

MPEGIO2

PCI-E Dual-Channel MPEG2/4/1 Encoder/Decoder with IP Streaming, Colour Overlay, Digital I/O and Comprehensive SDK

Application Software Manual

Version 1.0.2

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1. Main Features and Functions

MPEGIO2 is a dual-channel, multi-I/O, colour Overlay and hardware MPEG 2/4/1 encoding + decoding PCI-Express Card with many powerful features:

- Real-time **encode MPEG2, MPEG4 and MPEG1** video using on-board hardware compression chipset
- Real-time **decode MPEG2/4/1 video** on PC screen and external TV simultaneously using on-board chip
- 2 Channels per **MPEGIO2** Card, each capable of Encoding & Decoding, maximum 16 channels per PC
- Real-time Encode **128Kbps to 15Mbps** MPEG Video per Channel with Stereo Audio
- **Overlay Colour Graphics & Text** Simultaneously on Encoded MPEG Video and external TV Screen
- Overlay colour text, graphics, timer/counter, rectangle and box with alpha transparency and blinking
- Multiple input video as picture-in-picture, picture-by-picture for preview, encode, stream and TV output
- Each channel has 4 **sub-windows** to display video in different sizes, positions, and colour parameters
- **Live preview multi-channel video on PC screen** inside re-sizable / movable window or full screen
- Simultaneous Video Input/Output per Channel on 2xRCA, 1xSVideo In + 2xRCA/SVideo Out Sockets
- 2 Stereo Audio Input & Output Sockets per Channel, Each Audio Input has its own gain control
- 2 Audio Input, MPEG Decoding Audio and Audio from Matching Channel can be mixed to be encoded
- **4 Digital I/O Sockets** per Channel for real-time control to external devices, digital input is via interrupt
- Perfect Audio/Video Synchronization maintained on video preview, recording and streaming
- **Seamlessly Split Recorded MPEG files** manually or automatically at fixed time or length in real-time
- Record Video using timer or calendar scheduler with daily or weekly repeat options
- Real-time **Stream Video over IP Network** multi-cast or uni-cast independent of file recording status
- Real-time **Flip Input Video** horizontally or vertically and **Enlarge** Video from any point (2-times zoom)
- **PAL and NTSC encoding** at various sizes from 720X576, 720X480, down to 176X144-Pixels
- **PAL/NTSC Conversion:** Record, Stream, Preview and Output **PAL** input as **NTSC**, or **NTSC** as **PAL**
- **Program Stream (PS) or Transport Stream (TS)** MPEG Video can be Encoded and Decoded
- Selectable encoding parameters inc. bit-rate, frame rate, frame size, GOP structure, sampling rate, etc.
- Various Encoding Aspect-ratio supported inc. 4:3, 16:9, 1:1 and 2.21:1
- **Capture Still Images** as bmp, jpg, gif, tiff, and png format at 720X576/480-Pixel independent of record
- Live recording status can be displayed inside video frame with user-definable colour, font and position
- **Min. CPU Usage** maintained on multiple channel video preview, encoding, decoding and streaming
- **Comprehensive Software Development Kit** with C++, VB, C++.Net, C#.Net, VB.Net Source Codes
- Device Driver, Application Software with Source Code and SDK for Windows XP, Windows 7 or above

2. Package Contents

1XPCI-Express Card, full Software with SDK, video/audio **Breakout Box** and Connection Cable.

3. Minimum System Requirement

Hardware: Intel/AMD CPU PC with 1XPCI-Express Slot, 2GB RAM, 512MB Graphics card and audio.

Software: MS **Windows7** or **XP** SP2, DirectX9 on Windows XP, Direct3D9 on Windows 7 or above.

Note 1: PC's Graphics Card must install its latest device driver, otherwise Video Preview might fail.

Note 2: Only 32-bit Windows XP, Windows7/8 are supported, 64-bit Windows are not supported.

4. Hardware Installation

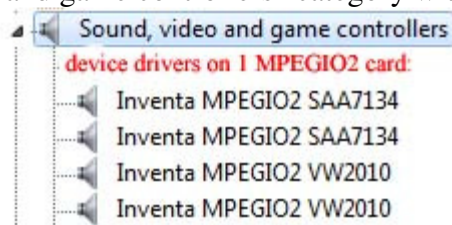
With PC power off, plug **MPEGIO2** PCIe card into a PCI-Express slot, screw the back metal bracket onto PC's rear rack. Connect the 68-pin SCSI cable between the back-socket on the **MPEGIO2** card and the **Breakout Box**, connect external video/audio device's video/audio output sockets to the input sockets on the **Breakout Box**. If needed, VCR or TV can be connected to the **TV Output** sockets on the **Breakout Box** to real-time display input video with colour overlay like a video overlay device, or to real-time output multiple input video window placements like a video multiplexer device.

5. Software Installation

Software installation includes **Device Driver** and **MPEGIO2.exe** application, either one can install first.

■ Device Driver Software Installation

When PC is powered on with the **MPEGIO2** card plugged in, MS Windows will inform new device is found and ask for the location of device driver: indicate to Windows the device driver software is located either at the installed application software folder (C:\Program Files\Inventa\MPEGIO2) or on the Setup CD, ignore Windows' warning messages claiming the driver has not passed Windows' Logo testing etc., proceed to install the device driver until 4 device drivers -- **2XInventa MPEG2 SAA7134** and **2XInventa MPEGIO2 VW2010** -- appear under the "ControlPanel->System->Hardware->DeviceManager->Sound, video and game controllers" category without "?" and "!" next to them:



Note 1. For multiple **MPEGIO2** cards, each will have two pairs of "**Inventa MPEGIO2 SAA7134**" and "**Inventa MPEGIO2 VW2010**" device drivers: one pair for each channel, two channels per card.

Note 2. If a channel lost a driver a warning dialog will appear and that channel will not be functional.

Note 3. Peripheral devices with the same hardware IDs as **MPEGIO2**, e.g. [Inventa's "MPEGIO"](#) or "[MPEGIOPro](#)" PCI cards, should not be used simultaneously with **MPEGIO2** on the same PC.

Note 4. "All Programs->Inventa->MPEGIO2->SetupDrv.exe" can also install / reinstall drivers. (Note on Windows 7 / 8, "**SetupDrv.exe**" needs to be run "**as administrator**" by right-mouse clicking the file name then selecting "**Run as administrator**").

Note 5: If PC boot up with **MPEGIO2** card inserted but no device driver installed, each card will have 4 unknown devices under the "ControlPanel->System->Hardware->DeviceManager" window: these must be upgraded to **MPEGIO2** device drivers manually or by running the program "**Start->All Programs->Inventa->MPEGIO2->SetupDrv.exe**".

Note 6: Some PC motherboards might not shut down the PC properly after installing **MPEGIO2** device drivers: in this case putting the "**ResetDrv.exe**" from the **MPEGIO2** Program Group into Windows' "**Startup**" folder ("**All Programs->Startup**") to reset the drivers usually can fix the shutdown problem.

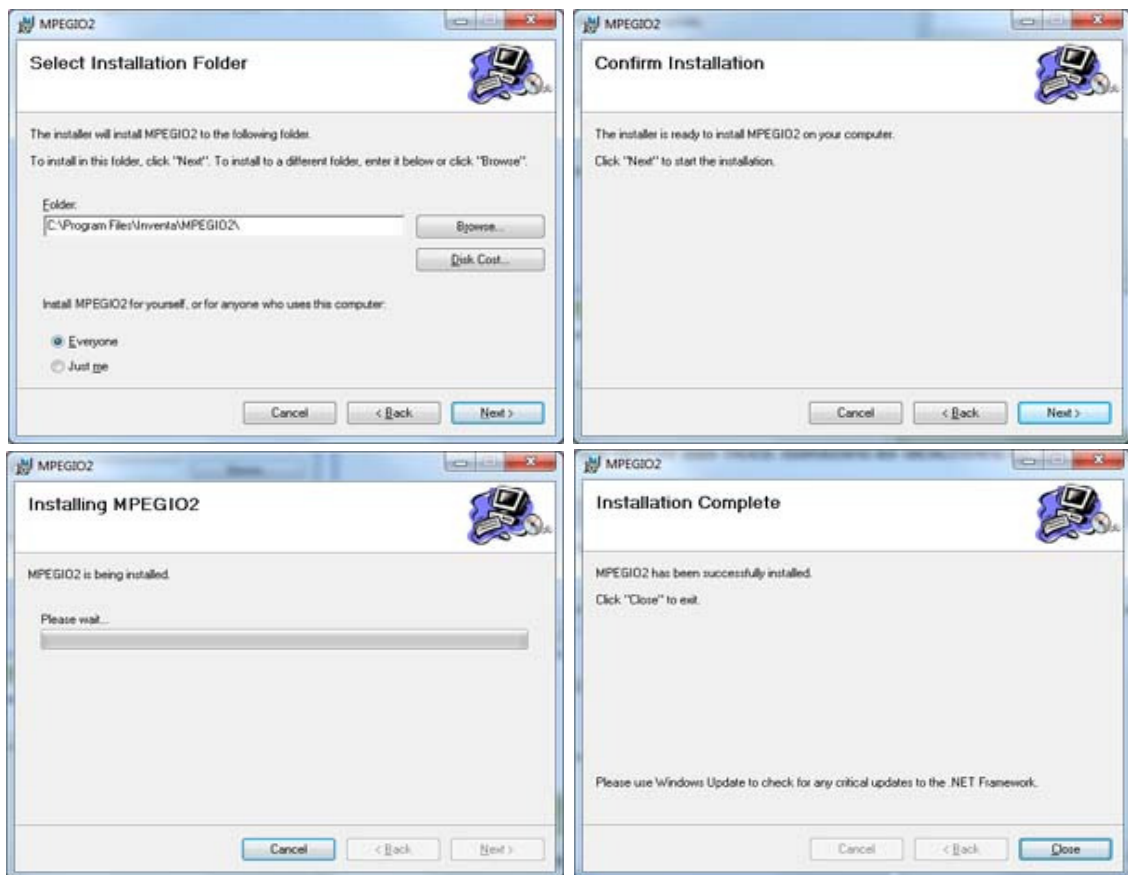
■ Application Software Installation


Once the Setup CD is inserted into PC's CD drive, the **Start.bat** program will automatically start – if this does not start double-click the “**Start.bat**” on the CD to start the setup process.

If Microsoft **VC++2008 Redistributable** or **.Net Framework 3.5** is not detected their setup will begin --- this will take a while --- then the **MPEGIO2.exe** “Setup Wizard” window will appear:



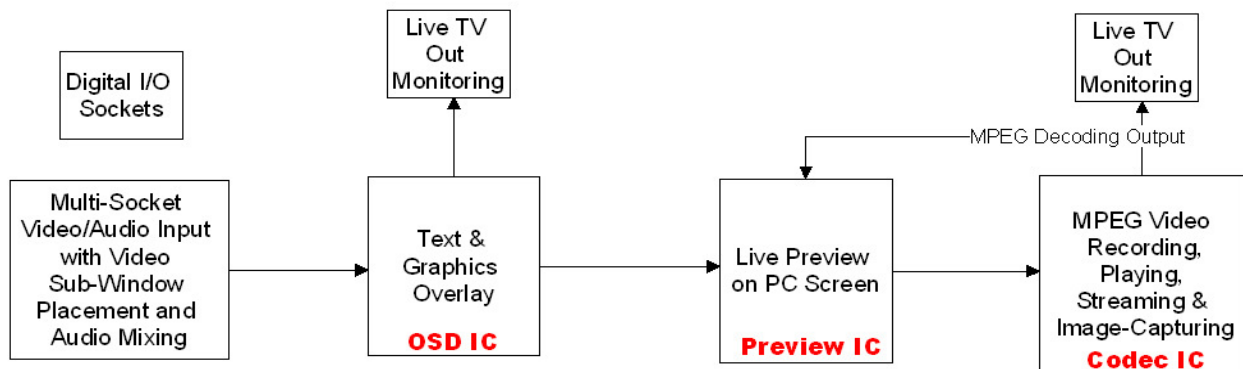
From this window, proceed to install **MPEGIO2.exe** application software.



At the end of the installation clicking the “**Close**” button will put  icon on Windows' desktop. Mouse double-clicking this icon will launch **MPEGIO2.exe** application program: it can also be launched from Windows' “**Start->All Programs->Inventa->MPEGIO2**” menu. Note if no **MPEGIO2** device driver exist this program simply displays a warning window and exit.

6. Device Architecture

Each **MPEGIO2** channel has several major functioning units as illustrated below:

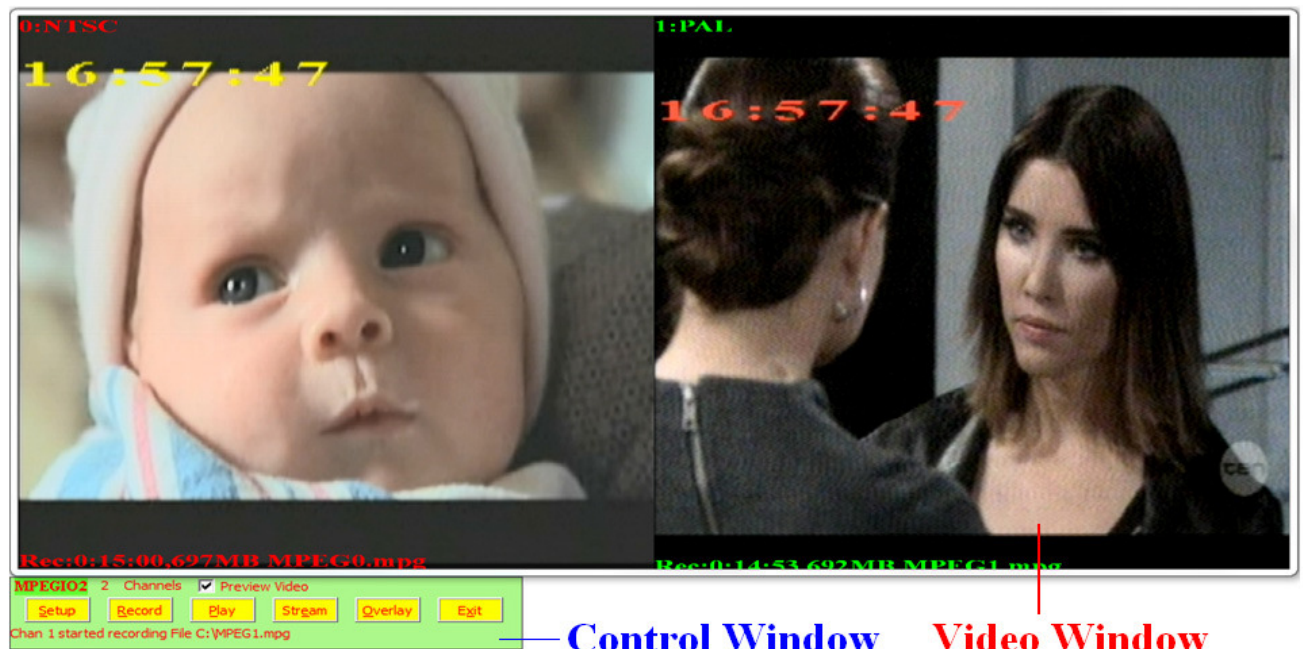


MPEGIO2 per Channel Functions

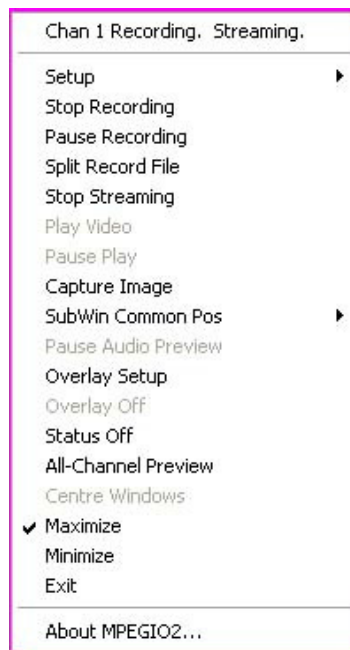
Following this illustration, the application software groups end-user controls to the hardware as Video/Audio I/O, Graphics/Text Overlay, On-Screen Preview, MPEG encode/decode/stream and Digital I/O. The **3 major processing IC chips** are **OSD IC**, **Preview IC** and **Codec IC**: they are responsible for overlay, preview and encoding/decoding respectively. Every **MPEGIO2** card has 2 independent channels each with the same functions as listed above: the only inter-relationship between them is under software control, they can route their video or audio output towards the matching channel's input ("matching channel" is the other channel on the same **MPEGIO2** card).

7. User Interface

On start up, the **MPEGIO2** software presents a **Video Window** and a **Control Window** on PC screen:



Right-mouse single clicking the **Video** or **Control Window** will also display a **Drop-down Menu**:



7.1 Control Window

The **Control Window** has function buttons **S**etup, **R**ecord, **P**lay, **S**tream, **O**verlay and **E**xit, it also has a check box to turn on/off **V**ideo **P**review (show/hide the **V**ideo **W**indow).

The **Control Window** cannot be resized but will become hidden on the Windows' Taskbar together with the **Video Window** when “**Minimize**” item is selected from the **Drop-down Menu**.

7.2 Video Window

When turned on, **Video Window** is always located above the **Control Window**: it can be resized by left-mouse clicking its edges then dragging. Left-mouse double-clicking will enter **Full-Screen** mode: video content will occupy the entire desktop area in front of all other windows (double-clicking again, or pressing the **Space bar** will revert back to normal window mode).

Left-mouse single-clicking inside **Video** or **Control Window** then dragging will move the **Video Window** and **Control Window** together around the desktop.

When multiple **MPEGIO2** channels are displayed, holding down the **Ctrl**-key then double-clicking the left-mouse button inside any channel's video area will expand that channel's video to fully occupy the entire video window (thus hiding all other channels' video) --- double-clicking again with **Ctrl**-key held-down will revert back to normal multi-channel display: see the **Video Preview & System Setup** Section for more details on this feature.

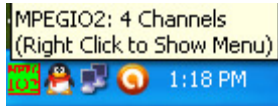
The **Video Window** can also show **MPEGIO2** channel's recording or playing status when recording or playing is started, as well as each channel's number and TV signal type.

7.3 Drop-down Menu

Drop-down Menu appears when Right-Mouse Button is single-clicked inside the **Video** or **Control Window**, or on the **Taskbar Icon**. Apart from various menu item selections, the **Drop-down Menu** also reflects one channel's status: if recording or playing is on or paused, streaming is on or off, status is on, Overlay is off, etc.

