e.g., in the scheduled recording situation.

During the recording process, the "**Split**" function will create new video files without stopping the recording and without losing any data, by specifying either a file size limit (The "**Split Recording File at File Size Every**:" tick box), or a recording time limit (the "**Split Recording File at Recording Time**:" tick box), or by clicking the "**Split**" button on the **Control Window:** 

or the "**Split Recording File**" item from the **Drop-down Menu**. Since each DVD disk has limited capacity, splitting recording file is very useful to spread long video recording across multiple files for multiple movie disk burning without interrupting the recording process. The split-video files will be named after the 1st recording file name with consecutive numerical numbers: if the first recording file is mpeg.mpg, the split files will be mpeg0001.mpg, mpeg0002.mpg, etc., with an ever-increasing 4-digit numerical number appended to the first file name. However, if the box "**Reset Split File Number When Reaching"** is checked and the edit box to its right has a value bigger than 0, this 4-digit numerical number will repeat between 0 and this value minus 1. For example, if this value is set to 666 (as in the **Setup Window** screenshot two pages earlier), the split files created will be mpeg.mpg, mpeg0001.mpg, mpeg0002.mpg, …, mpeg0664.mpg, mpeg0665.mpg, repeatedly. When the split recording is closing file mpeg0665.mpg (the last file in the sequence), the next file name to be used will again be mpeg.mpg (the first file in the sequence), and the video previously recorded in this file will be overwritten. Using such a repeated split file name scheme will create a fixed sequence of recording files and prevent hard disk from becoming full.

Stopping the video recording can be either **manual** (default), or automatic if video signal disappears for a certain period of time (check the "**Signal Loss**" box and supply signal loss time in seconds).

Please note, the video recording to hard disk only starts when video signal is available, that is, after video recording button is pressed or timer is started, if there is no video signal, the recording to hard disk will wait until the video signal appears. This is useful if the video tape inside VCR or Camera has un-recorded section at the start: you can start the tape playing early and be assured that the start of the video contents on the tape will always be accurately recorded by **MPEGIO** at the start of the MPEG file.

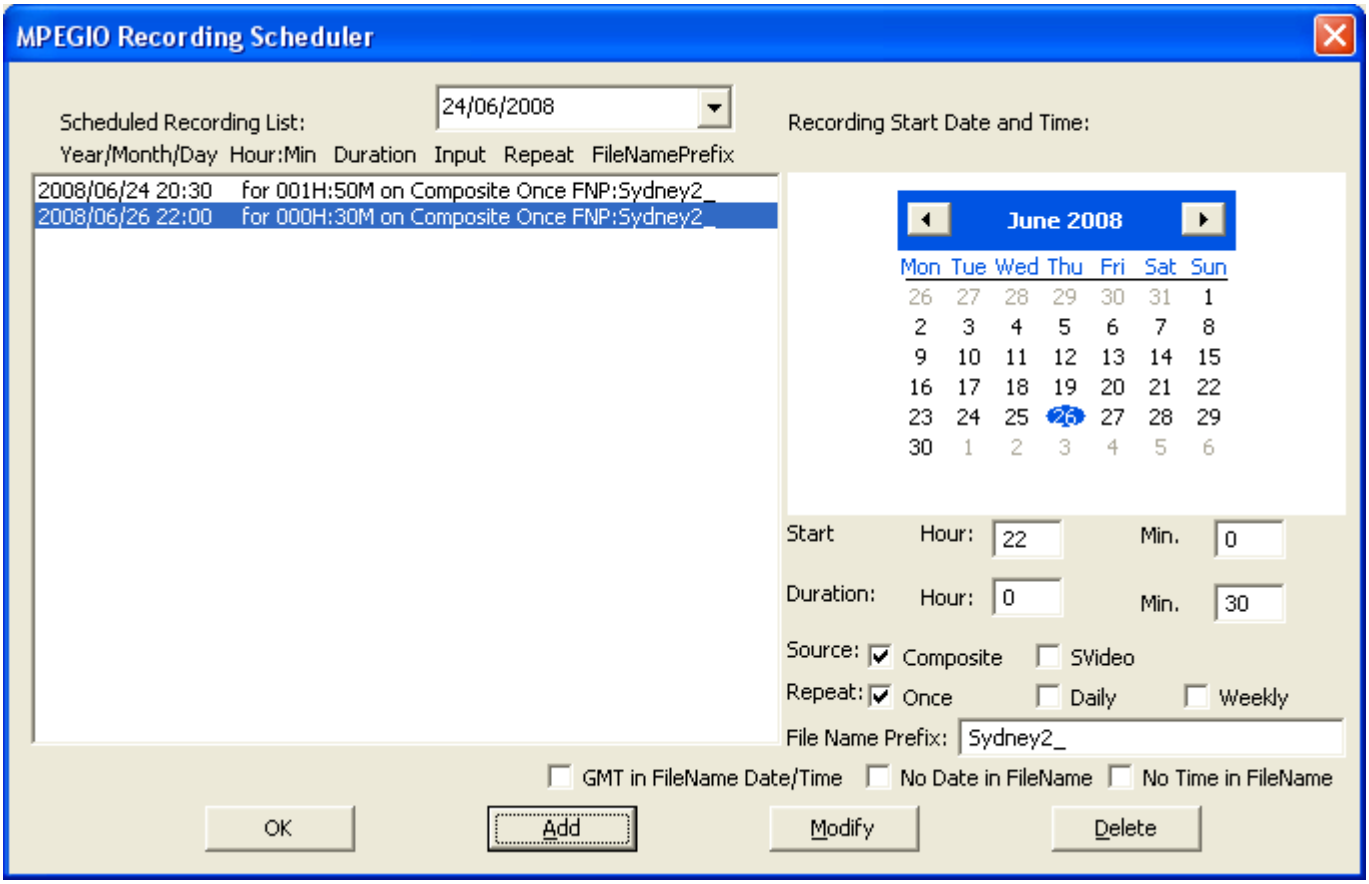
The "**Create Log**" check box indicates if a file named "**MPEGIO.log**" will be created and maintained under the system folder (usually C:\) to log every recorded video file name, length, encoding type etc. This "**MPEGIO.log**" file will be used by the "**Instant Re-Play**" function button 

to retrieve recorded file names to display in the "**Recorded Files**" window for playback, and by the "**Loop Disk**" function:

If the "**Loop Disk**" box is checked, and the current hard disk's free space becomes lower than 100Mbytes during the recording, **MPEGIO** will automatically delete the oldest recording file as remembered by the **"MPEGIO.log"** file to increase free space (If a "Mirror Disk" is selected, the same oldest files on the mirrored disk will also be deleted). If you wish to automatically increase free space as hard disk becomes full, you need to tick the "**Create Log**" box together with "**Loop Disk**" box, so that all currently being recorded file names can be remembered by **MPEGIO.log** file to be used for automatic deletion when free space becomes low.

