



HandyAvi 5.0 User's Manual

HandyAvi 5.0 User's Manual

11 May 2013



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HandyAvi Overview

HandyAvi

Overview

NOTE: HandyAvi now has 5 different license options:

- HandyAvi Deluxe Edition - Complete version that includes all features.
- HandyAvi TimeLapse Edition - Less expensive version with only the Time-Lapse imaging capture feature.
- HandyAvi Surveillance Edition - Less expensive version with only the Motion Detection capture feature.
- HandyAvi Astronomy Edition - Less expensive version with Astronomy, Meteor Capture and telescope control features.
- HandyAvi Animation Edition - Less expensive version with only the Animation capture features.

EACH edition allows full access to all of the [HandyAvi Tools menu items](#).

This help file shows **all** of the features of the complete HandyAvi Deluxe Edition.

HandyAvi:

- Is a multi-purpose Webcam program for creating and editing AVI movie files.
- Will work with nearly all types of webcams.
- Works with NTSC and PAL cameras if you use a USB Video Adapter.
- Supports video boards such as the Hauppauge WinTV 885 Capture Board.
- Will control Meade telescopes.

HandyAvi will let you make:

- Time-Lapse videos,
- Motion-Detect videos,
- Astronomy videos,
- Meteor and Lightning videos,
- Animation videos.

HandyAvi will let you:

- Open, play, edit and join AVI movie files,
- Edit an AVI file and make a new video from selected frames,
- Create AVI files using any compression scheme (codec) found on your machine,
- Create a new AVI file using a compression scheme OTHER than the one used to encode your original AVI file,
- Set the play-back speed of new movies that you create,



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- **Make Time-Lapse movies from any AVI movie file that you already have on hand,**
- **Scan an existing AVI file for meteors and create a new movie containing only the meteor trails that were found,**
- **Control any telescope that uses the standard Meade telescope control codes (The LX-200 telescope for example),**
- **Display information about any AVI file including the codec that the file was created with,**
- **Write selected images or all of the images within your AVI file as either .JPG files or .BMP files,**
- **Create a new movie from a directory containing .JPG files or .BMP files,**
- **Align and stack images contained within an AVI file for planetary astronomy imaging...**



Image Capture Modes

Create a Time-Lapse Video

Time-lapse Video Overview

HandyAvi allows you to easily make time-lapse videos using a webcam.

Regular webcam videos consist of frames taken as quickly as possible, usually on the order of 30 frames per second.

Time-lapse videos consist of frames taken at a slower rate. For example, to photograph clouds moving in the sky, you could take one frame every 20 seconds.

The time-lapse is then 20 seconds. When you play back such a video at 30 frames per second, the motion of the clouds appears to be greatly speeded up.

Time-lapse photography can be used to film:

- clouds moving
- flowers opening
- traffic on freeways
- boats moving on a lake or the ocean
- ants moving about their nest
- construction of buildings, bridges and freeways
- birds growing up in a nest
- shadows caused by the sun's motion
- plants growing
- cell-division using a microscope
- ice melting
- snow melting
- etc.

The only limitations are your imagination regarding what to photograph using a time-lapse video process.

Anything that occurs slowly can be speeded up using time-lapse photography. The results are often amazing.

Speeding up the action of the tendrils of vines as they seem to intelligently seek something to wrap around can be fascinating.

HandyAvi will allow you to set any time-lapse time that you desire - from as fast as your webcam can produce images up to years of elapsed time between frames!

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How to open the time-lapse video control window

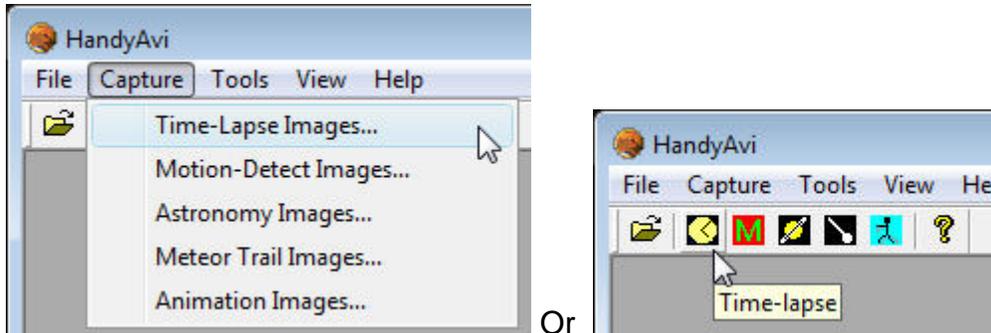


Figure 1

From the main HandyAvi window, select the Capture/Time-Lapse Images menu item to bring up the Time-Lapse Capture window.

There will be a delay after selecting the menu item as HandyAvi searches for cameras and establishes communication with one of them.

The main Time-Lapse Capture control window will then be displayed:

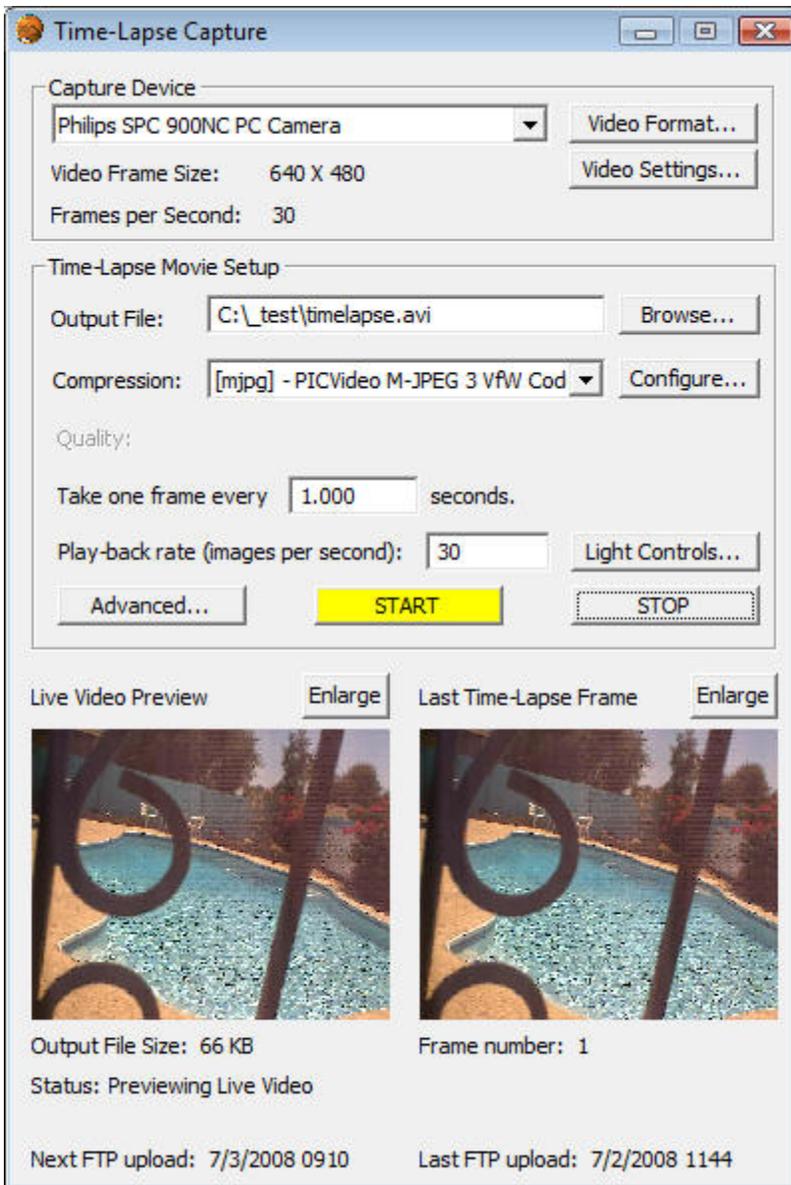


Figure 2

This window controls all of the time-lapse photography functions of HandyAvi.

The Capture Device Section

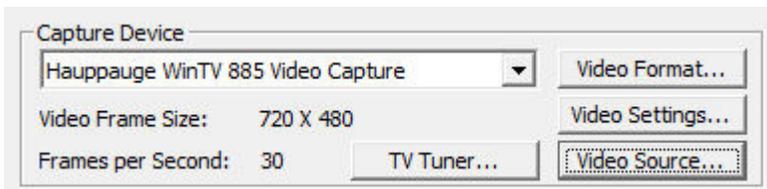


Figure 3



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This section of the Capture window allows you to choose a webcam (i.e., a capture device). If you have several webcams plugged in, they will all be listed here if you click on the pull-down arrow. In addition, some other types of video capture devices may be listed here such as the Hauppauge WinTV PVR PCI II Capture device or the Hauppauge WinTV Video 885 Capture device. Other buttons (see below) may also appear in this section depending upon the capabilities of the selected device.

We see in the Capture Device section that the webcam currently selected is the Logitech QuickCam Pro 4000.

Its "Video Frame Size" is currently set to 640x480.

Its frame rate is set to 30 frames per second. Note that this value will sometimes be overridden by the camera drivers when the camera is in a mode where brightness and contrast are set "automatically".

The video frame size and the video frame rate can be changed by left-clicking the "Video Format" button. This will bring up the camera manufacturer's Video Format or Properties window which will allow you to make changes to basic camera functionality.

Video Format: This button causes display of a window provided by the manufacturer of your webcam. For a Logitech QuickCam Pro 4000, the window that comes up looks like this:

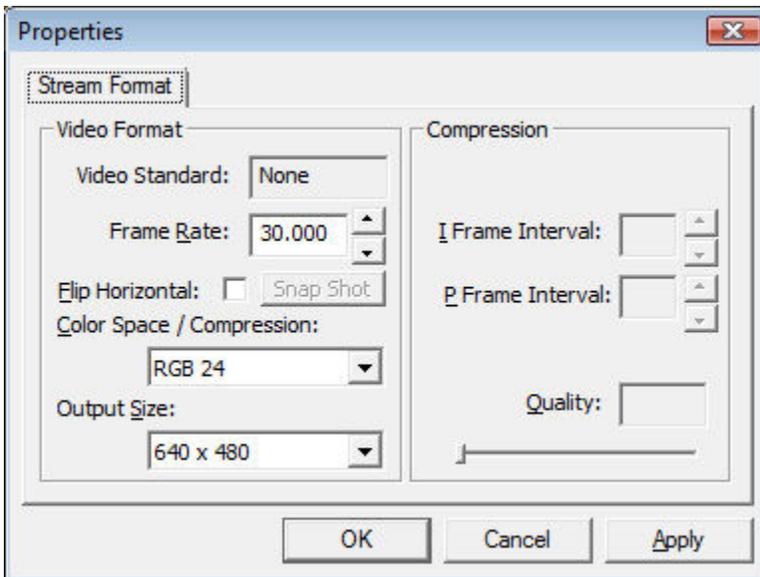


Figure 4

This window may be used to change the video format settings of your camera. In particular, the "Frame Rate" tells how many frames per second your camera will capture although your camera driver will sometimes override this if it is set to an "automatic" setting.

The Output Size selection allows you to select the frame size in pixels of the images that the camera will be taking. Both the ToUcam and the **Logitech QuickCam Pro 4000** for example, allow the image sizes shown here:

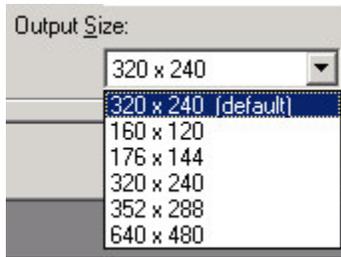


Figure 5

HandyAvi will automatically save and restore your Video Format settings if possible.

Video Settings: There is also a button called Video Settings. This will bring up the webcam manufacturer's video settings window and will allow you to change other types of camera settings such as contrast, color, brightness, sensitivity, etc., depending on how many items the camera manufacturer allows you to modify. The Video Settings window for the Logitech QuickCam Pro 4000 webcam looks like this:

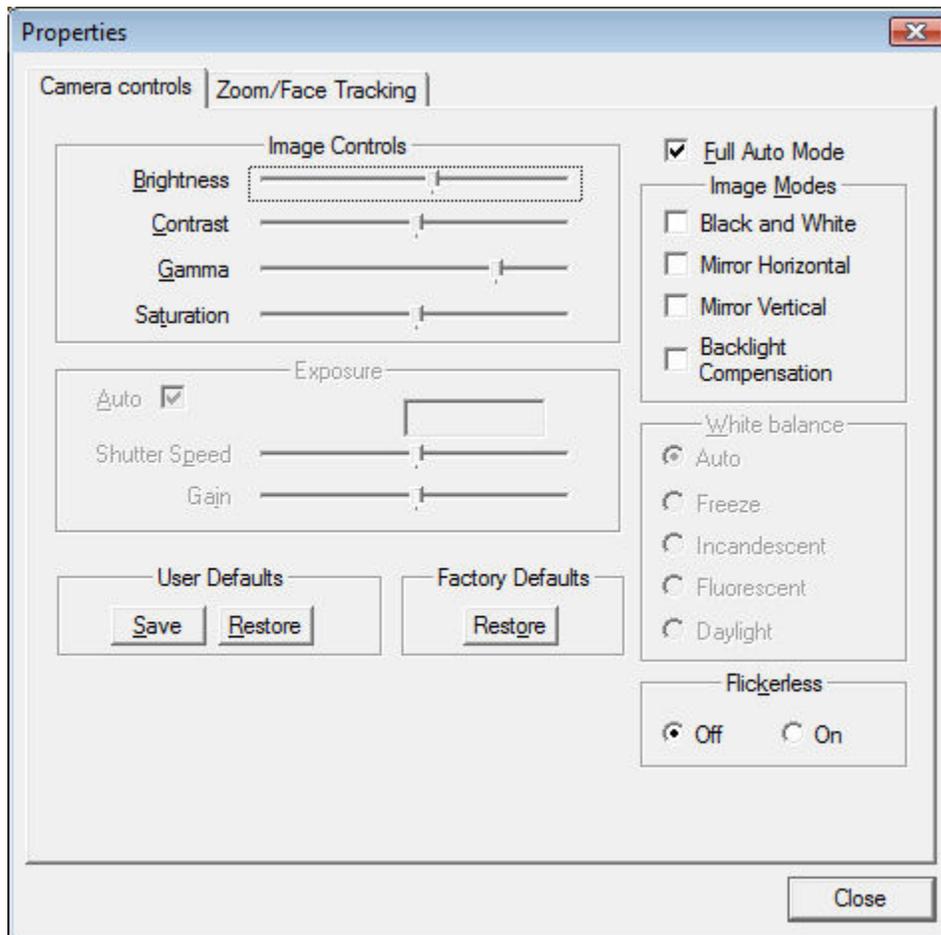


Figure 6

The image in Figure 6 shows that the camera is in "Full Auto Mode" which means that the camera will automatically adjust for changes in light levels. It will sometimes change the frame rate automatically when in this mode.

The Video Settings window for the Philips ToUcam webcam looks like this:



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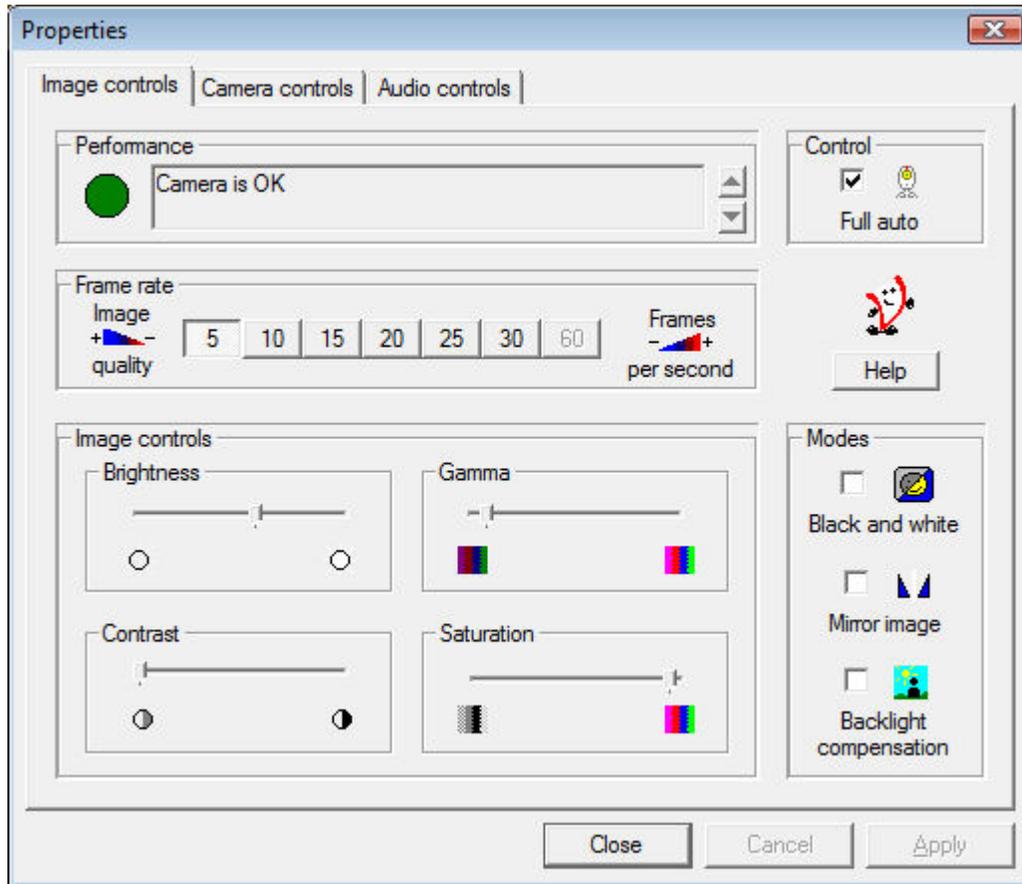


Figure 7

These controls provide a great deal of control over your webcam and might need to be adjusted to get the best results under various lighting conditions. For planetary astronomy of, for example, Saturn using a telescope, we usually take the camera out of "Full auto" and adjust the "Frame rate", "Brightness", "Contrast", etc., to provide an image that is not over-exposed. We have found that lowering the "Frame rate" is often helpful for planetary imaging.

Other webcams may have other types of video settings windows of course. The above are simply examples of webcam control features that two different manufacturers decided to provide.

IMPORTANT: if the "Full auto" control is checked in Figure 7, it can override the frame rate and set it to a lower value. Under dim lighting, the automatic settings for many webcams cause the frame rate to be reduced so that brighter images can be obtained. You can see in Figure 7 that the original frame rate of 30 frames per second has been overridden so that the frame rate is now 5 frames per second. By switching "Full auto" off, you can manually set the frame rate override to 30 if you wish to capture more frames more quickly. This is important because it can be puzzling if you are not aware of it.

Video Source: The user here has selected a "USB 2821 Device" which is a USB/Video Adapter so a "Video Source..." button is now displayed:

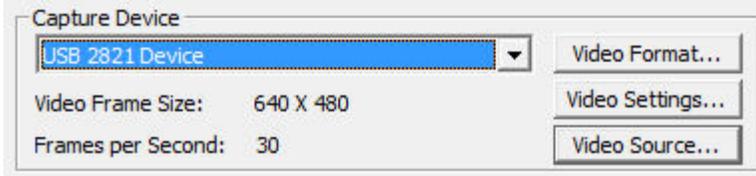


Figure 8

The "Video Source" button will be displayed ONLY when the capture device you are using supports Video Source options. (Most webcams do NOT support the "Video Source" option. However, many USB video adapters and many video boards do support the "Video Source" option.)

We have successfully used a USB 2.0 Video Adapter with Audio adapter (Model GA-VD204) which shows up as a "USB 2821 Device" with HandyAvi. We have also successfully used USB video adapters produced by five other manufacturers.

Some adapters allow EITHER Video Composite signals to be input or S-Video signals to be input. The Video Source window will allow you to choose which one will be seen by HandyAvi.

Here is what the USB 2821's "Video Source" windows looks like:

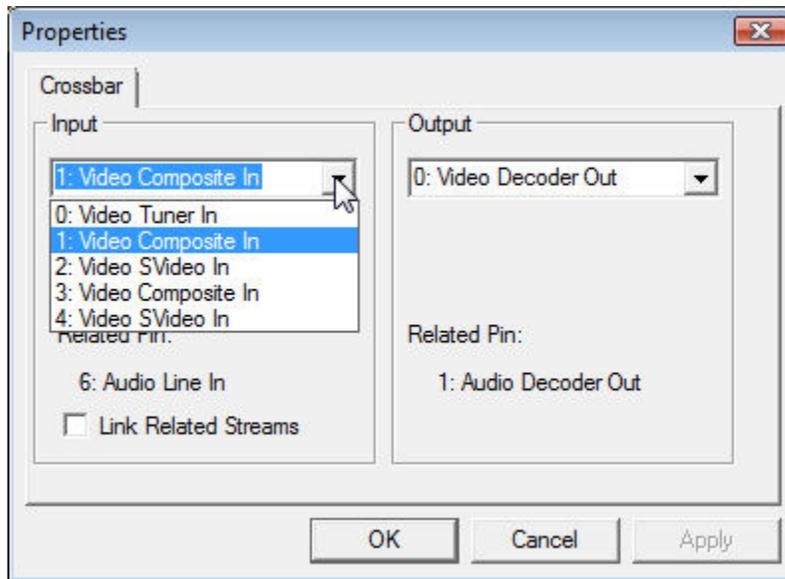


Figure 9

You can see that we have opened the "Input" pull-down. "Video Composite In" means HandyAvi will see the video stream from a camera plugged into the adapter's Composite Video input port (a standard Phono Plug).

If instead you plug an S-Video source into the adapter (from a VCR or DVD player, etc.) and choose "2: Video SVideo In" then HandyAvi will see the video stream of the S-Video device that you have plugged in.

Note that most surveillance cameras output Video Composite signals, i.e., NTSC signals in many countries, PAL in many others. We have a Watec 902H2 ULTIMATE camera that we are using for Meteor Detection. We plug its Video Composite output into the GA-VD204 adapter (or other USB-Video adapter) and then plug the adapter into the USB port. HandyAvi sees the video and everything works well.



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Note that some adapters check to see if you are using a USB 1 port or a USB 2 port. Some of them will NOT allow you to set higher resolutions (like 640 x 480) if you are using a USB 1 port. This is usually undocumented and can be puzzling which is why we are mentioning it here...

It should be noted that the Watec 902H2 ULTIMATE is an EXTREMELY sensitive low-light camera (.0001 Lux supposedly) and is more expensive than most cameras used for surveillance work. We needed the sensitivity for meteor detection. There are of course MANY cheaper cameras that output NTSC Video Composite signals that can be used with HandyAvi via a USB-Video adapter.

The user here has now selected a "Hauppauge WinTV 885 Video Capture" board:

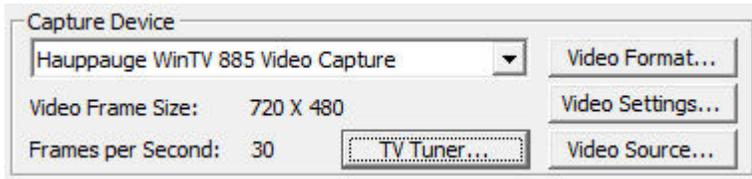


Figure 10

The "Video Source..." button now exposes this manufacturer's window:

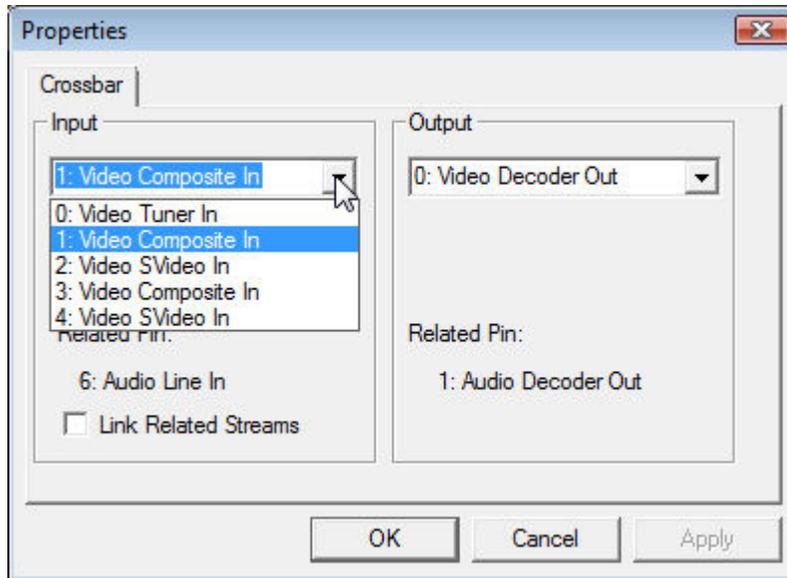


Figure 11

"Video Tuner In" means that the board is going to receive input from the TV tuner. S-Video and Composite inputs can also be selected as input sources. We don't know why this board has two "Video SVideo In" selections...

TV Tuner: The Capture Device section also now includes a "TV Tuner" button which provides access to the board manufacturer's TV Tuner settings window:

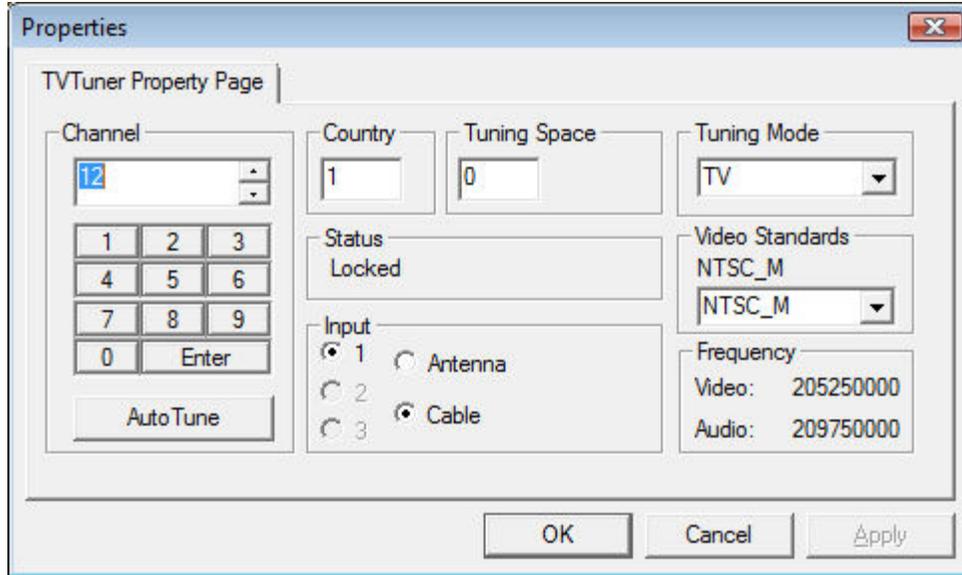


Figure 12

This window allows you to select the input television channel among other things. On this particular board, we have found that to input Channel 12, you have to enter 12 then click on "Enter" or the channel input is ignored! Usually, we would select "Antenna" unless we are connected to a cable. There is a selection for "Video Standards" which includes NTSC_M, NTSC_JM, PAL_M, PAL_N, and PAL_COMBO. The "Tuning Mode" includes "TV" and "FM".

The Time-Lapse Movie Setup Section

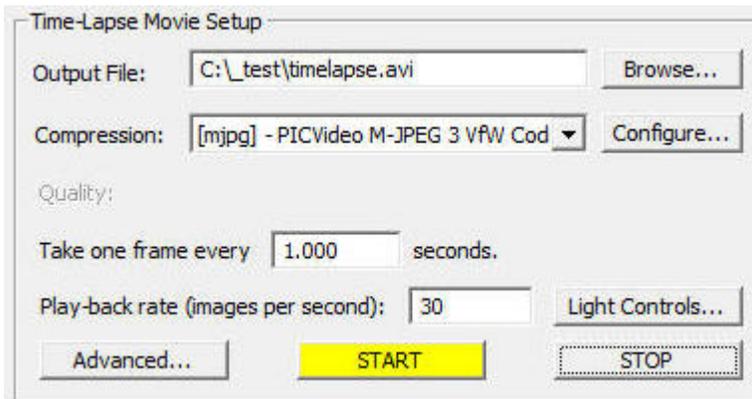


Figure 13

This section of the time-lapse video capture window allows you to set up the webcam for making a time-lapse video.

Output File: Enter the path name of the new video file you want to create. **Note:** The background color of this field will be YELLOW if you have selected File Recycling in the [Preferences](#) panel and have the "Use file recycling" box checked. The color is simply to notify you that file recycling is active.



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Browse: Brings up a standard file selector window so that you can more easily place the file in a particular folder.

Compression: Select any AVI file compression scheme resident on your computer. File compression schemes or codecs (short for coder/decoder) show up on your machine from many sources. Microsoft installs several. Your video camera may install one or more. You may download and install compression schemes from the internet. At the time of this writing, there are over 280 codecs listed at <http://www.fourcc.org>. Note that one of the selection items is called Uncompressed. If you select "Uncompressed", the image data in your files will not be compressed. Your files will be LARGE. However, each image in an uncompressed file will contain images that are **exactly** what the camera captured. Compressed images are usually slightly different from the original images because information is lost during compression. In most cases, the difference is not noticeable. Use of uncompressed images is important for some applications but not necessary or advisable for most. [Learn more about video codecs here.](#)

HandyAvi displays the FOURCC value for the compressor in brackets at the beginning of the "Compression:" line.

Note that HandyAvi will also allow you to read, work with, and display AVI files produced by other software or cameras and will select the proper decompression scheme automatically IF the required decompression scheme has been installed on your computer.

HandyAvi will also allow you to read a file that was written using one compression scheme and write a new AVI file using a new compression scheme. So you can convert AVI files from one compression scheme to another if the required codecs have been installed on your machine.

Configure: Brings up the compression CODEC's configuration window. This button only appears if the selected compression scheme HAS a configuration window.

Note that the "Quality:" slider and the quality settings in some CODECs do not "cooperate". In the case of the mjpg CODEC, the "Forced quality" slider determines the degree of JPEG compression and the "Quality" slider in the "Time-Lapse Movie Setup" window has absolutely no effect. Other CODECs we have tested do not override our "Quality:" slider.

When in doubt, you should test by setting the quality and capturing (for example) three frames of the same scene (use Time-Lapse and take one frame every 3 seconds or so). Then change the quality factor and make another movie. The size of the two resultant AVI movie files should be different.

See [Configure Window Examples](#) for information on the Configure options of various CODECs. [Learn more about video codecs here.](#)

Quality: Adjust the quality of the compression scheme. Most compression schemes create smaller files because they are actually discarding tiny image details. By discarding more and larger image details, you can produce a smaller AVI file. If the Quality is set to 100, then little or no image data is discarded and the resultant AVI file will be large. If the Quality is set to 0 then, theoretically, all image data is discarded and the resultant AVI file will contain blank images! Of course each codec is created by software people who may have thought about this and limited it so they do not throw away all of the image data even if the Quality is zero. Note that each codec is different and some may even ignore the Quality setting or not allow it to be set. Also note that lossy compression schemes are used in many applications. JPEG is an example of a lossy compression scheme that is used in MANY applications and the fact that some of the image data has been discarded is practically unnoticeable. So compression with slightly reduced quality is a very good thing in most cases. [Learn more about compression here.](#)

Take one frame every -- seconds: Set up the time-lapse image capture time delay between frames. For example "Take one frame every 10 seconds" will capture and add one frame to your new AVI file every 10 seconds. The captured frame will be the current Live Video Preview frame visible in the [Time-Lapse Display Area](#).

The delay time entered can be any time desired. 30 frames per second corresponds to a time-delay of approximately .03 seconds. If .03 seconds were to be used and if the camera were running at 30 frames per second, all frames would be captured (assuming your hardware can keep up.)

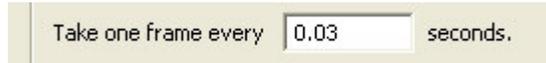


Figure 14

Play-back rate (images per second): Determines how fast your frames will be displayed when you play the AVI movie that you have recorded. If you want the frames to be played in "real-time" then you should set the rate to the same rate as the camera was set to when it was recording. If you want each frame to be presented at a very slow rate, then you could set the play-back rate to 1 second. In this case each frame of the movie would be displayed for one second when the movie is played.

Light Controls: Brings up a [control panel](#) that will allow control over a PowerLinc USB 1132U or 1132CU X-10 control device. One end of this device plugs into a wall-socket and the other end plugs into a USB port. You can turn other X-10 devices on and off from this panel and also allow the time-lapse systems to turn a light on, pause, take the next time-lapse image, then turn the light off awaiting the time for the next time-lapse image.

Advanced: Brings up the following window:

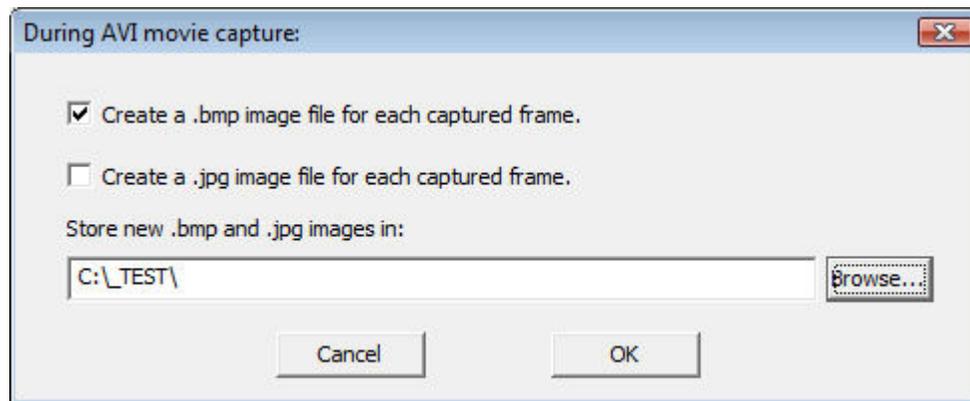


Figure 15

This will allow you to create a .bmp file and/or a .jpg file for every image that is being captured to the AVI file. The .bmp and .jpg images will be sent to the directory chosen for storage. The images are placed in the directory at approximately the same time they are captured and placed in the AVI file. There appears to be very little CPU time penalty for using this feature.

START: Starts the time-lapse image capture session. The system starts saving image frames to the Output File in accordance with the values you entered in the Time-Lapse Movie Setup window.

Note that the Start button here is yellow. This indicates that a **Set Allowable Image Capture Times...** [preference](#) item has been set. Yellow means that video recording is currently allowed but at some point in time, video recording will cease until it is again allowable. Red would mean that video recording is not allowed at the current time.



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NOTE: Output files will automatically be limited to less than 2 Gigabytes, the AVI file size limit. A new file with a unique new name will be generated and used automatically whenever the limit is about to be exceeded. See [Preferences](#) for more information about [Maximum AVI File Size](#).