7.4 Taskbar Icon

When the **MPEGIO2.exe** program is running, an icon will always appear at Windows' Taskbar area:



, right mouse clicking this Icon will pop up the **Drop-down Menu**(Note if any of the Setup Windows is open right-clicking will not pop up the menu). If any channel is recording, streaming etc., they will also be indicated at this icon's "tool tip" text when mouse cursor hovers



over this icon:

7.5 Total Channel Number

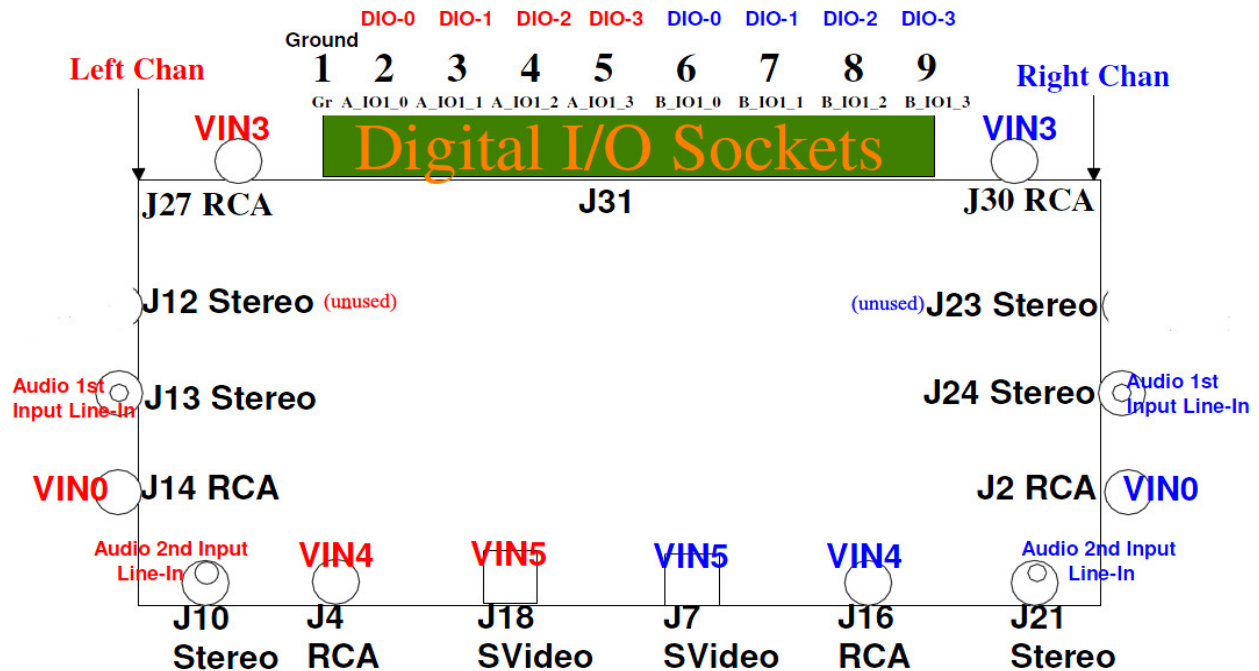
The **Control Window** also displays the number of **MPEGIO2** channels currently found in the PC, such as **4 Channels**. The **MPEGIO2.exe** program assumes this number will not change when it is running. This number counts only those channels currently with their device drivers properly installed. If a channel does not have its driver installed, or its driver is disabled, that channel will not be counted. The sequential number of a channel (the "Current Chan" value used in the various Setup Dialog Windows to identify each channel) might change as total number of channels change: if a card or a channel is removed or added, the channel number of each channel previously existed could also change.

7.6 Multiple MPEGIO2 Cards

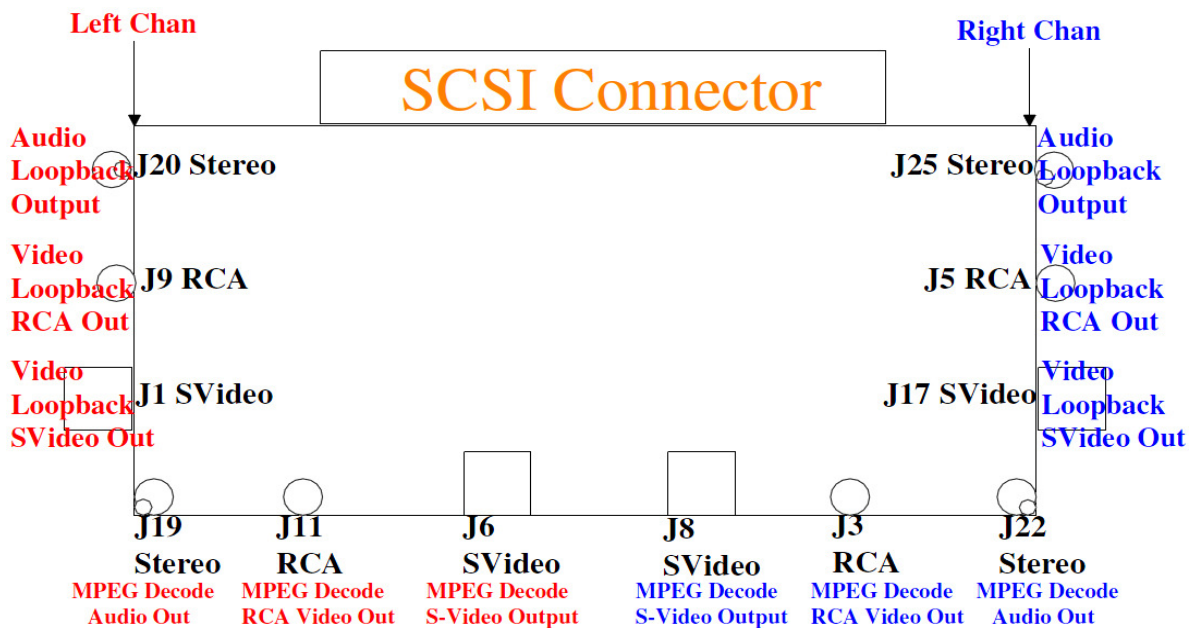
Simultaneously running multiple **MPEGIO2** cards in the same PC requires no special setup: the **MPEGIO2** device driver and application software will automatically recognize and count the total channel numbers according to their properly installed device drivers. If a channel does not have its device drivers installed due to failing hardware or deliberately disabled driver from the Windows' Control Panel, that channel will not be counted in the total channel number and video/audio I/O on that channel will not be functional, but functions of that channel's **matching channel** on the same PCIe card will not be affected except those functions related to its matching channel (routing A/V to/from its matching channel). **MPEGIO2** software allows max. 16 channels to be functional in one PC: these channels can be from 8 or more PCIe cards

8. Breakout Box Sockets

All signal Input/Output are accessed through the sockets on the 2-Layer **Breakout Box**: its **Top Layer** contains all Video/Audio **Input** sockets and the Digital I/O sockets; its **Bottom Layer** contains all Video/Audio **Output** sockets. Since each MPEGIO2 card has 2 independent channels, the sockets on the **Breakout Box** are arranged as **Left Channel Sockets** and **Right Channel Sockets**:



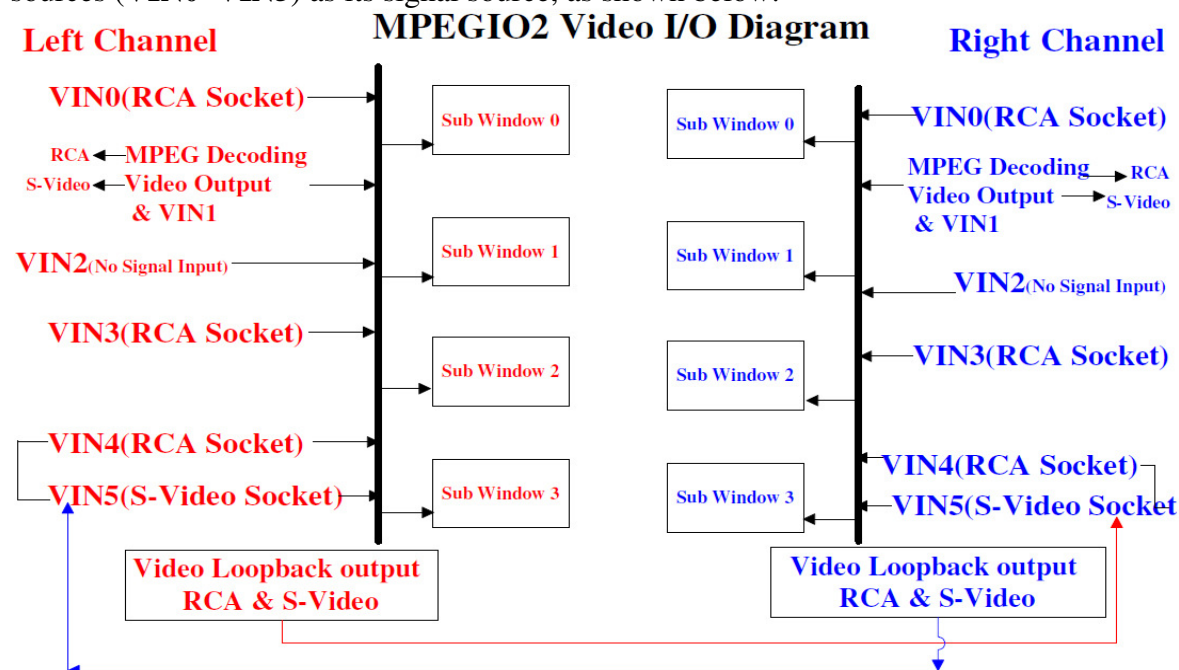
MPEGIO2 Breakout Box Top Layer



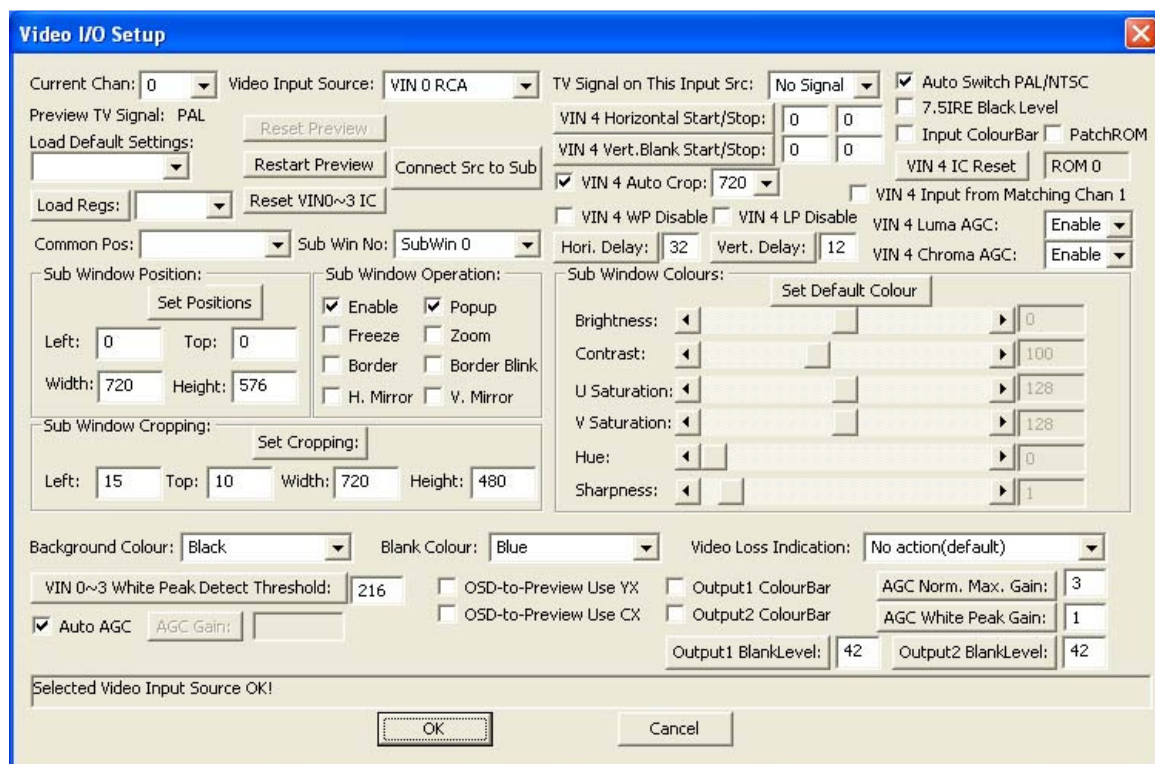
MPEGIO2 Breakout Box Bottom Layer

9. Video Input/Output

Each MPEGIO2 channel has 5 RCA(Composite) video input sources **VIN0, VIN1, VIN2, VIN3, VIN4**, and one S-Video input source **VIN5**: **VIN4** and **VIN5** belong to the same “5Th Input” (they share the same “brightness” signal line), while each of the **VIN0~VIN3** can connect to a different external signal. The **Breakout Box** only has **VIN0, VIN3, VIN4** and **VIN5** Input Sockets, since **VIN1** is permanently connected to the MPEG decoding (Playback) output, and **VIN2** is left unconnected (always “no signal”). A channel uses 4 “**Sub Windows**” (0 ~ 3) to show input video and decoded MPEG video inside its 720X576/480-Pixel Video Frame: any of these 4 **Sub Windows** can use any of the 6 video input sources (**VIN0~VIN5**) as its signal source, as shown below:



The “**Video I/O Setup**” Dialog is used to set up video input/output parameters:



This dialog can be opened from **Control Window->Setup**, or from **Drop-down Menu->Setup**.

The “**Current Chan**” combo box at the upper-left corner indicates which **MPEGIO2** channel has the Video I/O settings on the dialog, selecting a different channel number will immediately reflect the new channel’s various settings in the entire dialog window.

The “**Preview TV Signal**” field below the “**Current Chan**” indicates the TV Signal type this channel currently uses to display video preview and to encode MPEG video: this is always either PAL or NTSC, it will NOT be no signal since the **MPEGIO2** hardware always uses either NTSC or PAL to encode and preview video. To manually force the channel to use either PAL or NTSC as its Preview TV Signal, use the “**TV Signal on This Input Src**” combo box:

The “**Video Input Source**” combo box indicates one of the 6 “**Video Input Sources**” an **MPEGIO2** channel has: **VIN0~VIN3 RCA**, **VIN4 RCA** and **VIN5 S-Video**. When this changes, the content in “**TV Signal on This Input Src**” will reflect the Input Source’s current signal type, inc. “**No Signal**” status. However, if manually force a **PAL** or **NTSC** signal type in the “**TV Signal on This Input Src**” combo box, the “**Preview TV Signal**” field below the “**Current Chan**” combo box will also get that signal type, indicating this channel’s video preview and MPEG encoding TV signal type has been changed. By default, a channel set its video preview and MPEG encoding TV signal (the “**Preview TV Signal**” field) according to its 1st video input source with signal currently being used by at least one of its 4 “**Sub Windows**”: this can be manually overridden if a different PAL or NTSC signal type is selected from the “**TV Signal on This Input Src**” combo box. Forcibly selecting a different PAL/NTSC signal type this way therefore can be used to preview video and encode MPEG video in the PAL/NTSC type different from a Video Input Source’s actual signal type, with **MPEGIO2** hardware doing the real-time PAL-to-NTSC or NTSC-to-PAL conversion. Please note: do not forcibly change to different PAL/NTSC signal type when a channel is encoding or decoding!

When **MPEGIO2.exe** program starts up, if all input sources used by some Sub Windows for a channel have no signal, then the Country/Regional/Language setting in MS Windows’ Control Panel will be used to decide NTSC or PAL is used as the “**Preview TV Signal**”: USA/Japan etc. will use NTSC, UK, Australia etc. will use PAL: however, the command line switch **-g** can override this, see the section “**Command Line Parameters**” for more details.

Each **MPEGIO2** channel has 4 “**Video Sub Windows**”: they are selected from the “**Sub Win No:**” combo box as “**SubWin0 ~ SubWin3**”. Each Sub Window can select a “**Video Input Source**” as its input signal source: video from that input source will appear inside this Sub Window within the video frame, or no video will appear if that input source has no signal. Clicking the “**Connect Src to Sub**” button (between the “**Video Input Source**” and the “**Sub Win No**”) assigns the “**Video Input Source**” to the “**Sub Window**”. Note same “**Video Input Source**” can be connected to multiple **Sub Windows**.

The **VIN 0**, **VIN 3**, **VIN 4 RCA** and the **VIN 4 SVideo** Input Sources are direct sockets on the top layer of the Breakout Box: connecting external video sources to them will make the external signal type to appear in the “**TV Signal on This Input Src**” combo box.

The **VIN1** Input Source is always connected to the MPEG Decoding (Playback) output, the **VIN2** Input Source always has no signal since it’s not connected.

The “**Set Positions**” button arranges the positions of the 4 **Sub Windows** inside the video frame on PC screen and on encoded MPEG video. The “**Common Pos.**” combo box provides common positions for the 4 **Sub Windows**: 4-SubWindows Equal Split, SubWin 0 Full Screen, Picture-in-Picture, etc. Note the “**Sub Win Common Pos**” selection from the **Dropdown Menu** has the same function.

The “**Set Cropping**” button will crop the size of the currently selected Video Input Source: it is recommended to use the default values for the cropping for PAL and NTSC signals.

Below the “**Sub Win No**”, the “**Sub Window Operation**” groups operations on a Video Sub Window:

- **Enable:** If cleared, this Sub Window will disappear from the video frame. By default sub window is enabled.
- **Freeze:** If selected, the video inside the Sub Window will be frozen.
- **Border:** Selecting this will place a white border around the Sub Window.
- **Border Blink:** This will make the Sub Window's border blinking.
- **Zoom:** This will zoom the video inside the Sub Window when left mouse clicks inside the Sub Window with **Shift**-key held down: the video from the point the Left Mouse clicked will be zoomed 2 times larger and this zoomed video is shown inside the Sub Window. Left click again without holding the **Shift**-key will cancel the zooming.
- **Popup:** This decides the display priority between Sub Windows when they overlay: when two Sub Windows overlap the Sub Window with "**Popup**" selected will display on top of the Sub Window with "**Popup**" cleared. If both Sub Windows have the same "**Popup**" selection (both selected or both cleared) then the lower numbered Sub Window will have higher display priority.
- **H.Mirror:** Selecting this will flip the video inside the Sub Window horizontally (swap left and right).
- **V.Mirror:** Selecting this will flip the video inside the Sub Window vertically (upside down).