The **Scheduler** button 

can be clicked to show the **Recording Scheduler**:



MPEGIO Recording Scheduler Window

Adding scheduled recording will cause **MPEGIO** software to start recording at those times accordingly. Press the "**Modify**" button after changing an existing schedule's content. For each scheduled recording, the recorded file name is formed with the "**File Name Prefix**" content followed by the date and time when the recording starts. If the "**File Name Prefix**" field is empty, text "MPEGIO#" will be used in its place where "#" is the number of the **MPEGIO** card (1st card's # is 0). The recording date & time used in forming file name is the local time unless the "**GMT in FileName Date/Time**" box is ticked, then the **Greenwich Mean Time** will be used. Ticking the "**No Date in FileName**" or "**No Time in FileName**" field will not use Date or Time in the recording file name: ticking both of them will cause a fixed file name to be used on the scheduled recording: existing file with the same name will be overwritten without warning.

During video recording time, if video signal disappears, by default **MPEGIO** will stop writing data into the video file until video signal re-appears ---- making the video playback time of the recorded file shorter than the entire recording time. However, if "**Continue Record @ Signal Loss**" is ticked, **MPEGIO** will continue writing black screen or the last video frame into the video file, making the playback time of the recorded file equal to the recording time.

If one of the conditions (MPEGIO Start, Exit, Signal Loss, Disk Out of Space) under the **"Send Warning E-mail When:"** is ticked and an e-mail address is supplied, **MPEGIO** will automatically send e-mail when the ticked condition happens. Note some e-mail software needs to be set up to allow automatic sending e-mail by other software: e.g. in Outlook Express 6, the "Warn me when other application try to send e-mail as me" box under "Tools->Options->Security" must be cleared or a warning box will always pop up when sending e-mails.

A lightweight "**Password"** mechanism is available through the "**Password"** field: if a password is supplied here, access to the **Setup Window** will require supplying the correct password for each **MPEGIO** card.

9.2 Video Input Set-up

The video input source can be either Svideo or Composite Video(RCA). The TV Format can be PAL or NTSC.

9.3 Video Encoding Parameters

Type: DVD, VCD, SVCD, MPEG1/2/4. Use **DVD** if burning DVD movie disk is required.
Stream: System for MPEG1/VCD, **Program** for DVD/SVCD, **Program** or **Transport** for MPEG2/MPEG4

Note: (1) In MPEG2 or MPEG4 type, switching between Program Stream and Transport Stream will cause **MPEGIO** hardware reset after clicking the **OK** button of the **Setup Window**.

(2) Transport Stream (TS) encoding is useful for streaming video to Set-top box etc devices that specifically require TS format video, but not all PC MPEG decoding software can playback Transport Stream video.

(3) MPEG1/VCD always use System Stream, DVD/SVCD always use Program Stream

CBR: Constant Bit Rate(box checked) or Variable Bit Rate(box cleared)
Closed GOP: The encoded **Group-of-Picture** is closed(do not use previous frames) or not
VOB Format: Keep it Checked(default), unless for files to load faster in Ulead VideoStudio etc. software
GOP N value: number of frames in a GOP, is between 1 ~ 256.
GOP M value: number of B & P frames in a BP frame loop inside a GOP, between 0~3, 0 means I-frame only
Bad Sync: Detect and process bad timing signal for old VHS tapes played through VCR
Frame Size (Resolution): selectable in pixels, inc. 704X576(PAL), 704X480(NTSC) etc
Frame Rate: 23.976fps, 24fps, 25fps, 29.97fps, 30fps, 50fps, 59.94fps, 60fps
Bit Rates: selectable in **Bit-Per-Second(bps)** unit, ranging between 50**K**bps and 15**M**bps **(See Note below)**
Aspect Ratio: 4:3,16:9, or Square. This changes the encoded pixels' shape, not frame-size
Vertical Mask (in "Video Recording Start Position Mask"): remove lines at top of video frame
Horizontal Mask (in "Video Recording Start Position Mask"): remove pixels at left of video line
Scene Change: enable **Scene Change Detection** for video containing fast scene changes to improve quality.
Progressive: enable Progressive Encoding

The "**Black Screen Only"** check box indicates if total blackness will be recorded in the file to replace all video frames. Using this option could record a video file with very low video bit rate but normal sound, useful for creating a DVD disk that has long hours of audio but only black screen video. Using transcoding can also add date/time onto this black-screen video to indicate the audio recording date & time.

Important Note on Encoding Bit Rates: Depending on encoding **Frame-Size** used, **MPEGIO** hardware has the following **Minimum** encoding **Bit Rates**:

128**K**bps for 176X144(120)-Pixel Frame Size Encoding
512**K**bps for 352X288(240)-Pixel Frame Size Encoding
1.5**M**bps for 480X576(480)-Pixel and above Frame Size Encoding

While the **MPEGIO** software allows encoding below these Minimum Bit Rates, there is no guarantee that video files encoded below the minimum bit rates can always play back well: the general rule is MPEG4 video can be encoded at much lower bit rates than MPEG1/MPEG2 video while still being played back OK.