STOP: Terminates the time-lapse image capture session. The AVI file(s) can now be viewed with [the movie viewer](#).

The Time-Lapse Display Area

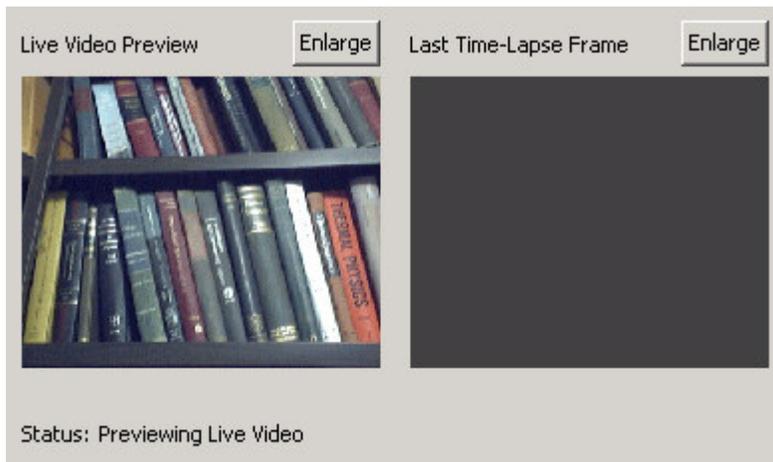
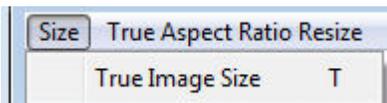


Figure 17

This area of the Time-Lapse Capture window contains two video display areas. The left one is a live video preview window showing what the camera is actually seeing at the frame rate at which it is currently running. The right window shows the last frame that was captured to your new video file. If nothing has yet been captured, it shows a blank as seen in the above image.

Enlarge: If you use one of the "Enlarge" buttons, a new window will be created containing the video image. This new window can be resized to any size by clicking and dragging an edge or corner of the window.

This new window also contains a "Size" option that will allow you to select a "True Image Size" option which will resize the window to show the actual size of the captured video images. Pressing the "t" key will also perform the True Image Size function.



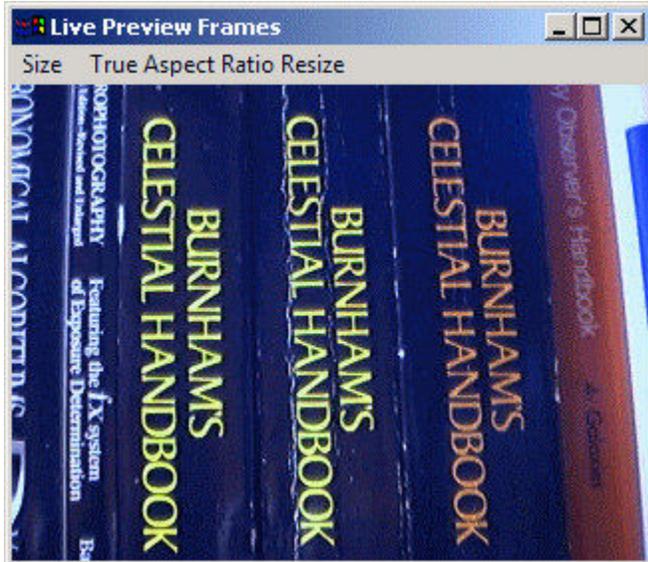
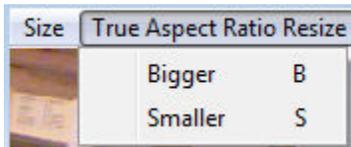


Figure 18

Figure 18 shows an enlarged "Live Preview Frames" window that has been sized with the "Size" option to the "True Image Size" of 320x240 which was the size selected in Figure 3 in the [Capture Device](#) section.

There is also a "True Aspect Ratio Resize" option:



Selection of "Bigger" will resize the window to a slightly bigger size while keeping the true aspect ratio of your image. Pressing the "b" key will also perform this action.

Selection of "Smaller" will resize to a slightly smaller size while keeping the true aspect ratio of your image. Pressing the "s" key will also perform this action.

If you close an enlarged window, the images will again appear in the "Live Video Preview" window or the other window if it was the one that had been enlarged.

Light Control

We wanted to make a time-lapse video of a Night-Blooming Cereus cactus. The Night-Blooming Cereus flowers open up at dusk and stay open all night. In the morning, the flowers react to sunlight and close up and wilt - usually by 10:00 AM. We illuminated the cactus with a 100 Watt light and made a time-lapse movie. The result was tremendously disappointing. The Night-Blooming Cereus flowers were much more sensitive to light than we had expected. The 100 Watt light was enough to trigger the wilt response even before the flowers opened! We then had to wait a year to try it again!

When the cactus was again ready to bloom, we made our next attempt by taking one frame every 60 seconds and turning on the light for 2 seconds and taking each frame just before turning the



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light off. This allowed the camera to adjust to the light and the cactus did not respond adversely to the brief 2-second light flashes.

To accomplish the above, we added a feature which allows use of PowerLinc USB 1132U X-10, PowerLinc USB 1132CU X-10, and PowerLinc USB 2414U X-10 control devices which plug in to your computer via a USB port.

(NOTE: The PowerLinc USB 1132U has been discontinued by the manufacturer. Its replacement is the PowerLinc USB 1132CU. There is also a PowerLinc 2414U. HandyAvi now handles each of these devices.)

The 1132U, 1132CU and 2414U devices also plug into your house wiring. These devices are sold by SmartHome (do a Google search). They also sell a line of X-10 "Appliance Modules". X-10 is a method for sending control signals through your house wiring, extension cords, etc. The control signals can turn a relay on and off within an Appliance Module. If a lamp is plugged into an Appliance Module, the lamp will turn on and off when the appropriate control signals are sent through the house wiring.

HandyAvi also supports a NetPower 8800 device which can also control a light. The 8800 does not use X-10. It is however one of the most inexpensive ways to control a light with HandyAvi.

There is a "Light Controls" button on the "Time-Lapse Capture" window that will bring up the **Light Controls** panel:

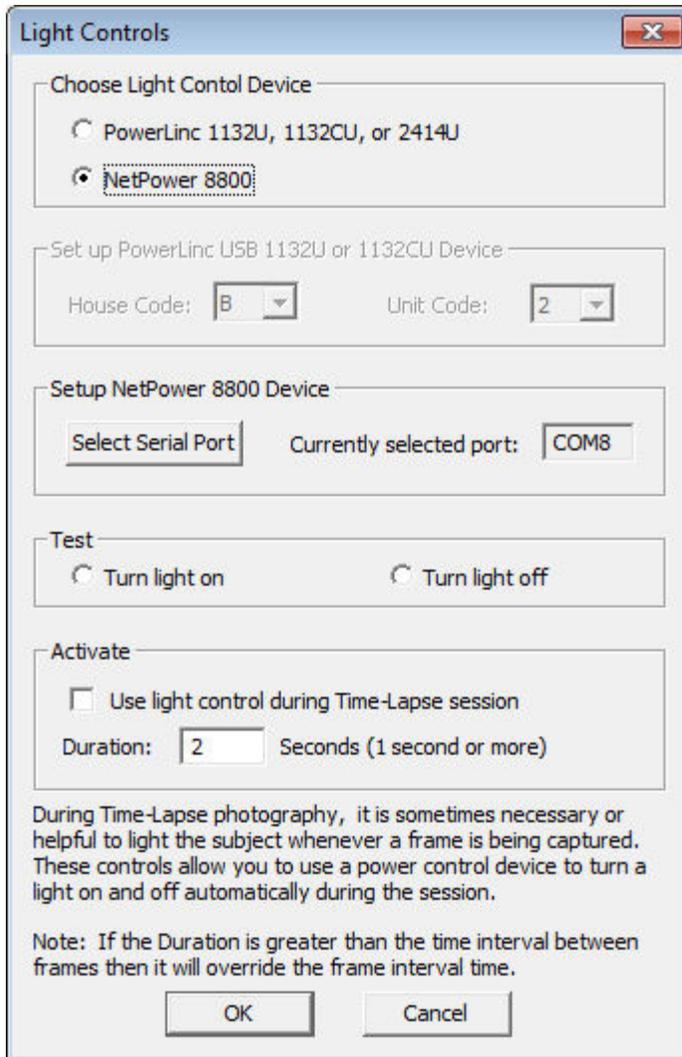


Figure 16

Use Light Control is a check box. When checked, HandyAvi will attempt to use the PowerLinc device plugged in to your computer to turn a light on and off during your Time-Lapse photography session.

House Code is a letter from "A" through "P" that is set to match the setting you selected on your Appliance Module. (The appliance modules have small circular switches that can be set to a House Code and a Unit Code of your choosing.)

Unit Code is a number from 1 through 16 that is set to match the setting you selected on your Appliance Module.

Duration is the length of time the light will stay on each time it is turned on. The value must be set to at least one second. (This is due to the sluggishness of the X-10 devices. They do not seem to respond well if they are switched at faster rates.)

Turn Light On allows you to test your settings by attempting to turn the light **on**. (This does not test the Duration setting.)



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Turn Light Off allows you to test your settings by attempting to turn the light **off**. (This does not test the Duration setting.)

About Video Codecs

Note: You do not have to learn about codecs to use HandyAvi.

However, the purpose of a CODEC is to compress your video data so that your AVI files are smaller. So if space on your hard drive is a consideration, you will probably want to use a CODEC.

AVI files can be created either by using no compression (uncompressed) or by using one of literally hundreds of compression schemes (codecs is short for Coder/decoder) that have been created by various companies. Uncompressed files are generally MUCH larger than compressed files.

In order for HandyAvi to use a particular compression schemes, it must have been installed on your computer.

Many AVI codecs probably already have been installed on your machine. Some come from Microsoft as part of your operating system. Some come from the manufacturers of webcams that you might have installed. You can even download and install codecs from the Internet. Some are free and others are not. <http://www.fourcc.org> is a site that lists and describes almost all known codecs. If you surf to that site, you will want to click on "codec list" to see all of the codecs.

Codecs have four character names known as "Four-Character Codes" or "FOURCC" names. This is how they are identified internally so that software applications such as HandyAvi can know which codec was used to produce a particular file.

FOURCC codes are also used internally when a HandyAvi user selects a compression scheme such as "Indeo® video 5.10". "Indeo® video 5.10" has a FOURCC name of "IV50". If you have an AVI file that was encoded using IV50, you can see the IV50 codec name by opening the file in HandyAvi and using the "View/AVI File Info" menu item.

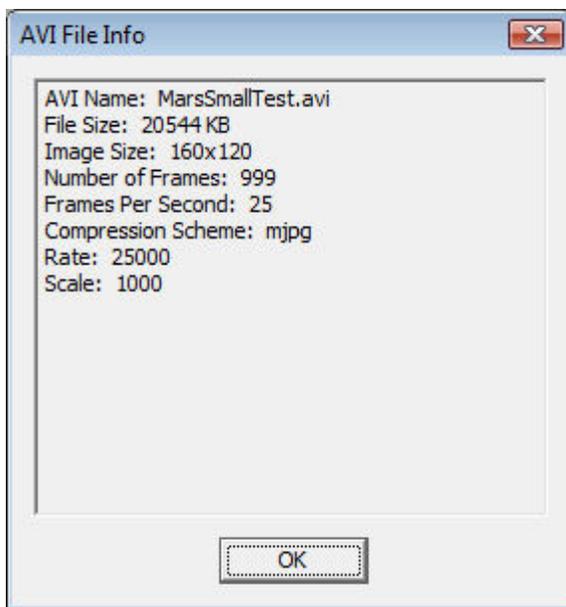


Figure 19

Figure 19 shows that the compression scheme used to compress the file "MarsSmallTest.avi" was mjpg which is the FOURCC code for the "Morgan Multimedia MJPG" codec.

HandyAvi will also attempt to open files compressed with codecs that are NOT installed on your machine. If the required codec is not installed, HandyAvi will, of course, be unable to PLAY the file but it will try to produce an AVI File Info report as shown in Figure 19 so that you will be able to identify the missing codec. If you know which codec was used, you might be able to locate an installable version of the codec via the Internet and install it. Then you would be able to play the file using HandyAvi. If you can play the file using HandyAvi then you can also use [HandyAvi's editing features](#) to create a new file using the same or a different codec and include or exclude selected frames from the new AVI file.

Many CODECs allow you to have control over the "Quality" factor or "Compression" factor that will let you make your files smaller.

[Learn more about Compression Quality.](#)

[Learn more about Configure windows.](#)

About Compression Quality

There are many video compression schemes. The purpose of a video compression scheme is to make a smaller file without sacrificing too much detail in the images.

An uncompressed AVI file is comprised of a series of bmp image files. There are actually many different bmp file formats. Each of the formats is designed to reconstruct an image pixel by pixel. Typically, AVI files are made up of bmp files which have 3 Bytes for each pixel. The three bytes contain the Red, Green, and Blue values for a pixel. Thus, a 640x480 uncompressed image requires approximately 3 x 640 x 480 bytes ("approximately" because there may be some "pad" bytes at the end of each line. There is also a small amount of header data describing the size, color content, length and width of the images, etc.) 3 x 640 x 480 Bytes is 921600 bytes or almost 1 Megabyte! If your AVI video camera is running at 30 frames (images) per second, then you will be storing 30 x 921600 Bytes per second or 27.6 Megabytes per second. 10 minutes of video would require 16,588,800,000 bytes or 16.5 Gigabytes! That is why video compression is usually a good idea! You would like to make the file smaller without messing up the images too much.

Lossless Compression

Lossless compression refers to a compression scheme that compresses the data without losing any of the "information" in the picture. If you compress an image using a lossless compression scheme, the restored image when decompressed is IDENTICAL to the original image. An example of lossless compression is "Run-Length Encoding" used in FAX machines. Run-length encoding for a black and white image consists of looking at each row of pixels in the original image and creating a file that tells how many white pixels are followed by how many black pixels, are followed by how many white pixels, etc, across the row. If you are sending a printed text document, there are usually a LOT of white pixels then a few black pixels, then a LOT of white pixels, etc., in a row. You can actually get very good compression for most faxed documents using this strategy AND it is lossless, i.e., the document that shows up at the other end is essentially identical to the original document.

Unfortunately, lossless compression cannot be done for most images. That is why lossy compression is used.

Lossy compression

Lossy compression refers to a compression scheme that compresses the data but loses some of the data. If you compress an image using a lossy compression scheme, the restored image when decompressed is NOT identical to the original image. However, if the scheme is a good one, the



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images will look almost identical. There are MANY lossy compression schemes some of which are very well known such as JPEG. We can use JPEG to illustrate Lossy compression.



Figure 20 - JPEG Quality Factor 99 (Very high quality) 358 Kilobytes



Figure 21 - JPEG Quality Factor 75 (high quality) 70.4 Kilobytes





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Figure 22 - JPEG - Quality Factor 50 (reduced quality) 23.4 Kilobytes



Figure 23 - JPEG - Quality Factor 10 (noticeably reduced quality) 9.9 Kilobytes

Each of the above images, when stored as a bmp file, requires 672.8 Kilobytes of storage space.

Note that bmp is lossless because it does not use compression, i.e., the image is stored with no loss of resolution or information but the file is BIG.

However when the lossy JPEG algorithms are applied and the file is stored as a JPEG file instead of a bmp file, you can see that as the quality factor decreases, the quality goes down and the storage space required goes down. (Note that some compression CODECs refer to "compression factor" instead "quality factor". A quality factor of 75 generally would mean a compression factor of 25, i.e., quality factor is 100 minus the compression factor.)

Typically, JPEG is run with a quality factor of 75. In Figure 21 above, we see that storing an image as a JPEG image with a quality factor of 75 instead of as a bmp file reduces the size of the file from 672.8 Kilobytes to 70.4 Kilobytes.

We see that it is very difficult if not impossible to see any difference between Figure 21 and Figure 22 so compression did not seem to degrade the image very much and it did reduce the file size from 672.8 Kilobytes to 70.4 Kilobytes.

We see in Figure 22 that the image has degraded slightly due to the lower quality factor of 50.

The degradation is barely noticeable if you look carefully at the side of the horse's face where the white and brown hair join you can see that the boundary is no longer smooth.

We see in Figure 23 that the image has degraded very noticeably due to the very low quality factor. The file is very small however, 9.9 Kilobytes instead of the original 672.8 Kilobytes.

The above merely illustrates the concept of lossy compression. Again, there are MANY compression schemes that have been invented. They all behave a little differently. They are all designed to reduce the size of the image file without noticeably degrading the image when it is displayed.

Why do you care? You care because the AVI files that you will be generating consist of a collection of images stored in a file. Movies are made up of many images that are displayed rapidly in succession. If you do not use compression, your AVI files will be HUGE.

See also: [Video CODECs](#), [Configure Window Examples](#).

Configure Window Examples

The following images show configuration windows associated with various [CODECs](#) that might be available on your machine.

These are accessible through the "Configure..." button that appears on the movie setup windows IF the selected "Compression" scheme has a configuration window associated with it. This shows the Movie Setup window for Time-Lapse captures so you can see where the "Configure..." button and Quality slider are.

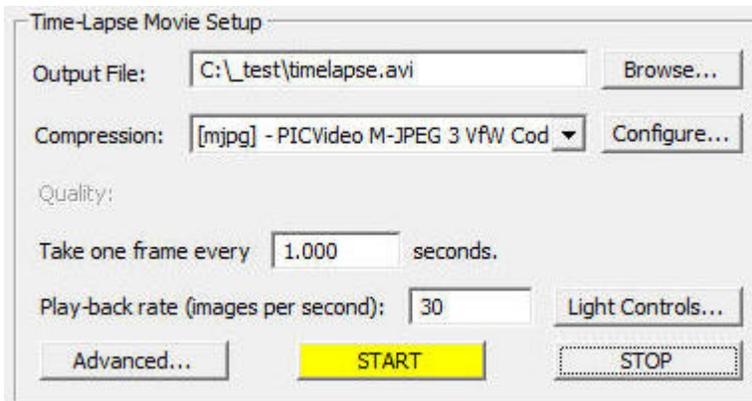
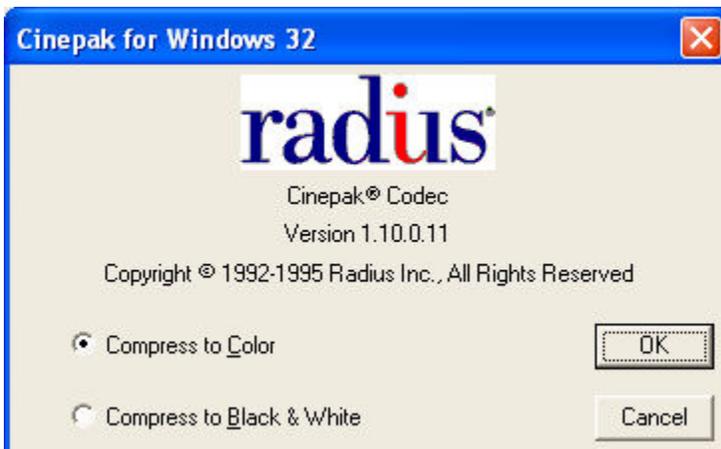


Figure 24

Below, we describe briefly the control each configuration window allows over [compression](#) [Quality](#).



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Figure 25 - Cinepak CVID CODEC

CVID has no adjustable quality option.
HandyAvi's Quality slider has no effect.

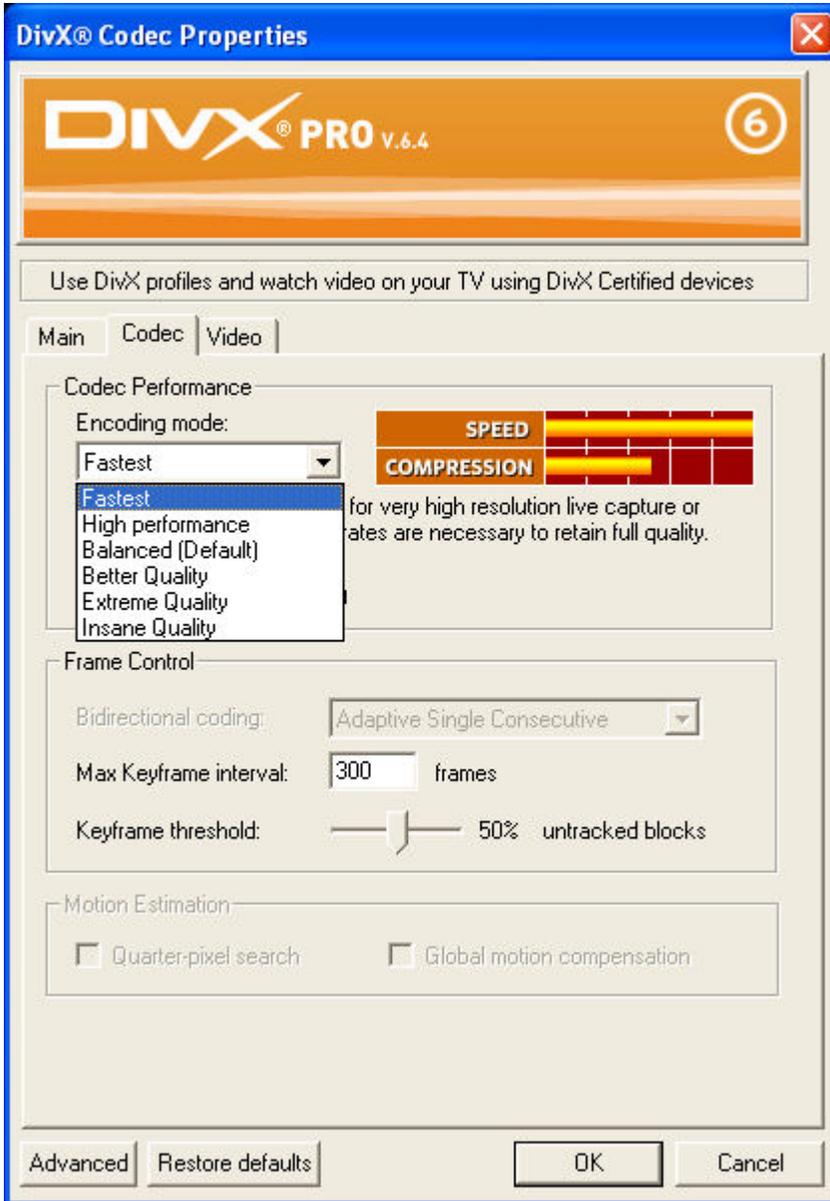


Figure 26 - DivX CODEC

DivX allows you to select various "Encoding Modes" which essentially cause the quality to be higher or lower.
HandyAvi's Quality slider has no effect.

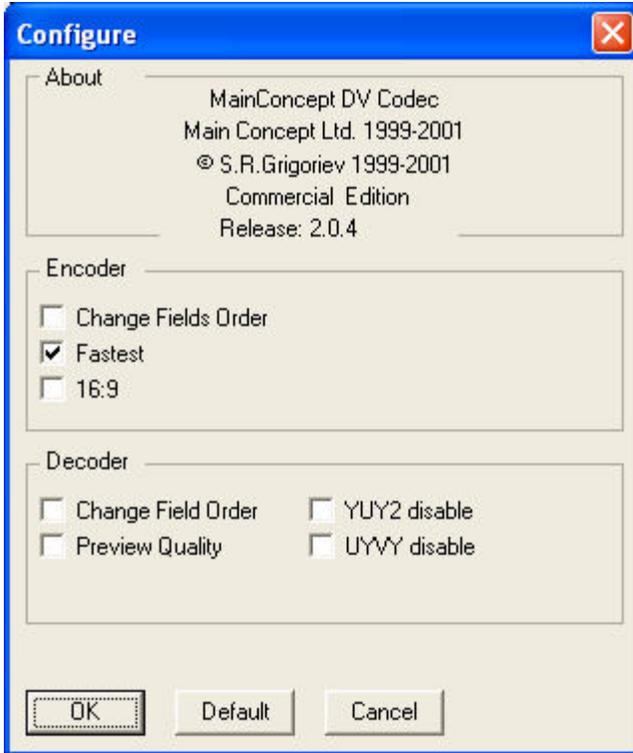


Figure 27 - DVSD Codec

DVSD allow you just two Quality options, Either "Fastest" or not. HandyAvi's Quality slider has no effect.

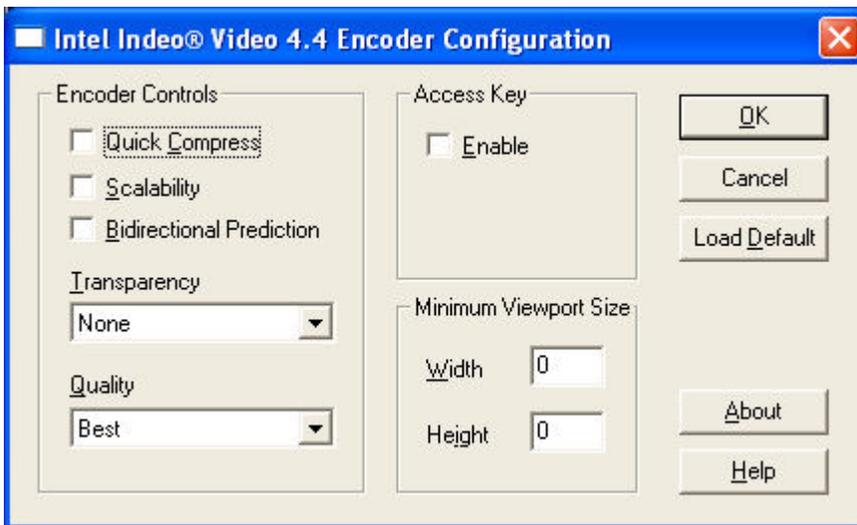


Figure 28 - IV41 CODEC

IV41 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.



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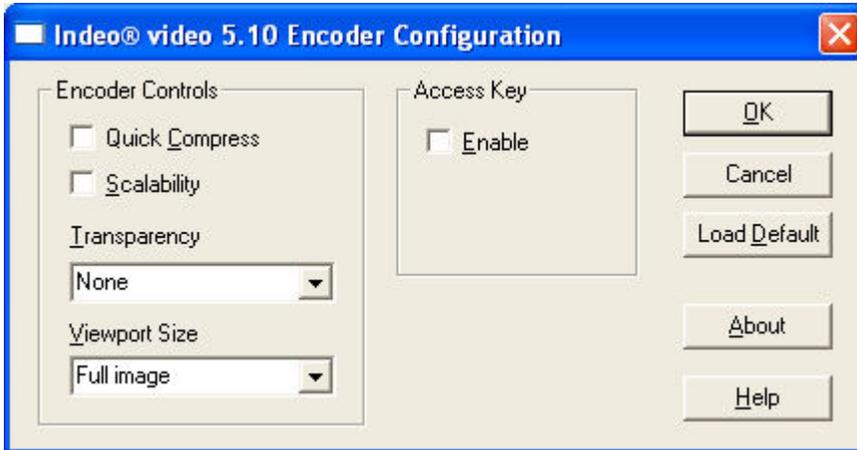


Figure 29 - IV50 CODEC

IV50 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.

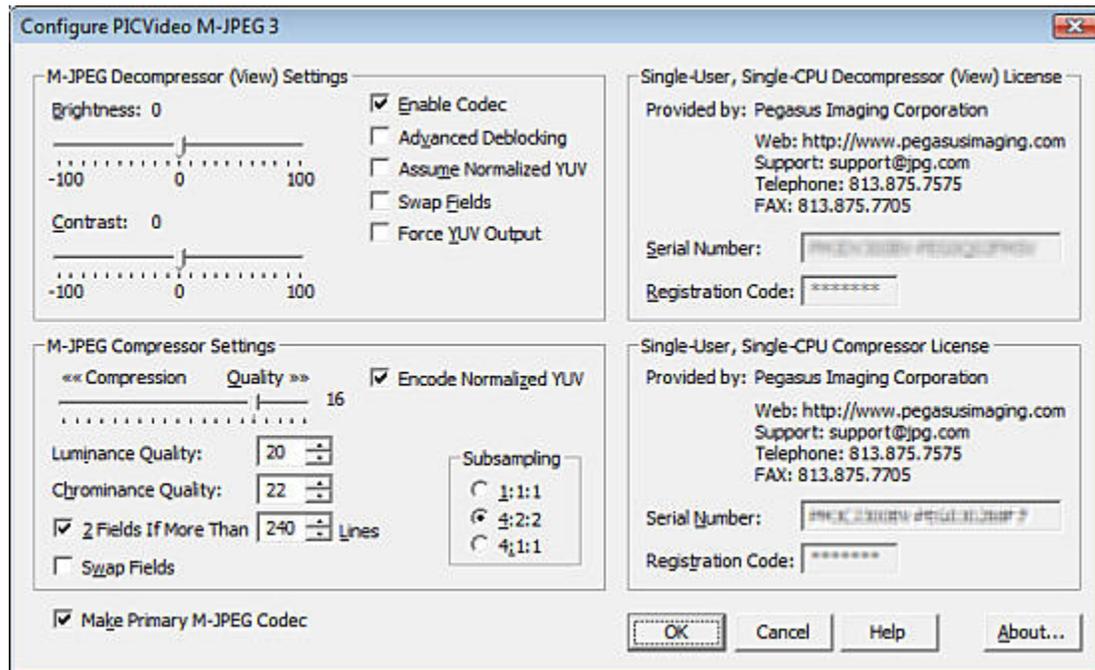


Figure 30 - PICVideo MJPG CODEC

There are at least two MJPG CODEC vendors out there. As far as we know, you have to buy an MJPG CODEC if you want to use one.

The PICVideo MJPG CODEC has a Compression-Quality slider that you can adjust to set your desired trade-off between image size and image quality.

HandyAvi's Quality slider does not appear when the PICVideo MJPG compression scheme is selected so the above panel is the only way to adjust Quality/Compression.

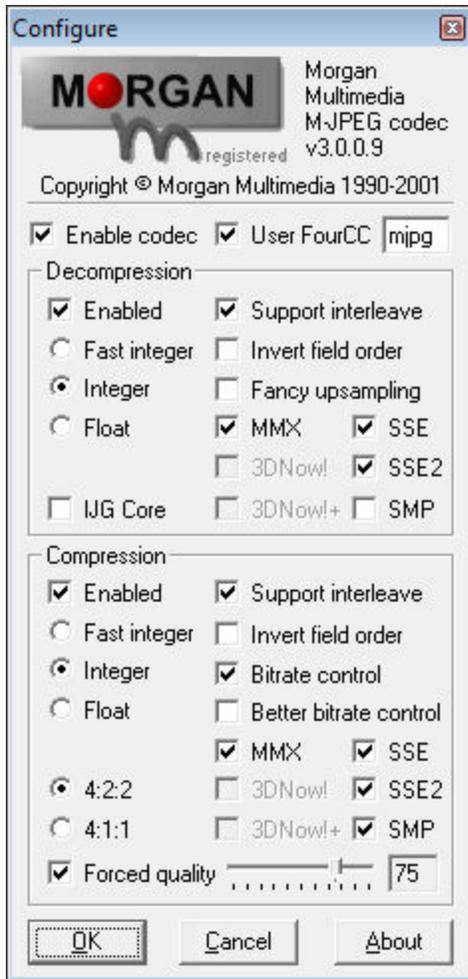


Figure 31 - Morgan Multimedia M-JPEG Codec

Morgan M-JPEG allows quality to be set if the "Forced quality" check box is checked. The value in the display box (here seen as 75) ALWAYS overrides the value set by the HandyAvi Quality sliders!

HandyAvi's Quality slider appears but has no effect.

(We ran into a problem with the above version of the Morgan CODEC in Vista when we used image sizes other than 160x120, 320x240 or 640x480. Caused a HandyAvi crash that we could not find a work-around for... We sent Email to the vendor describing the problem. Received no answer after several days. ***This CODEC seems to work just fine in Windows XP though...***

In the past, we have always used the Morgan Multimedia M-JPEG Codec but we have now installed the PICVideo M-JPEG CODEC and are using it instead on Vista.)