In the "**Sub Window Colours**" group, changing brightness, contrast etc. will affect colours for those Sub Windows using the current "**Video Input Source**". Clicking the "**Set Default Colour**" button will restore the default colour settings.

Clicking the "**Hori. Delay**" will shift the horizontal start position of the entire video frame as follows:

Horizontal delay: must be within 0 ~ 63:
 0 = - 32 Pixel delay
 ::
 32 = 0 Pixel delay (default)
 ::
 63 = + 31 Pixel delay.

Clicking the "**Vert. Delay**" will shift the vertical start position of the entire video frame as follows:

Vertical delay: can be within 0 ~ 31:
 0 = -11 Lines delayed
 ::
 12 = 0 Line delayed (default)
 ::
 31 = +19 Lines delayed.

Note the "**Hori. Delay**" and "**Vert. Delay**" buttons only affect the VIN0 ~ VIN3 Input Sources. The 5th Video Input Source has its own settings for video horizontal and vertical start/stop positions via buttons "**VIN4 Horizontal Start/Stop**", "**VIN4 Vert. Blank Start/Stop**" and "**VIN 4 Auto Crop**". Its video signal source can be either externally from the RCA(VIN4)/SVideo(VIN5) sockets on the **Breakout Box**, or internally from the matching channel's video output by ticking "**VIN 4 Input from Matching Chan**" --- ticking/clearing this box will also power down/up the 5th Video Input IC (the matching channel number is also displayed if the matching channel exists). Please do not tick the "**VIN 4 Input from Matching Chan**" on a channel and its matching channel simultaneously: the result will be undefined.

Note when socket VIN5 (SVideo) has signal input but socket VIN4 (RCA) doesn't and a Sub Window selects VIN4 as its input source, or when socket VIN4 (RCA) has signal input but socket VIN5 (SVideo) doesn't and a Sub Window selects VIN5 as its input source, that Sub Window will show black & white video because socket VIN4 and socket VIN5 share the same Brightness signal line.

Clicking the "**VIN 4 IC Reset**" button momentarily power-down the 5th Input IC then power it up again.

The "**ROM ***" field next to the "**VIN 4 IC Reset**" button is the 5th Input IC's software (ROM) version: this can be 0 as the original version, or 0x8C as the downloaded latest version if the box "**PatchROM**" is ticked: note if the 5th Input signal shows incorrect colour changing the ROM version could rectify the problem. To revert the ROM version to original 0 clear the "**PatchROM**" box then reboot the PC.

The "**VIN4 Horizontal Start/Stop**" has these limits for its start and stop values:

start: a signed integer value: -512 ~ +511: the number of pixels to blank out before/after the first horizontally active pixel, default is 0.

stop: a signed integer value: -512 ~ +511: the number of pixels to blank out before/after the last horizontally active pixel, default is 0.

The “**VIN4 Vert. Blank Start/Stop**” has these limits for its start and stop values:

start: a signed char value: -128 ~ +127: The Vertical Blank Area will appear (in number of lines of displayed video) before (when value is negative) or after (when value is positive) the standard vertical blanking intervals. Default is 0: Same time as start of the standard vertical blanking interval.

stop: a signed char value: -128 ~ +127: The Vertical Blank Area will end (in number of lines of displayed video) before (when value is negative) or after (when value is positive) the standard vertical blanking intervals. Default is 0: Same time as stop of the standard vertical blanking interval.

If the “**VIN 4 Auto Crop**” check box is ticked, the combo box to its right will select the horizontal active video size for the **5th Video Input**: 720 Pixels(default), 704 Pixels, or 640 Pixels.

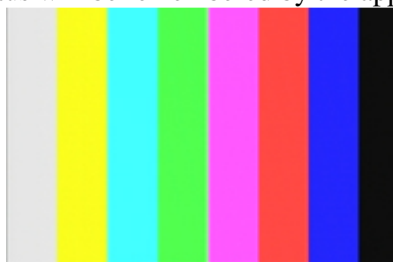
The “**VIN 4 Luma AGC**” and “**VIN 4 Chroma AGC**” set up the Automatic Gain Control for the 5th Input Source (VIN 4)’s Luminance and Chrominance, default are enabling AGC.

The “**VIN 4 WP Disable**” and “**VIN 4 LP Disable**” allow disabling the **White Peak Detection** and **Luminance Peak Detection** processing for the 5th Input Source(VIN 4), their default are both “Enable”.

If the “**Auto Switch PAL/NTSC**” check box is ticked, this channel’s Preview and MPEG encoding TV Signal type (the “**Preview TV Signal**”) will follow the current “**Video Input Source**” as its signal changes to NTSC or PAL (note **Auto Switch** only happens when the channel is not encoding or decoding).

The “**7.5IRE Black Level**” is only useful for Non-Japanese NTSC type video signals. Ticking this box will make the video’s black area darker.

Ticking the “**Input ColourBar**” box displays a colour bar in a channel’s video preview area (but not in the **Video Loopback RCA/SVideo ports** of the **Breakout Box**); this colour bar also appears in the encoded / streamed MPEG video and its setting/clearing status will be remembered by the application software:



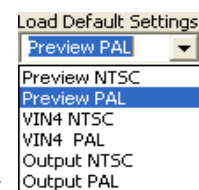
At the bottom area of the **Video I/O Setup** dialog:

“**Background Colour**” set up the colour for the area inside an **MPEGIO2** channel’s Video Preview Window where no Sub Window covers (thus exposes the “Background” of that channel). Default is **Black**.

“**Blank Colour**” is the colour appearing in Video Sub Windows that have no video signal from their Video Input Source and the channel’s “**Video Loss Indication**” is “**Filled with blank colour**”. Default is **Blue**.

“**Video Loss Indication**” selects the action taken when a Sub Window has no signal in its Input Source: **No action**(Default), **Keep last image**, **Filled with blank colour**, **Keep last image & blink border**.

When selected, the “**Load Default Settings**” combo box loads the default register values into one of the 3 I/O ICs for a channel: the OSD/Video Input IC for Preview/Encode, the 5th Video Input IC for the 5th Input Source (VIN 4 RCA and VIN 4 SVideo), and the Video Output IC for MPEG decoding and Loopback Output ports.



--- each of these default register value sets have different PAL and NTSC versions:

The “**Load Regs:**” button and the ComBo box to its right allow loading an arbitrary file containing an IC’s register number+value pairs into the OSD, VIN4 or Output ICs, mainly for debugging purpose.

Adjusting the “**VIN 0~3 White Peak Detect Threshold**” value can affect the amount of white colour being cut-off but can reduce chances of white background flickering: default value is 216, valid value range is 0 ~ 254. Using value 255 will turn off automatics white peak control. Note this button only affects the VIN 0 ~ VIN 3 input sources: the 5th Input Source has its own automatic white peak control.

The “**Auto AGC**” check box enables Automatic AGC Gain Value setting, clearing this box will enable the “**AGC Gain**” and EditBox next to it allowing manual setting of AGC Gain values (0 ~ 511 allowed): this will affect the brightness of the VIN 0 ~ VIN 3 Video Input Source.

The “**AGC Norm. Max Gain**” and “**AGC White Peak Gain**” will also affect the VIN 0 ~ VIN 3 Video Input Source brightness. A high “**AGC Norm. Max Gain**” value could also cause video shivering.

The “**OSD-to-Preview Use YX/CX**” boxes (only one can be ticked) are for debugging purpose : ticking them will make the OSD IC to Preview IC connection to use CVBS signal instead of Y/C.

Each **MPEGIO2** channel has 2 pairs of Output Video ports on the bottom layer of the **Breakout-Box**: the **Video Loopback RCA/SVideo Out** ports show the video on PC screen and encoded/streamed as MPEG video inc. all overlays items but excluding the “**Input ColourBar**” ticked below the “**7.5IRE Black Level**” box; the **MPEG Decode RCA/SVideo Out** ports show video decoded from MPEG file as full screen without any overlay or the “**Input ColourBar**” even if they are defined (overlay and the “**Input ColourBar**” can still appear on PC screen).

The “**Output1 ColourBar**” display a colour bar at the **MPEG Decode RCA/SVideo Out** ports.
The “**Output2 ColourBar**” display a colour bar at the **Video Loopback RCA/SVideo Out** ports.
Note these 2 colour bars are for debugging only, they won’t be remembered by the application software.

The “**Output1 BlankLevel**” fields show and adjust the video blank level for the **MPEG Decode RCA/SVideo Out** ports (J11, J6, J3, J8 on the Breakout Box).

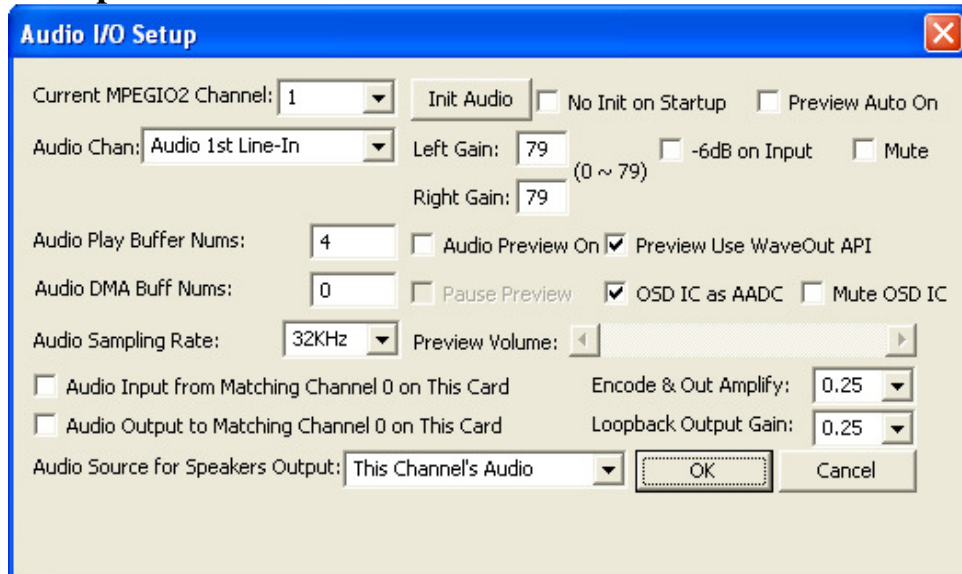
The “**Output2 BlankLevel**” fields show and adjust the video blank level for the **Video Loopback RCA/SVideo Out** ports (J9, J1, J5, J17 on the Breakout Box).

The “**Reset Preview**” button will re-initialize the Video/Audio Preview IC's Register Values to their default ones as the device driver “Drv7134.sys” contains, as in the PCIe card’s power-on stage: this button can only be used when Video Preview is not in progress.

The “**Restart Preview**” button quickly stops then restarts Video Preview on this **MPEGIO2** channel.

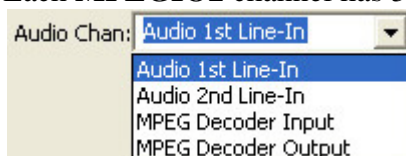
The “**Reset VIN0~3 IC**” button hardware reset the Video Input/OSD IC for the VIN 0~3 input: this is useful to fix garbled video display in any Sub Window, e.g. when doing PAL/NTSC switching, etc.

10. Audio Input/Output



The “**Audio I/O Setup**” dialog window can be opened from the “**Setup**” button on the Control Window, or from the **Drop-down menu->Setup**.

Each **MPEGIO2** channel has 3 Audio Input Sources selectable from the “**Audio Chan**” Combo Box:



the 1st input source is the **Audio 1st Input Line-In** socket on the Top Layer of the **Breakout Box**;
the 2nd input source is the **Audio 2nd Input Line-In** socket on the Top Layer of the **Breakout Box**;
the 3rd input source is the MPEG decoding audio output from this **MPEGIO2** channel.

The 4th item (“**MPEG Decoder Output**”) in the “**Audio Chan**” Combo box is not an audio input source for the **MPEGIO2** channel, it is the audio signal to be heard on the “**MPEG Decode Audio Out**” Ports on the Bottom Layer of the **Breakout Box**: it is listed here only for adjusting its left/right sub-channel output gains.

Audio signals from the 3 input sources can be mixed to be simultaneously heard on PC’s speakers and on the Audio Loopback Output port on the **Breakout Box**, as well as to be encoded/streamed-out with MPEG video. Their left and right sub-channel gains can be adjusted individually.

To enable audio input/output and preview, the “**Init Audio**” button can be used to initialize a channel’s audio. If the check box “**No Init on Startup**” is cleared (default), this **MPEGIO2** channel will initialize its audio ICs automatically when the software starts, therefore no need to click the “**Init Audio**” button.

Typing values between 0~79 in the “**Left Gain**” or “**Right Gain**” edit box will affect audio input gains immediately on the left sub-channel or right sub-channel of the current “**Audio Chan**”: this will affect PC speakers, audio encoded to MPEG stream, and Audio Loopback Output Ports on the **Breakout Box**.

Use the “**Audio Preview On**” check box to turn on / off the audio preview (hear audio on PC’s sound card/speakers, unrelated to audio encoding to MPEG file/stream). When audio preview is on, use the “**Preview Volume**” slider to adjust audio volume heard from PC speakers: this volume will not affect MPEG encoding nor audio heard from the **Audio Loopback Output** sockets on the **Breakout Box**.

Prior to turning on audio preview, ticking or clearing the “**Preview Use WaveOut API**” box selects using the MS Windows’ “WaveOut API” (default, for multiple **MPEGIO2** channels simultaneous use) or “DirectSound API”(use for one channel only) to play the audio as preview.

If “**Preview Auto On**” is ticked, each time **MPEGIO2.exe** starts it turns on audio preview if it was on when last time **MPEGIO2.exe** exit (“**Audio Preview On**” ticked and “**Pause Preview**” cleared).

Ticking the “**-6dB on Input**” check box will apply -6dB reduction on the input audio signal for all audio input sources simultaneously for this **MPEGIO2** channel.

The “**Mute**” check box (next to the “**-6dB on Input**”) will mute all the audio input channels: selecting this will make no audio heard on PC speakers, on the encoded/streamed-out MPEG data, and on the audio Loopback Output ports J20/J25 on the Breakout Box --- the only exception is when the button “**OSD IC as AADC**” is ticked the audio from “Audio 2nd Line-In” can still be encoded into MPEG file/stream (although not being heard on PC speakers).

The “**Audio Input from Matching Channel # on This Card**” (# indicates the actual matching channel number if it exists) allows the audio output from the matching channel to be used as this channel’s audio input (thus ignoring all the “**Audio Chan**” and **Gain** settings): to achieve this, the “**Matching Channel**” must check its “**Audio Output to Matching Channel on This Card**”: e.g., if channel 0 and channel 1 are “**Matching Channels**” on the same **MPEGIO2** card, and channel 1 wants to use channel 0’s audio output as its audio input, channel 1’s “**Audio Input from Matching Channel on This Card**” should be ticked, and channel 0’s “**Audio Output to Matching Channel on This Card**” should also be ticked.

Note changing “**Audio Input from Matching Channel # on This Card**” will also change the “**Audio Source for Speakers Output**” to either “**Matching Chan’s Audio**” or “**This Channel’s Audio**”.

The combo box “**Audio Source for Speakers Output**” selects which audio output will be sent to this channel’s “**Audio Loopback Output**” sockets (J20/J25) on the bottom layer of the **Breakout Box**: either this channel’s audio output, or the matching channel’s audio output. Selecting “**No Output to Speakers**” disables audio output on the “**Audio Loopback Output**” sockets. Note if “**OSD IC as AADC**” is ticked, “**Audio Source for Speakers Output**” will also affect encoded MPEG audio(see below): if Audio Input is from matching channel(the “**Audio Input from Matching Channel # on This Card**” is ticked), then the “**Audio Source for Speakers Output**” must select “**Matching Chan’s Audio**” to make the audio to be encoded into MPEG data; if Audio Input is not from the matching channel(the “**Audio Input from Matching Channel # on This Card**” is cleared), then the “**Audio Source for Speakers Output**” must select “**This Channel’s Audio**” to make the audio to be encoded into MPEG data.