9.4 Audio Encoding Parameters

Format: MPEG1 Layer 2, or AC3
Sampling Rate: 32KHz, 44.1KHz, 48KHz
Bit Rate: 32K, 48K, 56K, 64K, 80K, 96K, 112K, 128K, 160K, 192K, 224K, 256K, 320K, 384**Kbps**

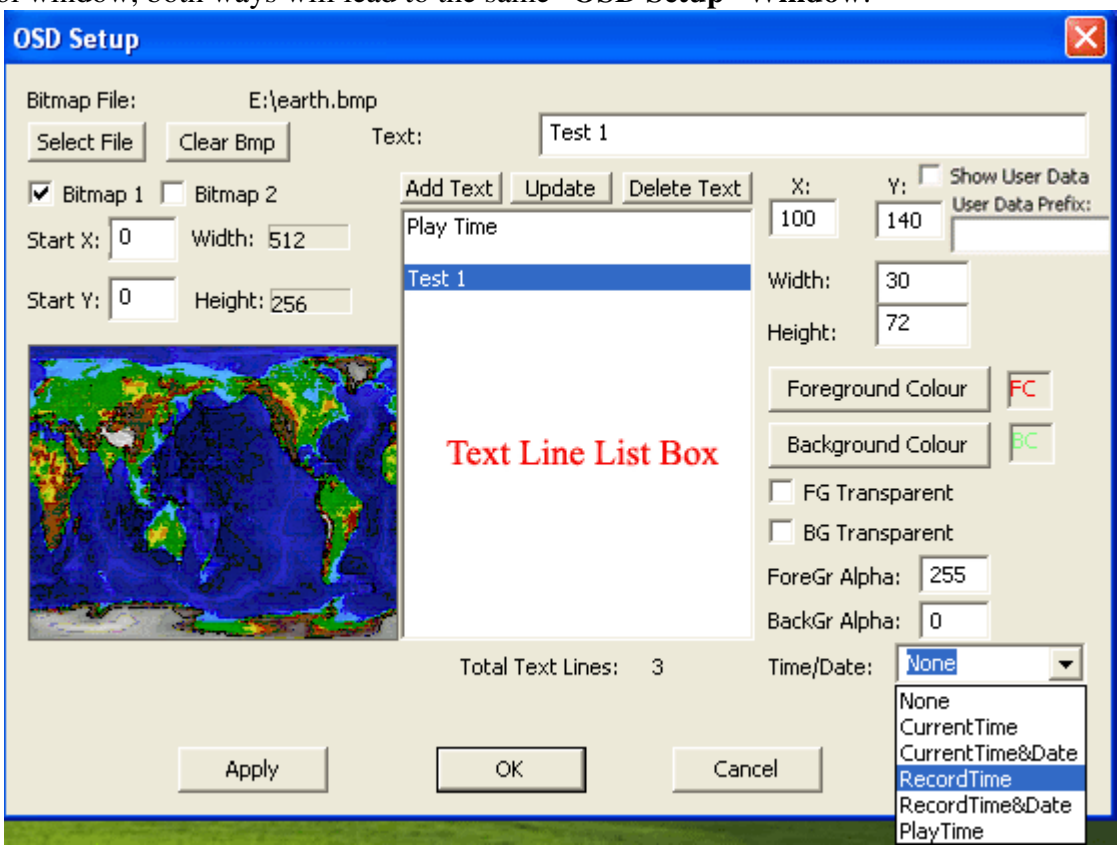
9.5 Video Display Set-ups

TV Format: must match the PAL/NTSC setting of the files to be played back
Aspect Ratio: this will decide the horizontal-vertical display ratio of the video window

10. Text & Graphics OSD(On Screen Display) Settings

OSD allows text, time/date and bitmaps to be overlaid live onto MPEG video during Decoding and Transcoding. Using 2 **MPEGIO** cards, these overlays can also be recorded live onto new MPEG files, by transcoding the 1st **MPEGIO** card's recording file into another file on the 2nd **MPEGIO** card. If **Video Streaming** (see section 8.4) is enabled, the OSD content will appear in the streamed-out video immediately.

Setting up OSD can be through either the "Select Play File" window or the **Pop-Up Menu** from **MPEGIO**'s video/control window, both ways will lead to the same "**OSD Setup**" **Window**:

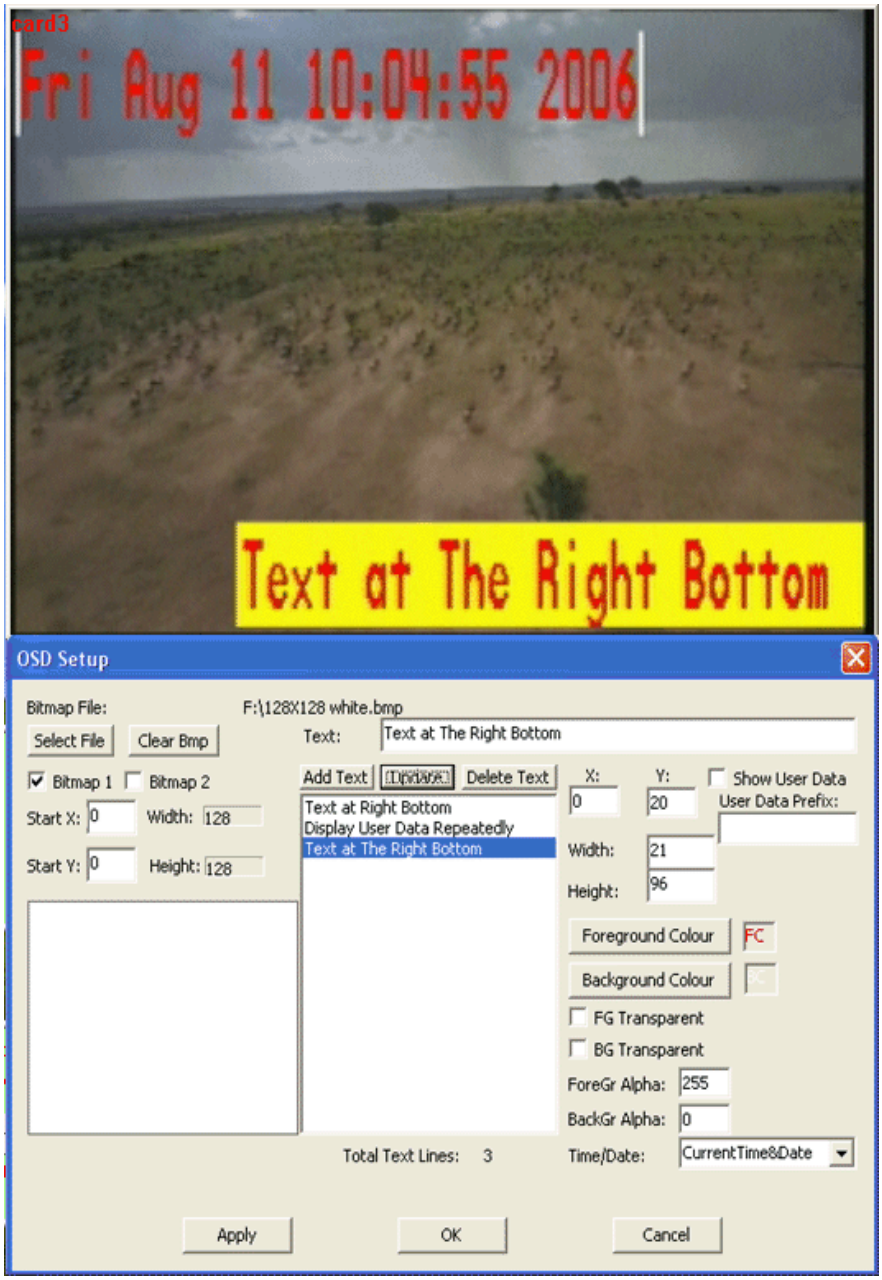


The **MPEGIO** OSD allows up to 2 bitmaps to be overlaid on to video simultaneously, within the video's frame. Inside each bitmap, **MPEGIO** allows up to 10 lines of text/time/date displayed with different size, position, colour and transparency values. Once assigned these values, clicking "Apply" button will make the OSD effective for next video play/transcoding operation. If the **OSD Setup Windows** is activated from the **MPEGIO**'s **Pop-Up Menu** during Decoding(Play) or Transcoding(Convert), clicking the Apply button will show the new OSD settings immediately on the video window, as well as on the external TV (if connected).

In **OSD Setup Window**, clicking "Bitmap1" or "Bitmap2" will switch set up parameters between the two bitmaps. If the two bitmaps overlap, Bitmap2's content is always on top of the Bitmap1's content at the overlapped area.

To add text/time/date onto a bitmap, use the "Add" "Update" and "Delete" buttons above the **Text Line List Box** in the middle of the **OSD Setup Window**.

Use the Foreground/Background Alpha values(0~255) to control the blending method of the text with its surrounding video/background colours, with 255 as no surrounding contents --- text completely standout, as in the time/date display below.



The "**Time/Date**" combo-box at the lower-right corner controls how time/date values are displayed: "None" means no time/date display; "Current Time/Date" means the time/date when the video is being played back; "Record Time/Date" means the current time minus the MPEG file creation time (thus the "Recording" Time/Date); the "PlayTime" means the MPEG file's playback time (duration).

If the "**Show User Data**" check box at the upper right corner is checked, it indicates if "User Data" (See Section 8.6 for details) is found in the MPEG video stream, this OSD field will display the content of the User Data: **Please note** this is NOT a complete User Data interpretation mechanism --- it only finds the User Data inserted at the Encoding/Streaming operation where the first byte of the User Data is printable character (ASCII code >= 0x20) and insertion speed is not very fast. To fully implement a User Data interpretation algorithm, the **MPEGIO Application SDK** will be needed to meet some specific application requirement.

If the "**User Data Prefix**" field at the upper right corner has contents, any "Show User Data" OSD item will use this content to search the starting part of the inserted User Data string: only those inserted user data that have their starting part matching the "**User Data Prefix**" contents will be displayed in any "Show User Data" OSD field.

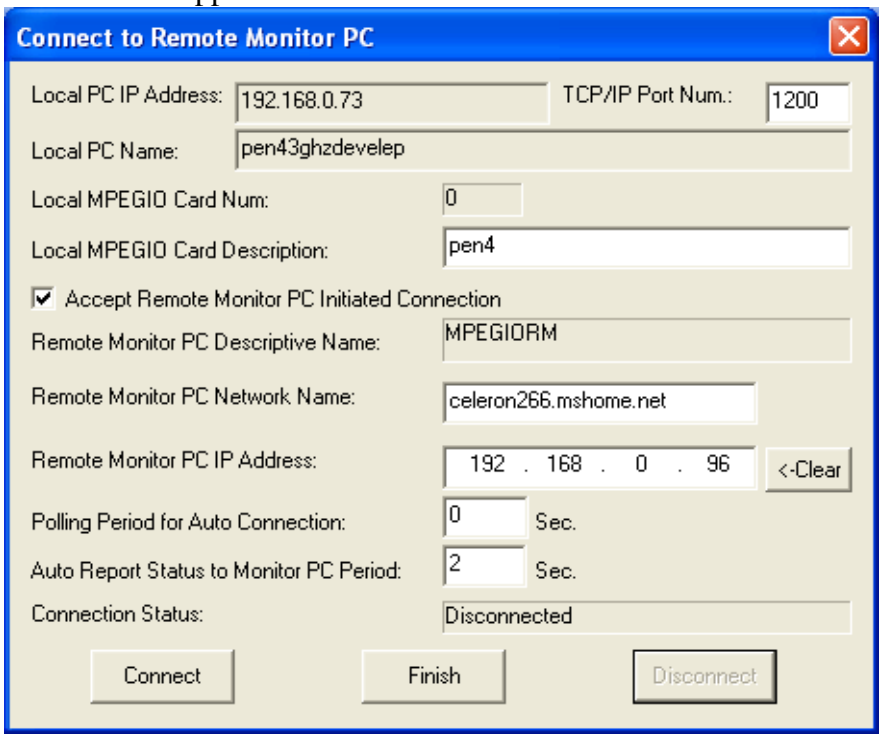
Special Notes for OSD Set-ups:

1. Bitmap must be 24-bit-per-pixel
2. Each bitmap can have maximum 1 time/date, and up to 10 text lines
3. Bitmap's X position inside video frame should be multiple of 4
4. Maximum displayable bitmaps are 705X555-Pixel for PAL, 690X470-Pixel for NTSC

11. Remote Management Function

This function allows multiple **MPEGIO** cards to connect to one single remote management PC(No **MPEGIO** card needed there) through any TCP/IP network inc. Internet and LANs. The connected **MPEGIO** cards' working status inc. video source, operating mode, recording parameters etc can all be displayed on the remote monitor PC. The remote monitor PC can also start/stop recording/streaming, change recording parameters, and reschedule recording. Such a centralized remote management of unlimited number of **MPEGIO** cards is particularly suitable for managing remote video capture cards operating in unattended environment.