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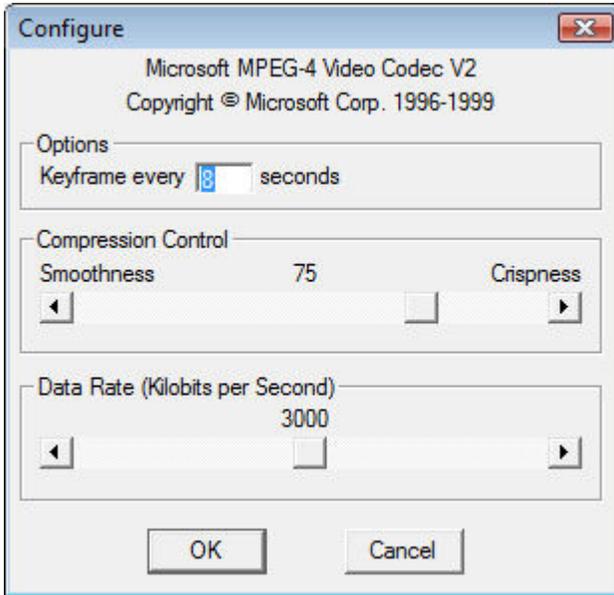


Figure 32 - mp42 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

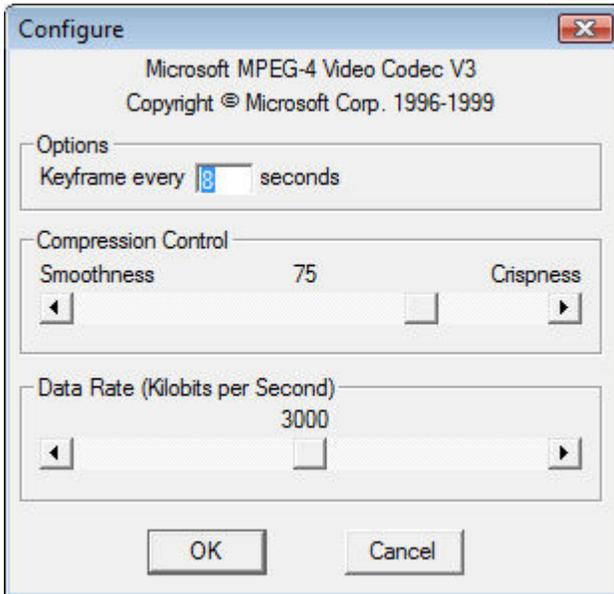


Figure 33 - MP43 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

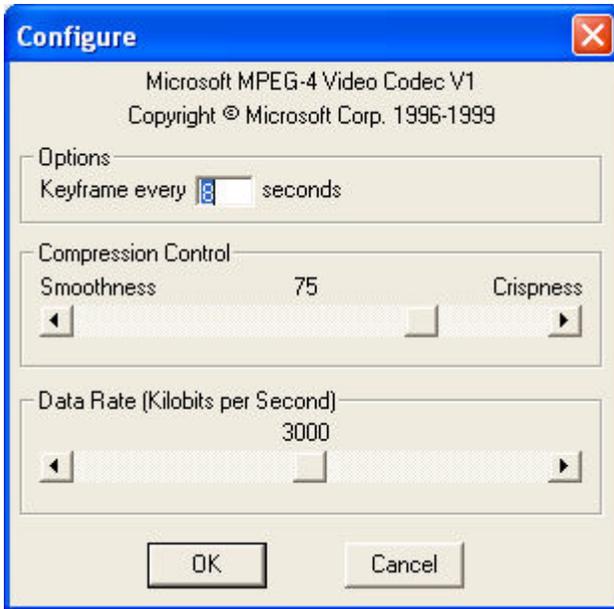


Figure 34 - MP41 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

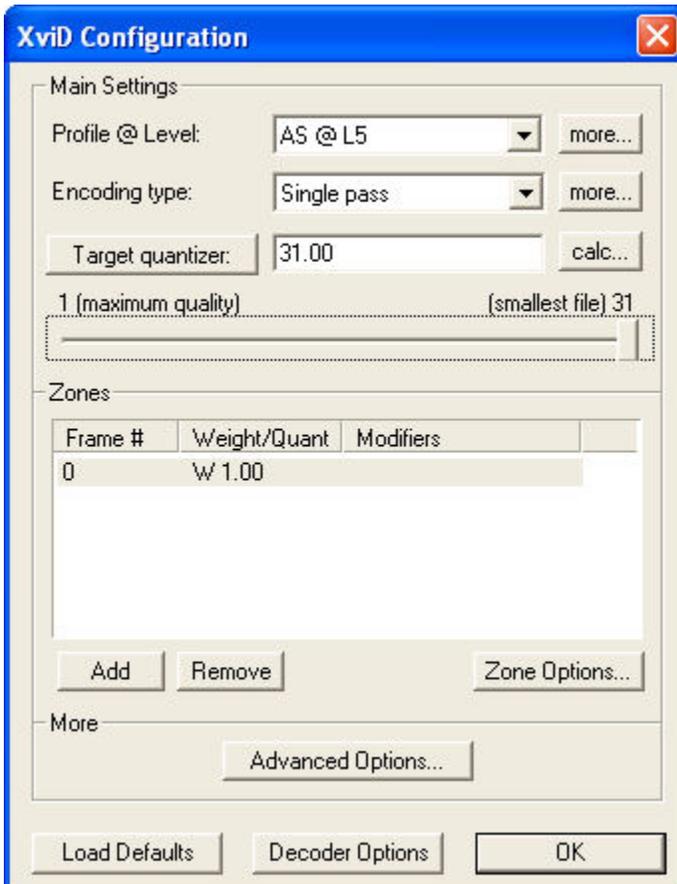


Figure 35 - XviD CODEC



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HandyAvi's Quality slider DOES control quality for this CODEC.

Create a Motion-Detect Video

Motion-detect Video Overview

HandyAvi allows you to easily make motion-detect videos using a webcam.

What we mean by a "motion-detect" video is that the only image frames that are transferred to your new AVI output file are frames that are "different" from the previous frame by some amount determined by a "sensitivity" setting.

For example, if your webcam is operating at 30 frames per second and you are doing motion-detect video capture with your webcam pointed at some scene then the first frame will be captured to your new AVI video file. No further frames are sent to your new AVI video file until something has moved, flashed, appeared or disappeared from the first frame. Each newly captured frame becomes the frame against which subsequent frames are compared. As long as things keep changing (subject to the sensitivity setting) in the scene that the webcam is pointed at, then new frames will be sent to your new AVI video file. If nothing is changing, no frames will be sent to your new AVI video file.

This means that you can monitor some scene for activity and capture all activity to your AVI video file without capturing video when there is no activity. This greatly reduces the storage needed for monitoring activity in a scene.

Motion-detect video could be used to

- monitor an entryway
- monitor a driveway
- monitor a parking area
- monitor a warehouse
- capture lightning during a thunderstorm
- monitor a place where wild animals might appear
- etc.

Applications are limited only by your imagination.

HandyAvi will allow you to set the sensitivity of the motion-detect feature while you are capturing frames so that you can see the effect of the sensitivity setting in real-time.

If you set the sensitivity to 0.0 then NO frames (except the first) will be captured.

If you set the sensitivity to 100.0 then ALL frames will be captured.

If you set the sensitivity somewhere between 0.0 and 100.0 then frames will be captured depending on how much the last stored motion-detect image frame differs from the next frame taken by the webcam.

How to open the motion-detect video control window

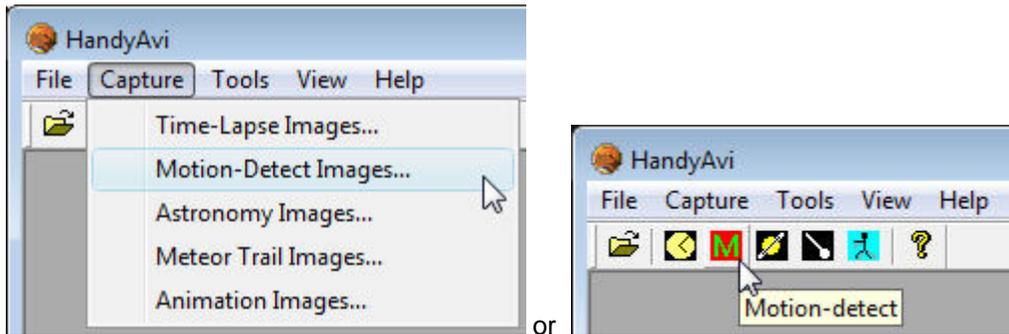


Figure 36

From the main HandyAvi window, select the "Capture/Motion-Detect Images" menu item to bring up the "Motion-Detect Capture window".

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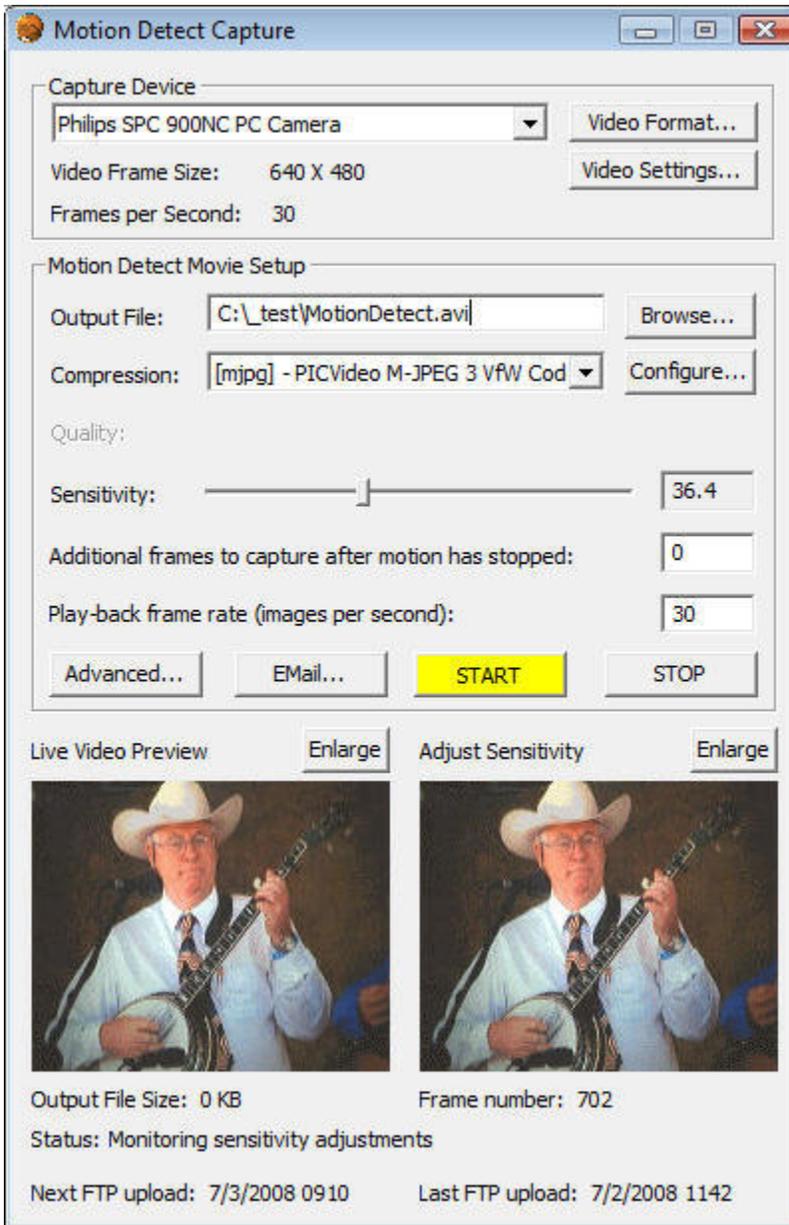


Figure 37

This window controls all of the motion-detect photography functions of HandyAvi.

The Capture Device Section

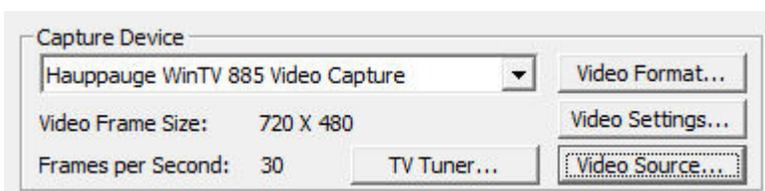


Figure 3

This section of the Capture window allows you to choose a webcam (i.e., a capture device). If you have several webcams plugged in, they will all be listed here if you click on the pull-down arrow. In addition, some other types of video capture devices may be listed here such as the Hauppauge WinTV PVR PCI II Capture device or the Hauppauge WinTV Video 885 Capture device. Other buttons (see below) may also appear in this section depending upon the capabilities of the selected device.

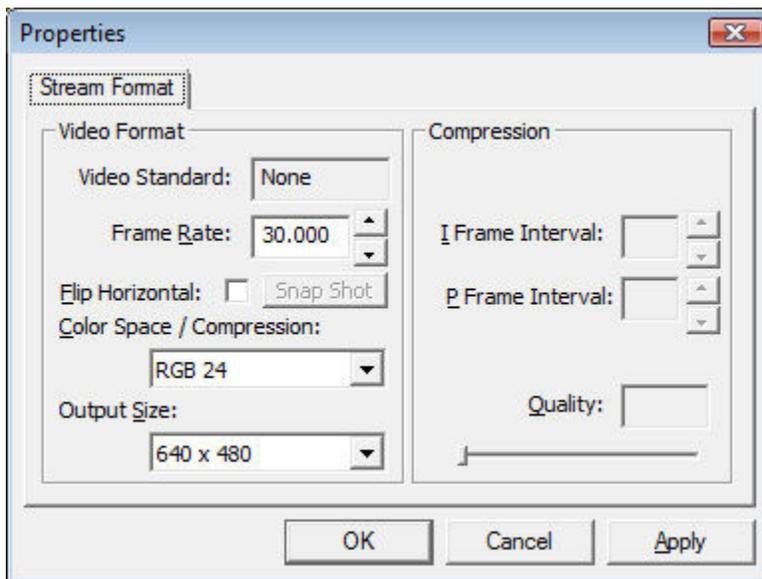
We see in the Capture Device section that the webcam currently selected is the Logitech QuickCam Pro 4000.

Its "Video Frame Size" is currently set to 640x480.

Its frame rate is set to 30 frames per second. Note that this value will sometimes be overridden by the camera drivers when the camera is in a mode where brightness and contrast are set "automatically".

The video frame size and the video frame rate can be changed by left-clicking the "Video Format" button. This will bring up the camera manufacturer's Video Format or Properties window which will allow you to make changes to basic camera functionality.

Video Format: This button causes display of a window provided by the manufacturer of your webcam. For a Logitech QuickCam Pro 4000, the window that comes up looks like this:

**Figure 4**

This window may be used to change the video format settings of your camera. In particular, the "Frame Rate" tells how many frames per second your camera will capture although your camera driver will sometimes override this if it is set to an "automatic" setting.

The Output Size selection allows you to select the frame size in pixels of the images that the camera will be taking. Both the ToUcam and the **Logitech QuickCam Pro 4000** for example, allow the image sizes shown here:



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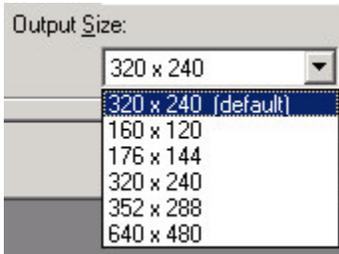


Figure 5

HandyAvi will automatically save and restore your Video Format settings if possible.

Video Settings: There is also a button called Video Settings. This will bring up the webcam manufacturer's video settings window and will allow you to change other types of camera settings such as contrast, color, brightness, sensitivity, etc., depending on how many items the camera manufacturer allows you to modify. The Video Settings window for the Logitech QuickCam Pro 4000 webcam looks like this:

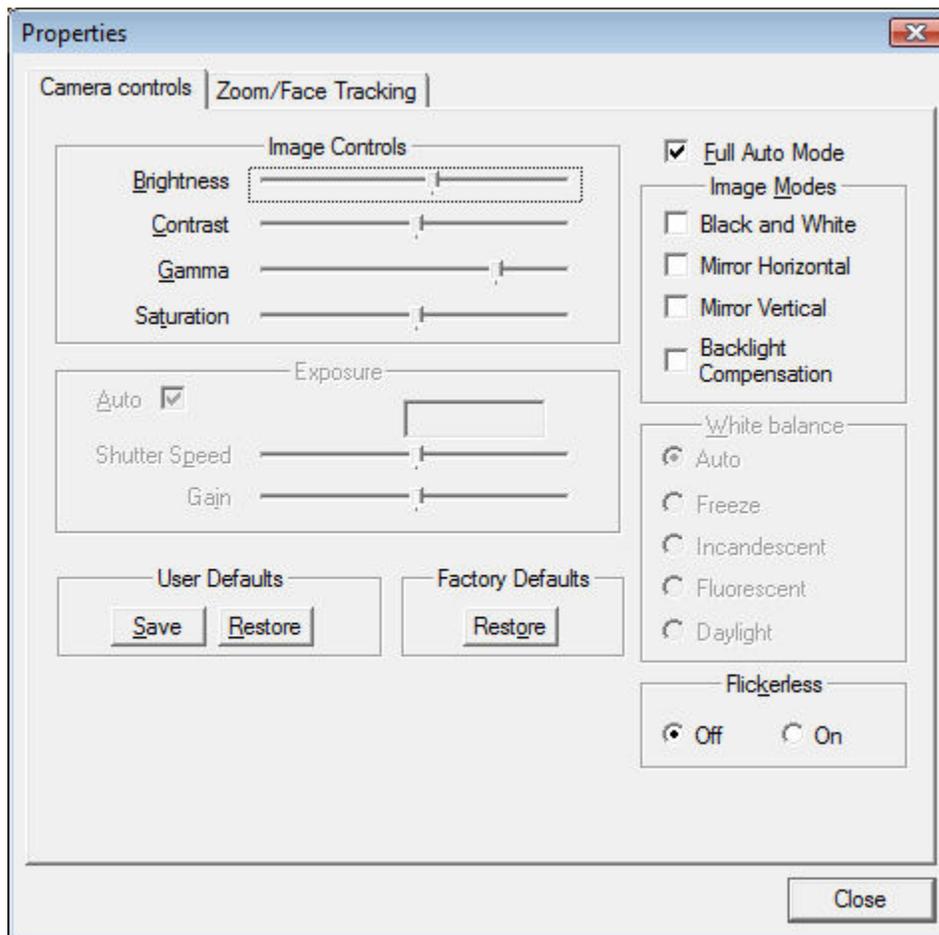


Figure 6

The image in Figure 6 shows that the camera is in "Full Auto Mode" which means that the camera will automatically adjust for changes in light levels. It will sometimes change the frame rate automatically when in this mode.

The Video Settings window for the Philips ToUcam webcam looks like this:

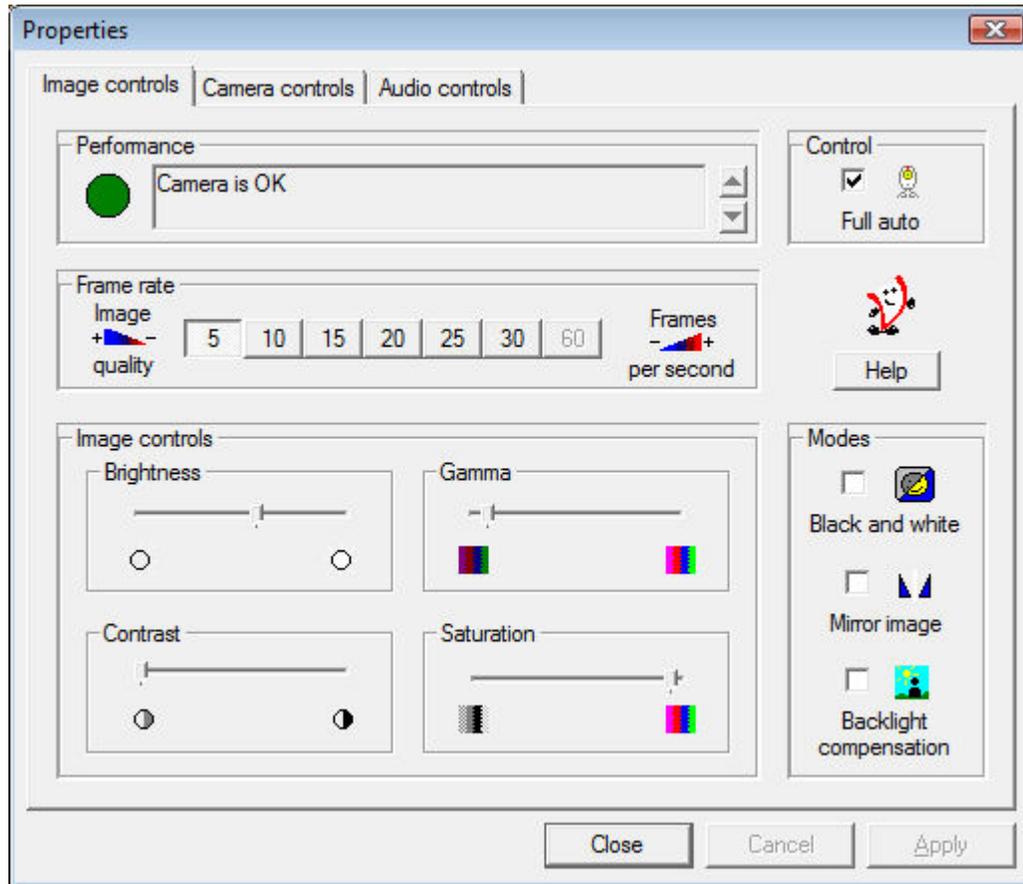


Figure 7

These controls provide a great deal of control over your webcam and might need to be adjusted to get the best results under various lighting conditions. For planetary astronomy of, for example, Saturn using a telescope, we usually take the camera out of "Full auto" and adjust the "Frame rate", "Brightness", "Contrast", etc., to provide an image that is not over-exposed. We have found that lowering the "Frame rate" is often helpful for planetary imaging.

Other webcams may have other types of video settings windows of course. The above are simply examples of webcam control features that two different manufacturers decided to provide.

IMPORTANT: if the "Full auto" control is checked in Figure 7, it can override the frame rate and set it to a lower value. Under dim lighting, the automatic settings for many webcams cause the frame rate to be reduced so that brighter images can be obtained. You can see in Figure 7 that the original frame rate of 30 frames per second has been overridden so that the frame rate is now 5 frames per second. By switching "Full auto" off, you can manually set the frame rate override to 30 if you wish to capture more frames more quickly. This is important because it can be puzzling if you are not aware of it.

Video Source: The user here has selected a "USB 2821 Device" which is a USB/Video Adapter so a "Video Source..." button is now displayed:



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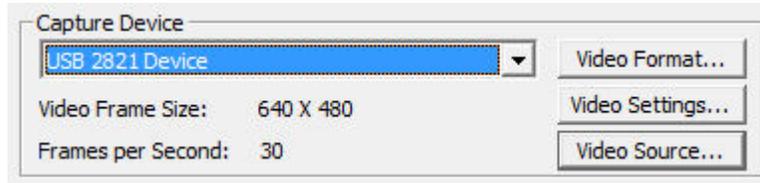


Figure 8

The "Video Source" button will be displayed ONLY when the capture device you are using supports Video Source options. (Most webcams do NOT support the "Video Source" option. However, many USB video adapters and many video boards do support the "Video Source" option.)

We have successfully used a USB 2.0 Video Adapter with Audio adapter (Model GA-VD204) which shows up as a "USB 2821 Device" with HandyAvi. We have also successfully used USB video adapters produced by five other manufacturers.

Some adapters allow EITHER Video Composite signals to be input or S-Video signals to be input. The Video Source window will allow you to choose which one will be seen by HandyAvi.

Here is what the USB 2821's "Video Source" windows looks like:

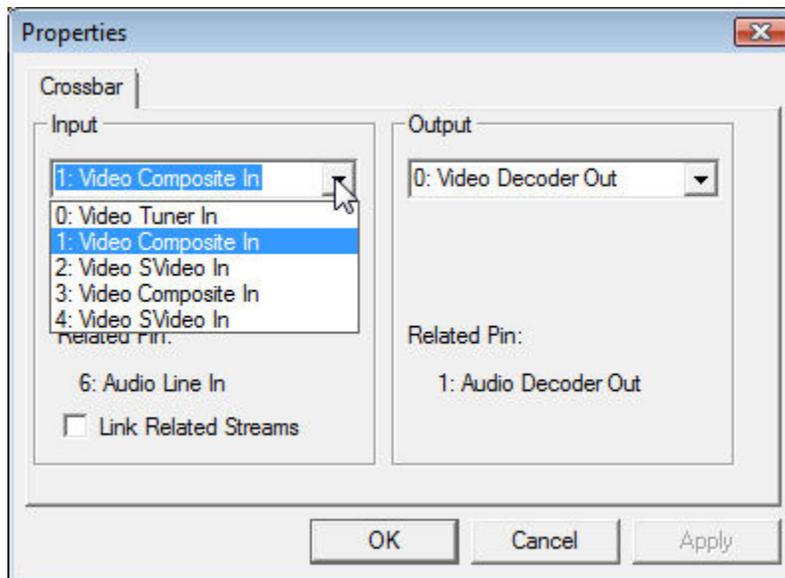


Figure 9

You can see that we have opened the "Input" pull-down. "Video Composite In" means HandyAvi will see the video stream from a camera plugged into the adapter's Composite Video input port (a standard Phono Plug).

If instead you plug an S-Video source into the adapter (from a VCR or DVD player, etc.) and choose "2: Video SVideo In" then HandyAvi will see the video stream of the S-Video device that you have plugged in.

Note that most surveillance cameras output Video Composite signals, i.e., NTSC signals in many countries, PAL in many others. We have a Watec 902H2 ULTIMATE camera that we are using for Meteor Detection. We plug its Video Composite output into the GA-VD204 adapter (or other USB-Video adapter) and then plug the adapter into the USB port. HandyAvi sees the video and everything works well.

Note that some adapters check to see if you are using a USB 1 port or a USB 2 port. Some of them will NOT allow you to set higher resolutions (like 640 x 480) if you are using a USB 1 port. This is usually undocumented and can be puzzling which is why we are mentioning it here...

It should be noted that the Watec 902H2 ULTIMATE is an EXTREMELY sensitive low-light camera (.0001 Lux supposedly) and is more expensive than most cameras used for surveillance work. We needed the sensitivity for meteor detection. There are of course MANY cheaper cameras that output NTSC Video Composite signals that can be used with HandyAvi via a USB-Video adapter.

The user here has now selected a "Hauppauge WinTV 885 Video Capture" board:

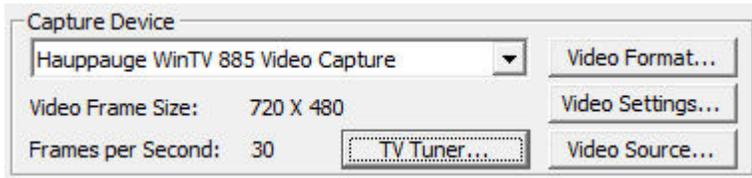


Figure 10

The "Video Source..." button now exposes this manufacturer's window:

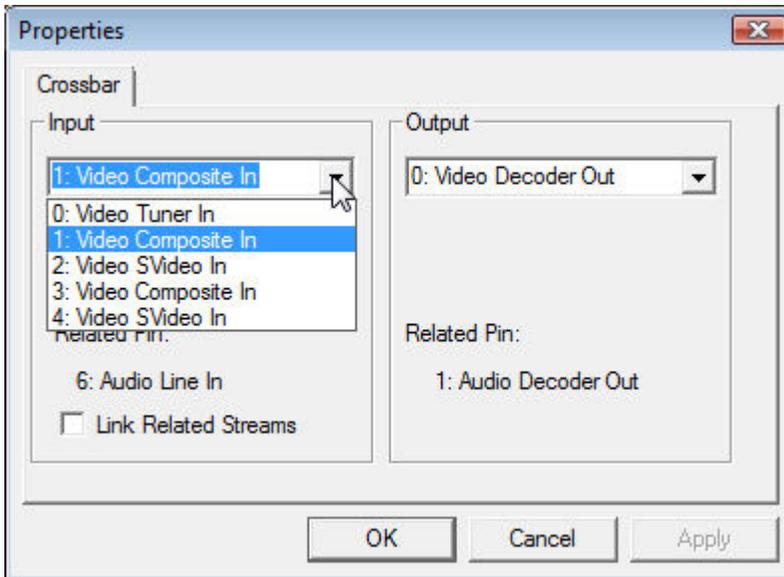


Figure 11

"Video Tuner In" means that the board is going to receive input from the TV tuner. S-Video and Composite inputs can also be selected as input sources. We don't know why this board has two "Video SVideo In" selections...

TV Tuner: The Capture Device section also now includes a "TV Tuner" button which provides access to the board manufacturer's TV Tuner settings window:



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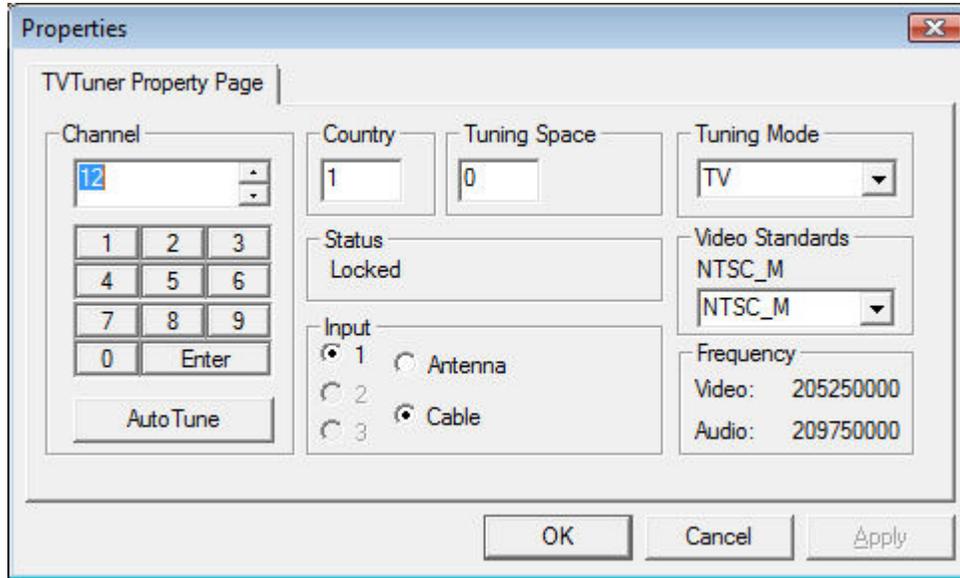


Figure 12

This window allows you to select the input television channel among other things. On this particular board, we have found that to input Channel 12, you have to enter 12 then click on "Enter" or the channel input is ignored! Usually, we would select "Antenna" unless we are connected to a cable. There is a selection for "Video Standards" which includes NTSC_M, NTSC_JM, PAL_M, PAL_N, and PAL_COMBO. The "Tuning Mode" includes "TV" and "FM".

The Motion Detect Movie Setup Section

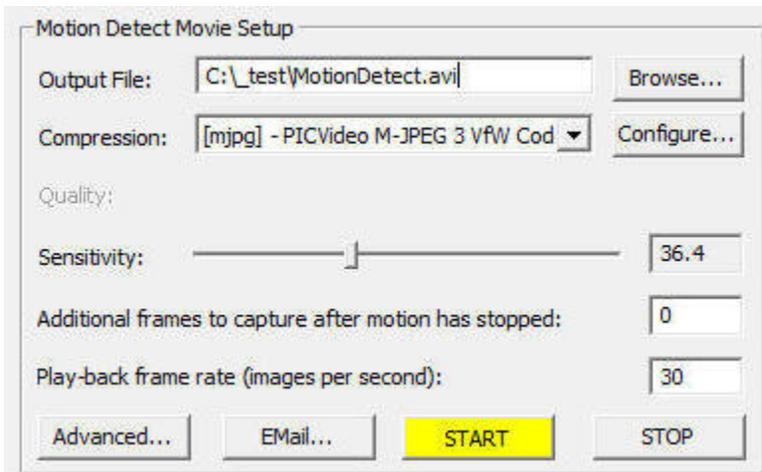


Figure 38

This section of the motion-detect video capture window allows you to set up the webcam for making a motion-detect video.

Output File: Allows you to type in the path name of the new video file you want to create. **Note:** The background color of this field will be YELLOW if you have selected File Recycling in the [Preferences](#) panel and have the "Use file recycling" box checked. The color is simply to notify you that file recycling is active.

Browse: brings up a standard file selector window so that you can more easily place the file in a particular folder.

Compression: Select any AVI file compression scheme resident on your computer. File compression schemes or codecs (short for coder/decoder) show up on your machine from many sources. Microsoft installs several. Your video camera may install one or more. You may download and install compression schemes from the internet. At the time of this writing, there are over 280 codecs listed at <http://www.fourcc.org>. Note that one of the selection items is called Uncompressed. If you select Uncompressed, the image data in your files will not be compressed. Your files will be LARGE. However, each image in an Uncompressed file will contain images that are exactly what the camera captured. Compressed images are usually slightly different from the original images because information is lost during compression. In most cases, the difference is not noticeable. Use of uncompressed images is important for some applications but not necessary or advisable for most. [Learn more about video codecs here.](#)

HandyAvi displays the FOURCC value for the compressor in brackets at the beginning of the "Compression:" line.

Note that HandyAvi will also allow you to read, work with, and display AVI files produced by other software or cameras and will select the proper decompression scheme automatically IF the required decompression scheme has been installed on your computer.

So you can convert AVI files from one compression scheme to another if the required codecs have been installed on your machine.

Configure: Brings up the compression CODEC's configuration window. This button only appears if the selected compression scheme HAS a configuration window.

Note that the "Quality:" slider and the quality settings in some CODECs do not "cooperate". In the case of the mjpg CODEC, the "Forced quality" slider determines the degree of JPEG compression and the "Quality" slider in the "motion-detect Movie Setup" window has absolutely no effect. Other CODECs we have tested do not override our "Quality:" slider.

When in doubt, you should test by setting the quality and capturing (for example) three frames of the same scene (use Time-Lapse and take one frame every 3 seconds or so). Then change the quality factor and make another movie. The size of the two resultant AVI movie files should be different.

See Configure Window Examples for information on the Configure options of various CODECs.

[Learn more about video codecs here.](#)

Quality: Adjust the quality of the compression scheme. Most compression schemes create smaller files because they are actually discarding tiny image details. By discarding more and larger image details, you can produce a smaller AVI file. If the Quality is set to 100, then little or no image data is discarded and the resultant AVI file will be large. If the Quality is set to 0 then, theoretically, all image data is discarded and the resultant AVI file will contain blank images! Of course each codec is created by software people who may have thought about this and limited it so they do not throw away all of the image data even if the Quality is zero.



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Note that each codec is different and some may even ignore the Quality setting or not allow it to be set. Also note that lossy compression schemes are used in many applications. JPEG is an example of a lossy compression scheme that is used in MANY applications and the fact that some of the image data has been discarded is practically unnoticeable. So compression with slightly reduced quality is a very good thing in most cases. Learn more about video codecs here.

Sensitivity: This slider lets you set up the motion-detect sensitivity. Each frame taken by the camera will be compared with the previously captured frame to see if it is different enough to be stored in your video output file.

If the sensitivity is set to 0.0, then only the first frame will be captured when you "START" making a video. Other frames cannot be different enough to be captured if the sensitivity is set to 0.0.

If the sensitivity is set to 100.0, then ALL frames will be captured after you "START" making a video. Each frame will seem to be different from the previous frame so all frames will be captured.

If the sensitivity is set somewhere between 0.0 and 100.0, then not all frames will be captured. Only frames "different enough", based on the sensitivity setting will be sent to the video output file. (The first frame of course is always sent to the video output file when the capture session is "START"ed.)

The sensitivity can be set during capture as well as before or after. This allows you to adjust the sensitivity and test it while a video is being made. You will be able to see which frames are captured by looking at the "Last Motion Detect" frame window in the [Motion-Detect Display Area](#).

Each frame taken by the camera will appear the current "Live Video Preview" frame visible in the [Motion-Detect Display Area](#).

Each frame captured and sent to your video output file will appear in the "Last Motion Detect" frame area visible in the [Motion-Detect Display Area](#).

Additional frames to capture after motion has stopped: Enter the number of frames to add (continue recording) after motion detection is no longer being triggered.

This was added for wildlife photography where, for example, a cougar triggers motion detection as he approaches a lake for a drink. While he is drinking, not much motion occurs so the motion detection triggering ceases but the cougar is still there drinking so you want to continue recording. If your camera is operating at 30 frames-per-second and you want to continue recording for 1 minute, you would want to enter the number 1800 (30 times 60 seconds).

Play-back frame rate (images per second): Determines how fast your frames will be displayed when you play the AVI movie that you have recorded. If you want the frames to be played in "real-time" then you should set the rate to the same rate as the camera was set to when it was recording. If you want each frame to be presented at a very slow rate, then you could set the play-back rate to 1 second. In this case each frame of the movie would be displayed for one second when the movie is played.

Start: Starts the motion detect movie making process.

Note that the Start button here is yellow. This indicates that a **Set Allowable Image Capture Times...** [preference](#) item has been set. Yellow means that video recording is currently allowed but at some point in time, video recording will cease until it is again allowable. Red would mean that video recording is not allowed at the current time.