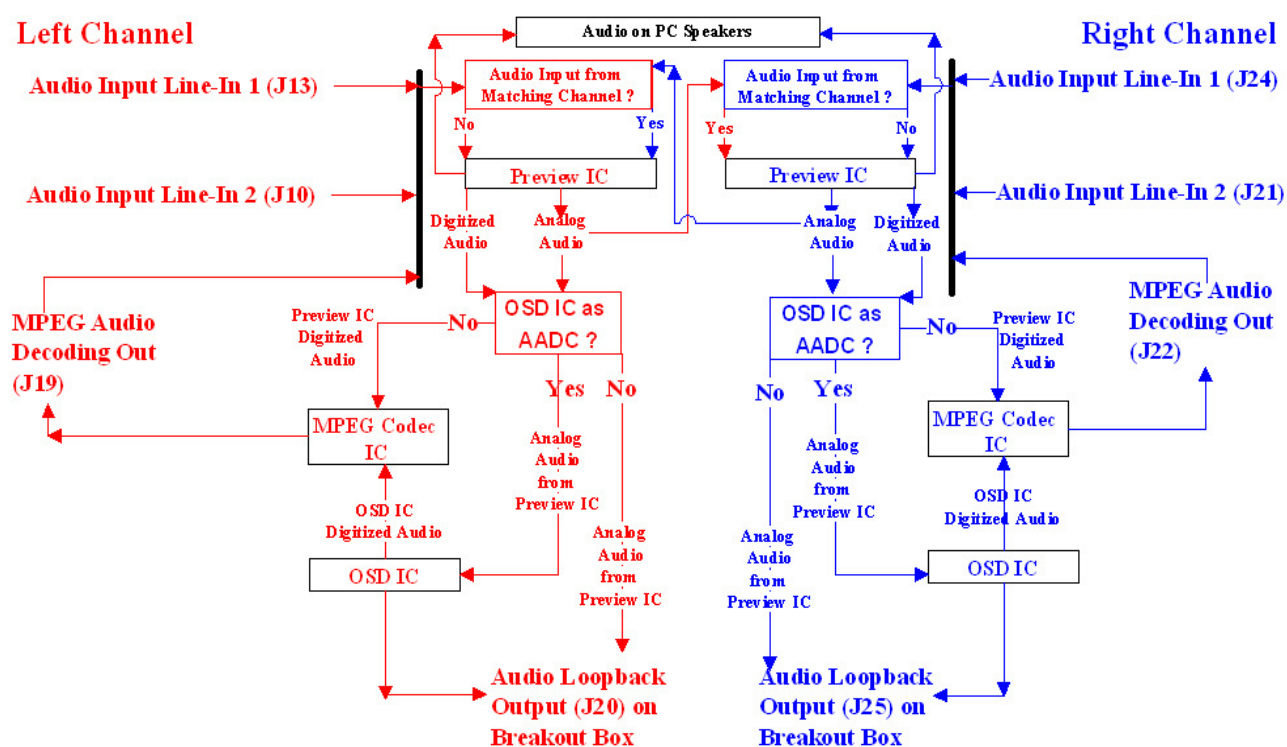
The “**Audio Sampling Rate**” combo box shows the sampling rate used to preview and encode audio: this is only changeable from the “**MPEG Encoding Setup**” Window, unless “**OSD IC as AADC**” is selected:

The “**OSD IC as AADC**” box selects if the OSD IC (ticked) or the Preview IC (cleared) is to be the Audio Analog-to-Digital Converter (ADC) to send digitized audio to the MPEG encoding IC to create MPEG audio. By default, this box is cleared meaning the Preview IC is used as audio ADC. Ticking this box will use OSD IC as audio ADC, which will bring over some changes:

- The audio output of the Preview IC (which always does the audio preview for audio heard on PC speakers) will now be connected to the OSD IC to be digitized then sent out to the MPEG Codec IC;


- The audio output from the OSD IC (not the audio output from the Preview IC) is now sent out to the Audio Loopback Out ports J20/J25 on the Breakout Box;
- The “**Encode & Out Amplify**” and “**Loopback Output Gain**” combo boxes will appear: these allow changing the audio output gains at the Audio Loopback Out ports (J20/J25 sockets) on the Breakout Box, and the “**Encode & Out Amplify**” value will also affect the encoded MPEG audio: note using too big gain here could cause corrupted audio in the encoded MPEG file/stream;
- The “**Audio Source for Speakers Output**” combo box now also affects the encoded MPEG audio: to get audio encoded in the MPEG file/stream this must select “**This Channel’s Audio**” if “**Audio Input from Matching Channel on this Card**” is cleared, and this must select “**Matching Chan’s Audio**” if “**Audio Input from Matching Channel on this Card**” is ticked (and the matching channel does exist);
- The “**Mute OSD IC**” box appears: ticking this will stop encoding all audio into MPEG file/stream and also stop audio output at the Audio Loopback Output ports on the Breakout Box (J20/J25), but will not affect audio heard on PC speakers (if Audio Preview is on);
- The audio preview sampling rate indicated by the “**Audio Sampling Rate**” combo box now can be different from the “**Sampling Rate**” in the “**MPEG Encoding Setup**” dialog window, this makes “**Audio Sampling Rate**” combo box user-selectable in the “**Audio I/O Setup**” dialog. In comparison, when preview IC is used as audio ADC (when “**OSD IC as AADC**” box is cleared), the “**Audio Sampling Rate**” combo box is always disabled, because when using preview IC as audio ADC audio preview sampling rate must be the same as audio encoding sampling rate which is only changeable from the “**MPEG Encoding Setup**” dialog window.

The following **Audio I/O Diagram** illustrates how audio signal flows in different situations:



MPEGIO2 Audio I/O Diagram

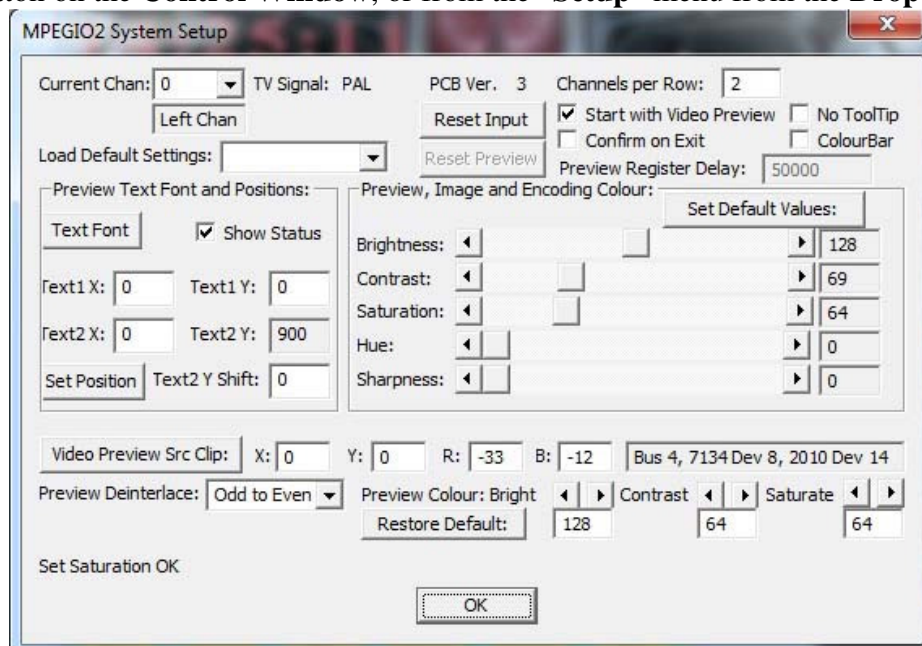
11. Video Preview & System Setup

The “**Preview Video**” check box  on the **Control Window** turns on/off the Video Preview for all channels. When turned on, video from **MPEGIO2** channels will appear inside a floating window that user can move, resize, minimize or maximize. Holding-down the left mouse button in the **Video** or **Control Window** then dragging will move the two windows together around the desktop.

Double-clicking left mouse button inside the Video Window will expand it to full-screen mode: double-clicking again will restore back to normal display. If the **Ctrl**-key is held-down while left mouse double-clicking inside the Video Window, no full-screen will happen, but the channels inside the Video Window will toggle between “**one channel**” mode and “**all channels**” mode: in “**one channel**” mode, the channel area the left-mouse double-clicked will expand to fill the entire Video Window; while in “**all channels**” mode, all channels will display their video inside the Video Window with equal width and height (Note selecting the “**Single/All Chan Preview**” Item in the **Drop-down Menu** also switch between “**one channel**” mode and “**all channels**” mode):



Parameters to control the Video Preview are inside the “**System Setup**” dialog that can be opened from the “**Setup**” button on the **Control Window**, or from the “**Setup**” menu from the **Drop-down Menu**:



In the “**System Setup**” dialog window, the “**Channels per Row**” controls how many channels will be arranged per row in the Video Preview Window: 0 is the same as the total number of channels.

Depending on the value entered, the number of rows will be automatically calculated, e.g., putting

number 2 for a PC with 4 **MPEGIO2** channels installed (2 cards) will display 2 rows of channels each with 2 channels. By default, all channels will be displayed in a single row. After changing this value, turn-off then turn-on Video Preview from Control Window to see the new arrangement.

Selecting the “**Start with Video Preview**” will make the **MPEGIO2.exe** program to automatically start the Video Preview when the program starts.

The “**Monitor**” combo box only appears when the PC has multiple monitors attached, it indicates the physical Monitor (screen) Number to display live video preview: this field is only modifiable when Video Preview is turned off. Changing this value then turning on the Video Preview will make live Video to appear when the Video Preview Window is in the designated monitor. Note live video will not appear (the preview window has no video) when Video Preview Window is moved to a monitor other than the one indicated by this Monitor Number. When PC has multiple monitors number 0 might not necessarily be the primary monitor: if the selected Monitor does not show live video, some other monitor will do. **MPEGIO2.exe** remembers the currently used Monitor Number on exit and will use it on its next start-up. By default, the **MPEGIO2.exe** uses the primary monitor number for video preview.

The “**Preview, Image and Encoding Colour**” scrollbars adjust colour properties for video inside the Video Preview window, for captured still images, and for the encoded MPEG video. The “**Set Default Values**” button will restore these colour parameters to their default values.

The “**Preview Colour**” (**Bright/Contrast/Saturate**) indicates and adjusts the colour on previewed video only, without affecting colours on captured still image and MPEG recording video.

The button “**Video Preview Src Clip**” set the Video Preview Source Clipping Pixels for an **MPEGIO2** Channel: the values in the **X, Y, R, B** edit boxes indicate:

X: the pixels to include (when negative) or exclude (when positive) from the left edge of the incoming video

Y: the pixels to include (when negative) or exclude (when positive) from the top edge of the incoming video

R: the pixels to include (when positive) or exclude (when negative) from the right edge of the incoming video

B: the pixels to include (when positive) or exclude (when negative) from the bottom edge of the incoming video

Note 1: To preview a smaller portion of the incoming video's raw frame(e.g. to avoid noise at edges), set **X** and **Y** to positive, **R** and **B** to negative: this will use a smaller portion of the raw video input to fill the video preview window, the visual result is the video is “zoomed in” (enlarged).

Note 2: The default settings are: **X = Y = R = 0, B = -12**.

Note 3: This clipping will not affect still image captured, nor encoded MPEG video on this channel.

The “**TV Signal**” field to the right of the “**Current Chan**” is the same as the “**Preview TV Signal**” field in the “**Video I/O Setup**” dialog window: it shows the video signal type this **MPEGIO2** channel is currently configured to use and will affect the video preview and MPEG encoding. This setting defaults to the signal type the first Input Source with signal this channel's Sub Windows use, but can be manually changed by selecting the “**TV Signal on This Input Src**” combo box inside the “**Video I/O Setup**” dialog window.

The “**Reset Input**” button will hardware reset the OSD and Video Input IC on the PCIe card for this channel: use this with caution! Because this will clear all video display and Overlays on this channel --- after doing this, only selecting the “**Load Default Settings**” combo box on the “**OSD IC PAL**” or “**OSD IC NTSC**” item can restore the video display.

The “**Load Default Settings**” combo box allows loading default register values to one of the 3 major ICs on the **MPEGIO2** card for a channel: the OSD and Video Input IC, the 5th Video Input (VIN4) IC, and the Video Output ICs, each of them has PAL and NTSC versions. This is the same as the “**Load Default Settings**” combo box inside the “**Video I/O Setup**” dialog window.

The “**Reset Preview**” is the same as in the “**Video I/O Setup**” dialog: re-initialize the Video/Audio Preview IC's Register Values to their default ones as the device driver “Drv7134.sys” contains, as in the PCIe card's power-on stage: this button can only be used when Video Preview is not in progress. Clicking this button will also set the “**Preview Register Delay**” value which might affect audio preview result, so normally should leave the default value unchanged.

The “**Confirm on Exit**” turns on or off the “**Are You Sure to End MPEGIO2 Application**” dialog box display when exiting the **MPEGIO2.exe** program.

The “**ColourBar**” box is the same as the “**Input ColourBar**” box in the “**Video I/O Setup**” dialog.

Ticking the “**No ToolTip**” will stop all ToolTip display throughout the **MPEGIO2.exe** application.

The “**Preview Text Font & Positions**” group controls the 2 line Status Text on the surface of the previewed video (they will not appear in encoded MPEG video, nor in the output of the Video Loopback Output ports on the Breakout Box):

- The “**Show Status**” will turn on or off the status lines;
- The “**Text Font**” will display font selection dialog for choosing font for the preview text;
- The “**Text1 X/Y**” are the 1st preview text line's left and top positions inside the video frame;
- The “**Text2 X/Y**” are the 2nd preview text line's left and top positions inside the video frame;
- The “**Set Position**” button can instantly update the X/Y positions for the 2 line status text.

The 1st **preview text line** contains channel number and its TV signal type, such as 0:PAL, 2:NTSC, etc.

The 2nd **preview text line** contains the channel's recording/decoding status, such as “Rec: 0:01:28. 102MB MPEG1.mpg”, meaning the channel has been recording for 1 min 28 sec. with 102Mbytes data recorded in file “MPEG1.mpg” under the current recording folder.

The “**Text2 Y Shift**” field shifts the 2nd preview text line vertically up or down, since the “**Text2 Y**” field is automatically calculated by the program and cannot be changed manually.

The “**Preview Deinterlace**” field is for Windows 7 or above only: selecting deinterlacing method on video preview --- deinterlacing can reduce fuzziness on fast moving objects' edges:

The “Odd to Even” method means copying Odd lines to Even lines within each video frame.

The “Even to Odd” method means copying Even lines to Odd lines within each video frame.

The “20% Screen” ~ “90%Screen” methods indicate conditional indeterlacing: Using “Odd to Even” deinterlace only when Video Preview area exceed 20% ~ 90% of the desktop window's width or height.

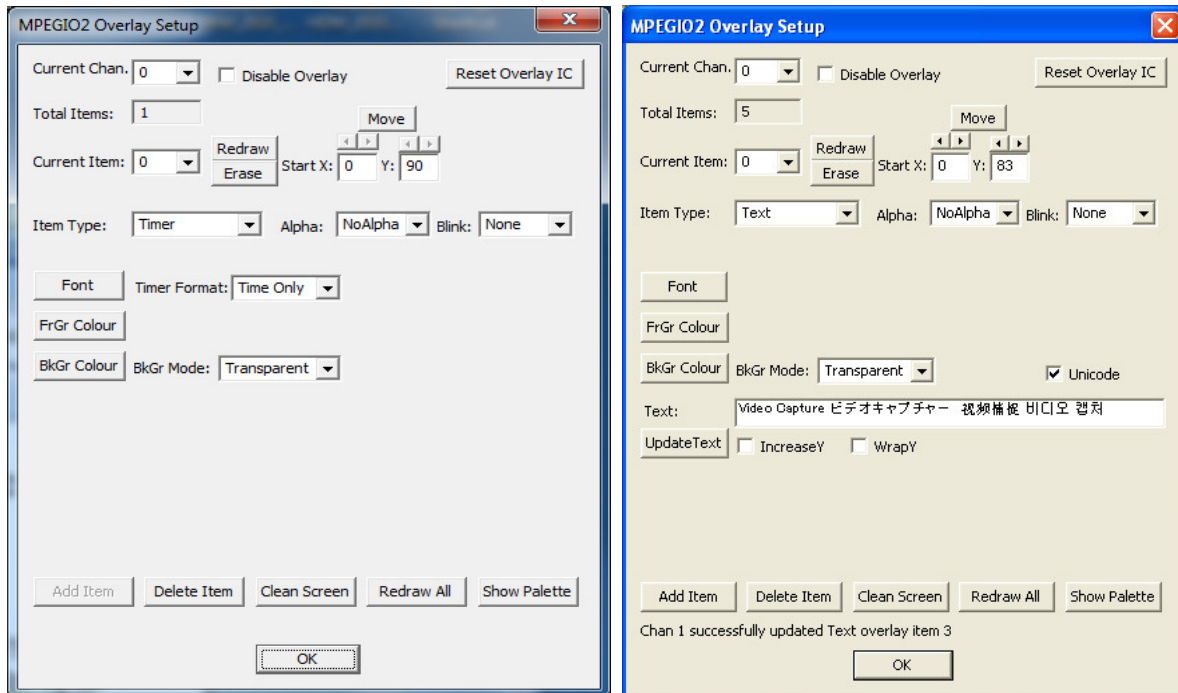
The read-only “**Left Chan**” (Or “**RightChan**”) field below the “**Current Chan**” combo box indicates if the current channel is the Left Channel (the 1st) or the Right Channel (2nd) on the **MPEGIO2** card.

The read-only “**Bus # Dev No. #**” field indicates the PCI ICs' Bus and Device (Preview and MPEG Codec ICs) Numbers for this **MPEGIO2** channel.

The “**PCB Ver.**” Field indicates the detected PCB board version of the **MPEGIO2** channel: a value 3 or higher is correct; a value 2 indicates switch IC failure, a value 1 indicates Input 5 IC failure.

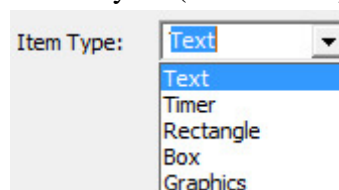
12. Overlay Text and Graphics on Video

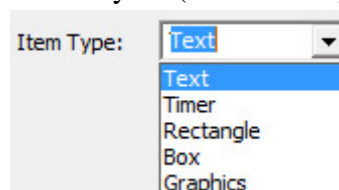
MPEGIO2 allows colour text and graphics to be overlaid on incoming video: these overlay and video will appear together on PC screen, on encoded MPEG data, and on the **Video Loopback RCA/S-Video Out** ports of the **Breakout Box**. Overlay is controlled through the “**Overlay Setup**” dialog window, opened from either the “**Setup**” button on the **Control Window**, or directly from the **Drop-down Menu**:



12.1 Overlay Item Management

MPEGIO2 channels organize overlays as “Overlay Items” with item number, type and other properties. Overlay Items can be created, moved, modified, deleted, redrawn, or erased. A channel can also disable its Overlay capability, list its colour palette, and reset its Overlay IC (i.e. OSD IC).



To create a new Overlay item, select the “**Item Type**”: , then according to selected **Item Type**, assign other property values., such as colour, text, position, size, alpha, etc. Clicking the “**Add Item**” button will create a new Overlay item with the properties as defined on the screen, and the Overlay Item is drawn over the video background in the current channel’s video frame: at the same time this new overlay will also appear in the encoded MPEG video if the channel is encoding, appear in streamed video if the channel is streaming, and appear on the **Breakout Box**’s **Loopback Output** sockets if external TV or other devices are connected.

Each created item can be selected through the “**Current Item**” combo box to show its properties.

The current Overlay Item can be operated on with different buttons on the Overlay Setup Window:

- **Delete Item**: Delete the current Overlay Item.
- **Redraw**: Redraw this overlay.
- **Erase**: Erase the overlay but do not delete it: clicking **Redraw** or **Redraw All** will make it to reappear.
- **Move**: Change the overlay position.

There are also buttons that operate on all existing Overlay Items:

- **Clear Screen:** Erase all overlays on the video frame but do not delete them.
- **Redraw All:** Redraw all existing overlay items.
- **Disable Overlay:** Tick to hide all overlays, clear to make them to reappear instantly.
When this button is ticked it disables the **MPEGIO2** channel's capability to display any overlay: all overlay items will disappear but remain undeleted. This option can be used as a quick way to turn on/off the defined overlay items instantly. Note the **Drop-down menu** also has this option.
- **Reset Overlay IC:** Hardware reset the OSD (Overlay) IC and redraw all overlays, this will reload the OSD IC's default register values: current overlay items will be redrawn, but all Video I/O setup will revert to their default settings, e.g., the Video Sub Windows' placement will return to the default 4-SubWindow Equal Split.