Clicking the "**Monitor PC On/Off**" button Monitor PC Off on **MPEGIO**'s Control Panel, the "Connect to Remote Monitor PC" window will appear:



Connect to Remote Monitor PC Window

After filling in the IP address of the Remote Monitor PC, clicking the "Connect" button will connect the **MPEGIO** card to the remote monitor PC that is running "**MPEGIORM.exe**" software (see below). Once connected, press "**Finish**" to exit and allow other functions to operate normally.

If the remote monitor PC is not responding, the connecting MPEGIO software will time-out in about 30~60 seconds, and the "Connection Status" field will indicate "Failed to Connect".
If the box "Accept Remote Monitor PC Initiated Connection" is ticked, this **MPEGIO** card can also be connected by a connection initiated by the remote monitor PC if it knows this PC's IP address. Note changes to this box's status only takes place AFTER pressing the "**Finish**" button.

If the "Polling Period for Auto Connection" is non-zero (>= 30 sec.), then **after pressing the "Finish" button**, the **MPEGIO** software will automatically try to connect to the remote monitor PC in every "Polling Period"

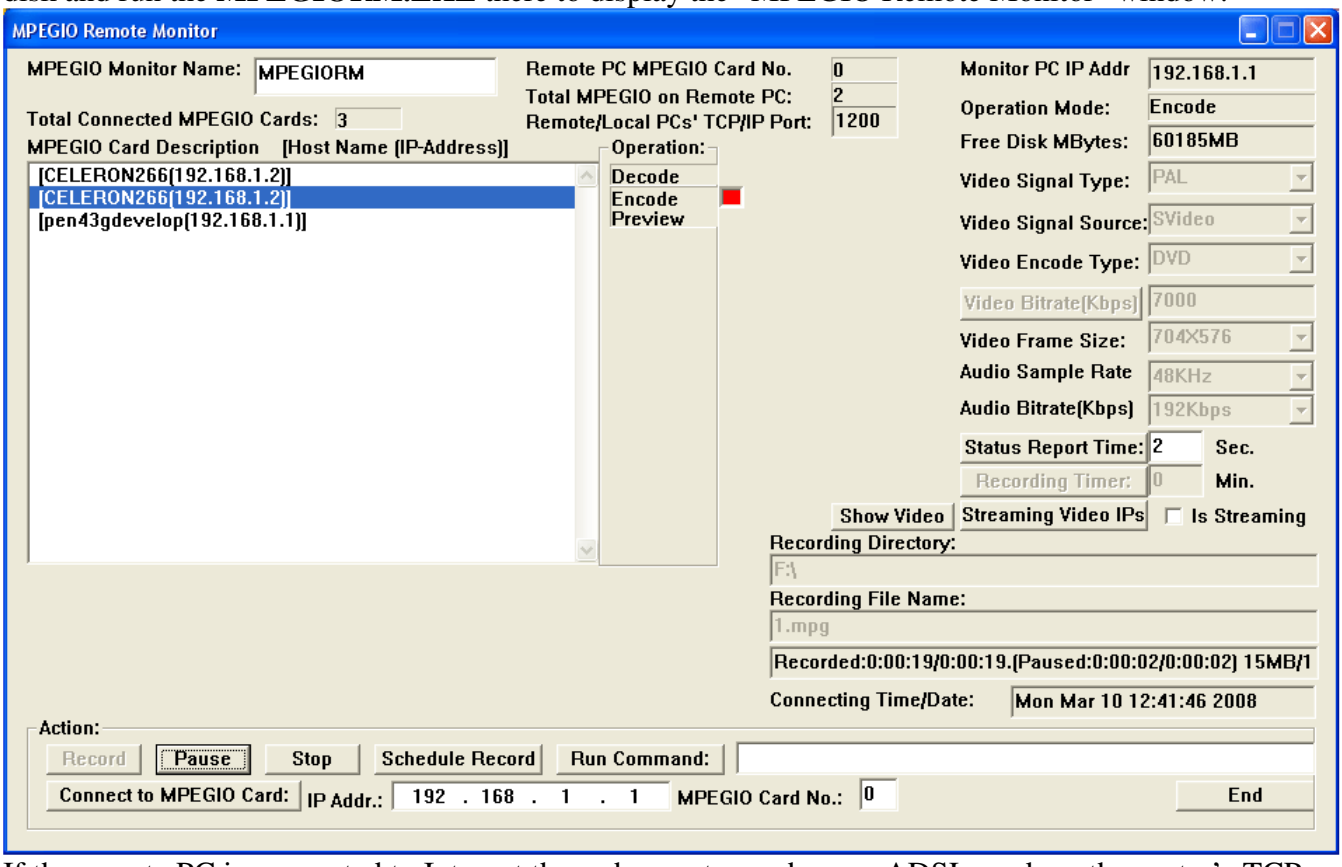
seconds until the connection is set up. When **MPEGIO** software exit and restart, this will enable an automatic connection to remote monitor PC.

The "TCP/IP Port Number" must have the same value as the "**MPEGIORM.exe**" software does on the remote monitor PC (see below).

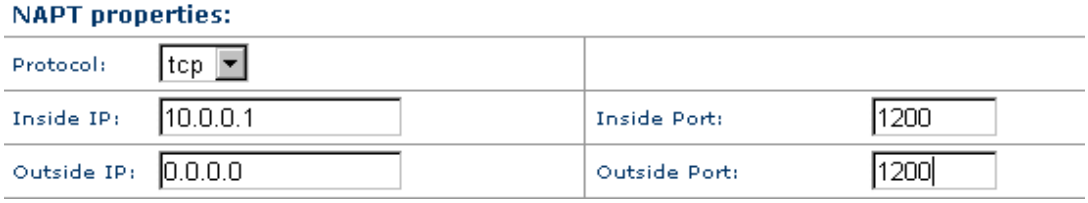
The "Local MPEGIO Card Description" field's content will appear on the remote monitor PC as part of the connected **MPEGIO** card's name.