NOTE: Output files will automatically be limited to less than 2 Gigabytes, the AVI file size limit. A new file with a unique new name will be generated and used automatically whenever the limit is about to be exceeded. See Preferences for more information about Maximum AVI File Size.

Stop: Stops the motion detect movie making process.

Advanced: button brings up the "Advanced Motion Detect Settings" window:

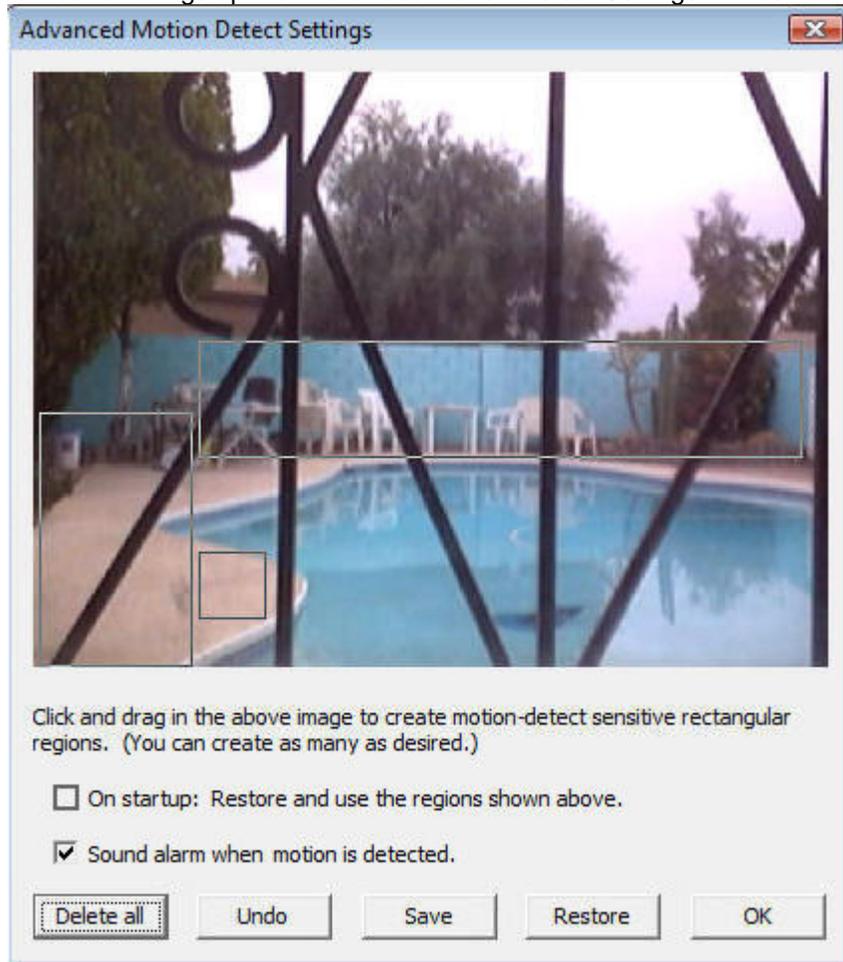


Figure 39

Normally, the whole image is sensitive to motion.

The "Advanced Motion Detect Settings" window allows you to create rectangular sensitive regions.

Note that the image area will contain the current image. It is refreshed about once per second so you can see current image. You will thus be able to see how the rectangles you create relate to the image.

The rectangular regions are created by placing the cursor on the image display area, depressing the left mouse button and dragging it while holding it down. When it is released, the new rectangle is added to a list of rectangles maintained internally by the software.

On startup: Restore and use the regions shown above: If the displayed regions have been "Save"d then they will be remembered and used whenever a Motion Detect Capture session is started. (Unless the saved file has been deleted or moved. In that case, the entire video area again becomes sensitive...)



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Sound Alarm when motion is detected: When this box is checked, a "bell" will sound when motion is detected.

Delete all: Will cause all rectangles to be deleted. The entire image will then be sensitive to motion.

Undo: Will erase the last rectangle. Pressing it repeatedly will erase previous rectangles in the opposite order in which they were created.

Note that the Advanced Motion Detect Settings window rectangles are active immediately, i.e., as soon as they are created, they will begin operating. This will allow you to tune the sensitivity if necessary.

During capture of an AVI file, when one or more of these sensitive regions have been created, image frames will be captured to the output file ONLY when motion occurs within one or more of the rectangles. This will allow you to ignore trees blowing in the wind for example but capture frames when motion occurs in the areas of interest.

Three sensitive rectangles are shown above. One would show any movement around the table at the other end of the pool, one would show any movement on a small portion of the path to the left of the pool and the third smaller window covers a small region of the pool deck. Any movement in any or all of these areas (subject to the sensitivity setting of course) would cause frames to be captured. Motion in all other areas of the image is ignored.

Save: Saves the rectangles in a file for future use.

Restore: Restores the rectangles stored in a file so that they will be used.

Email: Brings up the Email setup window:

Figure 40

This feature of HandyAvi allows you to send an Email message whenever motion is detected.

SMTP: This field must contain the address or TCP/IP address of a valid SMTP server. If you are successfully sending Email using Outlook or Netscape, then you have an SMTP server. Your Internet Service Provider (ISP) supplied you with one when you signed up with them. If you know what it is, use it. If not, you could call your ISP or look on-line to find the name of your SMTP server. Or you could display it via your Email program.

In Netscape,

1. On the Edit menu, click Mail and Newsgroup Account Settings
2. In the window that comes up, click Server Settings.
3. In the window that then comes up, click Advanced.
4. The name of your SMTP server shows up in the "Server" field. Write it down.
5. Close the Netscape windows without changing anything.
6. Enter the SMTP address you wrote down into the HandyAvi SMTP field in Figure 40.

In Outlook,

1. On the Tools menu, click E-mail Accounts.



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2. Select View or change existing e-mail accounts, and then click Next.
3. Select your ISP account, and then click Change.
4. A panel will come up. One of the fields says "Outgoing mail server (SMTP):" Your SMTP server will show up in that field. Write it down.
5. Close the Outlook panels without making any changes.
6. Enter the SMTP address you wrote down into the HandyAvi SMTP field in Figure 40.

Email Particulars: This area lets you type in the specifics of your Email messages.

From: Enter your Email address.

To: Enter the Email address of the person you want the message sent to. (Normally this would be the same as your From Email address.)

Subject: Type in whatever you want your subject line to say.

Text: Type in any text you want included in the message. (Normally this would be left blank.)

Email Still Image Transmission Settings: These are options defining the images to be sent in the Email messages and whether any Email messages should be sent.

Full Size Image: When motion is detected, the first image usually contains very little information. For example if a person walks into the motion-detection area, you might only see his foot in the first frame. So HandyAvi lets you choose the first, or second, or third, or whichever image frame you want to send when a new motion detection sequence is triggered. If the check box is not checked, this image will not be transmitted.

If, for example, you choose the 30th frame and the motion does not last that long and only 10 images are captured, there is a 2 second timer that will cause the 10 image to be sent.

Thumbnail Images: When motion is detected, this option allows you to Email an image containing as many thumbnail (small, 100 pixel max) images as desired. Each frame of the movie being captured is reduced in size and pasted into an array. A single JPEG image containing the requested number of thumbnail images is transmitted. If the check box is not checked, no thumbnail images will be composed and sent.

Enable Email Transmission: If this check box is checked, then Email will be sent. If the check box is not checked, no Email messages will be sent by HandyAvi.

Send Test Message: Press this button to send a test message to test whether you have correctly entered the SMTP server address and the Email "From" and "To" addresses. The test message will contain one full size test image. No thumbnail images will be included.

Here is a representative Email message composed and sent by HandyAvi where the user requested that the fourth image be a full size image and that the first 13 thumbnail images be captured and sent:

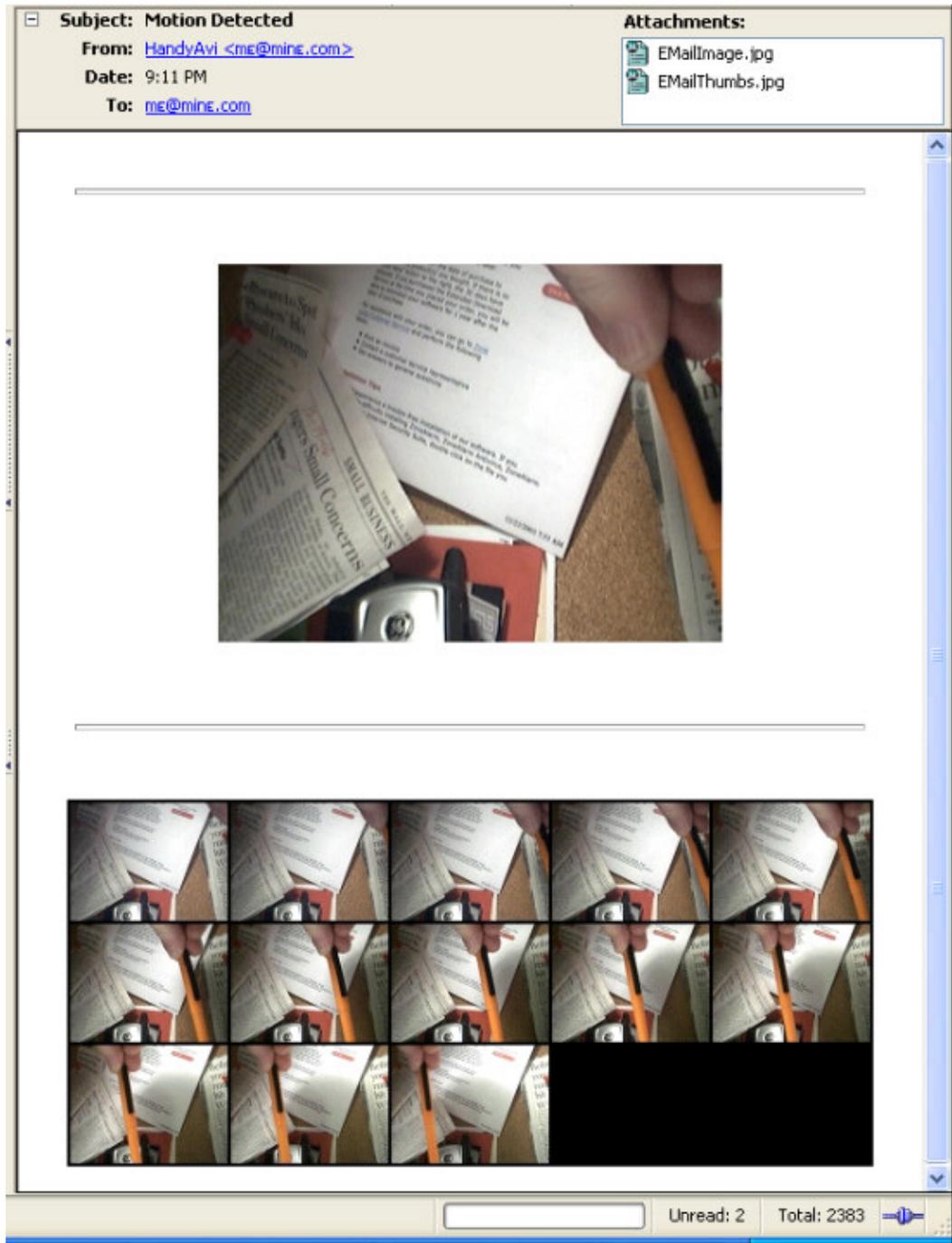


Figure 41

The above is just a test illustrating what HandyAvi will do. The test images are of a highlighter being moved through the camera view field.

The Motion-Detect Display Area



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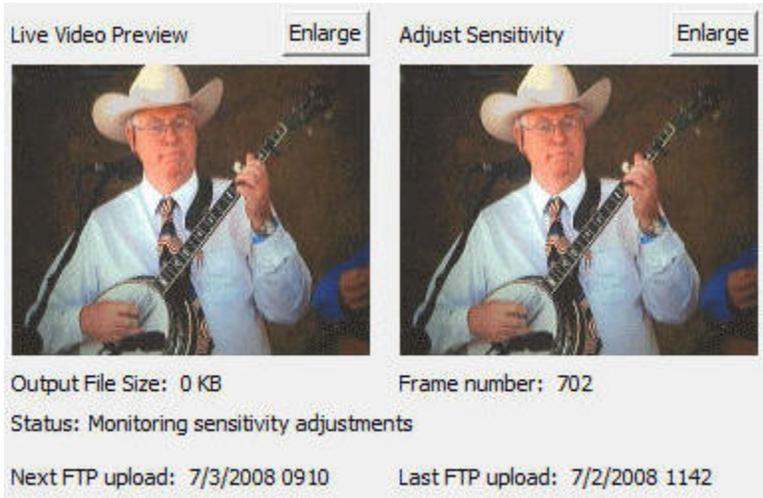


Figure 42

This area of the Motion Detect Capture window contains two video display areas. The left one is a live video preview window showing what the camera is actually seeing at the frame rate at which it is currently running. The right window shows the last frame that was captured to your new video file. If nothing has yet been captured, it shows a blank as seen in the above image.

Enlarge: If you use one of the "Enlarge" buttons, a new window will be created containing the video image. This new window can be resized to any size by clicking and dragging an edge or corner of the window.

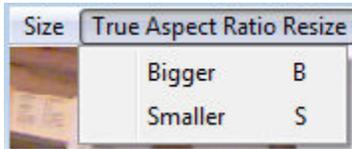
This new window also contains a "Size" option that will allow you to select a "True Image Size" option which will resize the window to show the actual size of the captured video images. Pressing the "t" key will also perform the True Image Size function.



Figure 43

Figure 43 shows an enlarged "Live Preview Frames" window that has been sized with the "Size" option set to the "True Image Size" of 320x240 which was the size selected in Figure 5 in the [Capture Device](#) section.

There is also a "True Aspect Ratio Resize" option:



Selection of "Bigger" will resize the window to a slightly bigger size while keeping the true aspect ratio of your image. Pressing the "b" key will also perform this action.

Selection of "Smaller" will resize to a slightly smaller size while keeping the true aspect ratio of your image. Pressing the "s" key will also perform this action.

If you close an enlarged window, the images will again appear in the "Live Video Preview" window or the other window if it was the one that had been enlarged.

About Video Codecs

Note: You do not have to learn about codecs to use HandyAvi.

However, the purpose of a CODEC is to compress your video data so that your AVI files are smaller. So if space on your hard drive is a consideration, you will probably want to use a CODEC.

AVI files can be created either by using no compression (uncompressed) or by using one of literally hundreds of compression schemes (codecs is short for Coder/decoder) that have been created by various companies. Uncompressed files are generally MUCH larger than compressed files.

In order for HandyAvi to use a particular compression schemes, it must have been installed on your computer.

Many AVI codecs probably already have been installed on your machine. Some come from Microsoft as part of your operating system. Some come from the manufacturers of webcams that you might have installed. You can even download and install codecs from the Internet. Some are free and others are not. <http://www.fourcc.org> is a site that lists and describes almost all known codecs. If you surf to that site, you will want to click on "codec list" to see all of the codecs.

Codecs have four character names known as "Four-Character Codes" or "FOURCC" names. This is how they are identified internally so that software applications such as HandyAvi can know which codec was used to produce a particular file.

FOURCC codes are also used internally when a HandyAvi user selects a compression scheme such as "Indeo® video 5.10". "Indeo® video 5.10" has a FOURCC name of "IV50". If you have an AVI file that was encoded using IV50, you can see the IV50 codec name by opening the file in HandyAvi and using the "View/AVI File Info" menu item.



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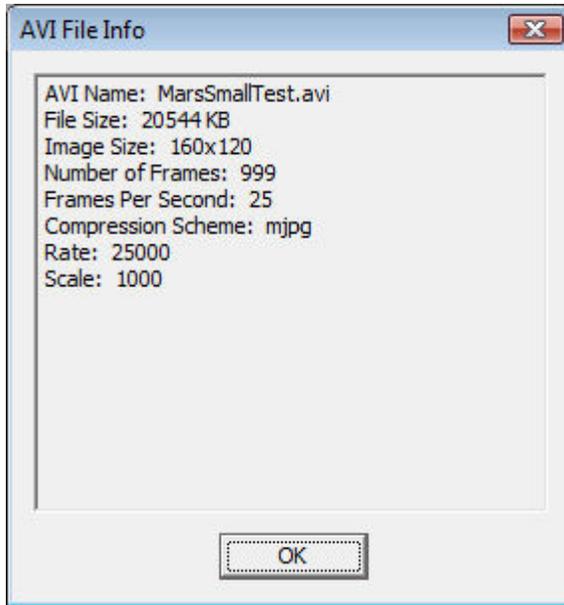


Figure 19

Figure 19 shows that the compression scheme used to compress the file "MarsSmallTest.avi" was mjpg which is the FOURCC code for the "Morgan Multimedia MJPG" codec.

HandyAvi will also attempt to open files compressed with codecs that are NOT installed on your machine. If the required codec is not installed, HandyAvi will, of course, be unable to PLAY the file but it will try to produce an AVI File Info report as shown in Figure 19 so that you will be able to identify the missing codec. If you know which codec was used, you might be able to locate an installable version of the codec via the Internet and install it. Then you would be able to play the file using HandyAvi. If you can play the file using HandyAvi then you can also use [HandyAvi's editing features](#) to create a new file using the same or a different codec and include or exclude selected frames from the new AVI file.

Many CODECs allow you to have control over the "Quality" factor or "Compression" factor that will let you make your files smaller.

[Learn more about Compression Quality.](#)

[Learn more about Configure windows.](#)

About Compression Quality

There are many video compression schemes. The purpose of a video compression scheme is to make a smaller file without sacrificing too much detail in the images.

An uncompressed AVI file is comprised of a series of bmp image files. There are actually many different bmp file formats. Each of the formats is designed to reconstruct an image pixel by pixel. Typically, AVI files are made up of bmp files which have 3 Bytes for each pixel. The three bytes contain the Red, Green, and Blue values for a pixel. Thus, a 640x480 uncompressed image requires approximately 3 x 640 x 480 bytes ("approximately" because there may be some "pad" bytes at the end of each line. There is also a small amount of header data describing the size, color content, length and width of the images, etc.) 3 x 640 x 480 Bytes is 921600 bytes or almost 1 Megabyte! If your AVI video camera is running at 30 frames (images) per second, then you will be storing 30 x 921600 Bytes per second or 27.6 Megabytes per second. 10 minutes of video would require 16,588,800,000 bytes or 16.5 Gigabytes! That is why video compression is usually a good idea! You would like to make the file smaller without messing up the images too much.

Lossless Compression

Lossless compression refers to a compression scheme that compresses the data without losing any of the "information" in the picture. If you compress an image using a lossless compression scheme, the restored image when decompressed is IDENTICAL to the original image. An example of lossless compression is "Run-Length Encoding" used in FAX machines. Run-length encoding for a black and white image consists of looking at each row of pixels in the original image and creating a file that tells how many white pixels are followed by how many black pixels, are followed by how many white pixels, etc., across the row. If you are sending a printed text document, there are usually a LOT of white pixels then a few black pixels, then a LOT of white pixels, etc., in a row. You can actually get very good compression for most faxed documents using this strategy AND it is lossless, i.e., the document that shows up at the other end is essentially identical to the original document.

Unfortunately, lossless compression cannot be done for most images. That is why lossy compression is used.

Lossy compression

Lossy compression refers to a compression scheme that compresses the data but loses some of the data. If you compress an image using a lossy compression scheme, the restored image when decompressed is NOT identical to the original image. However, if the scheme is a good one, the images will look almost identical. There are MANY lossy compression schemes some of which are very well known such as JPEG. We can use JPEG to illustrate Lossy compression.



Figure 20 - JPEG Quality Factor 99 (Very high quality) 358 Kilobytes



Figure 21 - JPEG Quality Factor 75 (high quality) 70.4 Kilobytes



Figure 22 - JPEG - Quality Factor 50 (reduced quality) 23.4 Kilobytes





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Figure 23 - JPEG - Quality Factor 10 (noticeably reduced quality) 9.9 Kilobytes

Each of the above images, when stored as a bmp file, requires 672.8 Kilobytes of storage space.

Note that bmp is lossless because it does not use compression, i.e., the image is stored with no loss of resolution or information but the file is BIG.

However when the lossy JPEG algorithms are applied and the file is stored as a JPEG file instead of a bmp file, you can see that as the quality factor decreases, the quality goes down and the storage space required goes down. (Note that some compression CODECs refer to "compression factor" instead "quality factor". A quality factor of 75 generally would mean a compression factor of 25, i.e., quality factor is 100 minus the compression factor.)

Typically, JPEG is run with a quality factor of 75. In Figure 21 above, we see that storing an image as a JPEG image with a quality factor of 75 instead of as a bmp file reduces the size of the file from 672.8 Kilobytes to 70.4 Kilobytes.

We see that it is very difficult if not impossible to see any difference between Figure 21 and Figure 22 so compression did not seem to degrade the image very much and it did reduce the file size from 672.8 Kilobytes to 70.4 Kilobytes.

We see in Figure 22 that the image has degraded slightly due to the lower quality factor of 50.

The degradation is barely noticeable if you look carefully at the side of the horse's face where the white and brown hair join you can see that the boundary is no longer smooth.

We see in Figure 23 that the image has degraded very noticeably due to the very low quality factor. The file is very small however, 9.9 Kilobytes instead of the original 672.8 Kilobytes.

The above merely illustrates the concept of lossy compression. Again, there are MANY compression schemes that have been invented. They all behave a little differently. They are all designed to reduce the size of the image file without noticeably degrading the image when it is displayed.

Why do you care? You care because the AVI files that you will be generating consist of a collection of images stored in a file. Movies are made up of many images that are displayed rapidly in succession. If you do not use compression, your AVI files will be HUGE.

See also: [Video CODECs](#), [Configure Window Examples](#).

Configure Window Examples

The following images show configuration windows associated with various [CODECs](#) that might be available on your machine.

These are accessible through the "Configure..." button that appears on the movie setup windows IF the selected "Compression" scheme has a configuration window associated with it. This shows the Movie Setup window for Time-Lapse captures so you can see where the "Configure..." button and Quality slider are.

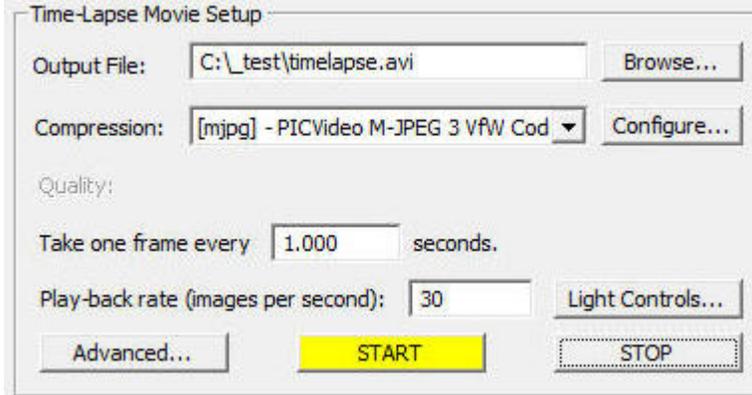


Figure 24

Below, we describe briefly the control each configuration window allows over [compression](#) [Quality](#).

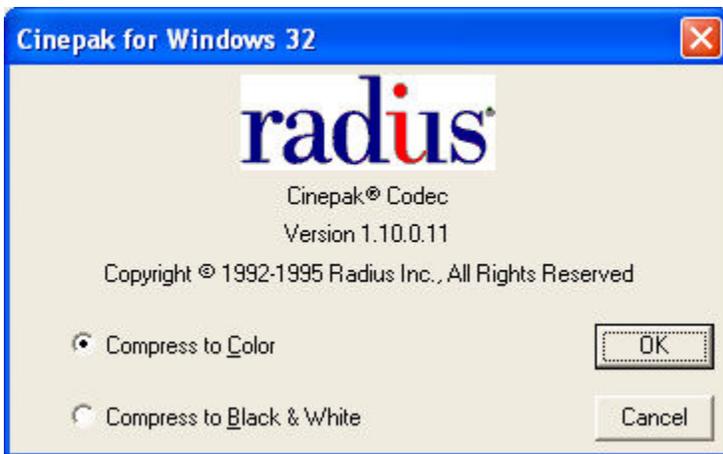


Figure 25 - Cinepak CVID CODEC

CVID has no adjustable quality option.
HandyAvi's Quality slider has no effect.



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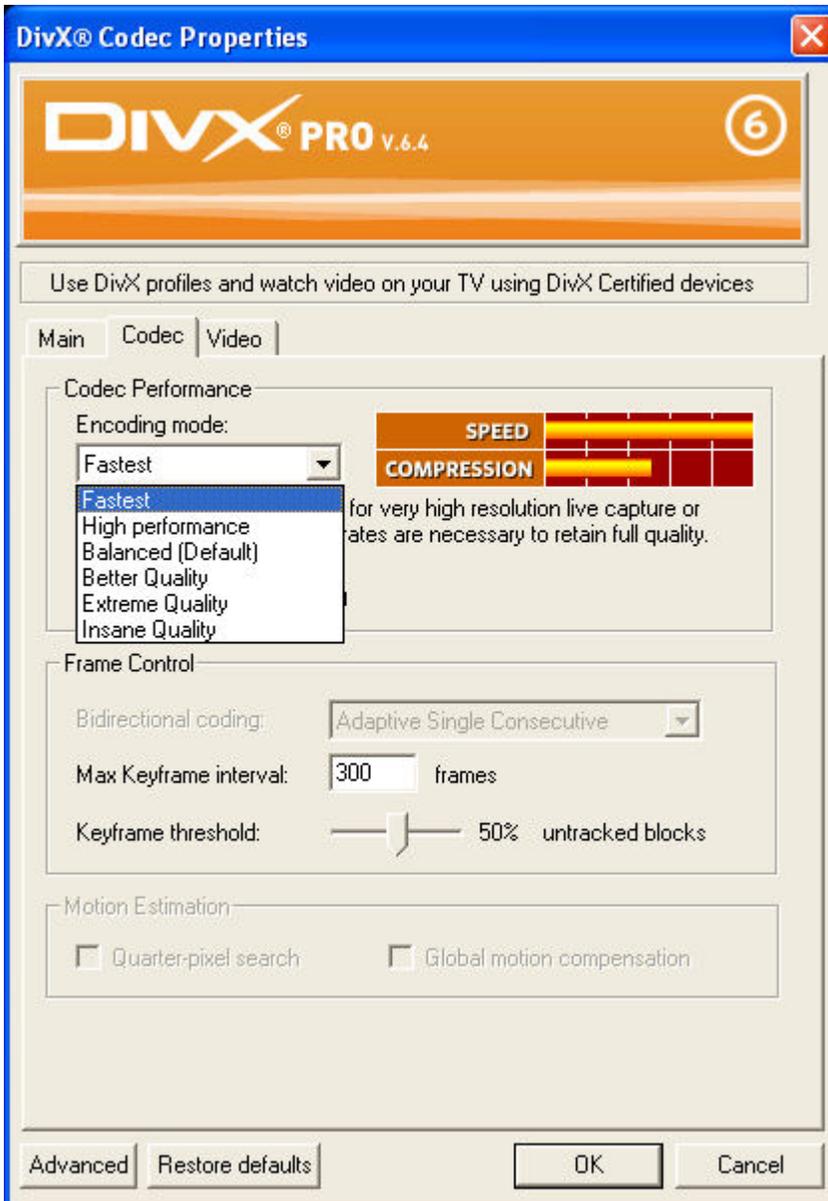


Figure 26 - DivX CODEC

DivX allows you to select various "Encoding Modes" which essentially cause the quality to be higher or lower.
HandyAvi's Quality slider has no effect.

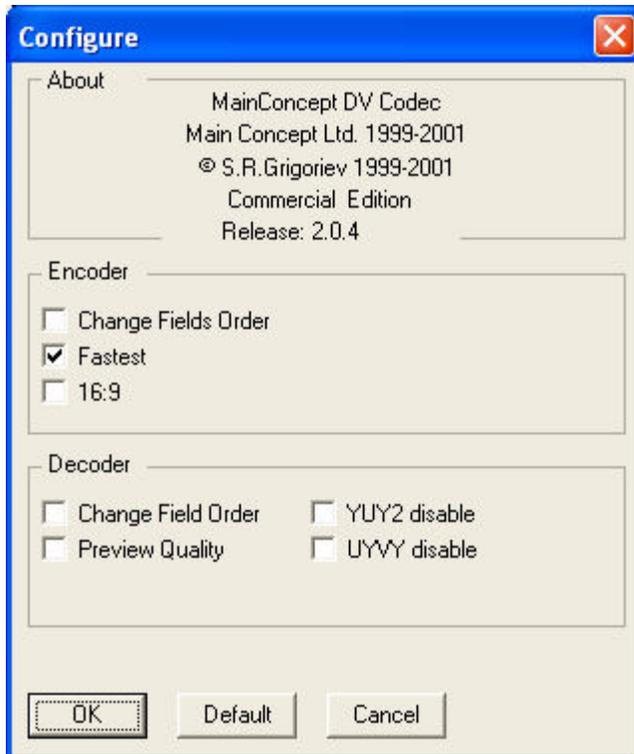


Figure 27 - DVSD Codec

DVSD allow you just two Quality options, Either "Fastest" or not. HandyAvi's Quality slider has no effect.

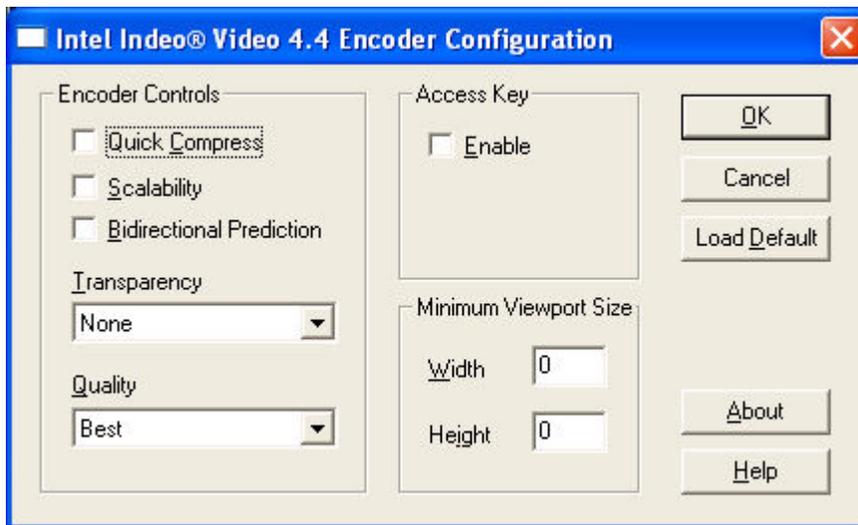


Figure 28 - IV41 CODEC

IV41 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.



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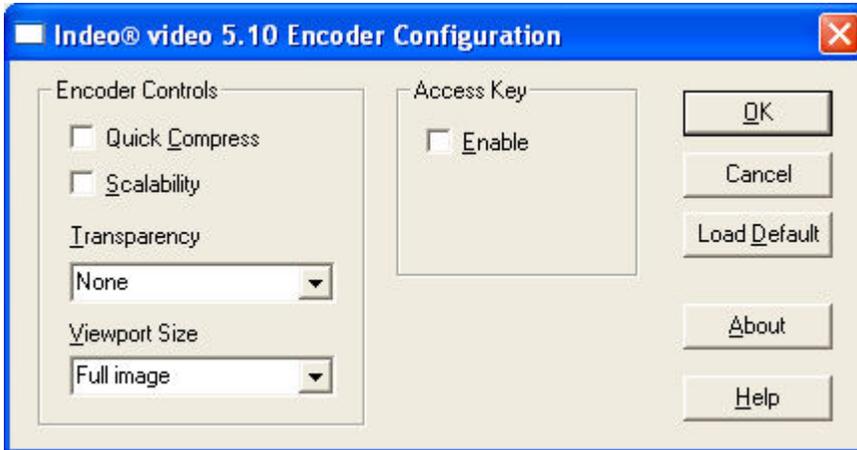


Figure 29 - IV50 CODEC

IV50 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.

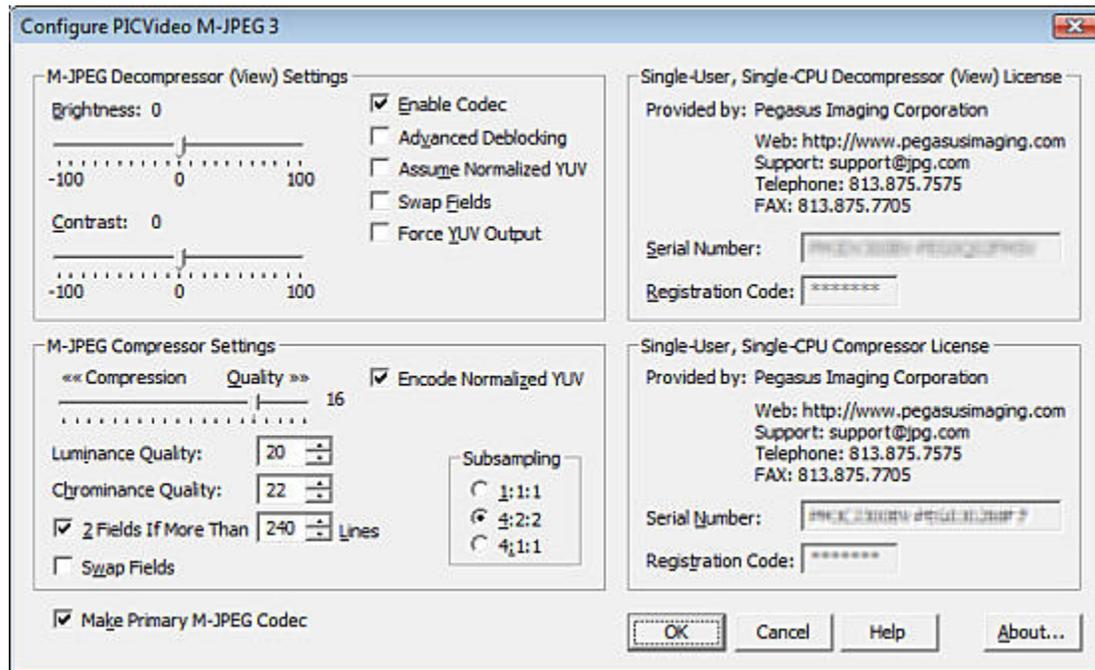


Figure 30 - PICVideo MJPG CODEC

There are at least two MJPG CODEC vendors out there. As far as we know, you have to buy an MJPG CODEC if you want to use one.

The PICVideo MJPG CODEC has a Compression-Quality slider that you can adjust to set your desired trade-off between image size and image quality.

HandyAvi's Quality slider does not appear when the PICVideo MJPG compression scheme is selected so the above panel is the only way to adjust Quality/Compression.