12.2 Overlay Item Types

Each Overlay Item has an **Item Type**, the currently supported **Overlay Item Types** include:

Text: ASCII/Unicode text with foreground/background colour, font, alpha, blink: many items allowed.
Timer: Time, Date with Time or Counter can be created with colour, font, alpha, only one item allowed.
Rectangle: Colour rectangles with width and height and alpha transparency, many items allowed.
Graphics: Graphics files(.bmp, jpg, gif, etc.) of 8-bit/256 colour and transparency, many items allowed.
Box: Colour box with width and height and alpha values different from non-box items, 4 items allowed.

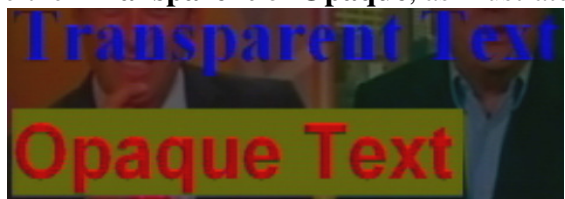
Note the “**Font**” button for **Text/Timer** overlay items offers limited selection of colours: to set more colours to **Text/Timer** overlays use the “**FrGr Colour**” (Foreground Colour) button.

The “**Unicode**” check box only appears when Item Type is **Text**: to input Unicode (double-byte) string as Text Overlay, tick this box and select some Unicode font from the “**Font**” button, also use appropriate keyboard input method from Windows ControlPanel, e.g. Chinese, Japanese or Korean.

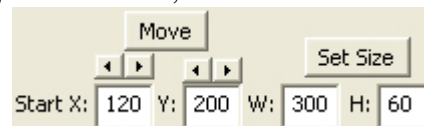
Overlay items can have Alpha for transparency: all the Text, Timer, Rectangle and Graphics type items share the same Alpha values: 25%, 50% or 75% transparency against their background video. An item can also have no transparency (no Alpha) which means it is solid colour fully visible in front of its background video.

The “**Box**” type overlay items have their own colour and Alpha transparency values defined separately from the non-**Box** items. They also have higher display priority over non-**Box** items as explained later. When more than one Overlay Items have been created for a channel, use the “**Current Item**” combo box to select among them: each Overlay Item's properties will appear immediately in property fields.

All Overlay Item Types except the Graphics Item have Colour Property: Foreground Colour is used to draw the overlay items, **Background Colour** for the **Text** and **Timer** Overlay Items is used to show the background in between character strokes. The **Background Mode** for **Text** and **Timer** Items can be either **Transparent** or **Opaque**, as illustrated here:



Each Overlay Item can be moved within the video frame by setting the “**Start X,Y**” fields then clicking

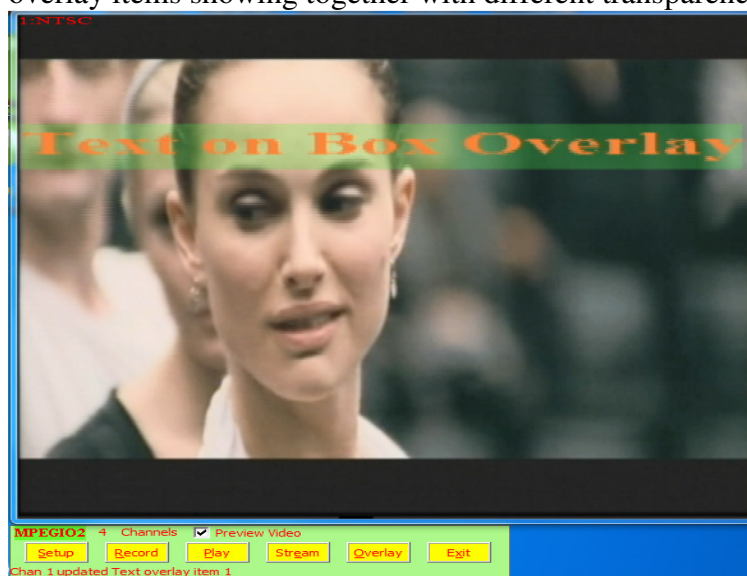


the “**Move**” button. Clicking the small sliders above the **X/Y** fields will move the current overlay item by one pixel per clicking. The **W(idth)** and **H(eight)** values will change the overlay item’s size when the “**Set Size**” is clicked: this is only applicable for **Rectangle** and **Box** overlay items. These size values will also appear for **Graphics** overlay items to indicate the width and height of the loaded graphics file. These X/Y/Width/Height changes are permanent: the old values will not be remembered.

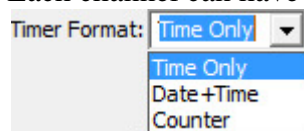
Different overlay types decide different overlay properties to appear or disappear inside the Overlay Setup dialog: in particular, when “**Item Type**” is changed to “**Graphics**”, the “**Font**” and Foreground, Background **Colour Boxes** will disappear, while the “**Use Palette**” and “**File Name**” buttons and field will appear. Selecting the “**Use Palette**” check box means to use the graphics file’s colour palette as the current overlay’s colour palette: each **MPEGIO2** channel allows maximum 252 colours to be used simultaneously at any time, Colour Palette(also called Colour LookUp Table “**CLUT**”) decides which 252 colours out of the $256 \times 256 \times 256 = 16\text{Million}$ possible RGB/YUV colours can be used as the current active colour. **MPEGIO2** can only use 8-bit colour graphics files as its graphics overlay item. When a graphics file is used as overlay item and the “**Use Palette**” is ticked, and if the graphics file’s palette is different from the current colour palette used by this **MPEGIO2** channel, the other overlay items using colours might also have their colours changed: to avoid this, it is a good idea to create all graphics overlay items first, then create text, timer and rectangle overlay items. Note the “**Box**” type of items have their own colour palette so will not be affected by loading graphics overlay items.

Clicking the “**Show Palette**” button will display the current palette being used.

Each **MPEGIO2** channel has a special “**Box**” type overlay item: “**Box**” type overlay allows maximum 4 items. **Box** overlays has its own colour, colour palette, alpha transparency values that are unrelated to the same-name properties for all other non-**Box** overlay items. When a **Box** overlay item is overlapped with non-**Box** overlay items (Text, Timer, Rectangle or Graphics), the **Box** overlay item has higher display priority over the non-**Box** overlay items: if the **Box** overlay item has no alpha (is fully visible) then it will sit on top of the other non-**Box** overlay items behind it (the non-**Box** overlay items will not be seen). If the **Box** overlay item has some **alpha** value transparency assigned to it, the **Box** overlay item will be partially transparent thus exposing partially the other non-**Box** overlay items beneath it, thus allowing multiple overlay items showing together with different transparency values, such as this:





Each channel can have at most one **Timer** overlay: **Timer** overlay can choose “**Format**” values:

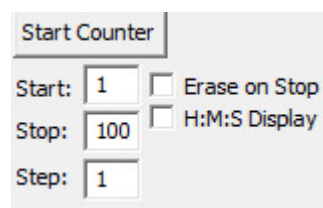


■ Timer Only, such as: , updated every 300 ms;

■ Date+Time, such as: , updated every 300 ms;

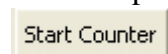
■ Counter, either numerical form like , or H:M:S form like .


When **Timer** overlay is using “**Counter**” format, several extra properties will appear:



The “**Start**” and “**Stop**” values are displayed when the counter starts and stops counting. The “**Step**” value is in 100ms unit: it is the time interval to increase/decrease the counting value by 1, e.g.:
 Start:1, Stop:100,Step:2 will start counting from 1 towards 100 with value increasing 1 per 0.2 second;
 Start:0, Stop:60,Step:10 will start counting from 0 towards 60 with value increasing 1 per 1 second;
 Start:100, Stop:1,Step:-5 will start counting from 100 towards 1 with value decreasing 1 per 0.5 second.
 The “**Erase on Stop**” option decides if the counter’s last value will be erased when the counter reaches its **Stop** value: ticking this check box will erase the last value, clearing it will keep the last value on the video frame after the counter stops.

When all parameters are set up properly for a **Counter Overlay**, click the “**Start Counter**” button



to start counting -- once started, this button becomes “**Stop Counter**”  so clicking it again will stop counting. Counter overlay can also be started / stopped by **Digital I/O Pin** status change.

The “**UpdateText**” button appears only when current item type is Text: this button uses new text typed in the “**Text:**” EditBox and “**Start X/Y**” positions to update an existing text overlay item: in comparison, the “**Redraw**” button (next to the “**Current Item**”) redraws the item with the existing contents.

The check boxes “**IncreaseY**” and “**WrapY**” also only appear when current item type is Text: ticking the “**IncreaseY**” means each time button “**UpdateText**” is clicked, the vertical (Y) position of the current text overlay item will be automatically increased by the height of the text string before redrawing. Ticking the “**WrapY**” means when automatically increased Y position reaches the bottom of the video frame, the next new Y position for automatically updated text redrawing will wrap back to the original Y value used when the Text item was initially created. If “**WrapY**” is not ticked, then when Y position reaches the bottom of the video frame, the automatically updated text will stay at the last line of the video frame, shifting all previously automatically updated text lines upwards by one line.

Note the Y position automatically updated in this way is temporary: once the **MPEGIO2.exe** program exit and restarts, the original Y position used when the Text item was created will be restored. In comparison, the Y(and X) values changed through the “**Start X/Y**” EditBoxes are permanent: they will be used when **MPEGIO2.exe** program exit and restarts.

13. MPEG Encoding Parameters

MPEGIO2 channels can encode their Video / Audio Preview contents into MPEG data to be saved as file or streamed over network, encoding parameters are set up from the “**MPEG Encoding Setup**” dialog opened from the **Setup** button on the Control window, or from the **Drop-down Menu->Setup**:

Each **MPEGIO2** channel can be configured either as **Program Stream** MPEG encoder or as **Transport Stream** MPEG encoder: selected from the “**Encoder Type**” combo box to the right of the “**Current Chan**”. This “**Encoder Type**” decides the encoded MPEG data format as either Program Stream or Transport Stream, it also decides the MPEG data the channel can decode: **Program Stream** channel can only decode **Program Stream** MPEG data, **Transport Stream** channel can only decode **Transport Stream** MPEG data.

The “**MPEG Type**” box next to the “**Encoder Type**” designates the **MPEG1**, **MPEG2**, or **MPEG4** format of the encoded video/audio, while the “**Mux Type**” further next decides if the input video and audio are multiplexed into the encoded MPEG stream as **Video & Audio**, or encoded as **Video Only** without Audio. Note while MPEG2/MPEG1 video can be played back by almost all software video players, MPEG4 video playback is less universal: known software players that can play **MPEGIO2** encoded MPEG4 video include [VideoLan\(vlc.exe\)](#), [SMPlayer](#), [KMPlayer](#), [ffplay.exe \(ffmpeg\)](#), [MainConcept Showcase](#), [DiVX Plus Player](#), [Total Video Player](#), [Eleccard MPEG Player](#), [GOM Player](#), etc. MPEG4 encodes higher quality at low bit rates when compared with MPEG2 encoding at the same low bit rates. MPEG2 video can create DVD/SVCD movie disks, MPEG1 video can create VCD movie disks. Note setting MPEG1 format must make sure Horizontal Size <= 352, Vertical Size <= 288/240 pixels or encoding failure will appear.

The read-only field “**TV Signal**” below the “**Current Chan**” indicates the signal format of the encoded MPEG video: either PAL or NTSC – this is consistent with the “**Preview TV Signal**” field in the “**Video I/O Setup**” dialog and the “**TV Signal**” field in the “**System Setup**” dialog. Note this can only be changed manually from within the “**Video I/O Setup**” dialog by forcibly setting the “**TV Signal on This Input Src**” combo box to PAL or NTSC. By default, an **MPEGIO2** channel automatically set its video preview and MPEG encoding TV signal (thus the “**Preview TV Signal**” field in **Video I/O Setup** dialog, the “**TV Signal**” fields in “**System Setup**” and “**MPEG Encoding Setup**” dialog windows) according to its 1st video input source with signal currently used by at least one of its 4 “**Sub Windows**”: this can be manually overridden if you deliberately select a different PAL or NTSC signal type from the “**TV Signal on This Input Src**” combo box in the “**Video I/O Setup**” dialog window --- this might be necessary if none of the 5 Video Input Sources has incoming signal and you still wish to encode MPEG video (e.g. create timer / counter Overlay on some static background bitmaps).

The various options under the “**Video Encoding Parameters**” group:

Hori. Size: the encoded video frame’s horizontal width in pixels: 176 ~ 720

Vert. Size: the encoded video frame’s vertical height in pixels: 144 ~ 576 for PAL, 144~512 for NTSC
(MPEG1 format must make sure Horizontal Size <= 352, Vertical Size <= 288/240 pixels)

Maximum Bit Rate: Encoded Maximum Video Bit Rate in K bit per sec., within 128Kbps ~ 15Mbps

Average Bit Rate: Encoded Average Video Bit Rate in K bit per sec., within 128Kbps ~ 15Mbps

Note 1: Maximum/Average Bit Rates are only applicable to VBR(Variable Bit Rate);
for CBR(Constant Bit Rate), only Maximum Bit Rate exists, or Max=Ave Bit Rates.

Note 2: **Average Bit Rate** must be <= **Maximum Bit Rate**

Note 3: Depending on the Encoding **Hori./Vert. Size**(Frame Size), the hardware has the following
Minimum Encoding Bit Rates:

132Kbps for 176X144-Pixel Frame Size Encoding

512Kbps for 352X288(240)-Pixel Frame Size Encoding

1.5Mbps for 480X576(480)-Pixel and above Frame Size Encoding.

CBR: Tick to use **Constant Bit Rate** encoding, clear to use **Variable Bit Rate** encoding.

Scene Change: Tick to enable **Scene Change** detection during encoding.

VOB Format: Tick will encode video as VOB Format (this is the default setting),
clear will encode video in standard PS Format.

Black Screen: Tick will encode full screen of blackness (no video visible).

Progressive Seq.: Tick means the encoded picture is progressive sequence, clear means interlaced.

Hori. Mask: Horizontal Start Position (pixels) inside the encoded video frame,
default is -1: the hardware automatically decides this.

Vert. Mask: Vertical Start Position (lines) inside the encoded video frame,
default is -1: the hardware automatically decides this.

Frame Rate: in Frames per Sec. (fps) unit, use 25/50 for PAL, use 29.97/59.94/60 for NTSC

Closed GOP: **GOP** is Group of Pictures. Ticking this means encoding prediction is based only on
pictures in the present GOP, not on pictures in previous or next GOP.

N and M Values: **N:** GOP Parameter N (1~256) -- number of frames in GOP

M: GOP Parameter M (0,1,2,3) -- frame distance between reference frames

 If M is not 0, then N must be a multiple of M.

 If M is 0, then N must be set to 1.

$6 \leq N < 256$ in integer multiples of M for $M = 3$

$4 \leq N < 256$ in integer multiples of M for $M = 2$

$2 \leq N < 256$ in integer multiples of M for $M = 1$

For example,

 If $N=15$ and $M=3$, the GOP structure is I B B P B B P B B P B B P B B.

 If $M = 0$, the GOP structure is I (encoder will generate I frames only)

 If $M = 1$, the GOP structure is IP

 If $M = 2$, the GOP structure is IBP

 If $M = 3$, the GOP structure is IBBP.

Aspect Ratio: 4:3 (default), 16:9 (wide screen), 2.21:1, or 1: 1(Square PEL).

User Data: Up to 120 (for Program Stream) or 176(for Transport Stream) bytes of text characters can
be inserted into encoded MPEG video/audio stream before or during the encoding time
when this button is clicked with some characters in the editing field next to it: If currently
encoding is in progress, each clicking of this button will insert the text once (multiple
clicking on same text will insert same text multiple times). If currently encoding is not in

progress, clicking this button will prepare the characters to be inserted once when MPEG encoding starts (multiple clicking on the same text will have no effect).
Note special software mechanism is needed to extract the user data inserted from the MPEG video stream during decoding process.

Video PID, Audio PID and UserData PID: These are only applicable when the channel is **Transport Stream** Encoder, they define the Video, Audio and UserData Packet IDs in the encoded MPEG stream. Valid Video /Audio PIDs are 21 ~ 8190 inclusive, valid UserData PIDs are 1 ~ 183 inclusive. Video PID default is 33, Audio PID default is 34, User Data PID default is 36.

The options under the “**Audio Encoding Parameters**” group:

Audio Format: Most commonly used is “**MPEG1L2**” – MPEG1 Layer 2

Sampling Rate: 32K, 44.1K, or 48K Hz: this setting will also be seen in **Audio I/O Setup** Window.

Bit Rate: Audio encoding bit rate in bits per second:

For Program Stream Encoder:

32000, 48000, 56000, 64000, 80000, 96000, 112000, 128000,
160000, 192000, 224000, 256000, 320000, 384000

For Transport Stream: if format != AC3/MPEG1L1(e.g. if format== **MPEG1L2**):

32000, 48000, 56000, 64000, 80000, 96000, 112000, 128000,
160000, 192000, 224000, 256000, 320000, 384000

For Transport Stream Encoder: if format == AC3/MPEG1L1:

32000, 64000, 96000, 128000, 160000, 192000, 224000,
256000, 288000, 320000, 352000, 384000, 416000, 448000

If the “**DVD Compliant**” button is clicked, the Video and Audio settings compliant to DVD creation will be forced on: Video Bit Rates within 4Mbps ~ 10Mbps, Frame Size 720/704 by 576/480, Audio Format MPEG1L2, Sampling Rate 48KHz, etc.

The “**Reset MPEG IC**” hardware reset the MPEG Codec IC: useful to fix encoding/decoding problems.

Note most options can only be set when the channel is not encoding.