The "Auto Report Status to Monitor PC Period" controls how often the **MPEGIO** card sends its status report to the remote monitor PC, default is every 2 seconds.

The remote monitor PC(no **MPEGIO** card needed) must start the **MPEGIORM.EXE** software, which is under the "MPEGIO Remote Monitor" folder on the **MPEGIO** Set-up CD -- Copy this folder to your hard disk and run the **MPEGIORM.EXE** there to display the "MPEGIO Remote Monitor" window:



If the remote PC is connected to Internet through a router such as an ADSL modem, the router's TCP port number (default to 1200) as indicated by the **MPEGIORM.EXE** software must be translated properly using the **Network Address Port Translation** (**NAPT**) function. For example, if the PC running **MPEGIORM.EXE** uses Alcatel SpeedTouch 530 ADSL modem, and the PC's internal Ethernet address is 10.0.0.1 on its LAN through its Ethernet card, and the default **MPEGIO** TCP port 1200 is used, the **NAPT** set up must be:



After supplying these values and pressing the "Apply" button on the Alcatel SpeedTouch 530' NAPT screen, an **NAPT** entry line like this should appear:

This will make the PC with Alcatel SpeedTouch 530 to receive and send **MPEGIO** data through Internet.

Instead of the **NAPT** method, **other Inter-Network Connection mechanism** such as Hamachi (http://www.hamachi.cc/) can also be used to connect **MPEGIO** cards and monitor PC over Internet or WAN. For connection over the local area network, these methods are not needed.

MPEGIORM.EXE listens to remote **MPEGIO** card software's connection request through the TCP port displayed on its screen. Different port numbers can be supplied as the **first command-line parameter** at start up, such as "**MPEGIORM.EXE 1500".** Note once a TCP port number different from the default value 1200 is used by **MPEGIORM.EXE**, all remote **MPEGIO** software need to change their TCP port number as well from their connection set-up. MPEGIO.exe and MPEGIORM.exe use the supplied TCP port plus other 10 ports above the supplied number(e.g. 1200, 1201, … 1210).

The No. 2~ No. 4 command-line parameters following the first one can be used to indicate the initial IP Address value of the remote **MPEGIO** card, e.g., running "**MPEGIORM.EXE 1200 192 168 0 102**" in a MS DOS Box will start **MPEGIORM.exe** with the default TCP Port 1200 but also put IP address "192 168 0 102" into the "IP Addr." Box at the bottom line of the MPEGIO Remote Monitor window.

MPEGIORM.exe software can initiate a connection to a remote **MPEGIO** card by clicking the "Connect to MPEGIO Card" button after supplying the remote PC's IP address and **MPEGIO** card no., if the remote **MPEGIO** card has ticked its "Accept Remote Monitor PC Initiated Connection" box.

On **MPEGIORM.EXE**'s window, pressing the "**Schedule Record**" button will display the same **MPEGIO Recording Scheduler Window** (see section 9.1) as on the **MPEGIO** software. Adding, modifying and deleting schedules can be operated exactly the same way as on a PC with **MPEGIO** card. Clicking OK will send the new schedules to the remotely connected **MPEGIO** card.

The "**Run Command**" button allows the remote **MPEGIO** card PC to execute simple Windows command: no space or argument is allowed in or following the command name/path. Complicated commands such as " ftp –s:ftpfile " can be put into a single **.bat** file for execution.

The "**Start Record**" button will record video into file indicated by the **Recording Directory** and **File Name** if they are valid path and name: existing file will be replaced without warning.

The "**Stop**" button will stop any non-preview operation: Encode, Decode or Transcode.

Clicking the "**Is Streaming**" box will start/stop video streaming: if the **MPEGIO** card being monitored starts or stops streaming this box will be automatically updated. The "**Show Video**" button will run **vlc.exe** program to display incoming streamed video, if available, from the address indicated in the "**Streaming Video IPs**".

12. Default Parameter Values

When first time starting **MPEGIO** software, various parameters used by **MPEGIO** have their **default values** set automatically. Each time when the software exits, the possibly changed values will be saved into a file named **MPEGIO.INI** under the PC's SYSTEM DRIVE(normally C:\), to be used for subsequent start-ups of the software. When the **MPEGIO.INI** file is deleted, or when holding down the **Ctrl** key while left-mouse double-clicking the **MPEGIO** icon , the software will start again using the default values, as listed here:

- **Video Window** Size and Position: 720X576-Pixel, centred at the screen
- **Control Window**: centred on the screen below the **Video Window**
- Current Recording Path: C:\
- Mirror Disk: None
- Recording Timer: 70 Minutes
- Action at Recording Timer/Schedule: None
- Name Recording File: Prompt before recording
- Split Recording File at File Size: 0(no split)
- Split Recording File at Recording Time: 0(no split)
- Reset Split Recording File Number: No
- Recording Stop Condition: Manually Press Stop Button
- Warn before Ending Record: No
- Video Input: Auto Detect if signal present, or Composite + PAL if no signal
- MPEG Encoding Type: DVD
- MPEG Encoding Stream: Program Stream
- Frame Size: 704 X 576-Pixels for PAL, 704 X 480-Pixels for NTSC
- Frame Rate: 25 fps for PAL, 29.97 fps for NTSC
- Encoding Aspect Ratio: 4:3
- CBR (Constant Bit Rate) Encoding: Yes
- Max. Encoding Bit Rate: 7Mbps
- Average Encoding Bit Rate: 6Mbps
- Closed GOP: No
- GOP N Value: 15
- GOP M Value: 3
- Bad Sync Detect: No
- VOB Format: Yes
- Scene Change Detection: No
- Progressive Encoding: No
- Black Screen Only Recording: No
- Audio Encoding Parameters: MPEG1Layer2, 48KHz, 192Kbps
- Video Playback: PAL, Free Aspect Ratio
- Record Start/Stop on Multiple Cards: No
- Video Window Show Card Number when multiple cards are installed: Yes
- OSD During Decoding/Transcoding: No
- Send Warning e-mail: No for all conditions
- TCP/IP Port for Remote Monitor PC Connection: 1200
- Polling Period for Automatic Remote Monitor PC Connection: 0
- Auto Status Report to Remote PC : Every 2 seconds
- Accept Remote Monitor PC Initiated Connection: Yes
- Create Log (use C:\MPEGIO.log to log all recordings): No
- Loop Disk (Delete Oldest Files Ever Recorded When Free Space Is Lower Than 100 MB): No
- Audio Delay at Play Start: 0 (No delay)
- Continue Record @ Signal Loss: No (no video frame is written into the recorded file when signal disappears)
- Password for Setup Window: None
- Stream out Decoded Video: No
- Receive Streaming Video (As Decode/Transcode Source): No
- Record Stream to File (if “Receive Streaming Video” is ON): No
- Incoming Video Is Multicast (if “Receive Streaming Video” is ON): Yes
- Auto Capture Still Images on Timer: No
- Write Time/Date on Captured Still Images: No
- Captured Still Image File Type: BMP
- OSD Show User Data (in the “Select Play Files” Window): No
- Play Delay (in the “Select Play Files” Window): 100 ms
- Loop (in the “Select Play Files” Window): No

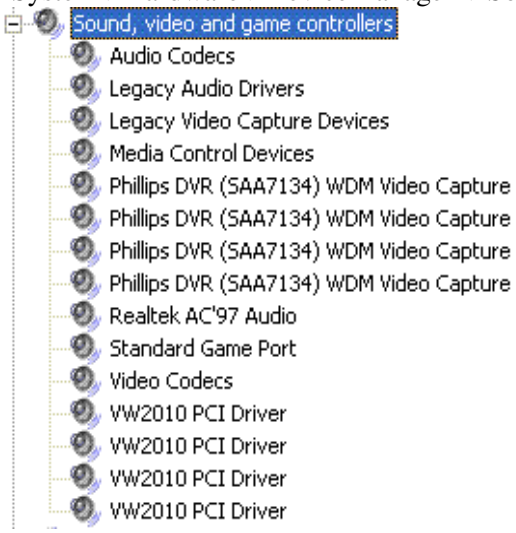
13. Create DVD from Captured Video Files

To create DVD movie disks from video files recorded by **MPEGIO**, a DVD Authoring Software, such as TMPGEnc DVD Author, Nero Pro, Ulead VideoStudio, Adobe Encore, etc, is needed. DVD menus, buttons, chapter points etc can be created from within the DVD authoring software.

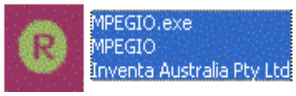
14. Running Multiple MPEGIO Cards Simultaneously

A maximum of **10 MPEGIO** PCI cards can be run on one PC to record or play video simultaneously. To run multiple **MPEGIO** cards in one PC, follow these steps:

(1) Power-down the PC, install all **MPEGIO** cards onto empty PCI slots
(2) Power-on the PC, install device drivers for all **MPEGIO** cards as in **Section 5. Software Installation**. Multiple device driver lines will appear in Windows' ControlPanel, each (consisting of 1 **Phillips DVR** and 1 **VW2010** driver lines) corresponds to one **MPEGIO** card. A PC with 4 **MPEGIO** cards will show their device drivers in Windows' "ControlPanel->System->Hardware->DeviceManager ->Sound, video and game controllers" as:



(3) Install the **MPEGIO** application software same as in the single card situation.

(4) From the **MPEGIO** icon 

in the C:\Program Files\Inventa\MPEGIO folder, drag/drop while holding down the **Ctrl + Shift** keys several shortcut icons onto Windows' desktop, making their number equal to the number of MPEGIO cards, and name them sequentially. For example, if 4 **MPEGIO** cards are installed, name them as **MPEGIO 0**, **MPEGO 1**, **MPEGIO 2**, **MPEGIO 3**: 

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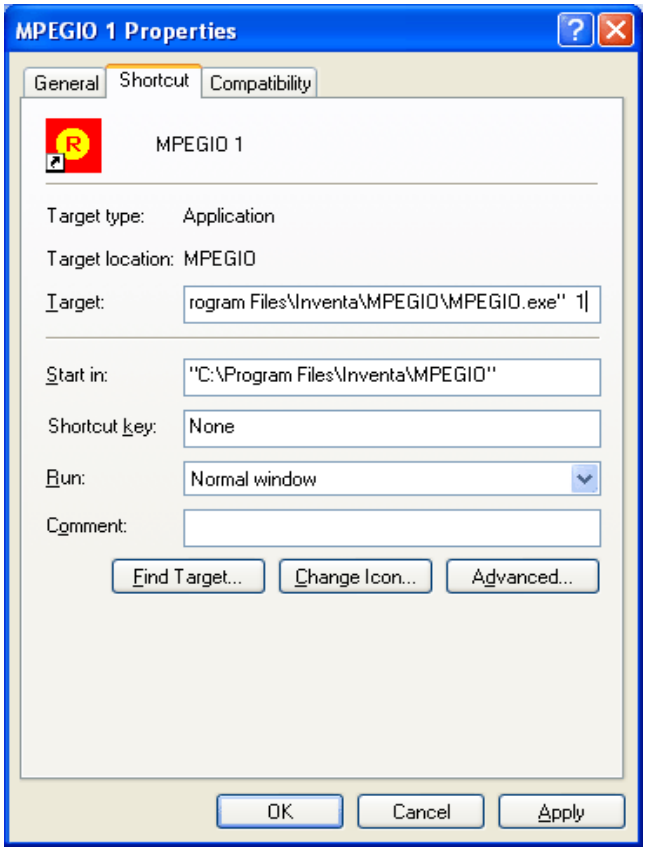
Note you must use the icon from the **C:\Program Files\Inventa\MPEGIO** folder to create "MPEGIO 1", MPEGIO 2" etc shortcuts, not the "MPEGIO 0" icon created by the Set-up software on the desktop.