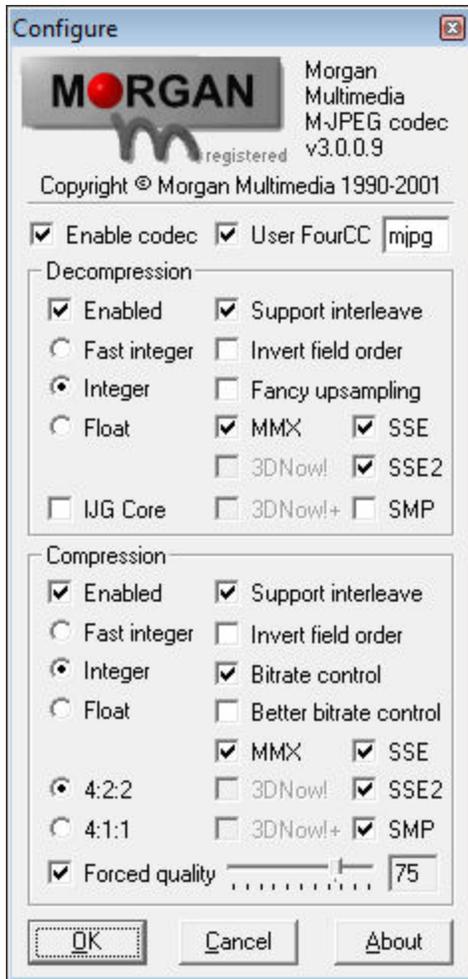


Figure 31 - Morgan Multimedia MJPEG Codec

Morgan MJPEG allows quality to be set if the "Forced quality" check box is checked. The value in the display box (here seen as 75) ALWAYS overrides the value set by the HandyAvi Quality sliders!

HandyAvi's Quality slider appears but has no effect.

(We ran into a problem with the above version of the Morgan CODEC in Vista when we used image sizes other than 160x120, 320x240 or 640x480. Caused a HandyAvi crash that we could not find a work-around for... We sent Email to the vendor describing the problem. Received no answer after several days. ***This CODEC seems to work just fine in Windows XP though...***

In the past, we have always used the Morgan Multimedia MJPEG Codec but we have now installed the PICVideo MJPEG CODEC and are using it instead on Vista.)



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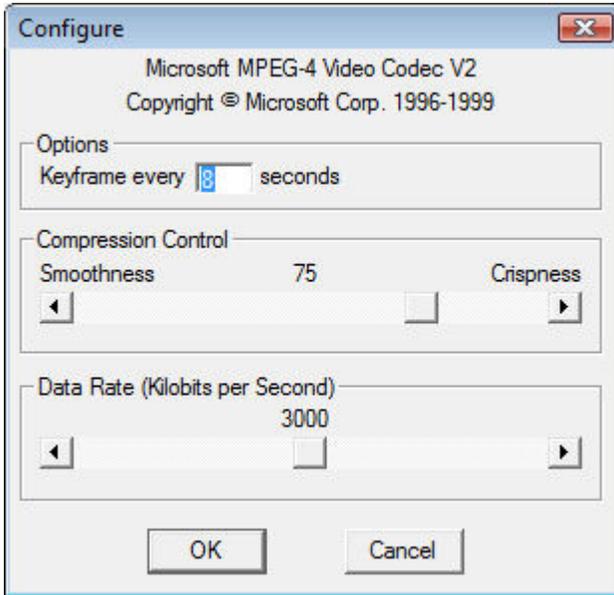


Figure 32 - mp42 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

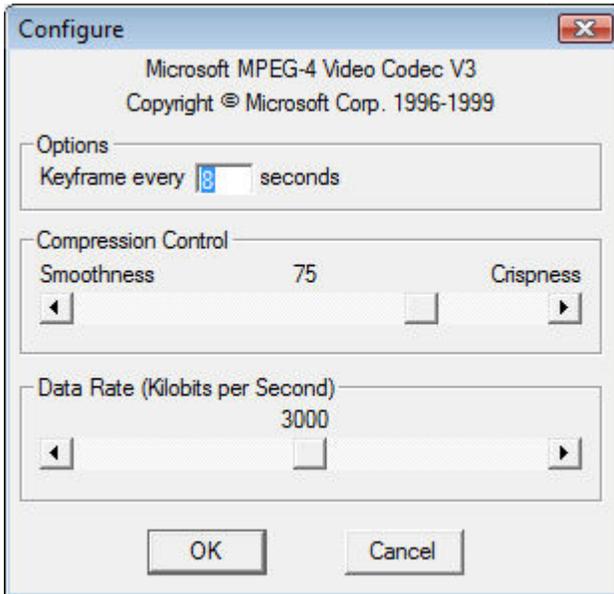


Figure 33 - MP43 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

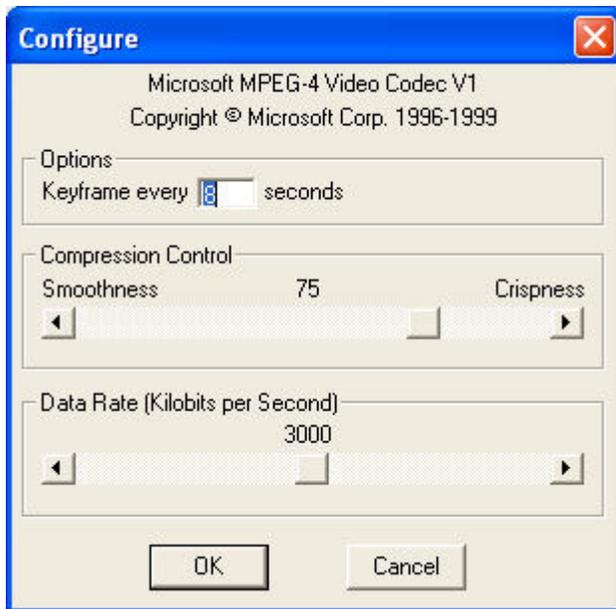


Figure 34 - MP41 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

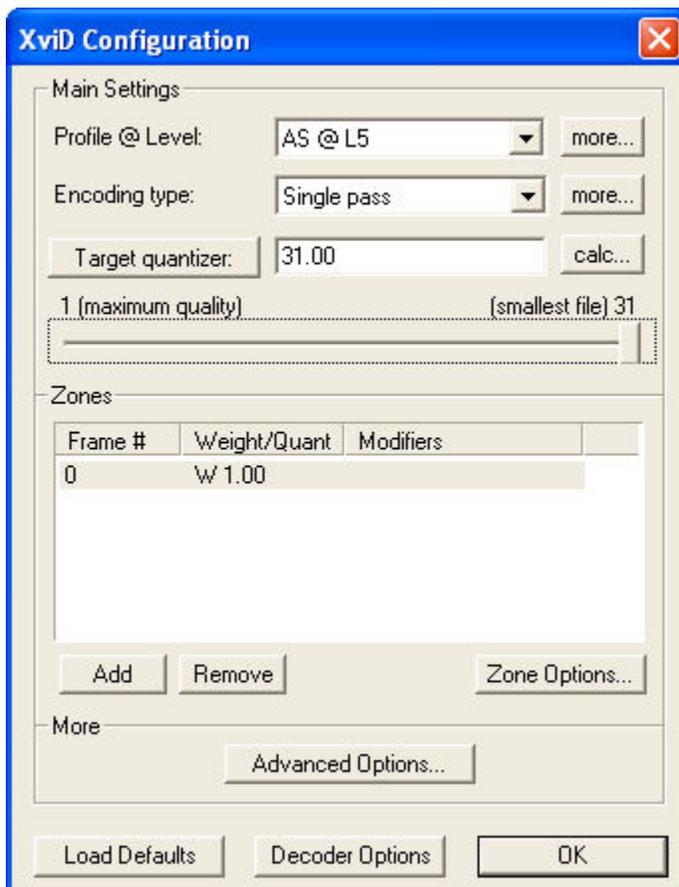


Figure 35 - XviD CODEC



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HandyAvi's Quality slider DOES control quality for this CODEC.

Create an Astrophotography Video

Astronomy Video Overview

HandyAvi allows you to easily make astronomy videos using a webcam.

Webcams have become increasingly popular for making telescopic webcam videos of the Moon and planets such as Venus, Mars, Jupiter, and Saturn.

A webcam can be used to take MANY frames of a bright astronomical object (the Moon and planets such as Venus, Mars, Jupiter, and Saturn) and capture them into an AVI movie file.

Each original frame typically looks blurry, distorted, and fuzzy, due to effects of the Earth's atmosphere. However, if you take a great many such frames, align them and average them together, the result is typically amazing! The blurriness, distortion, and fuzziness diminish greatly and fine details emerge.

HandyAvi can be used to take groups of frames (as fast as your webcam can capture images) spaced by any time interval desired. For example, if you specify 20 frames every 45 seconds then every 45 seconds, 20 frames will be captured at the camera's frame rate. Most cameras allow their frame rate to be set to some desired value. (The frame rate of a Philips ToUcam for example can be set to 5, 10, 15, 20, 25, or 30 frames per second.)

The "group of frames" feature is very useful for capturing planetary rotation.

HandyAvi also has a ["centering" feature](#) that will send Meade LX-200 type commands to a telescope to automatically keep the planetary image centered in the webcam's view field. This allows unattended capture of planetary images.

After capturing images, HandyAvi's [AVI file editing features](#) can be used to select the "best" 200 frames from, for example, a file containing 1000 frames, and make a new 200 frame AVI video file. Then by using HandyAvi's ["Stack Images"](#) tool or a freeware program like [RegiStax](#) to process the 200 frame AVI file, the result would be one relatively excellent still frame image.

The processed result will typically be FAR better than any of the original video frames. Here is an example:



Figure 44 - "Best" frame out of 1000 frames in an AVI file.



Figure 45 - 200 "best" frames stacked in HandyAvi



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Figure 46 - 200 "best frames stacked in RegiStax V4

HandyAvi uses Phase Correlation for image registration. That is presumably the algorithm also used in [RegiStax](#). But RegiStax, in addition, has an optimization subsystem which makes additional registration adjustments. RegiStax also contains some image processing subsystems such as wavelet processing that allow you to sharpen image details and additional features to adjust brightness and contrast to further improve the image.

Additional image processing was then done on one of the above images (which were stored as JPG files.) We used various programs such as [RegiStax](#), Paint Shop Pro, MaximDL... (We used Lucy-Richardson deconvolution in MaximDL in addition to other operations...)



Figure 47 - The image after additional image processing operations

HandyAvi allows you to capture all of the frames to one AVI file or you can capture each group to a different file where HandyAvi automatically generates new sequentially numbered files.

Jupiter makes one rotation every 9 hours and 55 minutes. You could set up HandyAvi to take 1000 frames every 10 minutes. Then, after one night (if Jupiter was visible for most of the night), you might have data showing nearly one complete rotation of Jupiter. 10 hours worth of data, if each 1000 frame group were stored in a separate file, would result in 60 files. If each file were post-processed using RegiStax and stored as JPG files, then you would have 60 JPG files. If you gave those files sequential names then you could use HandyAvi's new "[Make Movie from Still Images](#)" tool to make a movie of Jupiter that would show it rotating. You would probably want to set the "Play-back frame rate" low like 1 or 2 images per second so someone viewing the movie could see the rotation at a reasonable speed... (See our Mars movie at <http://www.astroshow.com/mars/ccdmars.html>.)

HandyAvi also features a [telescope control](#) system that will allow you to control nearly all features of most Meade telescopes.

One of the HandyAvi features in the [astronomy video control window](#) is the ability to issue commands to a Meade telescope to keep a planetary image centered automatically! When this option is selected, centering calibration will occur when the video capture is "START"ed and commands will be sent to the telescope as necessary to keep the planetary image centered in the webcam image field. This means that you can take 1000 images of Jupiter (or Mars, or Saturn, or ...) every 10 minutes and sleep during the entire process if you so wish. (You might need to stay awake and continue to adjust telescope focus however because most telescopes shrink as it gets colder through the night!)

How to open the astronomy video control window

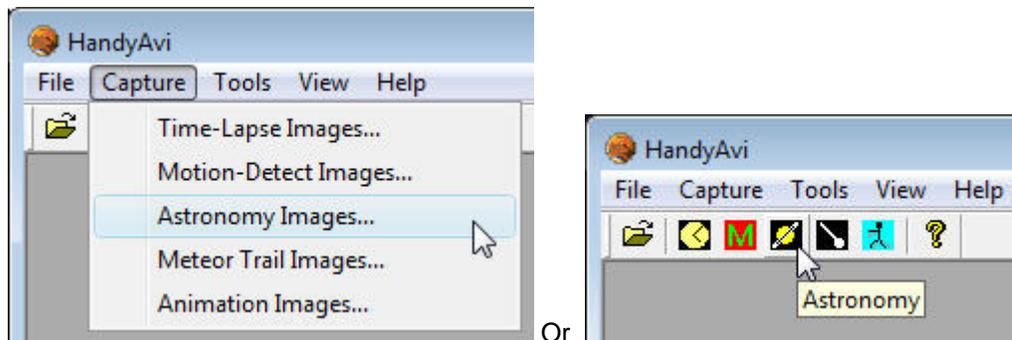


Figure 48

From the main HandyAvi window, select the "Capture/Astronomy Images..." menu item to bring up the "Astronomy Capture window."

HandyAvi's Astronomy Capture window will come up:



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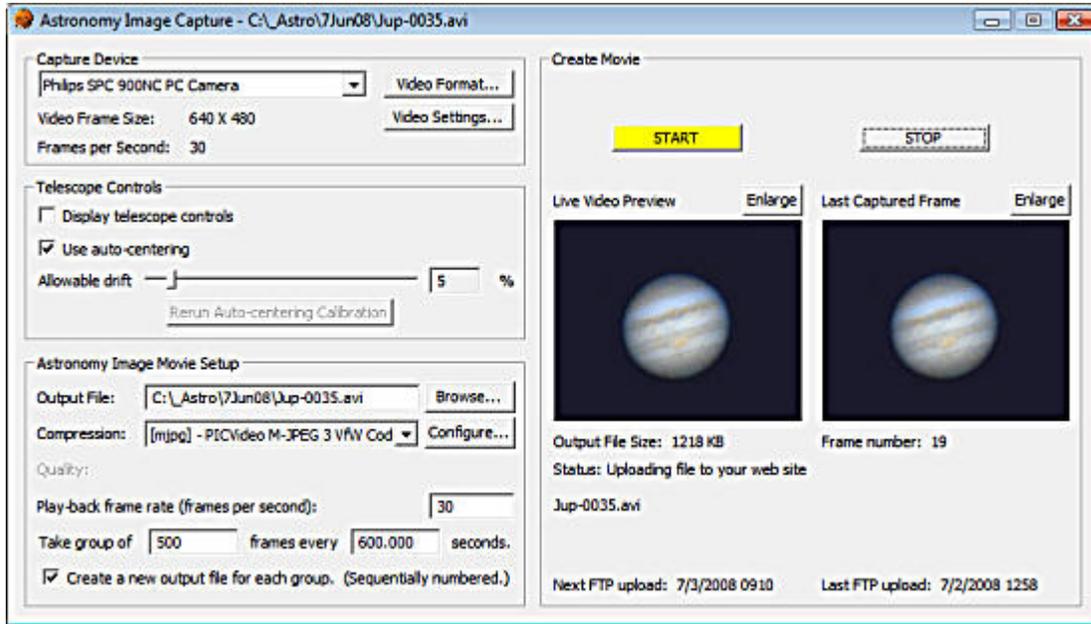


Figure 49

This window controls all of the astrophotography functions of HandyAvi.

The Capture Device Section

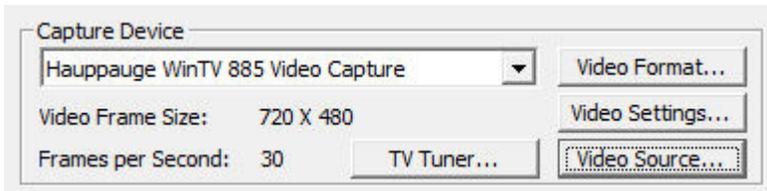


Figure 3

This section of the Capture window allows you to choose a webcam (i.e., a capture device). If you have several webcams plugged in, they will all be listed here if you click on the pull-down arrow. In addition, some other types of video capture devices may be listed here such as the Hauppauge WinTV PVR PCI II Capture device or the Hauppauge WinTV Video 885 Capture device. Other buttons (see below) may also appear in this section depending upon the capabilities of the selected device.

We see in the Capture Device section that the webcam currently selected is the Logitech QuickCam Pro 4000.

Its "Video Frame Size" is currently set to 640x480.

Its frame rate is set to 30 frames per second. Note that this value will sometimes be overridden by the camera drivers when the camera is in a mode where brightness and contrast are set "automatically".

The video frame size and the video frame rate can be changed by left-clicking the "Video Format" button. This will bring up the camera manufacturer's Video Format or Properties window which will allow you to make changes to basic camera functionality.

Video Format: This button causes display of a window provided by the manufacturer of your webcam. For a Logitech QuickCam Pro 4000, the window that comes up looks like this:

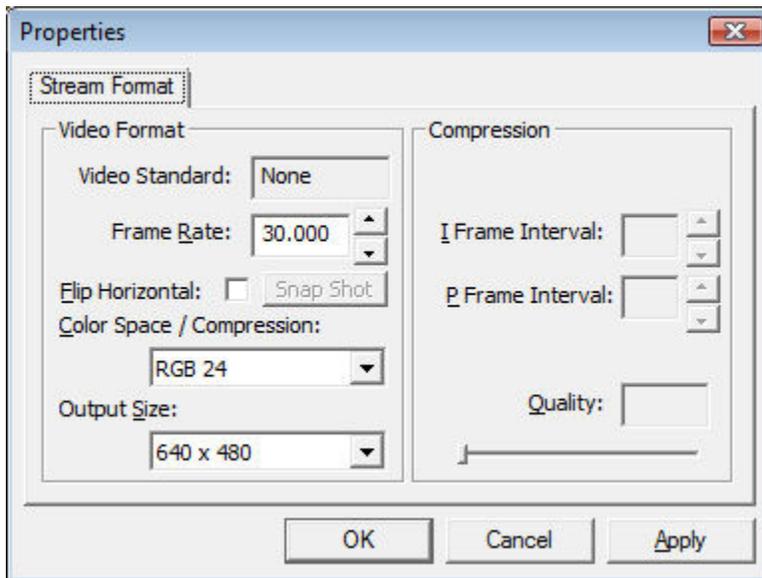


Figure 4

This window may be used to change the video format settings of your camera. In particular, the "Frame Rate" tells how many frames per second your camera will capture although your camera driver will sometimes override this if it is set to an "automatic" setting.

The Output Size selection allows you to select the frame size in pixels of the images that the camera will be taking. Both the ToUcam and the **Logitech QuickCam Pro 4000** for example, allow the image sizes shown here:

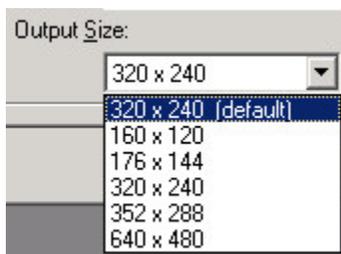


Figure 5

HandyAvi will automatically save and restore your Video Format settings if possible.

Video Settings: There is also a button called Video Settings. This will bring up the webcam manufacturer's video settings window and will allow you to change other types of camera settings such as contrast, color, brightness, sensitivity, etc., depending on how many items the camera manufacturer allows you to modify. The Video Settings window for the Logitech QuickCam Pro 4000 webcam looks like this:



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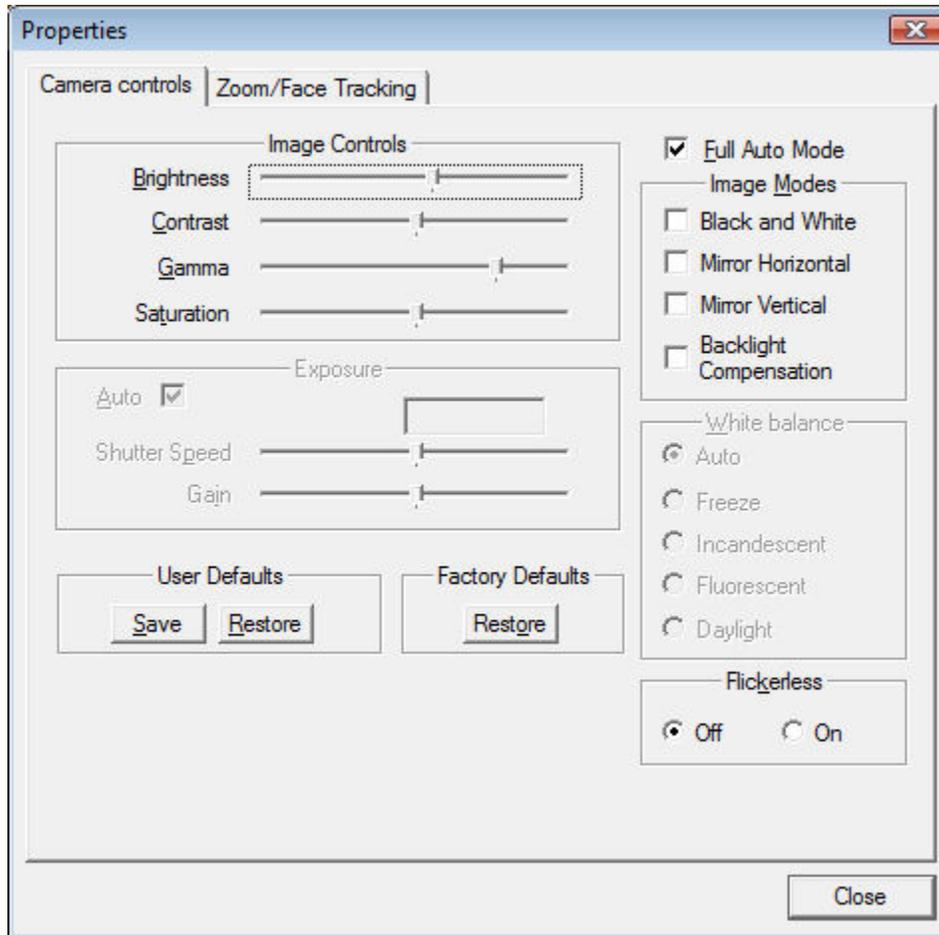


Figure 6

The image in Figure 6 shows that the camera is in "Full Auto Mode" which means that the camera will automatically adjust for changes in light levels. It will sometimes change the frame rate automatically when in this mode.

The Video Settings window for the Philips ToUcam webcam looks like this:

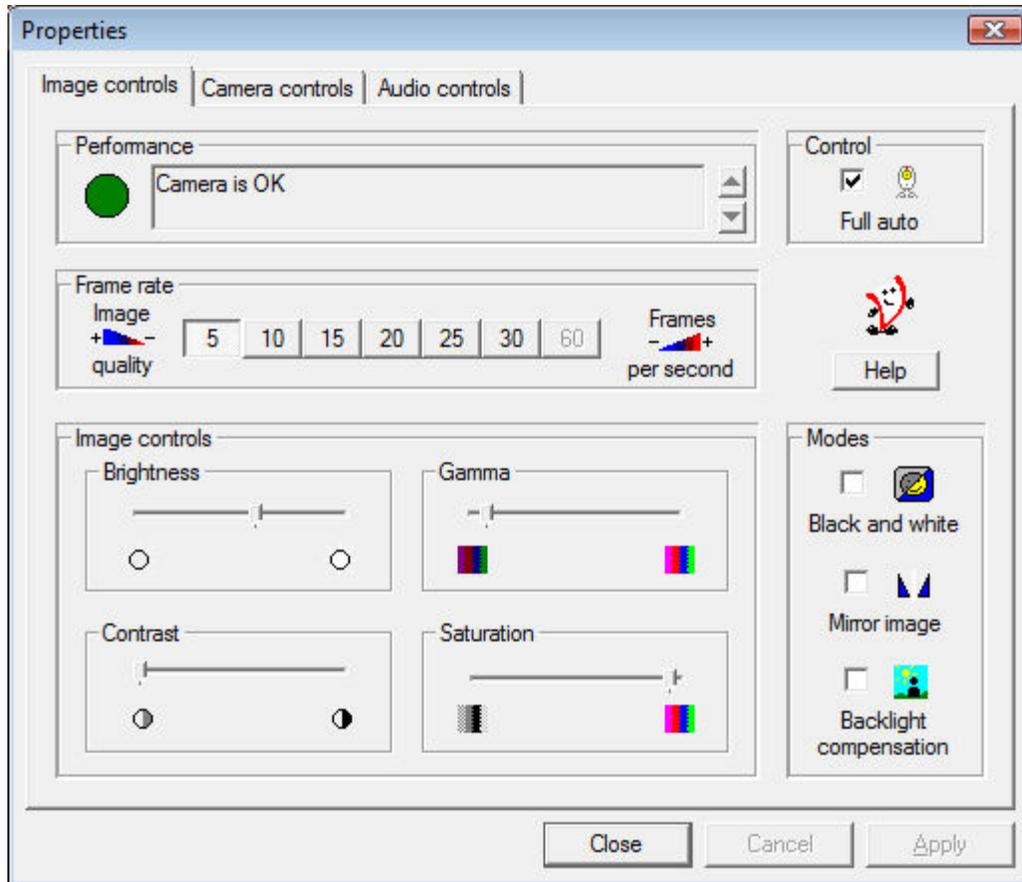


Figure 7

These controls provide a great deal of control over your webcam and might need to be adjusted to get the best results under various lighting conditions. For planetary astronomy of, for example, Saturn using a telescope, we usually take the camera out of "Full auto" and adjust the "Frame rate", "Brightness", "Contrast", etc., to provide an image that is not over-exposed. We have found that lowering the "Frame rate" is often helpful for planetary imaging.

Other webcams may have other types of video settings windows of course. The above are simply examples of webcam control features that two different manufacturers decided to provide.

IMPORTANT: if the "Full auto" control is checked in Figure 7, it can override the frame rate and set it to a lower value. Under dim lighting, the automatic settings for many webcams cause the frame rate to be reduced so that brighter images can be obtained. You can see in Figure 7 that the original frame rate of 30 frames per second has been overridden so that the frame rate is now 5 frames per second. By switching "Full auto" off, you can manually set the frame rate override to 30 if you wish to capture more frames more quickly. This is important because it can be puzzling if you are not aware of it.

Video Source: The user here has selected a "USB 2821 Device" which is a USB/Video Adapter so a "Video Source..." button is now displayed:



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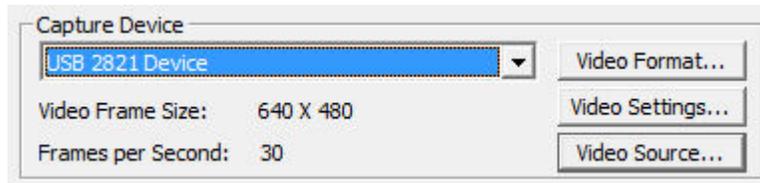


Figure 8

The "Video Source" button will be displayed ONLY when the capture device you are using supports Video Source options. (Most webcams do NOT support the "Video Source" option. However, many USB video adapters and many video boards do support the "Video Source" option.)

We have successfully used a USB 2.0 Video Adapter with Audio adapter (Model GA-VD204) which shows up as a "USB 2821 Device" with HandyAvi. We have also successfully used USB video adapters produced by five other manufacturers.

Some adapters allow EITHER Video Composite signals to be input or S-Video signals to be input. The Video Source window will allow you to choose which one will be seen by HandyAvi.

Here is what the USB 2821's "Video Source" windows looks like:

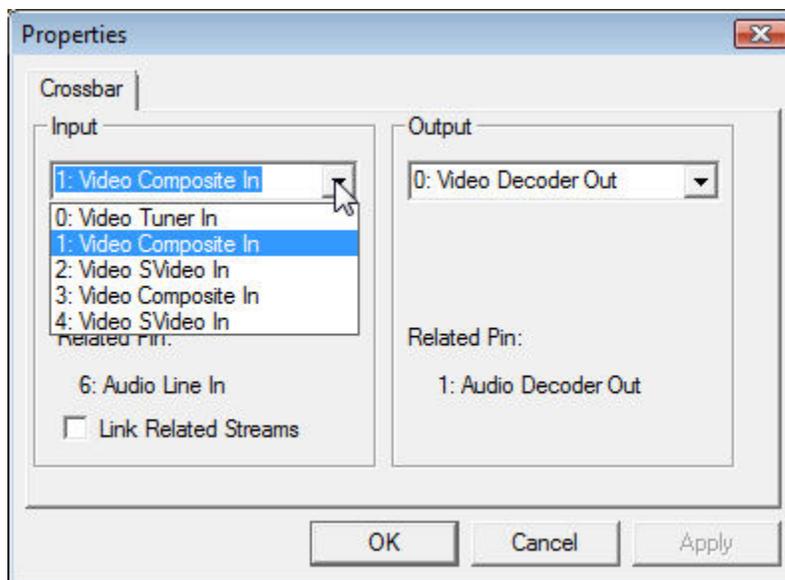


Figure 9

You can see that we have opened the "Input" pull-down. "Video Composite In" means HandyAvi will see the video stream from a camera plugged into the adapter's Composite Video input port (a standard Phono Plug).

If instead you plug an S-Video source into the adapter (from a VCR or DVD player, etc.) and choose "2: Video SVideo In" then HandyAvi will see the video stream of the S-Video device that you have plugged in.

Note that most surveillance cameras output Video Composite signals, i.e., NTSC signals in many countries, PAL in many others. We have a Watec 902H2 ULTIMATE camera that we are using for Meteor Detection. We plug its Video Composite output into the GA-VD204 adapter (or other USB-Video adapter) and then plug the adapter into the USB port. HandyAvi sees the video and everything works well.

Note that some adapters check to see if you are using a USB 1 port or a USB 2 port. Some of them will NOT allow you to set higher resolutions (like 640 x 480) if you are using a USB 1 port. This is usually undocumented and can be puzzling which is why we are mentioning it here...

It should be noted that the Watec 902H2 ULTIMATE is an EXTREMELY sensitive low-light camera (.0001 Lux supposedly) and is more expensive than most cameras used for surveillance work. We needed the sensitivity for meteor detection. There are of course MANY cheaper cameras that output NTSC Video Composite signals that can be used with HandyAvi via a USB-Video adapter.

The user here has now selected a "Hauppauge WinTV 885 Video Capture" board:

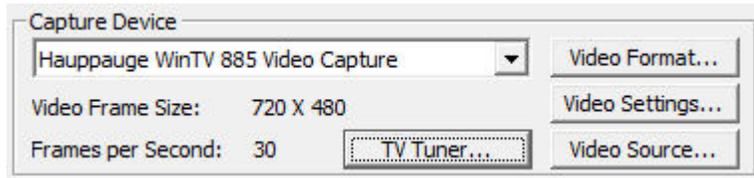


Figure 10

The "Video Source..." button now exposes this manufacturer's window:

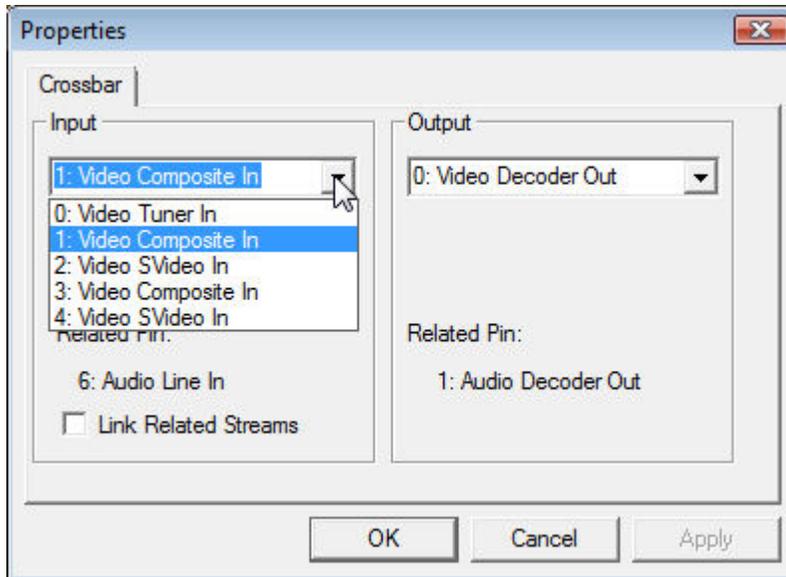


Figure 11

"Video Tuner In" means that the board is going to receive input from the TV tuner. S-Video and Composite inputs can also be selected as input sources. We don't know why this board has two "Video SVideo In" selections...

TV Tuner: The Capture Device section also now includes a "TV Tuner" button which provides access to the board manufacturer's TV Tuner settings window:



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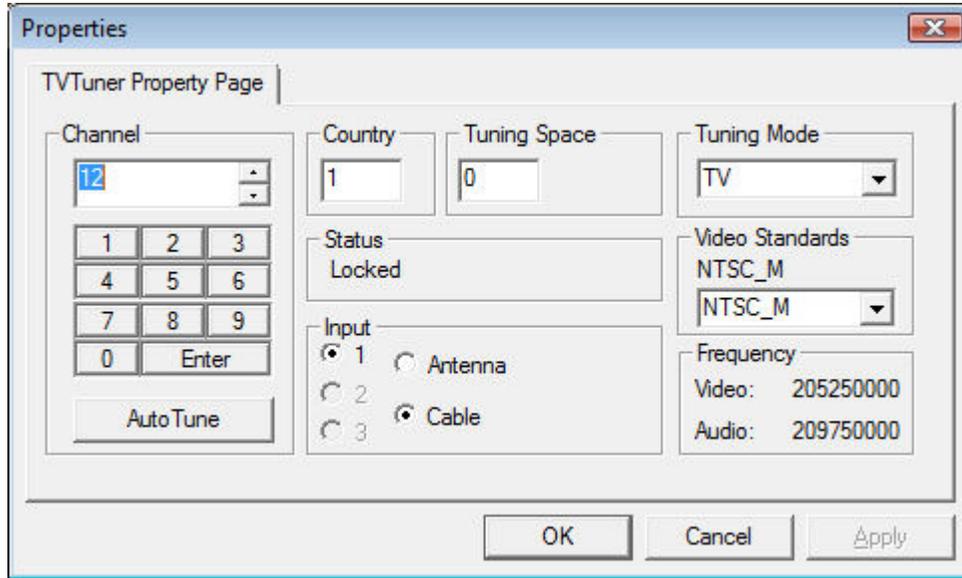
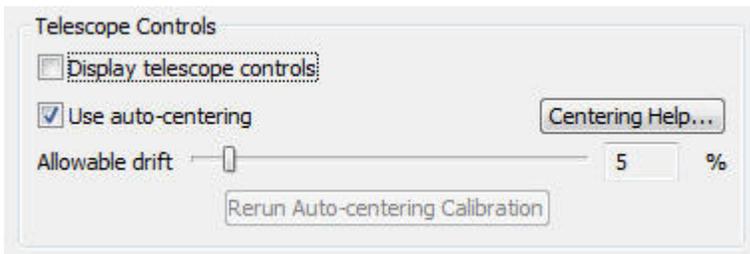


Figure 12

This window allows you to select the input television channel among other things. On this particular board, we have found that to input Channel 12, you have to enter 12 then click on "Enter" or the channel input is ignored! Usually, we would select "Antenna" unless we are connected to a cable. There is a selection for "Video Standards" which includes NTSC_M, NTSC_JM, PAL_M, PAL_N, and PAL_COMBO. The "Tuning Mode" includes "TV" and "FM".