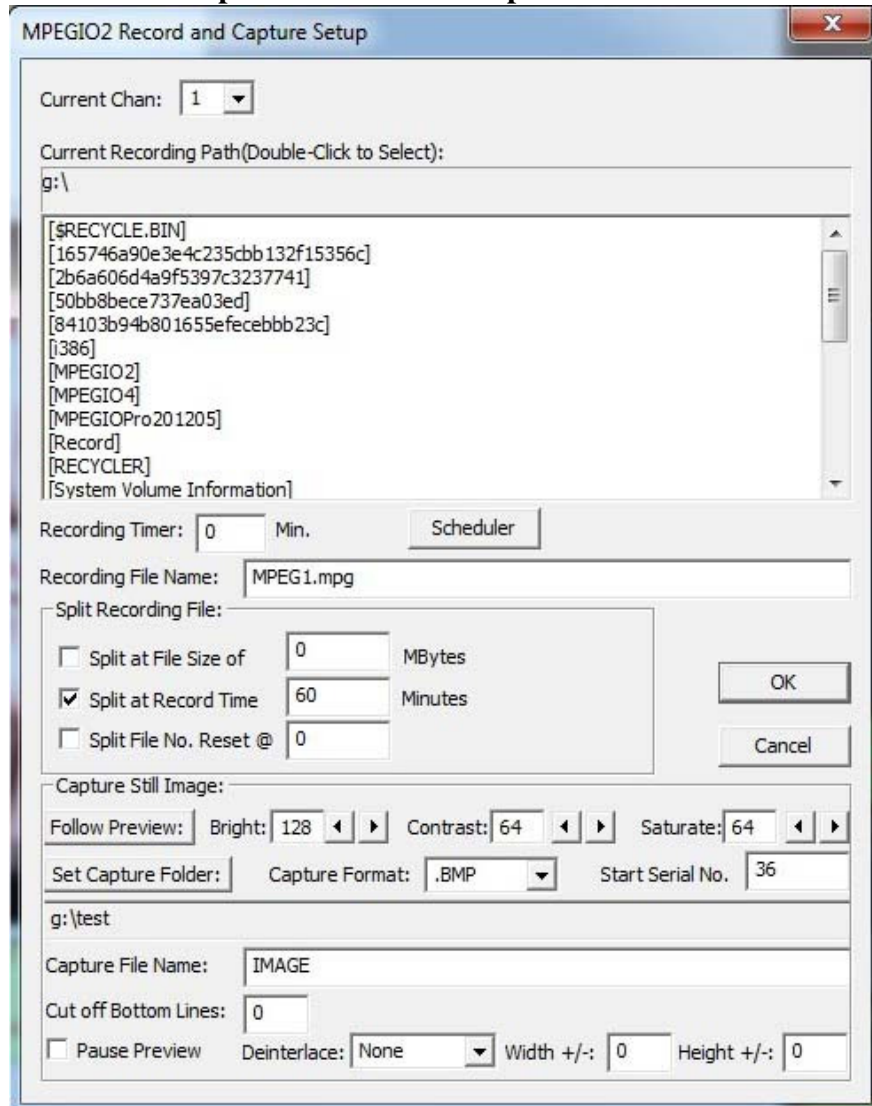
Encoding parameters are saved to the **MPEGIO2.ini** file when the **MPEGIO2.exe** program exit, and will be read back when the program starts, unless the command-line switch “**-d**” is present, or the **MPEGIO2.ini** file does not exist.

14. Record Video

Recording video is to write encoded MPEG data to disk files. The recorded file name, folder, the recording timer and scheduling etc., are set up in the “**Record and Capture Setup**” Window.

14.1 Setup Recording

The “**Record and Capture Setup**” Window can be brought up from either the **Setup** button on the **Control Window** or from the **Drop-down Menu-> Setup**:



Mouse double-clicking the drive/folder lines inside the “**Current Recording Path**” listbox will select the recording folder: the currently selected folder name appears immediately above the listbox .

The recording file name needs to be manually typed into the “**Recording File Name**” edit field – default name is MPEG#.mpg where “#” is the current channel number. If typed in file name has no **.mpg** extension, it will be added automatically when recording starts or when this dialog window re-opens. Note this file name will not be used for the scheduled recording.

During recording, recording files can be split automatically if “**Split at File Size of**” or “**Split at Record Time**” is ticked and their corresponding field set to some value, the recording will split a new file if the recording file size or time exceeds the size or time defined. For example:

- “**Split at File Size of**” ticked, its edit field is 4096: split a new file when file size reaches 4GBytes.
- “**Split at Record Time**” ticked, its edit field is 60: split a new file every 1 hour.
- If both boxes are ticked and edit fields set then the first condition met will cause a file split.

The split file name will be the 1st recording file name without splitting plus an 8-digit number starting from 00000001, increasing 1 each time a new file is split thereafter .

If the “**Split File No. Reset @**” is ticked and its edit field is non-zero, then when split file number reaches this number it will be reset to NULL: the next split file name will be the same as the very 1st file name before any split started, then next split file name will have the 8-digit number added, ..., e.g.: If this value is set to 10, the split files created will be Rec.mpg, Rec00000001.mpg, Rec00000002.mpg, ..., Rec00000010.mpg, Rec.mpg, Rec00000001.mpg,... repeatedly. This will create a fixed sequence of recording files to prevent filling-up disk space. Recording file can also be manually split by clicking the “**Split Record File**” item from the **Drop-down Menu** during recording, or by clicking the “**Split**” button from the “**Record and Capture**” window (See the “**Start/Stop Recording**” Sub-Section later) brought up by clicking the “**Record**” button from the **Control Window**. Split MPEG files have no gaps between any two adjacent files: binary joining them will create an MPEG file as if there was no splitting anywhere.

The “**Timer**” field allows setting a recording timer in minutes --- if not zero, the recording will automatically stops in **Timer** minutes.

The “**Scheduler**” button opens a “**Recording Scheduler**” window for **scheduled recording**:

Once setting up the **Start** date and time, **Duration**, **Repeat** etc., clicking the **Add** button will add a new recording schedule line to the “**Scheduled Recording List**” listbox. The edit box “**File Name Prefix**” allows a text prefix of <= 20 characters long to be added before the recording date and time to form the scheduled recording file name(Note the previously described “**Recording File Name**” field in the “**Record and Capture Setup**” dialog is NOT used for scheduled recording) in this format:

File Name Prefix + ChanNum + Date + Time+”.mpg”.

If the “**File Name Prefix**” field is empty, it will be replaced with string “**MPEGIO2**”.

Note the “**Start Hour**” is in 24-Hour format, i.e., 7pm is Hour 19.

Button “**Modify**” can be used to change an existing schedule line in the list box (highlight the line, change the fields, then click “**Modify**”).

Highlight an existing schedule line in the list box then click “**Delete**” will remove a schedule.

Ticking the “**UTC**” box will use “**Coordinated Universal Time**” in the scheduled file name, otherwise local time will be used in the file name.

Ticking “**No Date in FileName**” or “**No Time in FileName**” will exclude Date or Time (or both) when forming the scheduled recording file name.


When scheduled recording starts, it will overwrite an existing file with the same name if that exists.

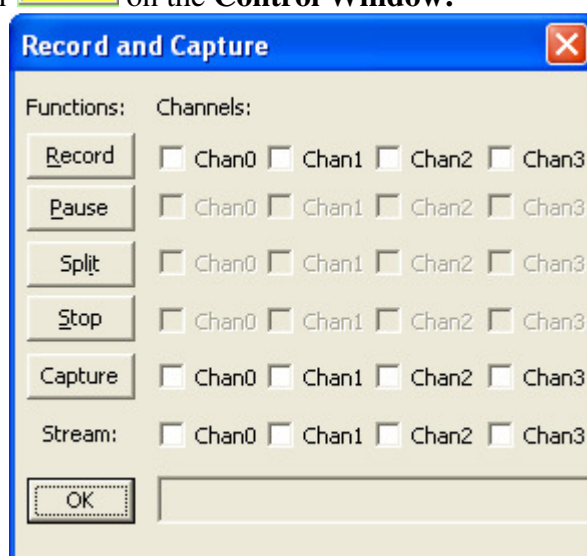
Note at scheduled time scheduled recordings can only start if the program **MPEGIO2.exe** is running.

When the scheduled time arrives, if the channel is already recording(e.g. through manual start) the scheduled recording will be ignored.

14.2 Start/Stop Recording

The “**Start Record**” selection from the **Drop-down Menu** can start recording for a single channel.

To start recording multiple channels simultaneously, use the “**Record and Capture**” window by clicking the “**Record**” button  on the **Control Window**:

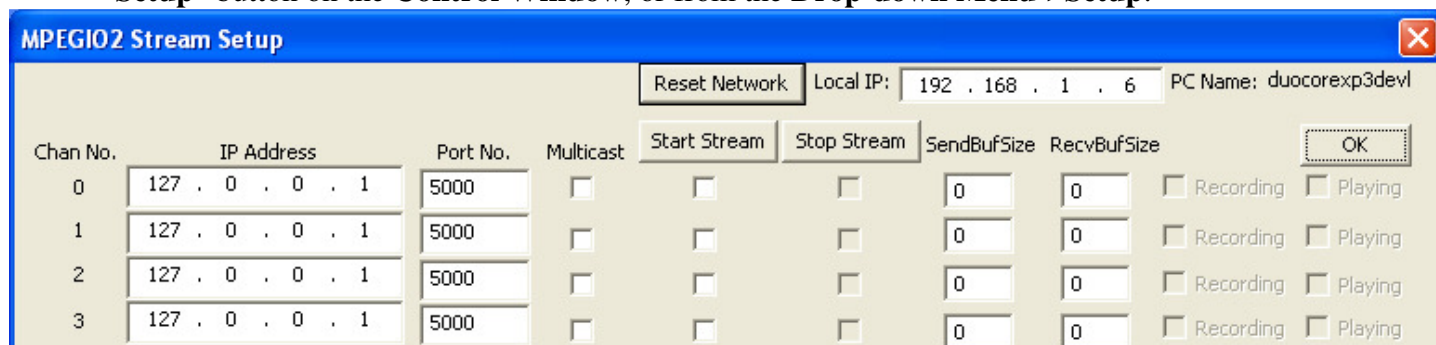


In this window, ticking multiple channels then clicking the **Record** button will start recording on those channels ticked. Similarly, **Pause**, **Split**, **Stop**, **Streaming** (as part of Start Recording) and **Capture** (Still Image) can all be done on multiple channels here. Stopping, Pausing or Splitting single channel recording can also be done from the **Drop-down Menu**. Existing file names will be overwritten silently.

15. Stream Video

Using User Datagram Protocol(UDP), **MPEGIO2** channels can stream out encoded or decoded MPEG video/audio to any IP client that can receive MPEG video, such as the free [VideoLan](#) software, [Amino Set-top box](#), etc.

To set up video streaming parameters, open the “**MPEGIO2 Stream Setup**” window from either the “**Setup**” button on the **Control Window**, or from the **Drop-down Menu->Setup**:



In order to receive streamed out MPEG video from **MPEGIO2** channel, a network client must have its **IP Address**, **Port Number** and **Multicast/Unicast** settings specified in this window. The “**SendBufSize**”, “**RevBufSize**” fields indicate the output and input buffer sizes in Kbytes of the network sockets created for streaming, 0 indicates using the default 128Kbyte size.

IP addresses can be either “**Multicast**” (tick the **Multicast** box) or “**Unicast**” (clear the **Multicast** box): 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 can receive the same video simultaneously. If a valid **Unicast** address is used, only the host machine that has that particular IP address can receive the streamed video, and only one playback client on that machine (PC or Set-top box) can actively receive that video at any time.

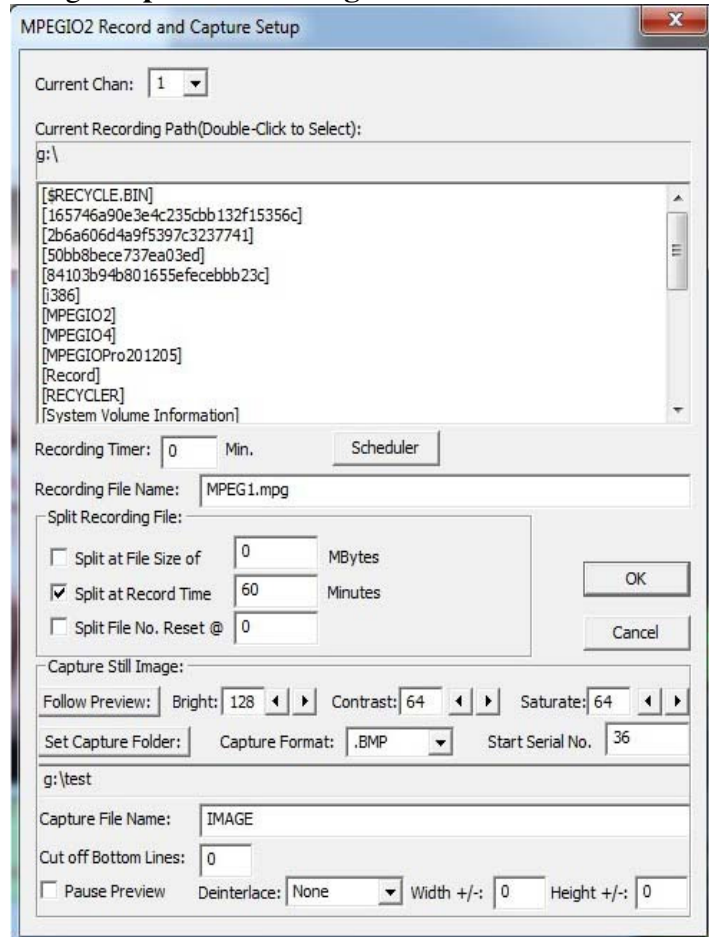
To stream across wide area network such as Internet, the receiving end must configure its router’s TCP/IP port through the **Network Address Port Translation (NAPT)** function using “**UDP**” protocol.

To start streaming video encoded from a channel, tick the box under the “**Start Stream**” button on the same line as the “**Chan No.**”, then click the “**Start Stream**” button: multiple channels can be ticked and started streaming encoded MPEG video simultaneously. Similarly, ticking the boxes under the “**Stop Stream**” button then clicking the button can stop streaming multiple channels. Starting or stopping streaming encoded video for a single channel can also be done through the **Drop-down menu**.

Streaming MPEG video can be started independent of (as shown here) or together with starting MPEG recording or decoding: to start streaming simultaneously when recording starts, use the “**Record and Capture**” dialog window described previously under the “**Start/Stop Recording**” Section. To start streaming **decoded** (previously encoded) MPEG video, see the “**Playback MPEG Video**” Section described later in this manual. Once a channel is streaming, its IP address, port number and Multicast properties cannot be changed until the streaming stops.

16. Capture Still Images

Still images can be captured from **MPEGIO2** channels in BMP, JPG, GIF(under WinXP only), TIFF(under Win7 or above), or PNG format. Each image file is 720X576 pixels for PAL or 720X480 pixels for NTSC input signal plus some plus or minus adjustment (described later in this section). Image capturing is completely independent of MPEG video Encoding, Decoding or Video Preview process: image can be captured during or prior to video encoding, streaming, decoding, regardless the Video Preview window is turned on or off. Image capture parameters setup is in the lower part of the previously described “**Record and Capture Setup**” window (in Section **Record Video->Setup Recording**) under the heading “**Capture Still Image**”:



Clicking the button “**Set Capture Folder:**” will set captured image files’ folder to be the currently displayed folder as under the “**Current Recording Path**” at the upper part of the window: this can be totally different(by left-mouse double-clicking inside the directory list box) from the folder set to hold recorded MPEG video files. When this button is clicked, the capture image folder name will appear in the read-only edit field beneath the button.

Use the “**Capture Format**” combo box to select image format, note under WinXP and under Win7 the 3rd format will be either .GIF or .TIF respectively.

The “**Start Serial No.**” edit box defines the starting numerical number the subsequent image capturing will use as part of the image file name, which is formed as 3 parts with underscores ‘_’ in between:

“**Capture File Name**” String **_Channel Number** as 2-Digit Number **_Serial No.** as 6-Digit Number.

Each time a new image file is captured, the **Serial Number** increases its value by 1 to be used for the next capture, unless its value is re-defined in this window.

The “**Bright**”, “**Contrast**” and “**Saturate**” fields can be used to adjust the colour parameters of the captured image without affecting colours on video preview and MPEG recording.

The “**Follow Preview**” button set the “**Bright**”, “**Contrast**” and “**Saturate**” values to be the same as the Video Preview’s “**Bright**”, “**Contrast**” and “**Saturate**” values set in the “**System Setup**” window.

The “**Cut off Bottom Lines**” field indicates number of lines to be cut off from the bottom of the captured image: if this is 10 then a PAL input signal channel will capture images at 720X**566** pixels instead of 720X**576** pixels, while an NTSC input signal channel will capture images at 720X**470** pixels instead of 720X**480** pixels. Set a non-zero cut off value can get rid of some of the noise lines sometimes appearing at the bottom of the captured (and previewed) video frame. This field defaults to 0.



The “**Pause Preview**” field only appears on Windows 7 or above, used to temporarily pause video preview during still image capture, so that to avoid black stripes on some Intel Chipset (Q67 etc.) motherboards. This normally can be cleared as default.

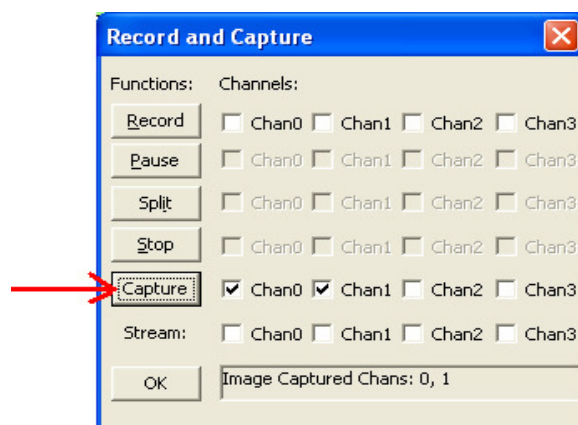
The “**Deinterlace**” field selects software deinterlacing applied on the captured image, default is None, but can be selected as Copying Odd lines to Even lines, or Copying Even lines to Odd lines, that can be used to improve on edge fuzziness on images captured from video with very fast moving objects.

The “**Width +/-**” and “**Height +/-**” fields allow plus or minus pixel adjustment (max. +/- 200) on the captured image size. These adjustment are applied after the “**Cut off Bottom Lines**” operation, and they only shrink or expand the captured image size but do not cut off or add pixels. Default are zeroes.

The PAL or NTSC signal format of an **MPEGIO2** channel is automatically decided according to the “**Preview TV Signal**” field in the **Video I/O Setup** dialog, the “**TV Signal**” fields in “**System Setup**” and “**MPEG Encoding Setup**” dialog windows --- these 3 fields show the same value, as described in detail in the previous Sections.