(5) For each shortcut icon on the desktop, supply one number indicating the **MPEGIO** card number, as the parameter passed to the **MPEGIO.exe** program (right-click the icon, select "Properties", add the number at the end of the "Target:" box after "MPEGIO.exe", with at least one leading space):



(6) Note by convention, the single number used in naming different **MPEGIO** shortcut icons (MPEGIO **0**, MPEGIO **1**, etc) corresponds to the **MPEGIO** card number.

(7) Once the correct card number is supplied to all the **MPEGIO** shortcut icons, double-clicking any icon will launch **MPEGIO** software for that particular PCI card. On the **MPEGIO** control window, a small "cardX" text will appear to the right of the "**MPEGIO**" name where the "X" can be 0, 1, etc., indicating the card number as supplied to the MPEGIO.exe in the "Target" box as described above: MPEGIO card1.

(8) Turning on the "**Video Window Show Card Number**" option in the **Setup Window** will display that **MPEGIO** card number in its **video window's** upper-left corner.

(9) Simultaneously start/stop recording: if the **"Record Start/Stop on Multiple Cards"** box is selected from the **Setup Window**, start/stop recording from this **MPEGIO** card will show the "Select Capture Cards" window:

(10) Audio heard on multiple **MPEGIO** cards: only the last selected(left mouse click its video / control window or newly started) card's audio can be heard from PC's sound card speakers. Volume & Mute controls apply to individual cards independently.

(11) Space multiple video windows across the screen: Pop-up menu items are available to equally arrange multiple **video windows** across the PC's screen: the selected video windows will be horizontally arranged using the **largest** window's size.

(12) **Audio I/O Sockets**: All **MPEGIO** cards' audio inputs go to the blue-coloured "audio input" socket, audio outputs go to the **green**-coloured "**audio output**" (the **green** 3.5mm) socket.

(13) In **multi-MPEGIO** PC, when 1st-time starting **MPEGIO** software, an "Initializing MPEGIO Cards…" process begins: do not use **MPEGIO** software until this process successfully finishes. This process will also start when **MPEGIO** cards are added or deleted, or **Ctrl key** was held when **MPEGIO** program is started.

(14) When anything not functioning properly, exit **MPEGIO** application software then run "**ResetDrivers**" from the **MPEGIO** program group: if this still cannot fix the problem, run **SetupDrivers** to re-install the **MPEGIO** device drivers.

15. Command Line Switches and Windows Messages

Apart from the numerical number discussed above to indicate **MPEGIO** card number, the **MPEGIO** command line also accepts these switches that are NOT case-sensitive:

R : Start Recording
S : Start Streaming
N : Disable Networking (No Remote Monitoring or Video Streaming)
H : Hide MPEGIO Video Window and Control Window

If a numerical card number is present, the **R**, **S**, H or **N** switches, if supplied, must be **after the numerical card number**, separated with one or more spaces from the card number and between themselves.

Examples of using command line switches:

-- MPEGIO.exe **0 R N**: Start MPEGIO card 0 and Start Recording, Disable Networking
-- MPEGIO.exe **2 S** : Start MPEGIO card 2 and Start Streaming Live Video Immediately
-- MPEGIO.exe **R S** : Start MPEGIO card 0 and Start Recording and Streaming

Note in the last example there is no card number supplied so card 0 is assumed.

MPEGIO can also accept user defined Windows Messages passed from any application software:

WM_USER+1: Stop Audio
WM_USER+2: Start Audio
WM_USER+3: Start Recording
WM_USER+4: Stop Recording
WM_USER+5: Start Streaming
WM_USER+6: Stop Streaming
WM_USER+7: Pause / Resume Recording

Note "WM_USER" is normally defined as 0x0400 by MS Windows SDK

16. Support

Technical support is at support@inventa.com.au.

Appendix 1: Keyboard Short-Cuts

A: Instantly Re-Play the Previously Recorded Video File (if there is one)
Ctrl+A: Start "**Recorded Files**" Window (if C:\MPEGIO.log has valid contents)

C: Start Video Conversion (Transcoding) Function
E: End the **MPEGIO** Software
I: Start Still-Image Grabbing Function
L: Split a New File to Hold the Video while Continuing Recording
M: Minimize the Video Window
N: Connect to Remote Monitor PC window
O: Start the “Colour Control Window”
R: Start Video Recording
S: Stop Video Recording, Play, or Conversion
T: Start “Set-up Window”
W: Restore the Video Window from Minimized Size
X: Full Screen Toggle

Appendix 2: MPEGIO Hardware Technical Specification

Encode Video Formats: MPEG-1, MPEG-2 MP@ML, MPEG-4 Simple Profile@L1,L2 & L3, with extensions to full-D1,H.263. I, IP, IBP, IBBP Frames. PES & ES.
Constant and Variable Bit Rate Encoding User Selectable
Video 4:2:2 to 4:2:0 conversion
Video Inverse telecine(3:2 pulldown)
Video frame rates: 23.976fps, 24fps, 25fps, 29.97fps, 30fps, 50fps, 59.94fps, 60fps
Video bits-rate from 50Kb/s~15Mb/s for MPEG1, MPEG2, and MPEG4(H.263)
Video resolution in pixels PAL: 176X144, 352X288, 480X576, 704X576, 720X576. NTSC:176X120, 352X240, 480X480, 704X480, 720X480
Video Encoding Aspect Ratio: 4:3, 16:9, Square PEL
Audio formats: MPEG-1 Layer I,II & III (MP3), AC3/Dolby 5.1, G.729 Audio sample rates: 8K, 16k, 22.5K, 24K, 32K, 44.1K, 48KHzAudio bit rates: 32Kbps ~ 384Kbps
PCI Bus v2.1 Compliance
Video Input: Composite and SVideo
Video Output: Composite or SVideo (Conversion Cable Supplied)
Audio Input: 3.5mm Phone Jack Stereo
Audio Output:3.5mm Phone Jack Stereo
Physical Dimension: 177mm(Length) X 105mm(Height --- not including PCI Connectors of about 7mm)