Telescope Controls Section



This section of the Astronomy Image Capture window allows interaction with a Meade telescope. HandyAvi currently handles Meade LX- series "classic" telescopes as well as newer Meade telescopes that use Meade's Autostar hand controller.

The Autostar hand controller has two ports, one which is connected to your telescope and the other which connects to your computer via a cable that plugs into an adapter that plugs into your computer's serial port. (If your computer does not have a serial port, there are USB/Serial adapter cables available through Amazon.com and other on-line vendors.)

Display telescope controls: If you check this box, HandyAvi will display the [telescope controls](#) assuming that you have set up the [COM port](#). If the box is checked and you close the astronomy session then reopen the Capture/Astronomy Images window. then the telescope controls will be displayed before the "Astronomy Image Capture" window comes up. (There might be a delay.) If you closed the telescope control window, un-checking and re-checking this box will bring up the

telescope control window. (It can also of course be opened from the main menu item Tools/Telescope controls...) The check-box is provided here for convenience.

Use auto-centering: When this item is checked, HandyAvi will keep a star or planet centered in the frame of the camera you are using with your telescope. This will prevent it from drifting outside of the frame. The auto-centering activities will only take place while image capture is underway. (Image capture is started with the "Start" button and stopped with the "Stop" button.)

Note: Auto-centering is designed for use primarily with planetary or star images where there is a bright area that needs to be centered. We are using what amounts to a "center of mass" calculation so it can be affected by objects of varying brightness around the periphery, i.e., extended objects such as the moon where only part of the surface is visible in the camera view field. We have tried auto-centering with the Moon and find that it will keep certain fields centered but it may choose to center on an area other than the exact area where you would like it to center. (Advanced methods such as phase correlation are available to us but they are rather slow because they require large Fourier transforms to be taken. For now, we opted not to use them for auto-centering. They are being used however in our image stacking subsystem.)

We had to create two different methods of centering because of differences that exist between Meade LX- "classic" (older) telescopes and newer Meade telescopes that are being controlled by an Autostar hand controller. The telescope communication protocol is the same but the behavior of the Right Ascension and Declination motors is very different.

LX-200 - We used a 10" Meade LX-200 "classic" telescope for testing here. You should set the Dec Backlash for minimum delay of movement when the direction is reversed, i.e. without "jumping" when Dec direction (N/S) is reversed. Pressing N, E, S or W on the Meade hand controller should cause the telescope to move slowly in the selected direction. If you look through the telescope, you can see the motion caused by pressing one of the keys. The motion is slow but occurs almost immediately. HandyAvi is able to use this fact to "calibrate" by moving the telescope in the N/S direction and then in the E/W direction to determine how much the scope moves in a given amount of time. When the "Start" button is pressed and if auto-centering is checked, HandyAvi will force the slew rate to Guide mode then attempt calibration by moving the telescope a tiny bit in both the Dec and RA directions. If successful, HandyAvi will then know how long and in which direction to move the telescope so that the planet or star will stay centered during the image capture operation. HandyAvi always forces LX- classic series scopes to use Guide mode for the slew rate when auto-centering is active. Our calibration algorithm will calibrate successfully IF reasonable motion actually occurs within 20 seconds in the Dec direction and within 20 seconds in the RA direction. Calibration is usually achieved within 2 seconds...

ETX-90 and ETX-120 - We purchased these scopes primarily for testing when we received a report from a user that the LX-200 algorithms didn't seem to work properly for these types of telescopes. We did intensive testing and rewrote HandyAvi's Serial I/O routines to accommodate differences we discovered. We also wrote a different algorithm for doing auto-centering with these types of telescopes.

HandyAvi is able to identify the Autostar device so it knows whether you are using an LX-classic or a newer telescope with the Autostar hand-controller. When the "Start" button is pressed and if auto-centering is checked, HandyAvi will force the slew rate to Guide mode then attempt calibration by moving the telescope a tiny bit in both the Dec and RA directions. If successful, HandyAvi will then know how long and in which direction to move the telescope so that the planet or star will stay centered during the image capture operations.



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Our experience has been that you should try to center the planet or star before you select "Start". This will minimize the "wandering" that occurs initially as HandyAvi attempts to center the object.

HandyAvi always forces the telescope to use Guide mode for the slew rate when auto-centering is active. Our calibration algorithm will calibrate successfully IF reasonable motion actually occurs within 20 seconds in the Dec direction and within 20 seconds in the RA direction. Calibration is usually achieved within 2 seconds...

You should use the [telescope controls](#) N, S, E, W buttons with Guide mode set to see what your telescope is doing. If everything is working perfectly, pressing one of these buttons should result in slow motion in the selected direction within a second or so of pressing the button. Our experience with the ETX-120 has been that Dec motion reversal often takes 10 or 20 seconds. RA motion reversal has occurred generally within 3 to 5 seconds.

Supposedly, setting Az/RA Percent and Alt/Dec Percent should make the responses faster. We currently have Az/RA set to 10% and Alt/Dec set to 75%. This will vary greatly depending on the behavior of a particular telescope. Make sure that no "jumps" or fast motion followed by slower motion occurs when you set these. What is needed for auto-centering is uniform motion in each direction hopefully with very little delay when a direction is reversed.

We have used many types of webcams and astronomy cams such as ones made by Meade and Orion and have used Barlow lenses and have achieved auto-centering functionality for the ETX scopes. Auto-centering should work for other types of Meade scopes but we have not tested them.

If auto-centering is active, the Create Movie section will display either "Centering" or "Tracking" followed by the pixel coordinates of the position of the planet or star on the screen. The "Centering" or "Tracking" words might have a direction appended to them so you will know which way the scope is attempting to move.

Centering Help: Brings up this page of the help file.

Allowable Drift: This slider determines how far away from the center the target image will be allowed to drift before HandyAvi attempts to drive it back to the center of the image frame.

Rerun Auto-centering Calibration: You can rerun the calibration while Handy is capturing data ("Start" button was pressed.) This item will be grayed-out, i.e., unavailable for use if calibration was OK.

The Astronomy Movie Setup Section

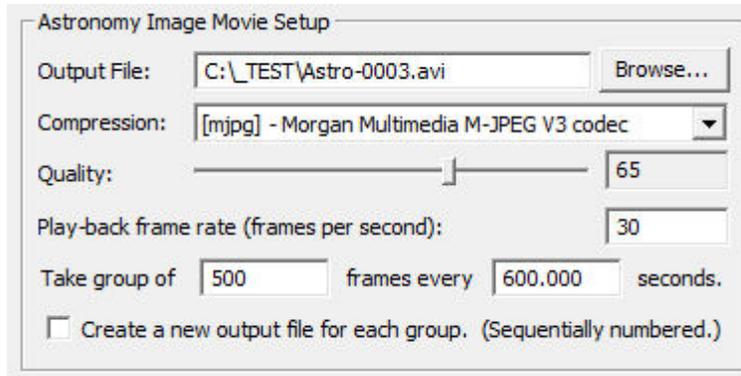


Figure 50

This section of the Astronomy video capture window allows you to set up the webcam for making an astronomy video.

Output File: Type in the path name of the new video file you want to create.

Browse: Brings up a standard file selector window so that you can more easily place the file in a particular folder.

Compression: Select any AVI file compression scheme resident on your computer. File compression schemes or codecs (short for coder/decoder) show up on your machine from many sources. Microsoft installs several. Your video camera may install one or more. You may download and install compression schemes from the internet. At the time of this writing, there are over 280 codecs listed at <http://www.fourcc.org>. Note that one of the selection items is called Uncompressed. If you select Uncompressed, the image data in your files will not be compressed. Your files will be LARGE. However, each image in an Uncompressed file will contain images that are **exactly** what the camera captured. Compressed images are usually slightly different from the original images because information is lost during compression. In most cases, the difference is not noticeable. Use of uncompressed images is important for some applications but not necessary or advisable for most. [Learn more about video codecs here.](#)

HandyAvi displays the FOURCC value for the compressor in brackets at the beginning of the "Compression:" line.

Note that HandyAvi will also allow you to read, work with, and display AVI files produced by other software or cameras and will select the proper decompression scheme automatically IF the required decompression scheme has been installed on your computer.

HandyAvi will also allow you to read a file that was written using one compression scheme and write a new AVI file using a new compression scheme. So you can convert AVI files from one compression scheme to another if the required codecs have been installed on your machine.

Configure: Brings up the compression CODEC's configuration window. This button only appears if the selected compression scheme HAS a configuration window.

Note that the "Quality:" slider and the quality settings in some CODECs do not "cooperate". In the case of the mjpg CODEC, the "Forced quality" slider determines the degree of JPEG compression and the "Quality" slider in the "Astronomy Movie Setup" window has absolutely no effect. Other CODECs we have tested do not override our "Quality:" slider.

When in doubt, you should test by setting the quality and capturing (for example) three frames of the same scene (use Time-Lapse and take one frame every 3 seconds or so). Then change the



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quality factor and make another movie. The size of the two resultant AVI movie files should be different.

See [Configure Window Examples](#) for information on the Configure options of various CODECs. [Learn more about video codecs here.](#)

Quality: Adjust the quality of the compression scheme. Most compression schemes create smaller files because they are actually discarding tiny image details. By discarding more and larger image details, you can produce a smaller AVI file. If the Quality is set to 100, then little or no image data is discarded and the resultant AVI file will be large. If the Quality is set to 0 then, theoretically, all image data is discarded and the resultant AVI file will contain blank images! Of course each codec is created by software people who may have thought about this and limited it so they do not throw away all of the image data even if the Quality is zero.

Note that each codec is different and some may even ignore the Quality setting or not allow it to be set. Also note that lossy compression schemes are used in many applications. JPEG is an example of a lossy compression scheme that is used in MANY applications and the fact that some of the image data has been discarded is practically unnoticeable. So compression with slightly reduced quality is a very good thing in most cases. [Learn more about video codecs here.](#)

Play-back rate (images per second): Determines how fast your frames will be displayed when you play the AVI movie that you have recorded. If you want the frames to be played in "real-time" then you should set the rate to the same rate as the camera was set to when it was recording. If you want each frame to be presented at a very slow rate, then you could set the play-back rate to 1 second. In this case each frame of the movie would be displayed for one second when the movie is played.

Take group of: lets you set up the astronomy image capture parameters. For example "Take 2 frames every 10 seconds" will capture and add two frames to your new AVI file every 10 seconds. Frames that could be captured will be displayed in the current "Live Video Preview" frame visible in the [Meteor Trail Create Movie Area](#). Each frame that is selected for inclusion in the AVI output file is displayed in the "Last Captured Frame" area when it is sent to the AVI output file.

HandyAvi can be used to take groups of frames (as fast as your webcam can capture images) spaced by any time interval desired. For example, if you specify 20 frames every 45 seconds then every 45 seconds, 20 frames will be captured at the camera's frame rate. Most cameras allow their frame rate to be set to some desired value. (The fame rate of a Philips ToUcam for example can be set to 5, 10, 15, 20, 25, or 30 frames per second.) This "group of frames" feature is very useful for capturing planetary rotation.

Important: Please note that the "Seconds" field will accept floating point values if you wish to use them:



Figure 51

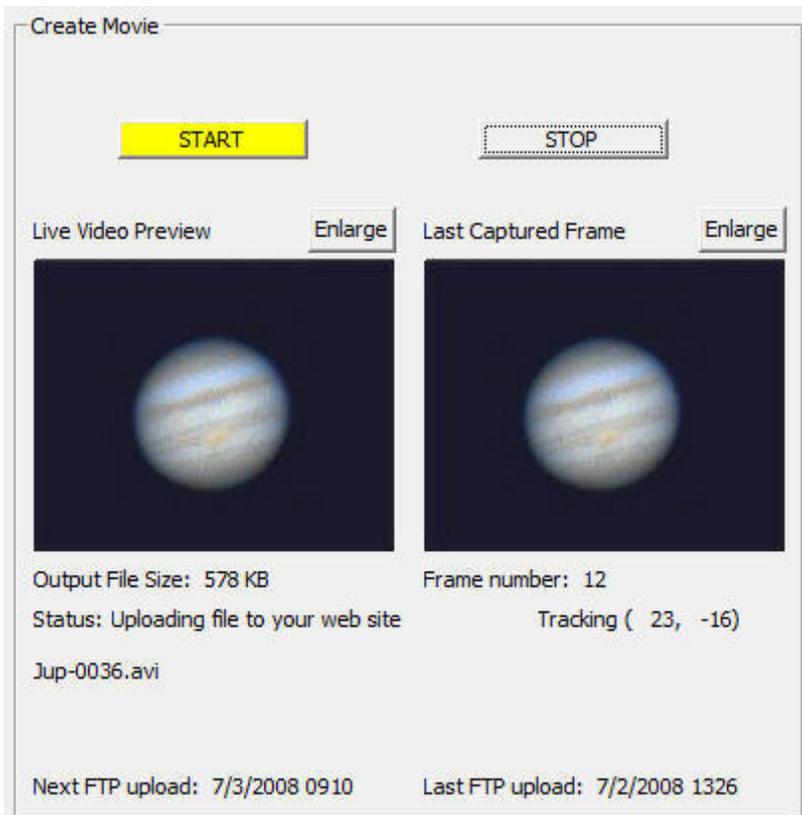
A setting of "Take group of 1 frames every .01 seconds" would allow frames to be captured continuously at a rate of 100 frames per second IF the camera could deliver frames that fast. If the camera only delivers frames at a rate of 30 frames per second, then "Take group of 1 frames every .01 seconds" would cause frames to be captured continuously at the rate of 30 frames per second (assuming your machine is fast enough to support frame storage and any compression operations if you chose to compress your images.)

Create a new output file for each group (sequentially numbered): This check box tells HandyAvi to use the "Output file" field as a base name for generating sequentially numbered files. For example, if the file name you entered in the "Output file" field was "C:\Astronomy.avi", then HandyAvi will first generate a file named "C:\Astronomy-0001.avi" and place the first "group" of frames into that file. It will then generate the name "C:\Astronomy-0002.avi" and place the second "group" of frames into that file. The third group of frames will be written to "C:\Astronomy-0003.avi" and so on.

Why is this useful? Say you plan to make AVI files of Jupiter and you decide to create groups of 1000 frames every 10 minutes (600 seconds) for the purpose of making a movie of Jupiter rotating. If all of the frames go into one file then you would have to edit the file by hand to create an AVI file for each group of 1000 frames for subsequent submission to a stacking program such as RegiStax.

If you use the "**Create a new output file for each group (sequentially numbered)**" feature, then each of the groups of 1000 images goes into a separate file thus eliminating a LOT of hand editing. Each individual file can then be sorted for "best" images (using HandyAvi's "Crop and Save" and "Frame Selector" tools) and the best images for each group can then be submitted to a stacking program (HandyAvi's [Stack Images](#) system or an external program such as [RegiStax](#)) in order to produce one final frame for each 10 minute interval. These frames can then be used to make a movie of the rotation of Jupiter. Note that when file names are generated, a test is done to see if a file of the generated name already exists. If it does, that name is not used and the next sequential name is generated and tested until an unused name is found. This protects you from accidentally overwriting files.

The Create Astronomy Movie Section





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Figure 52

START: Starts video capture. The Live Video Preview area will display all frames seen by the webcam in real-time. Captured frames (frames sent to the AVI output file) will appear in the "Last Captured Frame" area.

Note that the Start button here is yellow. This indicates that a **Set Allowable Image Capture Times...** [preference](#) item has been set. Yellow means that video recording is currently allowed but at some point in time, video recording will cease until it is again allowable. Red would mean that video recording is not allowed at the current time.

NOTE: Output files will automatically be limited to less than 2 Gigabytes, the AVI file size limit. A new file with a unique new name will be generated and used automatically whenever the limit is about to be exceeded. See [Preferences](#) for more information about [Maximum AVI File Size](#).

STOP: Terminate video capture and close the AVI output file. The file can then be viewed as a movie inside HandyAvi by "Open"ing it using the File menu. See the [Movie Display](#) section.

Live Video Preview: This window shows what the camera is actually seeing at the frame rate at which it is currently running. The Last Captured Frame window shows the last frame that was captured to your new video file. If nothing has yet been captured, it shows a blank as seen in the above image.

Enlarge: If you use one of the "Enlarge" buttons, a new window will be created containing the video image. This new window can be resized to any size by clicking and dragging an edge or corner of the window.

This new window also contains a "Size" option that will allow you to select a "True Image Size" option which will resize the window to show the actual size of the captured video images. Pressing the "t" key will also perform the True Image Size function.

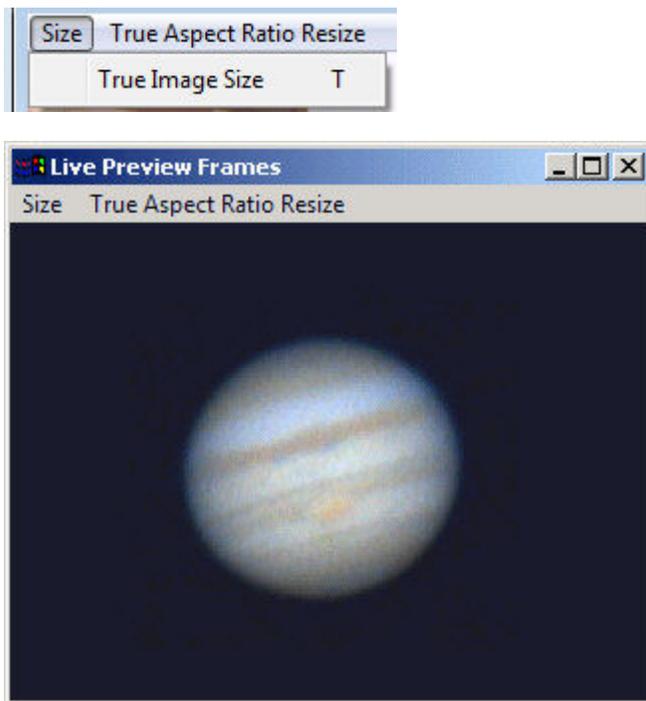
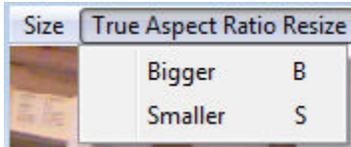


Figure 53

Figure 53 shows an enlarged "Live Preview Frames" window that has been sized with the "Size" option to the "True Image Size" of 320x240 which was the size selected in Figure 4 in the [Capture Device](#) section.

There is also a "True Aspect Ratio Resize" option:



Selection of "Bigger" will resize the window to a slightly bigger size while keeping the true aspect ratio of your image. Pressing the "b" key will also perform this action.

Selection of "Smaller" will resize to a slightly smaller size while keeping the true aspect ratio of your image. Pressing the "s" key will also perform this action.

If you close an enlarged window, the images will again appear in the "Live Video Preview" window or the other window if it was the one that had been enlarged.

Last Captured Frame: This window shows the last frame that was sent to the AVI file. There is also an Enlarge button that works the same as the Enlarge button for the Live Video Preview window.

About Video Codecs

Note: You do not have to learn about codecs to use HandyAvi.

However, the purpose of a CODEC is to compress your video data so that your AVI files are smaller. So if space on your hard drive is a consideration, you will probably want to use a CODEC.

AVI files can be created either by using no compression (uncompressed) or by using one of literally hundreds of compression schemes (codecs is short for Coder/decoder) that have been created by various companies. Uncompressed files are generally MUCH larger than compressed files.

In order for HandyAvi to use a particular compression schemes, it must have been installed on your computer.

Many AVI codecs probably already have been installed on your machine. Some come from Microsoft as part of your operating system. Some come from the manufacturers of webcams that you might have installed. You can even download and install codecs from the Internet. Some are free and others are not. <http://www.fourcc.org> is a site that lists and describes almost all known codecs. If you surf to that site, you will want to click on "codec list" to see all of the codecs.

Codecs have four character names known as "Four-Character Codes" or "FOURCC" names. This is how they are identified internally so that software applications such as HandyAvi can know which codec was used to produce a particular file.

FOURCC codes are also used internally when a HandyAvi user selects a compression scheme such as "Indeo® video 5.10". "Indeo® video 5.10" has a FOURCC name of "IV50". If you have an AVI file that was encoded using IV50, you can see the IV50 codec name by opening the file in HandyAvi and using the "View/AVI File Info" menu item.



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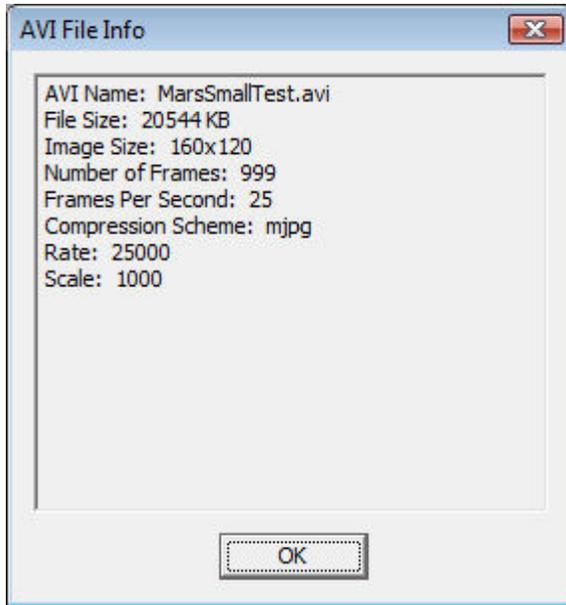


Figure 19

Figure 19 shows that the compression scheme used to compress the file "MarsSmallTest.avi" was mjpg which is the FOURCC code for the "Morgan Multimedia MJPG" codec.

HandyAvi will also attempt to open files compressed with codecs that are NOT installed on your machine. If the required codec is not installed, HandyAvi will, of course, be unable to PLAY the file but it will try to produce an AVI File Info report as shown in Figure 19 so that you will be able to identify the missing codec. If you know which codec was used, you might be able to locate an installable version of the codec via the Internet and install it. Then you would be able to play the file using HandyAvi. If you can play the file using HandyAvi then you can also use [HandyAvi's editing features](#) to create a new file using the same or a different codec and include or exclude selected frames from the new AVI file.

Many CODECs allow you to have control over the "Quality" factor or "Compression" factor that will let you make your files smaller.

[Learn more about Compression Quality.](#)

[Learn more about Configure windows.](#)

About Compression Quality

There are many video compression schemes. The purpose of a video compression scheme is to make a smaller file without sacrificing too much detail in the images.

An uncompressed AVI file is comprised of a series of bmp image files. There are actually many different bmp file formats. Each of the formats is designed to reconstruct an image pixel by pixel. Typically, AVI files are made up of bmp files which have 3 Bytes for each pixel. The three bytes contain the Red, Green, and Blue values for a pixel. Thus, a 640x480 uncompressed image requires approximately 3 x 640 x 480 bytes ("approximately" because there may be some "pad" bytes at the end of each line. There is also a small amount of header data describing the size, color content, length and width of the images, etc.) 3 x 640 x 480 Bytes is 921600 bytes or almost 1 Megabyte! If your AVI video camera is running at 30 frames (images) per second, then you will be storing 30 x 921600 Bytes per second or 27.6 Megabytes per second. 10 minutes of video would require 16,588,800,000 bytes or 16.5 Gigabytes! That is why video compression is usually a good idea! You would like to make the file smaller without messing up the images too much.

Lossless Compression

Lossless compression refers to a compression scheme that compresses the data without losing any of the "information" in the picture. If you compress an image using a lossless compression scheme, the restored image when decompressed is IDENTICAL to the original image. An example of lossless compression is "Run-Length Encoding" used in FAX machines. Run-length encoding for a black and white image consists of looking at each row of pixels in the original image and creating a file that tells how many white pixels are followed by how many black pixels, are followed by how many white pixels, etc., across the row. If you are sending a printed text document, there are usually a LOT of white pixels then a few black pixels, then a LOT of white pixels, etc., in a row. You can actually get very good compression for most faxed documents using this strategy AND it is lossless, i.e., the document that shows up at the other end is essentially identical to the original document.

Unfortunately, lossless compression cannot be done for most images. That is why lossy compression is used.

Lossy compression

Lossy compression refers to a compression scheme that compresses the data but loses some of the data. If you compress an image using a lossy compression scheme, the restored image when decompressed is NOT identical to the original image. However, if the scheme is a good one, the images will look almost identical. There are MANY lossy compression schemes some of which are very well known such as JPEG. We can use JPEG to illustrate Lossy compression.



Figure 20 - JPEG Quality Factor 99 (Very high quality) 358 Kilobytes



Figure 21 - JPEG Quality Factor 75 (high quality) 70.4 Kilobytes



Figure 22 - JPEG - Quality Factor 50 (reduced quality) 23.4 Kilobytes





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Figure 23 - JPEG - Quality Factor 10 (noticeably reduced quality) 9.9 Kilobytes

Each of the above images, when stored as a bmp file, requires 672.8 Kilobytes of storage space.

Note that bmp is lossless because it does not use compression, i.e., the image is stored with no loss of resolution or information but the file is BIG.

However when the lossy JPEG algorithms are applied and the file is stored as a JPEG file instead of a bmp file, you can see that as the quality factor decreases, the quality goes down and the storage space required goes down. (Note that some compression CODECs refer to "compression factor" instead "quality factor". A quality factor of 75 generally would mean a compression factor of 25, i.e., quality factor is 100 minus the compression factor.)

Typically, JPEG is run with a quality factor of 75. In Figure 21 above, we see that storing an image as a JPEG image with a quality factor of 75 instead of as a bmp file reduces the size of the file from 672.8 Kilobytes to 70.4 Kilobytes.

We see that it is very difficult if not impossible to see any difference between Figure 21 and Figure 22 so compression did not seem to degrade the image very much and it did reduce the file size from 672.8 Kilobytes to 70.4 Kilobytes.

We see in Figure 22 that the image has degraded slightly due to the lower quality factor of 50.

The degradation is barely noticeable if you look carefully at the side of the horse's face where the white and brown hair join you can see that the boundary is no longer smooth.

We see in Figure 23 that the image has degraded very noticeably due to the very low quality factor. The file is very small however, 9.9 Kilobytes instead of the original 672.8 Kilobytes.

The above merely illustrates the concept of lossy compression. Again, there are MANY compression schemes that have been invented. They all behave a little differently. They are all designed to reduce the size of the image file without noticeably degrading the image when it is displayed.

Why do you care? You care because the AVI files that you will be generating consist of a collection of images stored in a file. Movies are made up of many images that are displayed rapidly in succession. If you do not use compression, your AVI files will be HUGE.

See also: [Video CODECs](#), [Configure Window Examples](#).

Configure Window Examples

The following images show configuration windows associated with various [CODECs](#) that might be available on your machine.

These are accessible through the "Configure..." button that appears on the movie setup windows IF the selected "Compression" scheme has a configuration window associated with it. This shows the Movie Setup window for Time-Lapse captures so you can see where the "Configure..." button and Quality slider are.

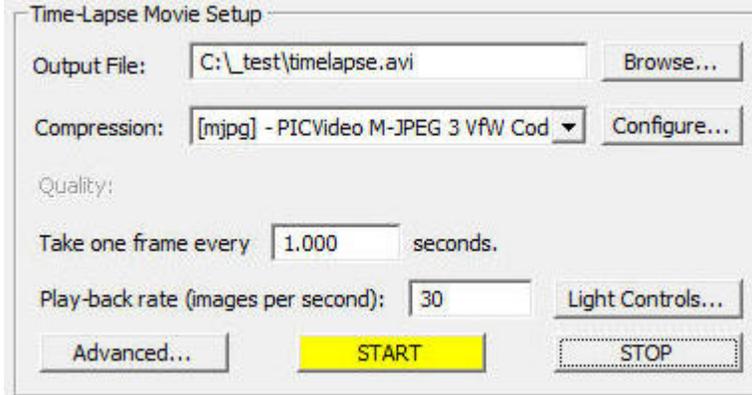


Figure 24

Below, we describe briefly the control each configuration window allows over [compression Quality](#).

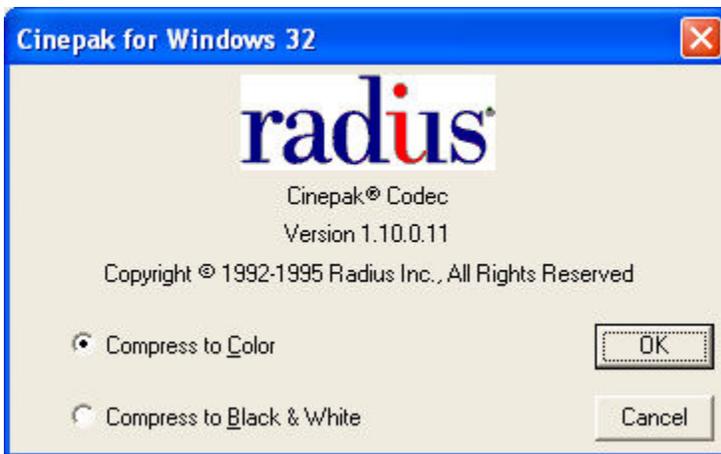


Figure 25 - Cinepak CVID CODEC

CVID has no adjustable quality option.
HandyAvi's Quality slider has no effect.



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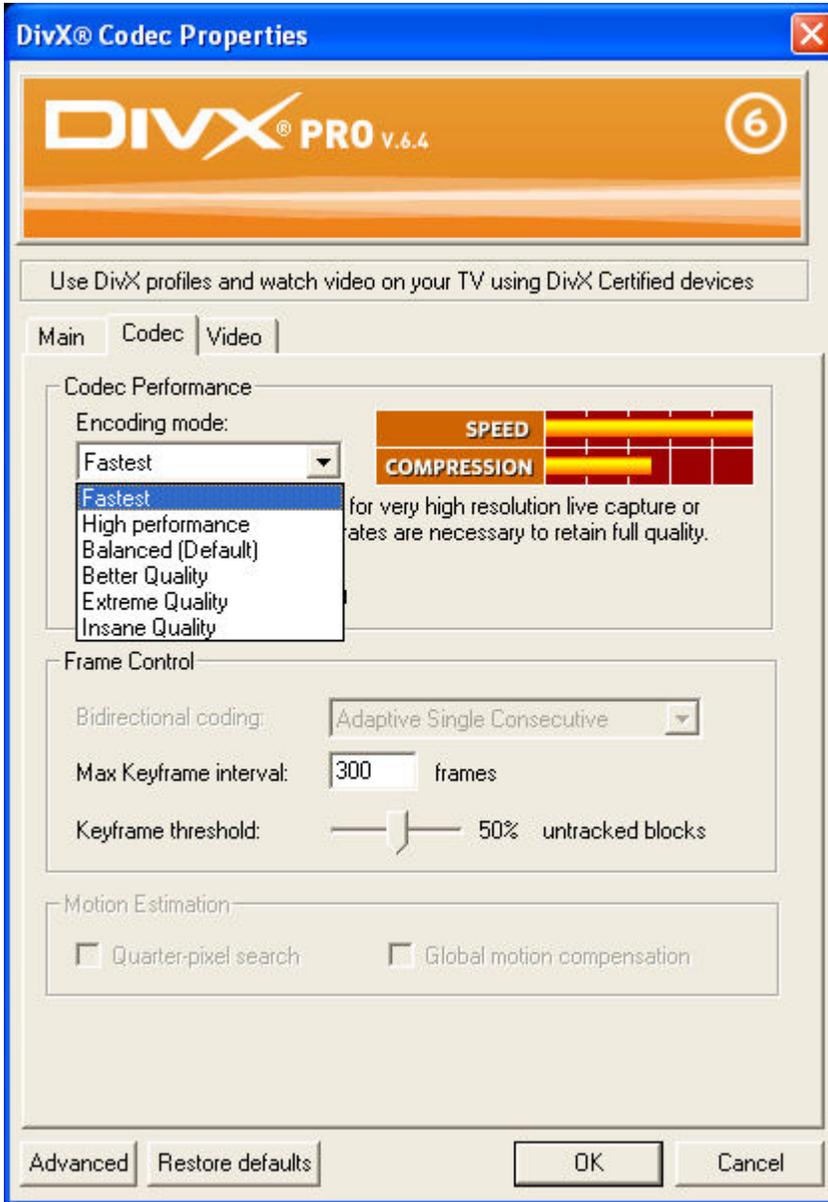


Figure 26 - DivX CODEC

DivX allows you to select various "Encoding Modes" which essentially cause the quality to be higher or lower.
HandyAvi's Quality slider has no effect.

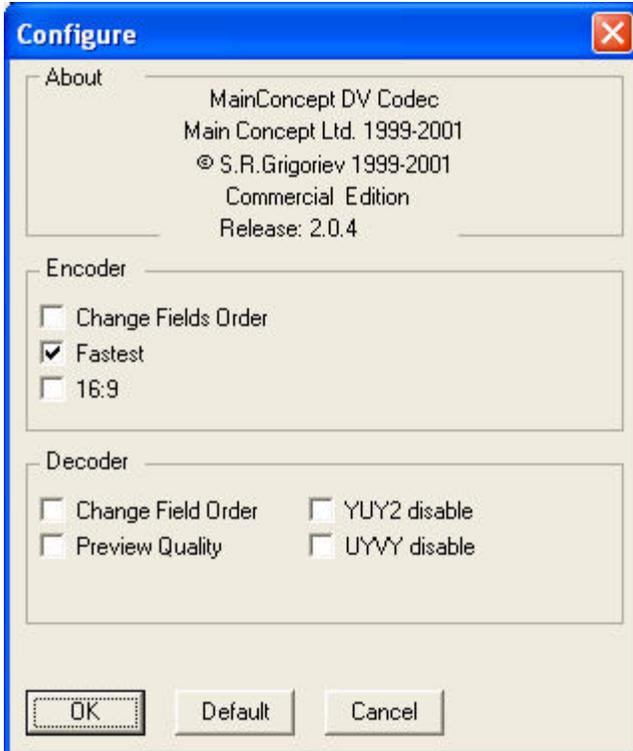


Figure 27 - DVSD Codec

DVSD allow you just two Quality options, Either "Fastest" or not. HandyAvi's Quality slider has no effect.