To capture image on a single channel, pop up the **Drop-down Menu** by right-mouse clicking in the channel’s area in Video Window then select “**Capture Image**”. Single channel image capture can also be triggered by voltage pulse on the “**Digital I/O Pins**”: see the “**Digital Input/Output Pins**” section later for setting up automatic image capture through Digital I/O pin configuration.

To manually capture images on multiple channels simultaneously, use the “**Capture**” button  of the “**Record and Capture**” dialog window opened by clicking the **Record** button  on the **Control Window**:




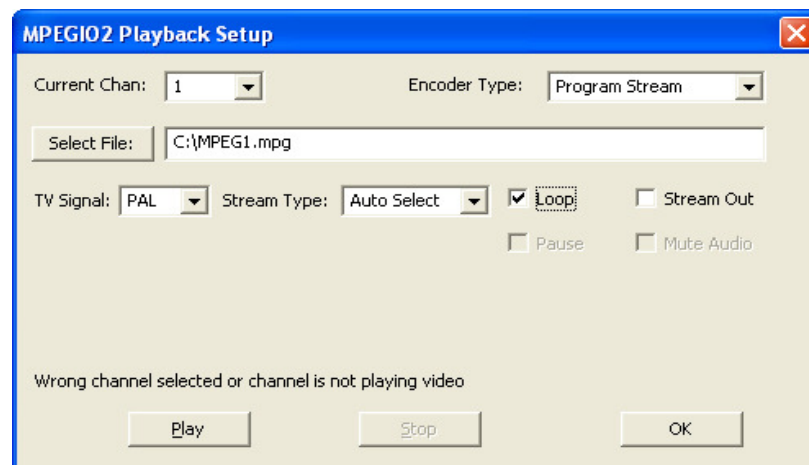
Here each click of the “**Capture**” button will capture still images for all those selected “**Chan#**” channels.

17. Playback MPEG Video (Decoding)

Although video recorded by **MPEGIO2** can play back on most software video players, playing on **MPEGIO2** hardware offers low PC resource (CPU/RAM) consumption even on simultaneous multi-channel playback, simultaneous output to external TV monitors, and no need for any software MPEG Codec. **MPEGIO2** also allows playing back one MPEG file as multiple images within one or two channels simultaneously.

During playback, the recorded MPEG data is decoded by the **Codec IC** on the card; the decoded video appears simultaneously on PC screen in the Video Preview window as the “**VIN1**” signal source, and on the **MPEG Decode** ports and **Loopback Output** ports (RCA and S-Video) of the **Breakout Box**. Decoded video can also be streamed over IP network, same as streaming encoded video. Note on the **Breakout Box**, the “**MPEG Decode ports**” show the decoded video as full screen without any overlay (if overlay is created), while the “**Loopback Output ports**” show the decoded video in any Video Sub Window the **VIN1** Video Source is connected to as its Input Source, together with any Overlay created: this is because internally the MPEG decoding output coming out of the MPEG Codec IC is physically connected to the **VIN1** Video Input Source: this source can be connected to one or more Sub Windows; so if you wish, you could display two or more identical decoding video images simultaneously on the PC screen and on the **Loopback Output** ports of the **Breakout Box**. You can also real-time convert the decoded video to a different MPEG format on the matching channel and stream it out simultaneously.

To setup and start/stop/pause decoding MPEG video, open the “**Playback Setup**” window by clicking the “**Play**” button  on the Control Window, or from the **Drop-down Menu->Play Video**:

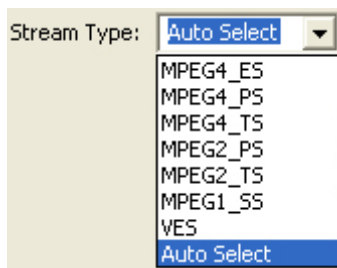


This window can also be opened from the **Drop-down Menu->Setup->Playback Setup**.

The “**Encoder Type**” selection decides the decoded MPEG encoding type: channel with Program Stream Encoder Type can only decode MPEG data encoded by Program Stream encoder, channel with Transport Stream Encoder Type can only decode MPEG data encoded by Transport Stream encoder: mismatched Encoder Type will result in no video or wrong content being decoded.

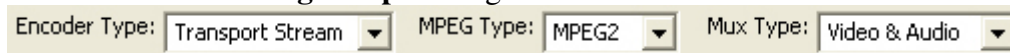
The “**TV Signal**” combo box is the same as in the “**Preview TV Signal**” field described previously in the “**Video I/O Setup**” dialog window. The current channel’s TV Signal type (PAL or NTSC) must match the MPEG to be decoded: MPEG video encoded as PAL must be decoded when channel has PAL TV Signal type, video data encoded as NTSC must be decoded when channel has NTSC TV Signal type.

The “**Stream Type**” combo box selects the decoded MPEG video’s Stream Type:



MPEG4_ES: MPEG4 Elementry Stream (Video only);
 MPEG4_PS: MPEG4 Program Stream;
 MPEG4_TS: MPEG4 Transport Stream;
 MPEG2_PS: MPEG2 Program Stream;
 MPEG2_TS: MPEG2 Transport Stream;
 MPEG1_SS: MPEG1 System Stream;
 VES: Video Elementry Stream(Contains only Video, no Audio encoded);
 Auto Select: Automatically Decide by **MPEGIO2** Channel Hardware.

Ideally, the decoded “**Stream Type**” should match the corresponding set up when the MPEG video was encoded, as the combined settings in the “**Encoder Type**”, “**MPEG Type**” and “**Mux Type**” fields in the “**MPEG Encoding Setup**” dialog



as described in the previous “**MPEG Encoding Parameters**” Section. However, when the MPEG video file’s “**Stream Type**” is unknown, the “**Auto Select**” can be selected to let **MPEGIO2** hardware detect its “**Stream Type**”: note this could cause software crash if the presented MPEG data is invalid or un-recognizable by the **MPEGIO2** hardware. In general, **MPEGIO2** can safely decode all MPEG video encoded by itself, by [Inventa](#)’s [MPEGIO](#), [MPEGIOPro](#), [USBOSDM2](#), [USBMPEG2-Box](#), and generic MPEG2, MPEG1 video files encoded by other hardware or software encoders. MPEG4 video encoded by other hardware or software encoders are not guaranteed to be decoded properly.

MPEG video file name can be selected by typing in the full path or clicking the “**Select File**” button to choose from folders.

The “**Loop**” check box allows repeatedly decoding the file (re-decode from the beginning when file end is reached) until playback is manually stopped.

The options “**Pause**” and “**Stop**” are enabled when Play is successfully started: they will pause playing temporarily or stop playing completely. “**Pause**” or “**Stop**” can also be initiated from the **Drop-down Menu** once Play is successfully started.

Ticking the “**Stream Out**” box will stream the decoded MPEG video over the Network **IP Address + Port + Multicast** type as setup in the “**MPEGIO2 Stream Setup**” dialog window described in Section “**Stream Video**” previously.

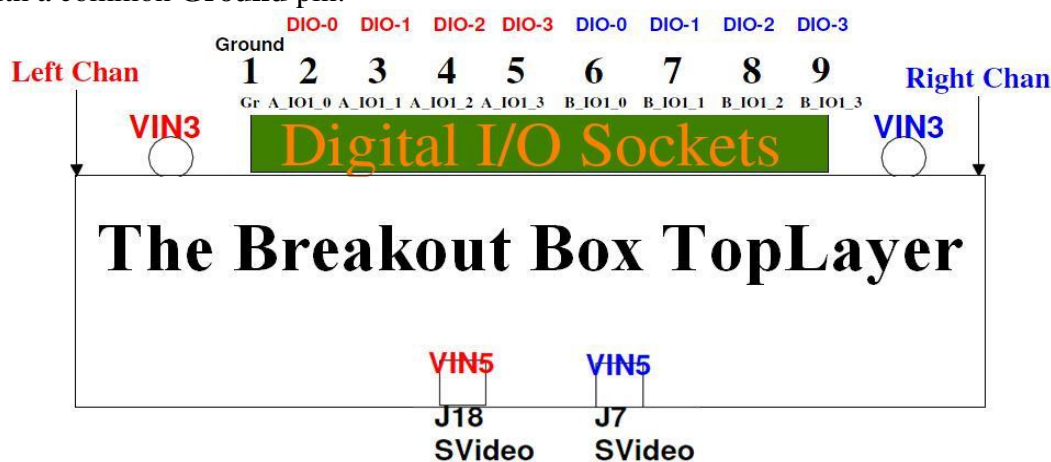
A channel cannot play video while is encoding and vice versa. However, played video in a channel can be output to its matching channel on the same **MPEGIO2** card to be encoded there simultaneously, by setting the playing channel’s video output to be the matching channel’s video input: this way a decoded MPEG file can be simultaneously encoded with a possibly different MPEG format, or even a different PAL/NTSC TV signal type, in real-time, into a new file or network stream address or both.

When a channel is not encoding and streaming, using mouse to **drag-and-drop** an MPEG file (name must have case-insensitive extension “.mpg”) into the Video Preview Window area of that channel will start playing that file: if the channel is currently playing the current playing will stop and the newly

dropped file will start playing. Note this “**drag-and-drop**” playing will always use the “Auto Select” as “**Stream Type**”, so Video Only files (VES Stream Type) will not play properly in this way.

18. Digital Input/Output Pins

Each MPEGIO2 channel has 4 “**Digital I/O**” pins, located at the Top Layer of the **Breakout Box**, together with a common **Ground** pin:



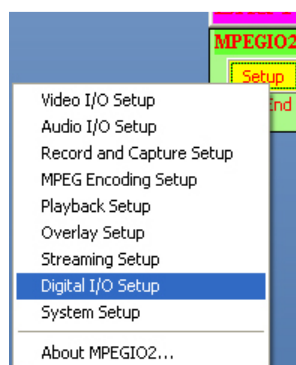
The Breakout Box TopLayer

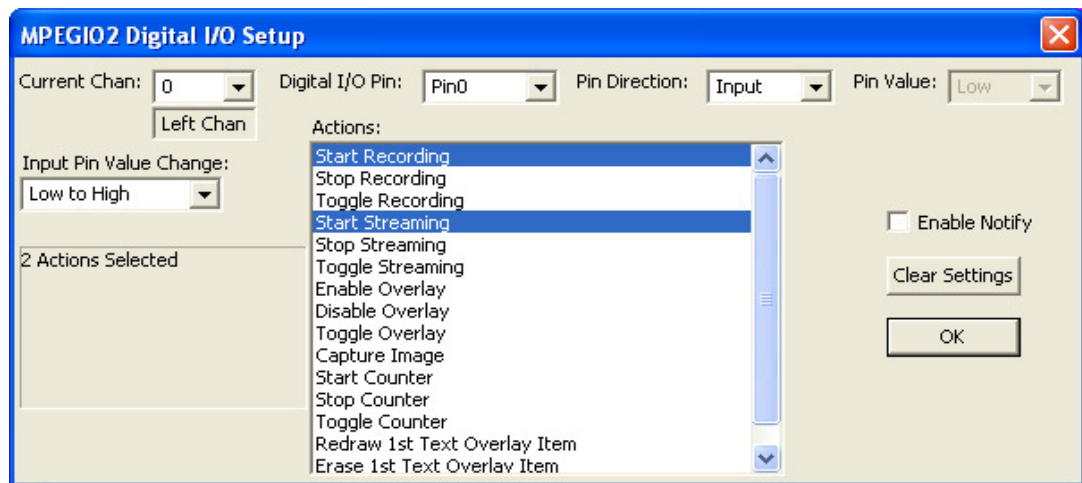
**User Stands here Looking down
towards the Breakout Box**

Connecting an external device between a Digital I/O pin and the ground pin allows the external device to receive High/Low signal from MPEGIO2 software, or to send High/Low signal to MPEGIO2 software, therefore be controlled by MPEGIO2 or to control MPEGIO2’s operation.

MPEGIO2 Digital I/O pins treat DC voltage $-0.5V \sim +0.3V$ as Low, $+0.7V \sim +5.5V$ as High Status, each I/O pin can sustain 25mA max. current. Voltage from old batteries are not suitable as input trigger since they cannot supply enough current.

To use Digital I/O pins, open the “**MPEGIO2 Digital I/O Setup**” window by clicking the “**Setup**” button on the Control Window then select “**Digital I/O Setup**”:



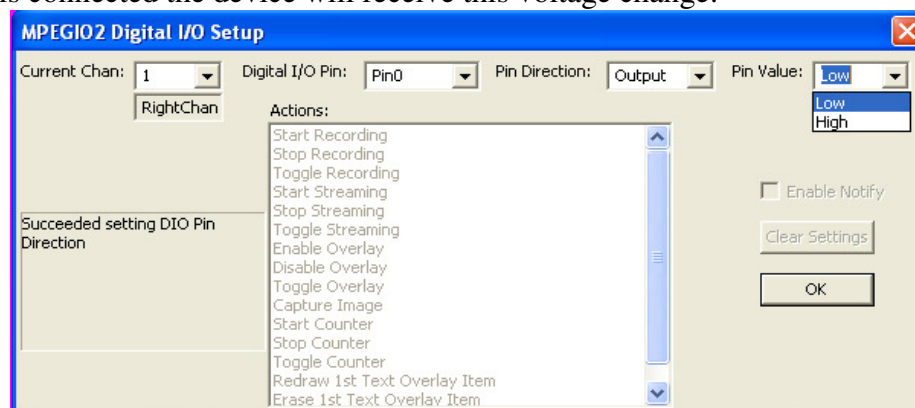


In this window, the “**Digital I/O Pin**” combo box indicates the 4 Digital I/O pins a channel has; the “**Pin Direction**” indicates either **Input** or **Output** direction a pin is configured as: **Input** pins can receive High/Low voltage signal sent by external devices connected to them, while **Output** pins can send High/Low voltage signal to external devices. By default all pins are configured as **Input**, but user can change any pin’s direction by selecting the “**Pin Direction**” combo box value.

When a Digital I/O pin is set as **Input** direction, voltage High/Low change on this pin can send notification to the **MPEGIO2** software automatically: “**Actions**” can then be taken in response to the pin’s status change. Ticking the “**Enable Notify**” check box then selecting some lines inside the “**Actions**” list box, a pin’s status change will cause those selected “**Actions**” to happen, such as starting or stopping recording, streaming or capturing image. The “**Input Pin Value Change**” combo box selects either “**Low to High**” or “**High to Low**” voltage change on this pin that will cause the selected “**Actions**” to happen. The button “**Clear Settings**” is to clear all “**Status Change to Actions**” setup. Note the “**Toggle**” actions mean the same voltage pulse on the pin will 1st start the operation, then the next pulse will stop the operation: e.g., “**Toggle Overlay**” means the 1st voltage pulse will enable the overlay if the overlay is currently disabled, then when the 2nd voltage pulse happens the overlay will be disabled again.

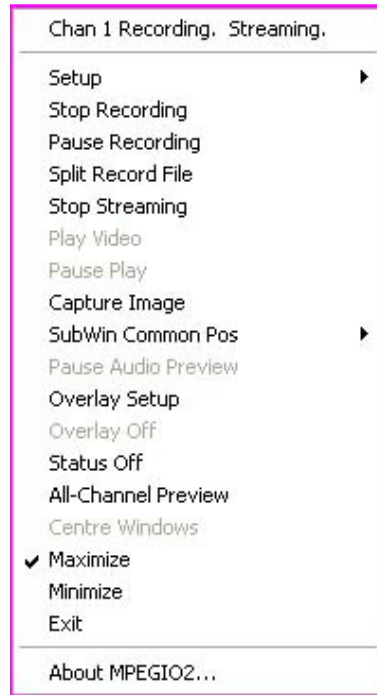
Note: Do Not trigger “**Capture Image**” too quickly on a channel: this could cause software crash: e.g. setting “**Capture Image**” for both **Low to High** and **High to Low** on the same pin should be avoided.

When a digital I/O pin is set up as “**Output**” direction, the previously disabled combo box “**Pin Value**” becomes enabled: now manually selecting this Pin Value as “**High**” or **Low**” will change the voltage (“**High**” will produce approx. +5 Volt, “**Low**” will drop it to 0 Volt) at the pin accordingly --- if external device is connected the device will receive this voltage change:




More flexible Digital I/O control can be achieved by calling relevant functions in the **MPEGIO2 SDK**: see the “**Digital I/O Functions**” Section in the “**MPEGIO2 SDK User Manual**” for more details.

19. Other Drop-down Menu Selections



When the **Drop-down Menu** is brought up by right-mouse clicking the Video/Control Window, its top line always indicates a channel number: if right-mouse was clicked inside a channel's video area in the Video Window, the channel number will indicate that channel; if right-mouse was clicked on the Control Window, the channel number will indicate the previously mouse clicked channel inside the Video Window. When a menu item is selected from the **Drop-down Menu**, its operation is only on the channel as the **Drop-down Menu**'s top line indicates : e.g., “**Start Record**” will only record MPEG video for this channel, “**Capture Image**” will only capture this channel's video image, etc.

- **Overlay Off**: Hide all defined Overlay Items for this channel, same as “**Disable Overlay**”.
- **Sub Win Common Pos**: Arrange the 4 Video Sub Windows according to some Common Positions.
- **Pause Audio Preview**: Toggle this channel's Audio Preview on/off if it is previewing audio.
- **Status Off**: Hide all Preview Text display, such as the “0:PAL” at the top of this channel's video.
- **Single-Chan Preview/All-Channel Preview**: Displaying one or all channels in the preview window.
- **Centre Windows**: Set the Video & Control Windows to be at screen centre with default sizes.
- **Maximize**: Toggle the Video Window to be Full-Screen or not, same as left mouse double-click.
- **Minimize**: Toggle the Video & Control Windows to be a Taskbar icon  or normal windows.
- **Exit**: End the **MPEGIO2.exe** application program.
- **About MPEGIO2...**: Display **About MPEGIO2** Dialog.

20. Command Line Parameters

At start up, **MPEGIO2.exe** application program accepts some **command-line-parameters** so that it can enter certain operation mode once started. **Command-line-parameters** are supplied in the form of:

-Cmd chanNum [Value]

Where **Cmd** is a single letter (Case Insensitive) command, this field must always be supplied;
chanNum is the numerical channel number(0 for 1st channel), this field must always be supplied;
Value is the value needed for **Cmd**, this is an optional field depending on **Cmd**'s content.

Currently supported **Command-line-parameters** are:

- r **chanNum**: start recording on channel “chanNum”.
- s **chanNum**: start streaming on channel “chanNum”.
- f **chanNum filename**: use **filename** as recording file name for “**chanNum**”, note if **filename** contains spaces the entire string must be double-quoted.
- p **chanNum pathname**: use **pathname** as recording path name for “**chanNum**”, note if **pathname** contains spaces the entire string must be double-quoted.
- t **chanNum timerVal**: use numerical value **timerVal** as recording timer (in Minutes) for “**chanNum**”.
- n **NoCodec**: Setting 1’s in any of the lowest 16 binary bits in numerical value “**NoCodec**” indicates that channel will **not** initialize its MPEG Codec IC(therefore cannot encode/decode).
- d: start the program with **default** values for all parameters
(see next section on default parameter values), ignoring the **MPEGIO2.ini** file.
- v **OnOff**: start the program with Video Preview Window On (**OnOff**=1) or Off (**OnOff**=0).
- u: start the program in Full Screen mode.
- m: start the program in **minimized** mode.
- k: start the program muting PC speakers for all channels’ audio preview.
- g: **TVSignal**: **TVSignal** must be 1 (NTSC) or 2 (PAL), indicating the default TV Signal Type used when no signal is available at all input sources used by any Sub Window for a channel. If -g is not supplied and no signal is available at all input sources used by any Sub Window for a channel, the Windows’ Regional/Country/Language setup (in Windows’ Control Panel) will decide if NTSC or PAL is used as the default TV Signal Type: USA, Japan, Canada etc. country setting will use NTSC, Australia, UK, etc. will use PAL.
- a: **DMARamMode**: **DMARamMode** must be 1 or 2 to indicate the DMA RAM mode used during Video Preview and Image Capture for Windows 7 or above, ignored on WinXP:
Value 1 is suitable for graphics chipset that can do YUV to RGB colour space conversion, such as ATI Radeon: Mode 1 is more efficient than Mode 2;
Value 2 is useful for graphics chipset that cannot do YUV to RGB colour space conversion, such as Intel Q67 chipset graphics cards or NVidia GS8400;
Default is 0: the SDK detects the graphics card chipset’s colour space conversion capability then chooses mode 1 or 2 automatically.

Some examples:

MPEGIO2.exe -r 0 -f 0 record0.mpg --- start recording on channel 0 to file record0.mpg
MPEGIO2.exe -s 0 -d --- start streaming on channel 0, do not read **MPEGIO2.ini** file at start
MPEGIO2.exe -r 0 -r 1 -s 0 -s 1 --- start recording and streaming on channel 0 and channel 1
MPEGIO2.exe -r 0 -p 0 C:\chan0 -f 0 rec.mpg --- record on channel 0 to file c:\chan0\rec.mpg
MPEGIO2.exe -n 9 --- Disable MPEG Codec at Channel 0 and 3 so these 2 channels cannot encode/decode

Note: **command-line parameters** will override the **MPEGIO2.ini** settings if they conflict.

21. Default Parameter Values

MPEGIO2.exe uses initialization file “**MPEGIO2.ini**” to store values for its user-definable parameters: each time **MPEGIO2.exe** exits, values of these parameters are saved into **MPEGIO2.ini** file which resides in the same folder as the **MPEGIO2.exe** program ---- Make sure the user account logged into MS Windows has **Write** permission to the Folder (usually C:\Program Files\Inventa\MPEGIO2) the **MPEGIO2.exe** resides, otherwise the **MPEGIO2.ini** file cannot be created. Each time when **MPEGIO2.exe** program starts it uses this file’s contents to assign values to its parameters. If the **MPEGIO2.ini** file does not exist (such as when **MPEGIO2.exe** is started on a PC for the 1st time), or if the **Ctrl** Key is held down when **MPEGIO2.exe** starts, or if the “-d” **command line parameter** is supplied, the software will use the following **default values** for its parameters:

Video I/O Parameters:

- Sub Window Common Position: 4 SubWins (Split with each SubWin occupying 1/4 of the video frame)
- Sub Window Cropping : For PAL: Left=15, Top=10, Width=720, Height=576
For NTSC: Left=15, Top=12, Width=720, Height=480
- Sub Window Enable: Yes
- Sub Window Input Source: SubWin0=VIN0, SubWin1=VIN1, SubWin2=VIN5, SubWin3=VIN3
(Note VIN1 is MPEG decoding video output, VIN5 is SVideo Socket)
- Sub Window Freeze: No
- Sub Window Border: No
- Sub Window Popup: Yes
- Sub Window Zoom: No
- Sub Window Border Blink: No
- Sub Window Mirror: No
- VIN 4 Auto Crop: No
- VIN 4 Horizontal Start/Stop: 0/0
- VIN 4 Vertical Blank Start/Stop: 0/0
- Auto Switch PAL/NTSC: No
- 7.5IRE Black Level: Yes if “Default TV Signal Type” is NTSC and Country Code is not Japan, otherwise No
- Input ColourBar: No
- Background Colour: Black
- Blank Colour: Blue
- Video Loss Indication: No Action
- White Peak Detect Threshold: 216 (for VIN 0 ~ VIN 3)
- Auto AGC (Gain): Enabled (for VIN 0 ~ VIN 3)
- Manual AGC Gain Value: 240 (for VIN 0 ~ VIN 3)
- AGC Normal Maximum Gain: 3 (for VIN 0 ~ VIN 3)
- AGC White Peak Gain: 1 (for VIN 0 ~ VIN 3)
- VIN 4 Luma AGC : Enable
- VIN 4 Chroma AGC : Enable
- VIN 4 WP(White Peak Detection) Disable: No
- VIN 4 LP(Luma Peak Detection) Disable: No
- PatchROM: Cleared
- Output1 BlankLevel: 42
- Output2 BlankLevel: 42

Audio I/O Parameters:

- No Init on Startup: No
- Preview Auto On: No
- -6dB on Input: No
- Mute: No
- Left Gain: 79
- Right Gain: 79
- Audio Play Buffer Nums: 4
- Audio DMA Buffer Nums: 0
- Audio Sampling Rate: 32KHz
- Audio Preview On: No
- Preview Use WaveOut API: Yes
- Audio Input from Matching Channel on this Card: No
- Audio Output to Matching Channel on this Card: No
- Audio Source for Speakers Output: This Channel's Audio

Record and Capture Setup:

- Current Recording Path: C:\
- Timer: 0(No Recording Timer)
- Recording File Name: MPEG#.mpg (# is the channel number)
- Split Recording File: No

Overlay Item Parameters:

- Font: Times New Roman, Regular, Size 14, Script Western
- Start X/Y: 0, 0
- Foreground Colour: Red
- Background Mode: Transparent
- Alpha: None
- Blink: None
- Disable Overlay: No
- Timer Format: Time Only

MPEG Encoding Parameters:

- Encoder Type: Program Stream
- MPEG Type: MPEG2
- Horizontal Size: 720
- Vertical Size: 576 if PAL, 480 if NTSC
- Max. Bit Rate: 6.00 Mbps
- Ave. Bit Rate: 6.00 Mbps
- CBR: No
- Scene Change Detect: No
- VOB Format: No
- Black Screen: No
- Horizontal Mask: -1
- Vertical Mask: -1
- Frame Rate: 25 if PAL, 29.97 if NTSC
- Closed GOP: No
- GOP Structure: N==15, M==3
- Aspect Ratio: 4:3 for MPEG2 and MPEG4, 1:1 for MPEG1
- MPEG Encoding Audio Bit Rate: 384 Kbps
- MPEG Encoding Audio Sampling Rate: 32KHz
- MPEG Encoding Audio Format: MPEG1 Layer 2
- Video PID: 33
- Audio PID: 34
- UserData PID: 36
- User Data: None

Video Streaming Parameters:

- IP Address: 127.0.0.1 (local PC)
- Port Number: 5000
- Multicast Streaming: No
- SendBufSize: 0 (Use 128Kbytes)
- RecvBufSize: 0 (Use 128Kbytes)

Image Capture Parameters:

- Capture Folder: C:\
- Start Serial No.: 0
- Image Type: Bitmap (.bmp)
- Image Capture File Name: IMAGE
- Bright: 128, Contrast: 64, Saturate: 64
- Cut off Bottom Lines: 0
- Pause Preview during Still Image Capture(Win7 only): No
- Width +/-, Height +/-: 0

Digital I/O:

- Pin Direction: Input
- Pin Value: Low
- Enable Notify: No

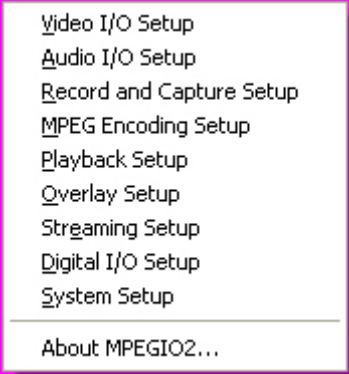
System Setup:

- Start with Video Preview: Yes
- Confirm on Exit: Yes
- Channels per Row inside Video Preview Window: 0 (All channels on one row)
- Show Preview Status: Yes
- Monitor Number used for Video Preview: the Primary Monitor Number
- Status Text1 X/Y: 0/0
- Status Text2 X/Y: 0/0
- Status Text2 Shift: 0
- Video Preview Src Clip X/Y/R: 0, B: -12
- Confirm on Exit: Yes
- ColourBar: No
- Text Font: Times New Roman, Regular, Size 14(WinXP)/36(Win7), Colour Red, Script Western
- Preview Deinterlace(Win7 only): Odd to Even
- Preview Colour Bright/Contrast/Saturate: 128/64/64

22. Hotkeys

■ Control Window or Video Window:

When focus is on either Window, pressing one of these case-insensitive keys will execute these functions:

A screenshot of a software menu titled 'Setup Menu'. The menu items are: Video I/O Setup, Audio I/O Setup, Record and Capture Setup, MPEG Encoding Setup, Playback Setup, Overlay Setup, Streaming Setup, Digital I/O Setup, System Setup, and About MPEGIO2... The 'About MPEGIO2...' item is at the bottom and is disabled (greyed out).

Video I/O Setup
Audio I/O Setup
Record and Capture Setup
MPEG Encoding Setup
Playback Setup
Overlay Setup
Streaming Setup
Digital I/O Setup
System Setup
About MPEGIO2...

S: Setup Button: Display Setup Menu:

R: Record Button: Display the “Record and Capture” Dialog Window

P: Play Button: Display the “MPEGIO2 Playback Setup” Dialog Window

E: Stream Button: Display the “MPEGIO2 Stream Setup” Dialog Window

O: Overlay Button: Display the “MPEGIO2 Overlay Setup” Dialog Window

X: Exit Button: Exit the MPEGIO2 Program.

■ Drop-down Menu:

Case-insensitive keys in Drop-down Menu same as mouse-selecting the corresponding menu item:

A: About MPEGIO2

C: Capture Image

E: Start/Stop Stream

I: Split Record File

M: Maximize

N: Minimize

R: Start/Stop Record

U: Pause/Resume Record

V: Pause/Resume Audio Preview

P: Play/End-Play Video

O: Overlay Setup

W: Centre Windows

X: Exit MPEGIO2.exe

Y: Pause/Resume Play

■ Video Window Mouse Clicking:

Left Mouse Double-Click: Toggle between Full Window and Normal Window Display.

Ctrl + Left Mouse Double-Click: Toggle between “One Chan Mode” and “All Chan Mode”.

Shift + Left Mouse Single-Click: Zoom from the mouse point if “Zoom” is enabled for the Channel,

---- See **Video I/O Setup** Dialog Window for Zoom ----

Left Mouse Click without Shift held-down to Cancel Zoom.

23. Special Applications

With its unique design architecture, **MPEGIO2** can create some special applications, examples include:

- (1) Encode PAL input to NTSC MPEG video or vice versa, this also real-time convert PAL/NTSC input to NTSC/PAL output on the **Breakout Box** Ports (RCA & SVideo): on the “**Video I/O Setup**” dialog, set the “**TV Signal on This Input Src**” combo box to the TV signal type different from the input signal will accomplish this. Note if video preview is garbled after manually setting the “**TV Signal on This Input Src**”, clear then tick the “**Preview Video**” check box on the Control Window usually can fix it.
- (2) Simultaneously encode and stream two different format and/or sizes MPEG video from the same input: configure one Sub Window’s video source as from this **MPEGIO2** channel’s matching channel will accomplish this --- on the “**Video I/O Setup**” dialog, select a Sub Window’s “**Video Input Source**” as “**VIN 4 SVideo**”, then tick the “**VIN 4 Input from Matching Chan**”. For example, this can simultaneously encode **Program Stream** and **Transport Stream** video, or **MPEG2** and **MPEG4** video from the same video input, to two separate MPEG files and/or IP streams.
- (3) Play and convert previously encoded MPEG video (by **MPEGIO2** or other hardware/software) into a different format MPEG video: as in (2), set up a Sub Window’s video source as from the matching channel, then play some recorded video on the matching channel while simultaneously encode a different MPEG format on this channel: Overlay Text/Graphics can be added on the encoded video.
- (4) Silently trigger recording/streaming/capturing on external signal using the “**Actions**” on the “**Digital I/O Setup**” dialog: after setting up actions “Start Recording”, “Start Streaming”, “Capture Image” etc., minimize the **MPEGIO2**, or re-start the program as minimized.
- (5) Simultaneously play/stream/convert the currently encoded video using third-party software: running [VideoLan\(vlc.exe\)](#), [SMPlayer\(MPlayer\)](#), [ffplay.exe\(ffmpeg\)](#), [DiVX Plus Player](#), [Total Video Player](#), [Eleccard MPEG Player](#) etc. side-by-side with **MPEGIO2.exe**, the MPEG video can be processed in many different ways inc. streaming, conversion, editing etc. in real-time while the hardware is encoding.

24. Technical Discussions

1. Under Windows XP, avoid starting **MPEGIO2.exe** while other Video Overlay application is displaying video: programs such as MediaPlayer, VideoLan etc. will grab DirectDraw surface resulting in **MPEGIO2.exe** unable to start Video Preview Window: Start **MPEGIO2.exe** first then start these programs will be OK. Note on Windows 7 or above **MPEGIO2.exe** can start any time regardless other applications have been displaying video preview or not.
2. When Pause/Resume recording to MPEG files, please note if the paused period (the time between pause and resume recording) is short (e.g., < 20 sec), then some software MPEG video players such as [VLC.exe](#), Windows MediaPlayer, etc. will also pause when their play reaches the paused point inside the MPEG file, while other software video players such as “[E.M. Total Video Player](#)” (<http://www.effectmatrix.com/>), [MediaPlayer Classic](#)(<http://mpc-hc.sourceforge.net/>), [GOM Player](#) (<http://www.gomlab.com/eng/>), [SMPlayer\(MPlayer\)](#), [KMPlayer](#), etc. will play smoothly over the paused point without obvious delays. Note **MPEGIO2** itself will always play smoothly over any paused points without delays in its recorded files regardless how long or short the paused time was.
3. Screen Capture with Live Video Preview: live video previewed by **MPEGIO2** can be successfully captured under Windows7 or above (but not on WinXP) when Ctrl+“Print Screen” keys are pressed.
4. File folders must have Write Permission: all folders holding the MPEG recording files, still image files and **MPEGIO2.ini** file must have Write Permission for the user, or these files cannot be created: e.g. on Windows 8 C: drive’s root directory might not be writable so use other folders to save MPEG and image files. Also on Windows 8 by default the MPEGIO2 program folder C:\Program Files\Inventa\MPEGIO2 folder is not writable: this must be changed manually to have write permission for the current user so that **MPEGIO2.ini** file can be written each time **MPEGIO2.exe** exit.
5. MS Windows’ “Power Options” should not turn off hard disk: during MPEG recording if the MS Windows’ “Power Options” (under “Screen Saver” settings) include turning off hard disk this must be disabled, otherwise recording can fail and hang **MEGIO2.exe** when the hard disk is turned off.
6. Install MPEG2 playback Codec filters: on Windows XP and Windows 7 the **Start.bat** program automatically registers MPEG2 playback codec, while on Windows 8, this must be done manually by running the “RegFilters.bat” from the MPEGIO2 Program Group as “Administrator”. Without properly registering MPEG2 playback codec the Windows MediaPlayer cannot play MPEG2 files.

25. MPEGIO2 Hardware Specifications

Host Interface: 1X PCI-Express Card
Maximum Power Consumption: < 10 Watts
Video Input: 6 X Composite (RCA), 2 X S-Video (4-Pin Mini-DIN)
Video Output (for Real-time Monitoring and MPEG Decoding): 4 X Composite (RCA), 2 X S-Video
Audio Input: 4 X Line-in 3.5mm Stereo Mini Socket
Audio Output: 4 X Line-out 3.5mm Stereo Mini Socket
Encoded/Decoded 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. Support Both Program Stream and Transport Stream Encoding & Decoding
Constant Bit Rate (CBR) and Variable Bit Rate (VBR) Encoding
Video 4:2:2 to 4:2:0 Conversion
Video Inverse telecine (3:2 pulldown)
Video Encoding Frame Rates: 23.976fps, 24 fps, 25fps, 29.97fps, 30fps, 50fps, 59.94fps, 60fps
Video Encoding Bit Rates: 128 Kbps ~ 15.00 Mbps
Video Encoding / Decoding Resolution in Pixels: Horizontal 176, 352, 480, 528, 544, 640, 704, 720, Vertical 120, 144, 240, 288, 480, 512, 608, 576
Video Encoding Aspect Ratio: 4:3, 16:9(Wide Screen), 2.21:1, 1:1 (Square Pels)
Audio Encoding Format: MPEG1 Layer 1, Layer 2, Layer 3(MP3), MPEG-2 audio, AC3, AAC, G.711, G.723, G.726, G.729
Audio Sampling Rates: 32KHz, 44.1KHz, 48Khz
Audio Encoding Bit Rates: 0 to 448Kbps, inc. 64Kpbs, 128Kpbs, 160Kbps, 192Kbps, 224Kbps, 256Kbps, 320Kbps, 384Kbps. etc.
Digital Input/Output Pins: 8 Pins (4 for each Channel): each Pin responds to -0.5V ~ +0.3V as Low Status, +0.7V ~ +5.5V as High Status, with maximum current 25mA per Pin, and a total current sourced by all Pins limited to 160mA. 1 Ground Pin Common for All I/O Pins.
PCIe Card Dimension: Length 230mm, Height 145mm