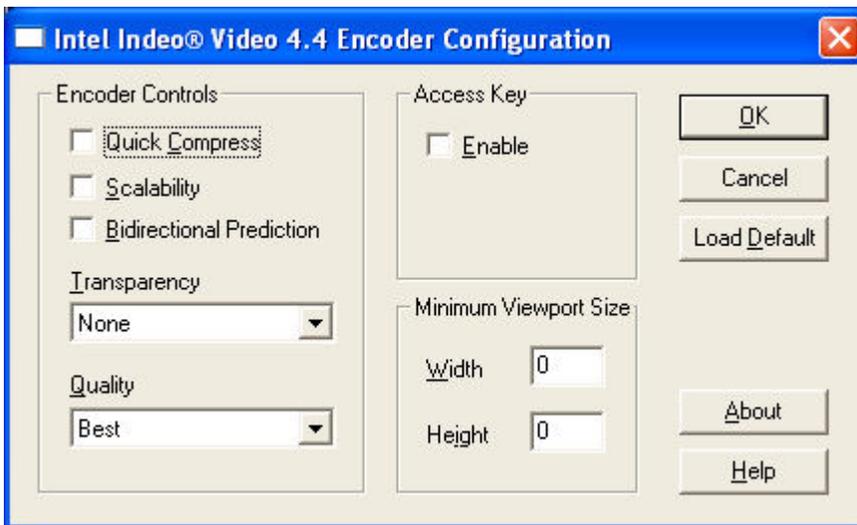


Figure 28 - IV41 CODEC

IV41 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.



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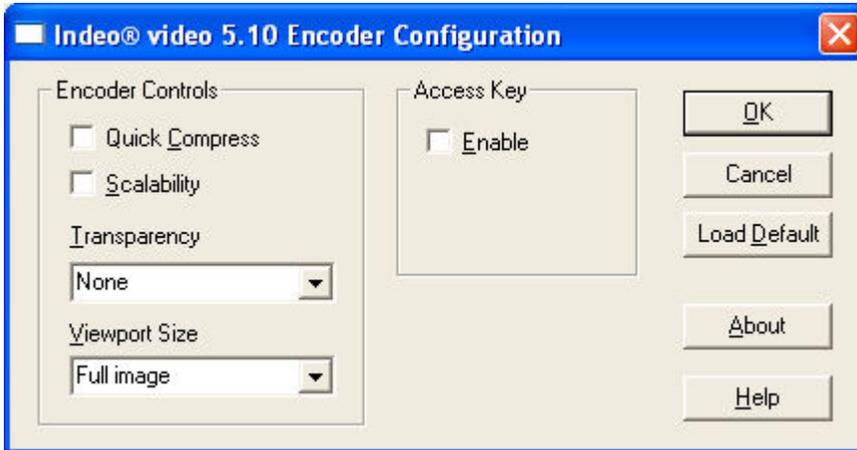


Figure 29 - IV50 CODEC

IV50 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.

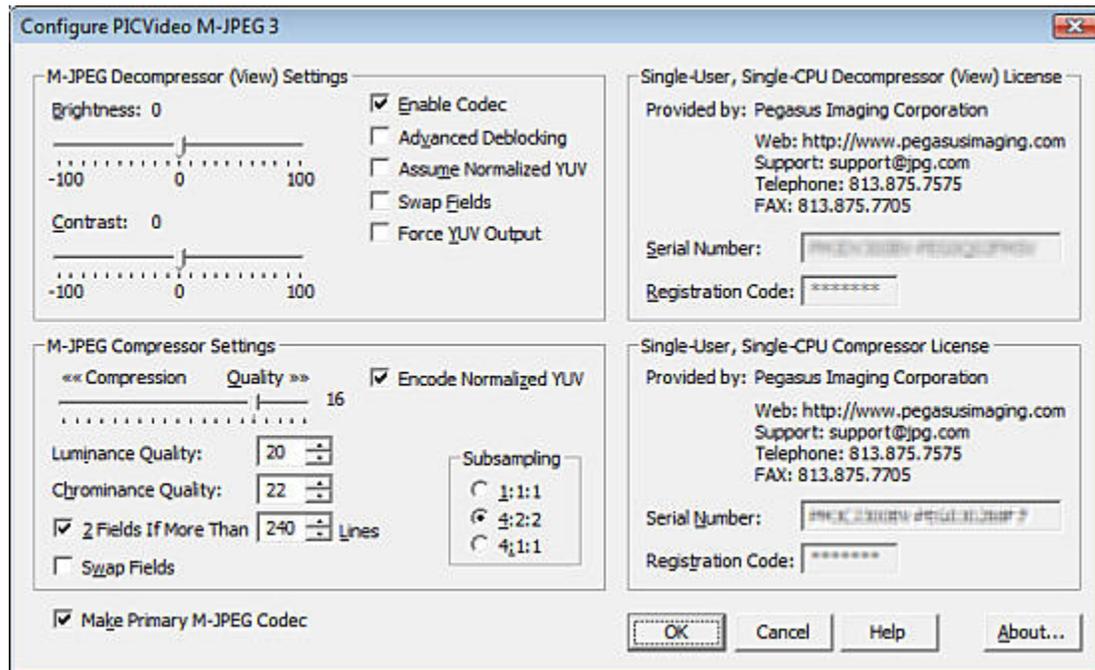


Figure 30 - PICVideo MJPG CODEC

There are at least two MJPG CODEC vendors out there. As far as we know, you have to buy an MJPG CODEC if you want to use one.

The PICVideo MJPG CODEC has a Compression-Quality slider that you can adjust to set your desired trade-off between image size and image quality.

HandyAvi's Quality slider does not appear when the PICVideo MJPG compression scheme is selected so the above panel is the only way to adjust Quality/Compression.

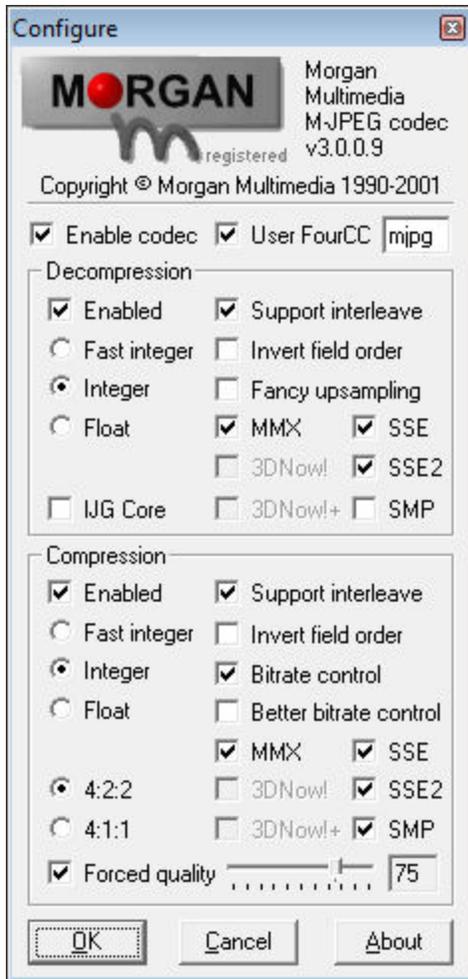


Figure 31 - Morgan Multimedia M-JPEG Codec

Morgan M-JPEG allows quality to be set if the "Forced quality" check box is checked. The value in the display box (here seen as 75) ALWAYS overrides the value set by the HandyAvi Quality sliders!

HandyAvi's Quality slider appears but has no effect.

(We ran into a problem with the above version of the Morgan CODEC in Vista when we used image sizes other than 160x120, 320x240 or 640x480. Caused a HandyAvi crash that we could not find a work-around for... We sent Email to the vendor describing the problem. Received no answer after several days. ***This CODEC seems to work just fine in Windows XP though...***

In the past, we have always used the Morgan Multimedia M-JPEG Codec but we have now installed the PICVideo M-JPEG CODEC and are using it instead on Vista.)



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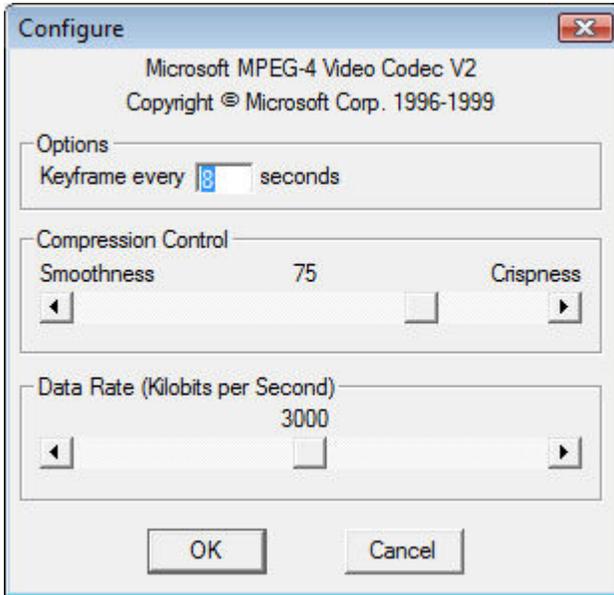


Figure 32 - mp42 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

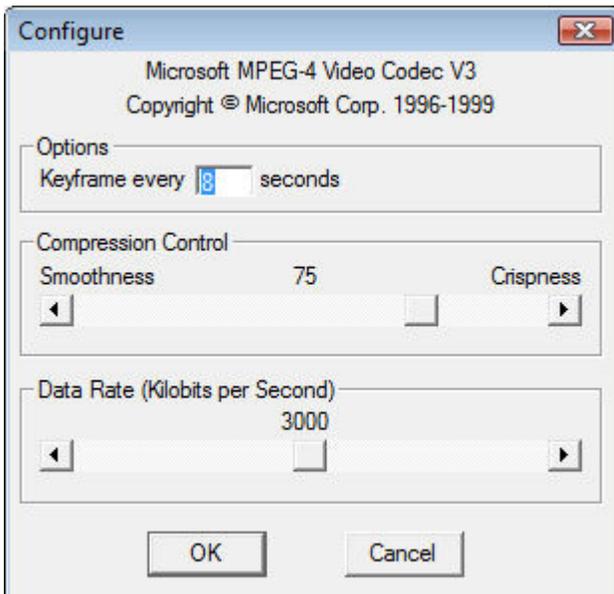


Figure 33 - MP43 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

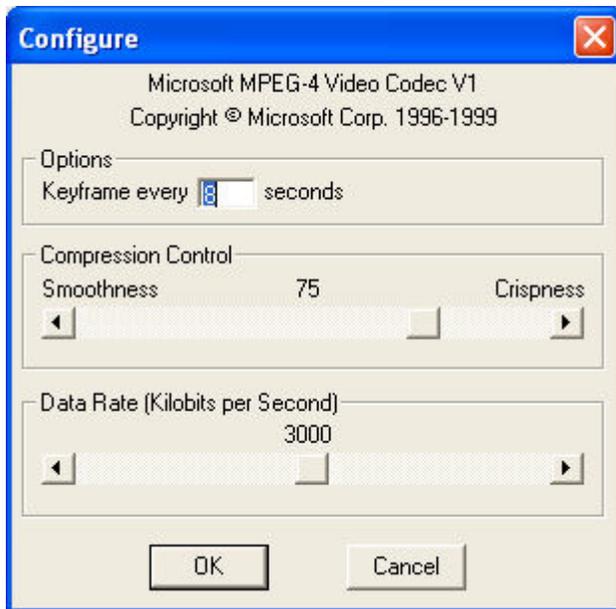


Figure 34 - MP41 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

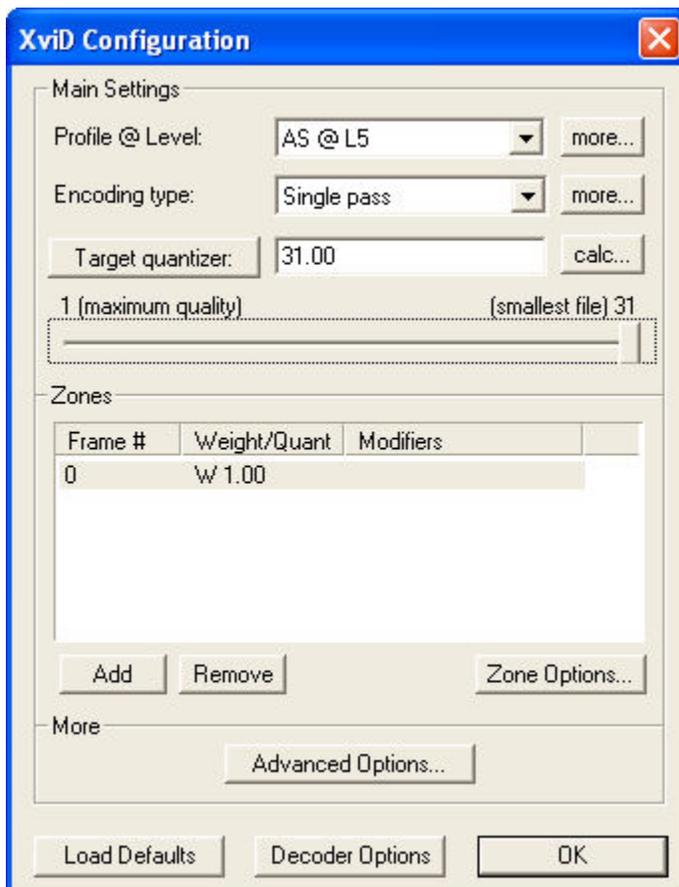


Figure 35 - XviD CODEC



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HandyAvi's Quality slider DOES control quality for this CODEC.

Create a Meteor Trail Video

Meteor Trail Video Overview

HandyAvi allows you to easily create meteor trail videos using a webcam.

HandyAvi employs a sophisticated motion detection algorithm which allows capture of ENTIRE meteor trails.

Your AVI file, after a night of recording, will be relatively small and contain only those frames associated with meteor trails (or other objects moving across the sky such as airplane trails of course.)

The system will also capture multiple lightning bolts and any other phenomena that trigger the motion detection system.

Note: The system will continue to record as long as motion continues even if the pre-frames and post-frames values are set very low!

How it works

A simple-minded way to capture meteor trails would be to simply record everything all night long. For a small frame size of 320x240 pixels containing color, 8 hours of video at 30 frames per second uncompressed would require $8 \times 3600 \times 30 \times 320 \times 240 \times 3 = 194.4$ Gigabytes! Using compression could bring that down some (it would still be Gigabytes though) but you would still have to sit at your computer and look through 8 hours worth of data to see if you captured any meteor trails.

It would be much better to use motion detection to record data only when a meteor flashed by.

However, meteors generally start out very dim then flash to very bright then quickly dim again. Typical motion-detection algorithms would probably see the bright flash, record that frame and a few more bright-trail frames then stop recording before completion of the dim trail. They would completely miss capture of the beginning of the trail.

What you'd really like to do is employ motion-detection AND somehow capture a selected number of frames BEFORE the bright flash and then continue recording frames AFTER the bright flash while any additional motion is detected so that the entire meteor trail (or aircraft trail) is captured.

HandyAvi employs a sophisticated algorithm which allows you to do exactly that.

HandyAvi automatically captures a specified number of frames (pre-frames) immediately preceding the "trigger event" so that the (possibly) dim beginning of the meteor trail is captured.

HandyAvi continues recording data while additional motion is detected.

HandyAvi continues recording an additional number of "post-frames" after the last motion is detected.

The AVI file will contain COMPLETE meteor trails, airplane trails or lightning events.

The sophisticated motion detection algorithm employed by HandyAvi completely eliminates false detections caused by camera noise, cosmic ray events, star scintillation, etc.

The AVI file will then contain only meteor trails (and airplane trails or lightning flashes) and will not occupy gigabytes of space.

You will not have to waste time looking through thousands of empty frames generated by other less sophisticated software systems.

RAM Requirements

HandyAvi allows you to specify up to 250 pre-frames and up to 250 post-frames. If you used the maximum settings for both, the internal memory requirement would be 500 times the size of one of your camera images. For frame sizes of 640 x 480, that would be 500 x 640 x 480 x 3 or about 460 Megabytes, relatively small in relation to typical memory sizes of current computers.

Typical (and recommended) values for pre-frames and post-frames are 5 and 5 though so the buffers would occupy only 10 x 640 x 480 x 3 or about 10 Megabytes. 10 Megabytes is very insignificant in modern computers.

How to Open the Meteor Trail Video Control

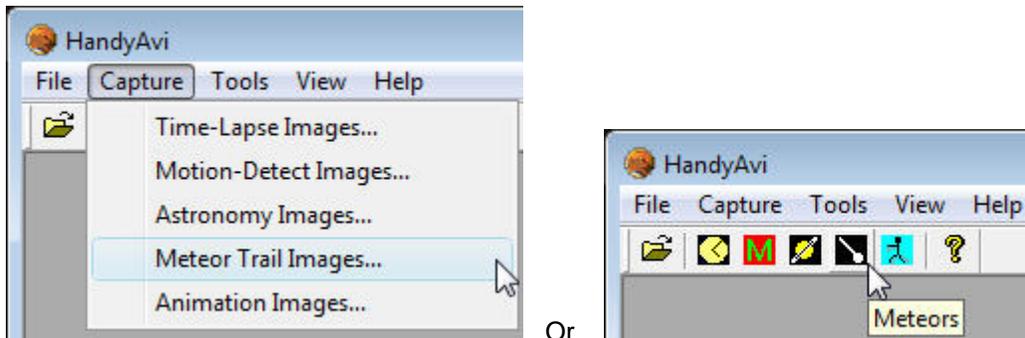


Figure 63

From the main HandyAvi window, select the "Capture/Meteor Trail Images" menu item to bring up the "Meteor trail Capture window".



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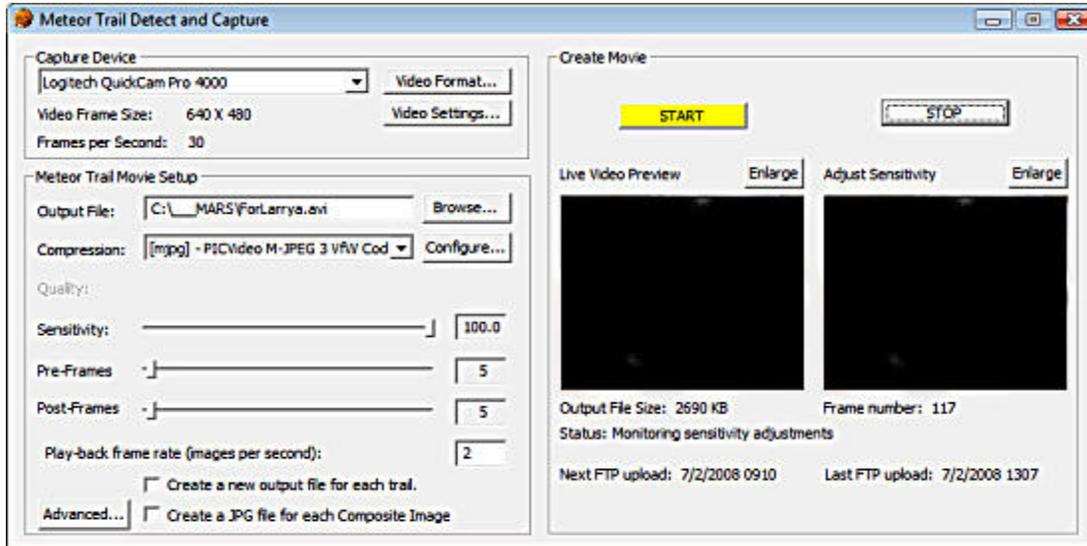


Figure 64

This window controls all of the meteor trail photography functions of HandyAvi.

The Capture Device Section

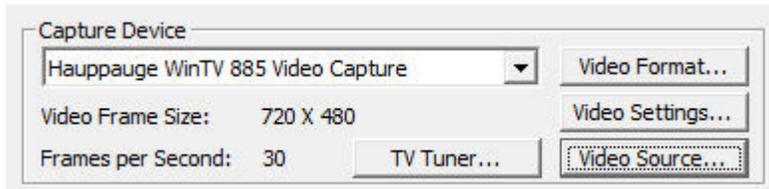


Figure 3

This section of the Capture window allows you to choose a webcam (i.e., a capture device). If you have several webcams plugged in, they will all be listed here if you click on the pull-down arrow. In addition, some other types of video capture devices may be listed here such as the Hauppauge WinTV PVR PCI II Capture device or the Hauppauge WinTV Video 885 Capture device. Other buttons (see below) may also appear in this section depending upon the capabilities of the selected device.

We see in the Capture Device section that the webcam currently selected is the Logitech QuickCam Pro 4000.

Its "Video Frame Size" is currently set to 640x480.

Its frame rate is set to 30 frames per second. Note that this value will sometimes be overridden by the camera drivers when the camera is in a mode where brightness and contrast are set "automatically".

The video frame size and the video frame rate can be changed by left-clicking the "Video Format" button. This will bring up the camera manufacturer's Video Format or Properties window which will allow you to make changes to basic camera functionality.

Video Format: This button causes display of a window provided by the manufacturer of your webcam. For a Logitech QuickCam Pro 4000, the window that comes up looks like this:

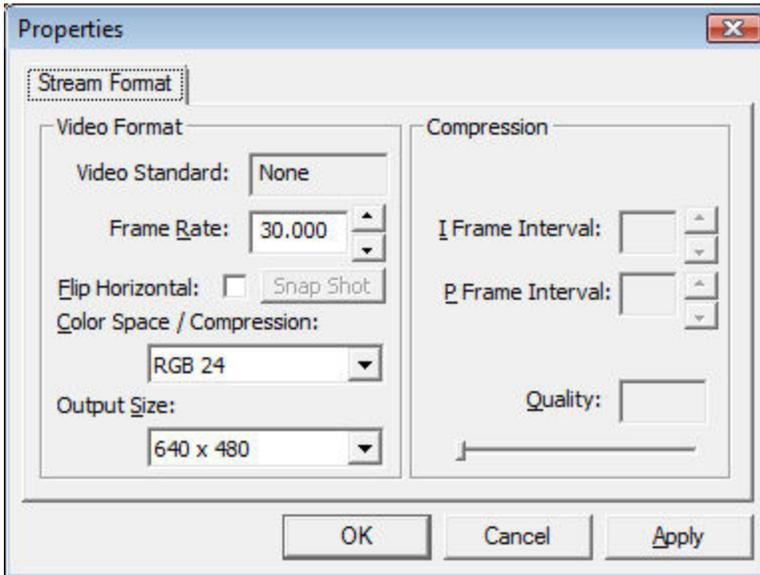


Figure 4

This window may be used to change the video format settings of your camera. In particular, the "Frame Rate" tells how many frames per second your camera will capture although your camera driver will sometimes override this if it is set to an "automatic" setting.

The Output Size selection allows you to select the frame size in pixels of the images that the camera will be taking. Both the ToUcam and the **Logitech QuickCam Pro 4000** for example, allow the image sizes shown here:

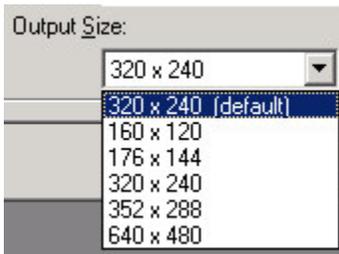


Figure 5

HandyAvi will automatically save and restore your Video Format settings if possible.

Video Settings: There is also a button called Video Settings. This will bring up the webcam manufacturer's video settings window and will allow you to change other types of camera settings such as contrast, color, brightness, sensitivity, etc., depending on how many items the camera manufacturer allows you to modify. The Video Settings window for the Logitech QuickCam Pro 4000 webcam looks like this:



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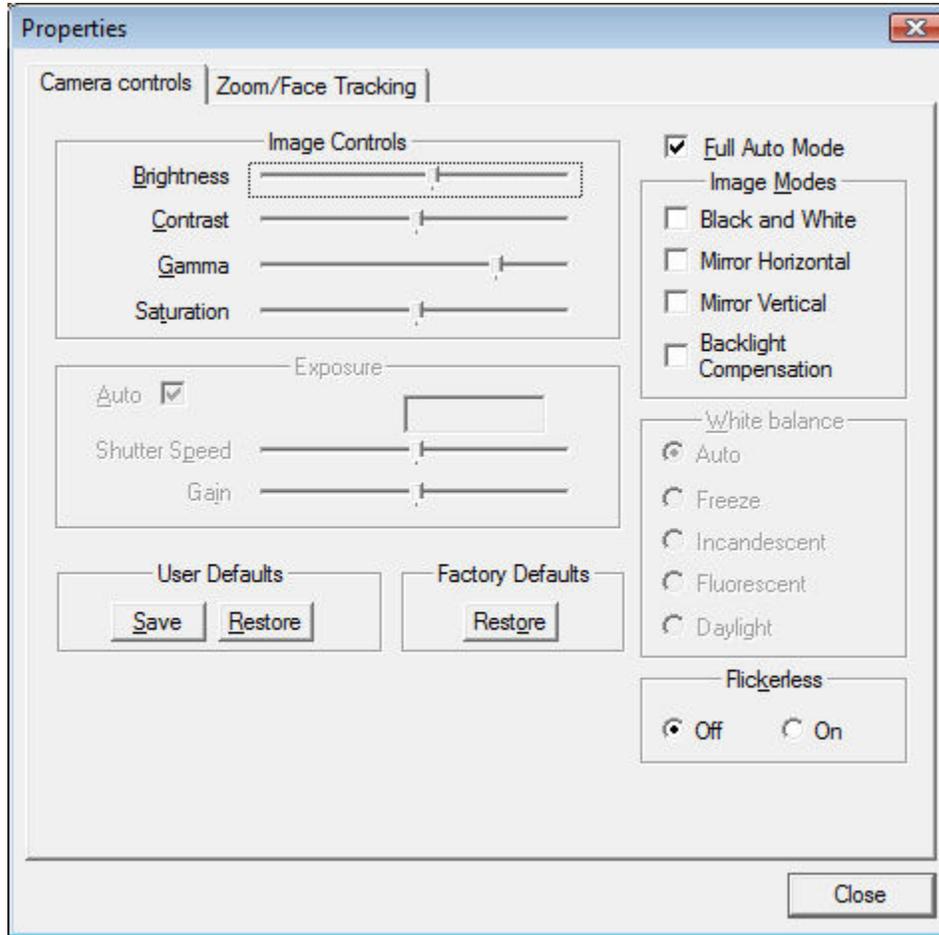


Figure 6

The image in Figure 6 shows that the camera is in "Full Auto Mode" which means that the camera will automatically adjust for changes in light levels. It will sometimes change the frame rate automatically when in this mode.

The Video Settings window for the Philips ToUcam webcam looks like this:

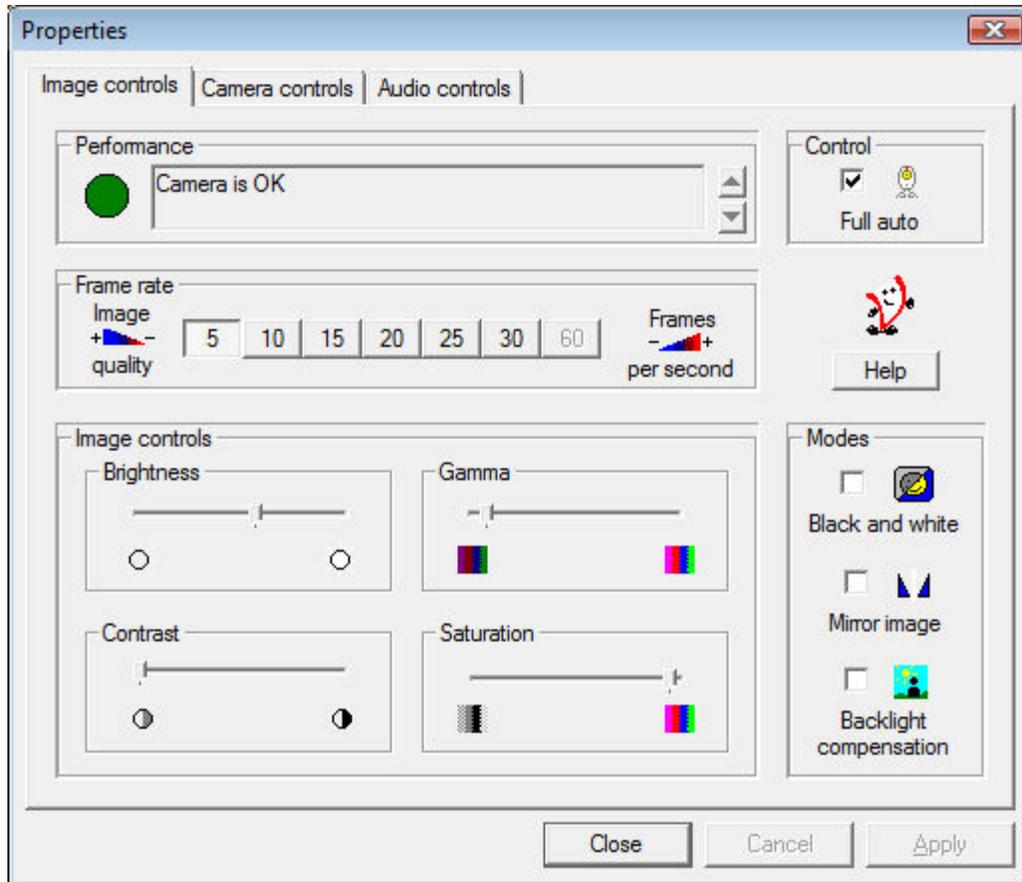


Figure 7

These controls provide a great deal of control over your webcam and might need to be adjusted to get the best results under various lighting conditions. For planetary astronomy of, for example, Saturn using a telescope, we usually take the camera out of "Full auto" and adjust the "Frame rate", "Brightness", "Contrast", etc., to provide an image that is not over-exposed. We have found that lowering the "Frame rate" is often helpful for planetary imaging.

Other webcams may have other types of video settings windows of course. The above are simply examples of webcam control features that two different manufacturers decided to provide.

IMPORTANT: if the "Full auto" control is checked in Figure 7, it can override the frame rate and set it to a lower value. Under dim lighting, the automatic settings for many webcams cause the frame rate to be reduced so that brighter images can be obtained. You can see in Figure 7 that the original frame rate of 30 frames per second has been overridden so that the frame rate is now 5 frames per second. By switching "Full auto" off, you can manually set the frame rate override to 30 if you wish to capture more frames more quickly. This is important because it can be puzzling if you are not aware of it.

Video Source: The user here has selected a "USB 2821 Device" which is a USB/Video Adapter so a "Video Source..." button is now displayed:



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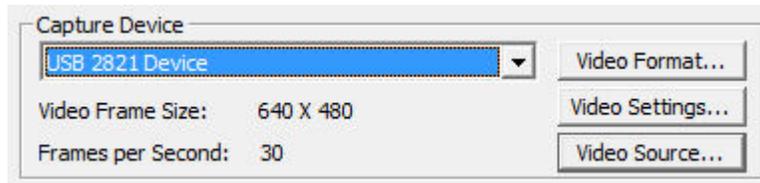


Figure 8

The "Video Source" button will be displayed ONLY when the capture device you are using supports Video Source options. (Most webcams do NOT support the "Video Source" option. However, many USB video adapters and many video boards do support the "Video Source" option.)

We have successfully used a USB 2.0 Video Adapter with Audio adapter (Model GA-VD204) which shows up as a "USB 2821 Device" with HandyAvi. We have also successfully used USB video adapters produced by five other manufacturers.

Some adapters allow EITHER Video Composite signals to be input or S-Video signals to be input. The Video Source window will allow you to choose which one will be seen by HandyAvi.

Here is what the USB 2821's "Video Source" windows looks like:

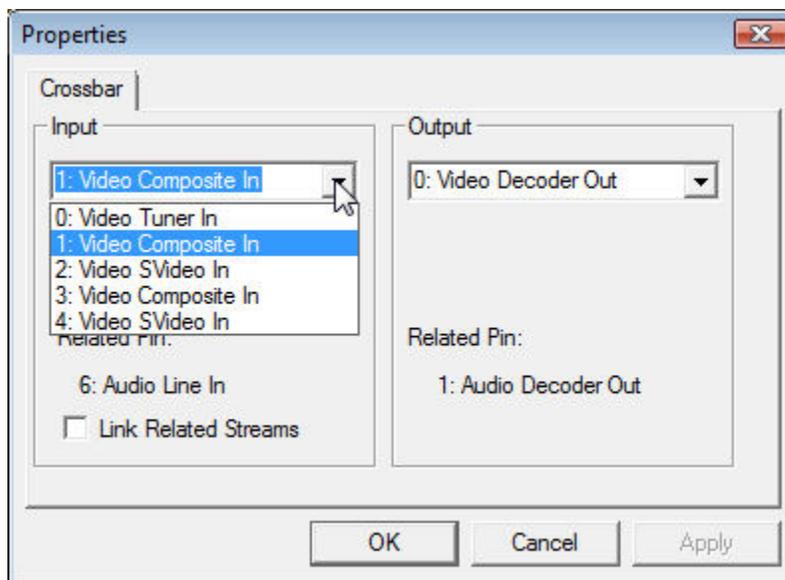


Figure 9

You can see that we have opened the "Input" pull-down. "Video Composite In" means HandyAvi will see the video stream from a camera plugged into the adapter's Composite Video input port (a standard Phono Plug).

If instead you plug an S-Video source into the adapter (from a VCR or DVD player, etc.) and choose "2: Video SVideo In" then HandyAvi will see the video stream of the S-Video device that you have plugged in.

Note that most surveillance cameras output Video Composite signals, i.e., NTSC signals in many countries, PAL in many others. We have a Watec 902H2 ULTIMATE camera that we are using for Meteor Detection. We plug its Video Composite output into the GA-VD204 adapter (or other USB-Video adapter) and then plug the adapter into the USB port. HandyAvi sees the video and everything works well.

Note that some adapters check to see if you are using a USB 1 port or a USB 2 port. Some of them will NOT allow you to set higher resolutions (like 640 x 480) if you are using a USB 1 port. This is usually undocumented and can be puzzling which is why we are mentioning it here...

It should be noted that the Watec 902H2 ULTIMATE is an EXTREMELY sensitive low-light camera (.0001 Lux supposedly) and is more expensive than most cameras used for surveillance work. We needed the sensitivity for meteor detection. There are of course MANY cheaper cameras that output NTSC Video Composite signals that can be used with HandyAvi via a USB-Video adapter.

The user here has now selected a "Hauppauge WinTV 885 Video Capture" board:

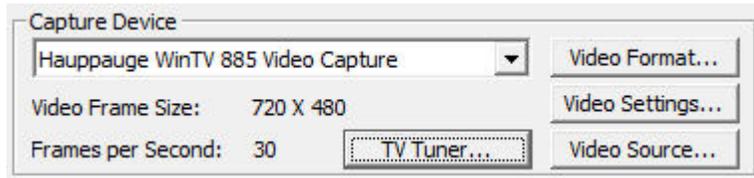


Figure 10

The "Video Source..." button now exposes this manufacturer's window:

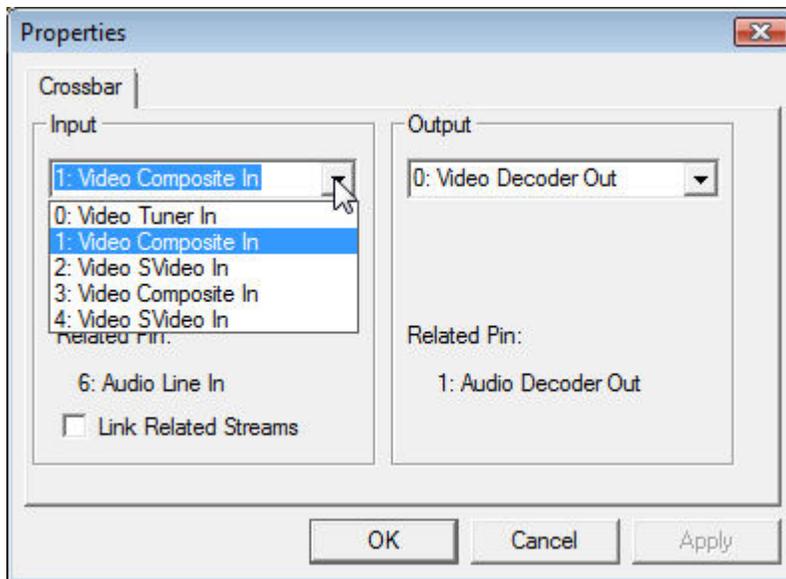


Figure 11

"Video Tuner In" means that the board is going to receive input from the TV tuner. S-Video and Composite inputs can also be selected as input sources. We don't know why this board has two "Video SVideo In" selections...

TV Tuner: The Capture Device section also now includes a "TV Tuner" button which provides access to the board manufacturer's TV Tuner settings window:



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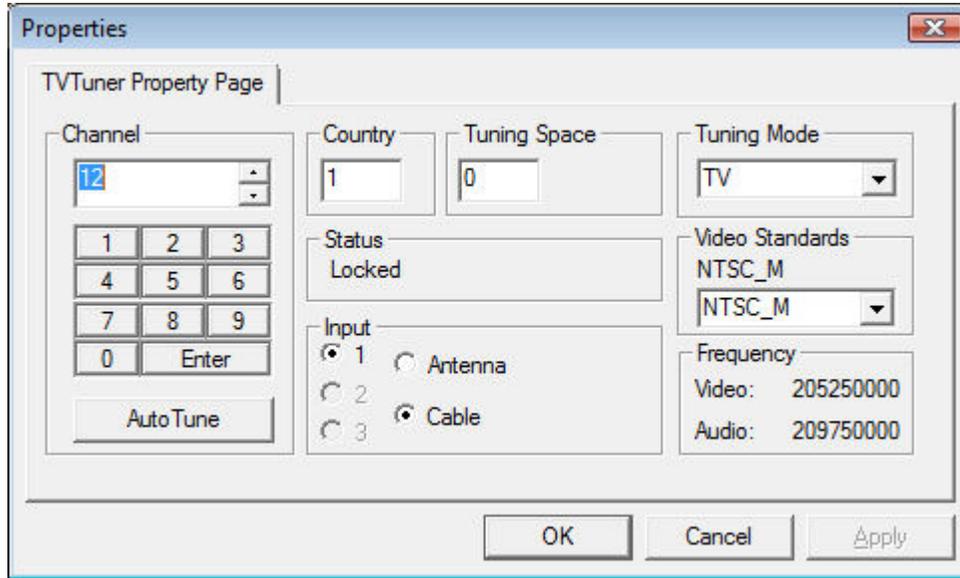


Figure 12

This window allows you to select the input television channel among other things. On this particular board, we have found that to input Channel 12, you have to enter 12 then click on "Enter" or the channel input is ignored! Usually, we would select "Antenna" unless we are connected to a cable. There is a selection for "Video Standards" which includes NTSC_M, NTSC_JM, PAL_M, PAL_N, and PAL_COMBO. The "Tuning Mode" includes "TV" and "FM".

The Meteor Trail Movie Setup Section

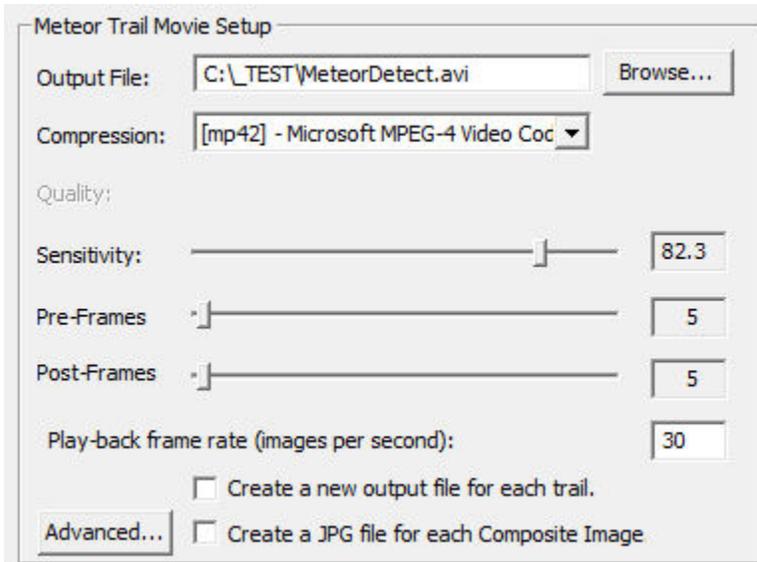


Figure 65

This section of the Meteor Trail Video Capture window allows you to set up the webcam for making a Meteor Trail video.

Output File: Type in the path name of the new video file you want to create.

Browse: Brings up a standard file selector window so that you can more easily place the file in a particular folder.

Compression: Select any AVI file compression scheme resident on your computer. File compression schemes or codecs (short for coder/decoder) show up on your machine from many sources. Microsoft installs several. Your video camera may install one or more. You may download and install compression schemes from the internet. At the time of this writing, there are over 280 codecs listed at <http://www.fourcc.org>. Note that one of the selection items is called Uncompressed. If you select Uncompressed, the image data in your files will not be compressed. Your files will be LARGE. However, each image in an Uncompressed file will contain images that are exactly what the camera captured. Compressed images are usually slightly different from the original images because information is lost during compression. In most cases, the difference is not noticeable. Use of uncompressed images is important for some applications but not necessary or advisable for most. Learn more about video codecs [here](#).

HandyAvi displays the FOURCC value for the compressor in brackets at the beginning of the "Compression:" line.

Note that HandyAvi will also allow you to read, work with, and display AVI files produced by other software or cameras and will select the proper decompression scheme automatically IF the required decompression scheme has been installed on your computer.

HandyAvi will also allow you to read a file that was written using one compression scheme and write a new AVI file using a new compression scheme. So you can convert AVI files from one compression scheme to another if the required codecs have been installed on your machine.

Configure: Brings up the compression CODEC's configuration window. This button only appears if the selected compression scheme HAS a configuration window.

Note that the "Quality:" slider and the quality settings in some CODECs do not "cooperate". In the case of the mjpg CODEC, the "Forced quality" slider determines the degree of JPEG compression and the "Quality" slider in the "[Meteor Detect Movie Setup](#)" window has absolutely no effect. Other CODECs we have tested do not override our "Quality:" slider. When in doubt, you should test by setting the quality and capturing (for example) three frames of the same scene (use Time-Lapse and take one frame every 3 seconds or so). Then change the quality factor and make another movie. The size of the two resultant AVI movie files should be different.

See [Configure Window Examples](#) for information on the Configure options of various CODECs. [Learn more about video codecs here.](#)

Quality: Adjust the quality of the compression scheme. Most compression schemes create smaller files because they are actually discarding tiny image details. By discarding more and larger image details, you can produce a smaller AVI file. If the Quality is set to 100, then little or no image data is discarded and the resultant AVI file will be large. If the Quality is set to 0 then, theoretically, all image data is discarded and the resultant AVI file will contain blank images! Of course each codec is created by software people who may have thought about this and limited it so they do not throw away all of the image data even if the Quality is zero.

Note that each codec is different and some may even ignore the Quality setting or not allow it to be set. Also note that lossy compression schemes are used in many applications. JPEG is an example of a lossy compression scheme that is used in MANY applications and the fact that



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some of the image data has been discarded is practically unnoticeable. So compression with slightly reduced quality is a very good thing in most cases. [Learn more about video codecs here.](#)

Sensitivity: This slider lets you set the Meteor Trail Detection sensitivity. When you have not yet pressed "Start" to take a movie, the right-hand image (Adjust sensitivity) of the "Create Movie" section registers a frame and increases the counter by one for each frame that "triggered" the motion detection algorithm.

If the sensitivity is set high, to 100 for example, then simple camera noise will trigger the motion detection algorithm and the counter will count up rapidly indicating that nearly all frames seen by the camera are seen as motion frames. If you press Start with this setting, every frame would be a "trigger" frame and cause nearly everything to be sent to the output AVI video file. You typically do not want to set sensitivity this high unless you are testing the camera.

Before pressing start, you should play with the sensitivity setting and set it just below the point where the counter stops counting. Basically you are setting the camera noise threshold. After this is set properly, then the only things that should trigger the motion detection would be true motion events such as meteors, airplanes, lightning flashes, etc.

Setting a sensitivity value essentially sets a noise threshold above which, trigger events are recognized.

HandyAvi employs a sophisticated implicit dark-frame algorithm to suppress camera noise and cosmic ray noise. This method operates on-the-fly, without interfering with normal frame-capture, i.e., no "dead time" is captured.

The algorithm allows stars to move slowly across the frame (if the camera is unguided) without triggering an event. It also suppresses triggering on star scintillation (twinkling) caused by the Earth's atmosphere or triggering on cosmic ray events or on camera noise.

The sensitivity can be set during capture as well as before or after. This allows you to adjust the sensitivity and test it while a video is being made. You will be able to see which frames are captured by looking at the "Last Captured - Composite" frame window in the [Meteor Trail Create Movie Area](#).

Changing the sensitivity while meteor trail capture is underway is not recommended because each trigger event will cause the writing of a whole sequence of frames making it difficult to determine the true sensitivity. That is why we allow the sensitivity to be set BEFORE starting the Create Movie function.

Pre-Frames: This slider allows you to specify how many image frames preceding the trigger frame will be written to your AVI output file. Allowable values are 0 to 250. When a meteor or other motion is detected, the system will write out as many frames, preceding the trigger frame, as specified. Then the trigger frame will be written out and then additional frames will be written out if motion continues to be detected. After no motion has been detected, the number of post-frames specified are captured and written out.

Note: If you click on a slider you can then use the left and right arrow keys on the keyboard to make fine adjustments.

Post-Frames: This slider allows you to specify how many image frames following the last detected motion will be written to your AVI output file. Allowable values are from 1 to 250.

We recommend that you set this to 5 or more since this value also establishes a time-window for further motion detection.

For example, let's say that 6 "Pre-frames" and 5 "Post-frames" are specified. When a meteor or other motion is detected (the "trigger" event), the system will write out the 6 frames that immediately preceded the motion event frame. Then the trigger frame will be written out. Then motion detection will continue (interleaved) as the 5 "Post-frames" are written out. If motion is detected during the writing of the "Post-frames", image capture to the AVI file will continue and 5 new "Post-frames" will be scheduled. Motion detection and frame writing will continue in this manner as long as motion persists. Eventually, no more motion will be detected and HandyAvi will then record the final 5 "Post-frames", then stop recording frames and begin waiting for a new motion event.

Note: If you click on a slider you can then use the left and right arrow keys on the keyboard to make fine adjustments.

Play-back rate (images per second): Determines how fast your frames will be displayed when you play the AVI movie that you have recorded. If you want the frames to be played in "real-time" then you should set the rate to the same rate as the camera was set to when it was recording. If you want each frame to be presented at a very slow rate, then you could set the play-back rate to 1 second. In this case each frame of the movie would be displayed for one second when the movie is played.

Create a new output file for each trail: This was requested by a user who was trying to separate each meteor track from other meteor tracks so that he could determine the time of the track among other things.

If you check the box, then each recorded trail will automatically be put into a new AVI file. (Up to 9999 files.)

The new file names are generated automatically. Checks are made to ensure that the new file name does not match an existing file name. In case of a match, the file name suffix counts up until it finds a name that is not being used. New file names are the same as the original file name except that they contain a suffix such as "-0001". For example, if the original file is named "myAviFile.avi" then when its track has completed, it will be closed and a new file with the name "myAviFile-0001.avi" will be generated. If that name is not already the name of an existing file in the current folder then it will be used as the name of a new recording file. Recording will continue with no intervention required on the part of you, the user.

Note that there is a [log file](#) for every AVI file created that contains frame times. These log files can be suppressed in [Preferences](#) if desired. (Log files are generated by default.)

Note also that each frame can be labeled automatically with a date/time stamp if you set the "Date stamp each captured image" and/or "Time stamp each captured image" in [Preferences](#).

Create a JPG file for each composite image: During recording, and immediately after a new meteor trail has been recorded, the "Last Captured - Composite" window of the Meteor Trail ["Create Movie"](#) area will display a composite image of the entire meteor trail. A JPG file can be created and stored for each of these images. The JPG file names will be automatically assigned. If your original file name was "metFile.avi", the file name of a composite image will look like "metFile_n1_n2.jpg" where n1 is the number of the first frame in the AVI file of the captured trail and n2 is the number of the last frame in the AVI file of the captured trail, e.g., "metFile_117_126.jpg."

Advanced: This button will bring up the Advanced Meteor Detect Settings window:



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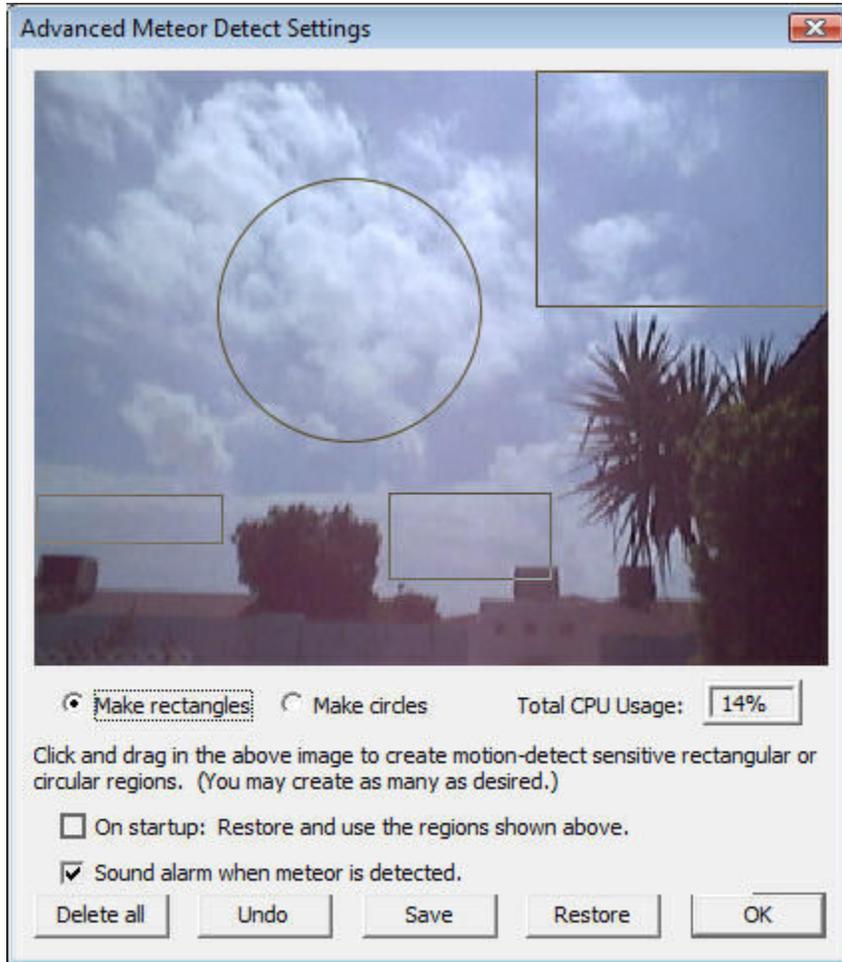


Figure 66

By left-mouse-clicking and dragging, motion-detect sensitive areas can be placed on the window. In the case shown, we were considering a setup for lightning capture. (The circle is probably not what we want in this case but serves to illustrate the use of circular regions.) When the wind blows, the palm fronds blow and could trigger the motion detection algorithm. By setting up rectangular and circular motion sensitive areas that do NOT include the palm fronds or trees but include much of the sky, we avoid the problem. The only areas that will trigger motion detection are the areas within the rectangles and circles.

Note that overlaps are not a problem. The overlapped regions get examined more than once for motion however which can degrade performance slightly. If you created 100 large overlapped regions, you might cause enough performance degradation to be significant. There is no need to do that, so don't do that!

Also note that placing circles and/or rectangles can be done ahead of time or on the fly AFTER recording has been started. The effect of each rectangle is IMMEDIATE.

A "Total CPU Usage" box has been added so that you can see immediately the effect your choices are having on performance. If you place one tiny rectangle on the screen, you will see the CPU usage go down. No rectangles or circles means that the entire image is being examined for motion. The performance registered is a reasonably accurate reflection of the load being placed on the system by the motion detection routines and will be about the same whether you have "START"ed video capture or are

still setting up for video capture. If the CPU usage reaches 100, frames might be skipped occasionally.

Note that circles require more CPU time than rectangles. Circles were added to support meteor detection users who have full-sky panoramic cameras and who want to avoid automobile lights and other disturbances (like trees blowing in the wind) occurring at the horizon(s).

Sound Alarm when meteor is detected: When this box is checked, a "bell" will sound when a new meteor is detected.

On startup: Restore and use the regions shown above: If the displayed regions have been "Save"d then they will be remembered and used whenever a Motion Detect Capture session is started. (Unless the saved file has been deleted or moved. In that case, the entire video area again becomes sensitive...)

Delete all: Will cause all rectangles to be deleted. The entire image will then be sensitive to motion.

Undo: Will erase the last rectangle. Pressing it repeatedly will erase previous rectangles in the opposite order in which they were created.

Note that the Advanced Motion Detect Settings window rectangles are active immediately, i.e., as soon as they are created, they will begin operating. This will allow you to tune the sensitivity if necessary.

During capture of an AVI file, when one or more of these sensitive regions have been created, image frames will be captured to the output file ONLY when motion occurs within one or more of the rectangles. This will allow you to ignore trees blowing in the wind for example but capture frames when motion occurs in the areas of interest.

Three sensitive rectangles are shown above. One would show any movement around the table at the other end of the pool, one would show any movement on a small portion of the path to the left of the pool and the third smaller window covers a small region of the pool deck. Any movement in any or all of these areas (subject to the sensitivity setting of course) would cause frames to be captured. Motion in all other areas of the image is ignored.

Save: Saves the rectangles in a file for future use.

Restore: Restores the rectangles stored in a file so that they will be used.

Notes:

Frames taken by the camera will appear in the current "Live Video Preview" frame visible in the [Meteor Trail Create Movie Area](#).

Frames being written out in response to a trigger event and being sent to your video output file will appear briefly/rapidly in the "Last Motion Detect" frame area visible in the [Meteor Trail Create Movie Area](#).

After completion of a trail, a "composite" image will appear in the "Last Motion Detect" frame area. If you were capturing a meteor for example, the entire meteor track would be shown in this one frame.

The Meteor Trail Create Movie Area



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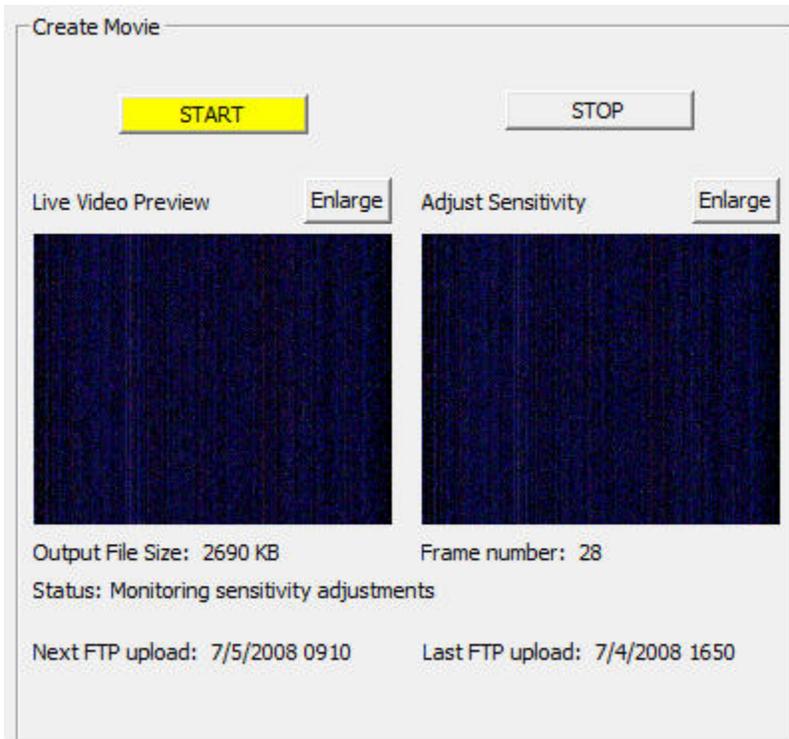


Figure 67

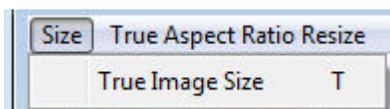
START: Starts the meteor trail movie recording process.

NOTE: Output files will automatically be limited to less than 2 Gigabytes, the AVI file size limit. A new file with a unique new name will be generated and used automatically whenever the limit is about to be exceeded. See Preferences for more information about Maximum AVI File Size.

STOP: Stops the meteor trail movie making process.

Enlarge: If you use one of the "Enlarge" buttons, a new window will be created containing the video image. This new window can be resized to any size by clicking and dragging an edge or corner of the window.

This new window also contains a "Size" option that will allow you to select a "True Image Size" option which will resize the window to show the actual size of the captured video images. Pressing the "t" key will also perform the True Image Size function.



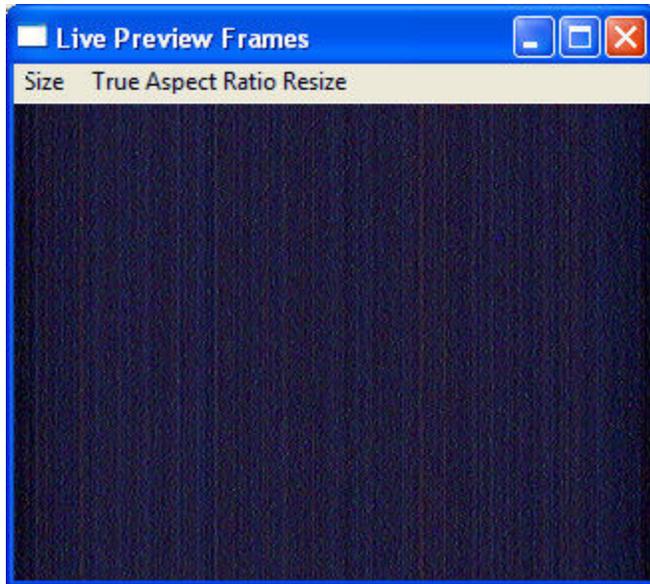
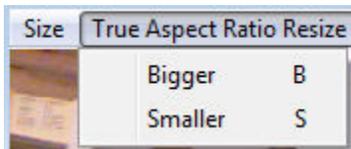


Figure 68

Figure 68 shows an enlarged "Live Preview Frames" window that has been sized with the "Size" option to the "True Image Size" of 320x240 which was the size selected in Figure 4 in the [Capture Device](#) section.

There is also a "True Aspect Ratio Resize" option:



Selection of "Bigger" will resize the window to a slightly bigger size while keeping the true aspect ratio of your image. Pressing the "b" key will also perform this action.

Selection of "Smaller" will resize to a slightly smaller size while keeping the true aspect ratio of your image. Pressing the "s" key will also perform this action.

If you close an enlarged window, the images will again appear in the "Live Video Preview" window or the other window if it was the one that had been enlarged.

NOTE: There are no "blind" times. All motion is captured for each complete trail no matter how long it takes for the trail to complete. This is due to the sophisticated image interleaving method we employ.

About Video Codecs

Note: You do not have to learn about codecs to use HandyAvi.



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However, the purpose of a CODEC is to compress your video data so that your AVI files are smaller. So if space on your hard drive is a consideration, you will probably want to use a CODEC.

AVI files can be created either by using no compression (uncompressed) or by using one of literally hundreds of compression schemes (codecs is short for Coder/decoder) that have been created by various companies. Uncompressed files are generally MUCH larger than compressed files.

In order for HandyAvi to use a particular compression schemes, it must have been installed on your computer.

Many AVI codecs probably already have been installed on your machine. Some come from Microsoft as part of your operating system. Some come from the manufacturers of webcams that you might have installed. You can even download and install codecs from the Internet. Some are free and others are not. <http://www.fourcc.org> is a site that lists and describes almost all known codecs. If you surf to that site, you will want to click on "codec list" to see all of the codecs.

Codecs have four character names known as "Four-Character Codes" or "FOURCC" names. This is how they are identified internally so that software applications such as HandyAvi can know which codec was used to produce a particular file.

FOURCC codes are also used internally when a HandyAvi user selects a compression scheme such as "Indeo® video 5.10". "Indeo® video 5.10" has a FOURCC name of "IV50". If you have an AVI file that was encoded using IV50, you can see the IV50 codec name by opening the file in HandyAvi and using the "View/AVI File Info" menu item.

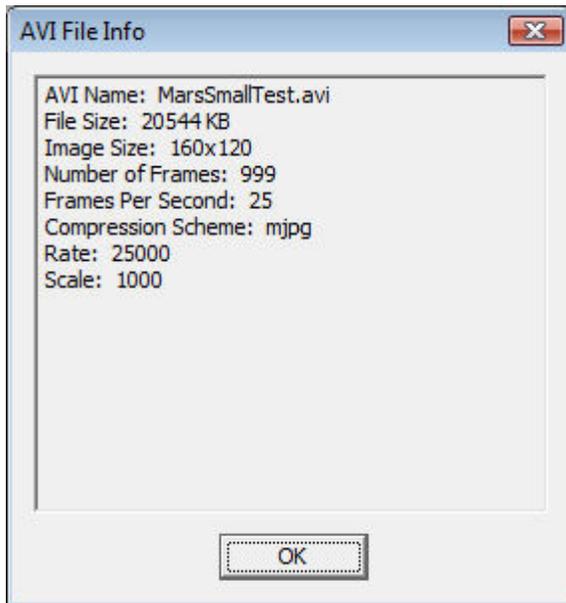


Figure 19

Figure 19 shows that the compression scheme used to compress the file "MarsSmallTest.avi" was mjpg which is the FOURCC code for the "Morgan Multimedia MJPG" codec.

HandyAvi will also attempt to open files compressed with codecs that are NOT installed on your machine. If the required codec is not installed, HandyAvi will, of course, be unable to PLAY the file but it will try to produce an AVI File Info report as shown in Figure 19 so that you will be able to identify the missing codec. If you know which codec was used, you might be able to locate an installable version of the codec via the Internet and install it. Then you would be able to play the

file using HandyAvi. If you can play the file using HandyAvi then you can also use [HandyAvi's editing features](#) to create a new file using the same or a different codec and include or exclude selected frames from the new AVI file.

Many CODECs allow you to have control over the "Quality" factor or "Compression" factor that will let you make your files smaller.

[Learn more about Compression Quality.](#)

[Learn more about Configure windows.](#)

About Compression Quality

There are many video compression schemes. The purpose of a video compression scheme is to make a smaller file without sacrificing too much detail in the images.

An uncompressed AVI file is comprised of a series of bmp image files. There are actually many different bmp file formats. Each of the formats is designed to reconstruct an image pixel by pixel. Typically, AVI files are made up of bmp files which have 3 Bytes for each pixel. The three bytes contain the Red, Green, and Blue values for a pixel. Thus, a 640x480 uncompressed image requires approximately 3 x 640 x 480 bytes ("approximately" because there may be some "pad" bytes at the end of each line. There is also a small amount of header data describing the size, color content, length and width of the images, etc.) 3 x 640 x 480 Bytes is 921600 bytes or almost 1 Megabyte! If your AVI video camera is running at 30 frames (images) per second, then you will be storing 30 x 921600 Bytes per second or 27.6 Megabytes per second. 10 minutes of video would require 16,588,800,000 bytes or 16.5 Gigabytes! That is why video compression is usually a good idea! You would like to make the file smaller without messing up the images too much.

Lossless Compression

Lossless compression refers to a compression scheme that compresses the data without losing any of the "information" in the picture. If you compress an image using a lossless compression scheme, the restored image when decompressed is IDENTICAL to the original image. An example of lossless compression is "Run-Length Encoding" used in FAX machines. Run-length encoding for a black and white image consists of looking at each row of pixels in the original image and creating a file that tells how many white pixels are followed by how many black pixels, are followed by how many white pixels, etc, across the row. If you are sending a printed text document, there are usually a LOT of white pixels then a few black pixels, then a LOT of white pixels, etc., in a row. You can actually get very good compression for most faxed documents using this strategy AND it is lossless, i.e., the document that shows up at the other end is essentially identical to the original document.

Unfortunately, lossless compression cannot be done for most images. That is why lossy compression is used.

Lossy compression

Lossy compression refers to a compression scheme that compresses the data but loses some of the data. If you compress an image using a lossy compression scheme, the restored image when decompressed is NOT identical to the original image. However, if the scheme is a good one, the images will look almost identical. There are MANY lossy compression schemes some of which are very well known such as JPEG. We can use JPEG to illustrate Lossy compression.



Figure 20 - JPEG Quality Factor 99 (Very high quality) 358 Kilobytes



Figure 21 - JPEG Quality Factor 75 (high quality) 70.4 Kilobytes





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Figure 22 - JPEG - Quality Factor 50 (reduced quality) 23.4 Kilobytes



Figure 23 - JPEG - Quality Factor 10 (noticeably reduced quality) 9.9 Kilobytes

Each of the above images, when stored as a bmp file, requires 672.8 Kilobytes of storage space.

Note that bmp is lossless because it does not use compression, i.e., the image is stored with no loss of resolution or information but the file is BIG.

However when the lossy JPEG algorithms are applied and the file is stored as a JPEG file instead of a bmp file, you can see that as the quality factor decreases, the quality goes down and the storage space required goes down. (Note that some compression CODECs refer to "compression factor" instead "quality factor". A quality factor of 75 generally would mean a compression factor of 25, i.e., quality factor is 100 minus the compression factor.)

Typically, JPEG is run with a quality factor of 75. In Figure 21 above, we see that storing an image as a JPEG image with a quality factor of 75 instead of as a bmp file reduces the size of the file from 672.8 Kilobytes to 70.4 Kilobytes.

We see that it is very difficult if not impossible to see any difference between Figure 21 and Figure 22 so compression did not seem to degrade the image very much and it did reduce the file size from 672.8 Kilobytes to 70.4 Kilobytes.

We see in Figure 22 that the image has degraded slightly due to the lower quality factor of 50.

The degradation is barely noticeable if you look carefully at the side of the horse's face where the white and brown hair join you can see that the boundary is no longer smooth.

We see in Figure 23 that the image has degraded very noticeably due to the very low quality factor. The file is very small however, 9.9 Kilobytes instead of the original 672.8 Kilobytes.

The above merely illustrates the concept of lossy compression. Again, there are MANY compression schemes that have been invented. They all behave a little differently. They are all designed to reduce the size of the image file without noticeably degrading the image when it is displayed.

Why do you care? You care because the AVI files that you will be generating consist of a collection of images stored in a file. Movies are made up of many images that are displayed rapidly in succession. If you do not use compression, your AVI files will be HUGE.

See also: [Video CODECs](#), [Configure Window Examples](#).

Configure Window Examples

The following images show configuration windows associated with various [CODECs](#) that might be available on your machine.

These are accessible through the "Configure..." button that appears on the movie setup windows IF the selected "Compression" scheme has a configuration window associated with it. This shows the Movie Setup window for Time-Lapse captures so you can see where the "Configure..." button and Quality slider are.

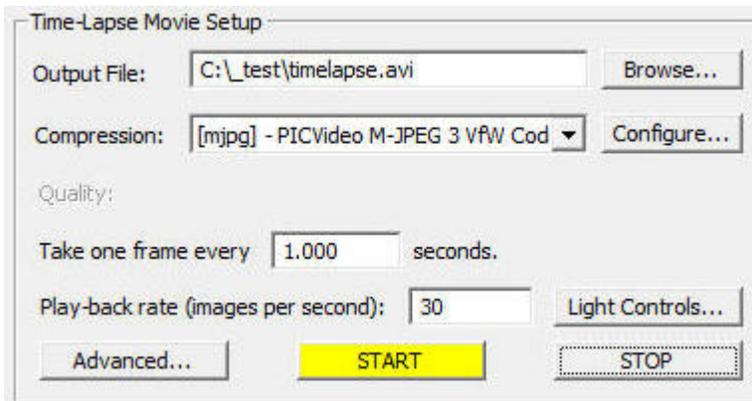
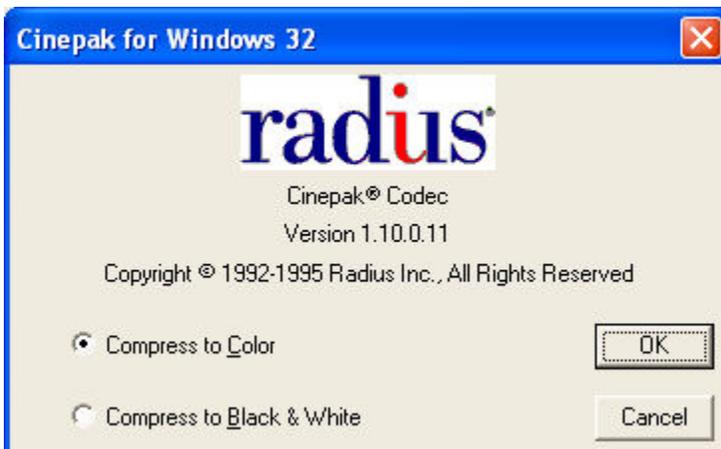


Figure 24

Below, we describe briefly the control each configuration window allows over [compression](#) [Quality](#).



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Figure 25 - Cinepak CVID CODEC

CVID has no adjustable quality option.
HandyAvi's Quality slider has no effect.

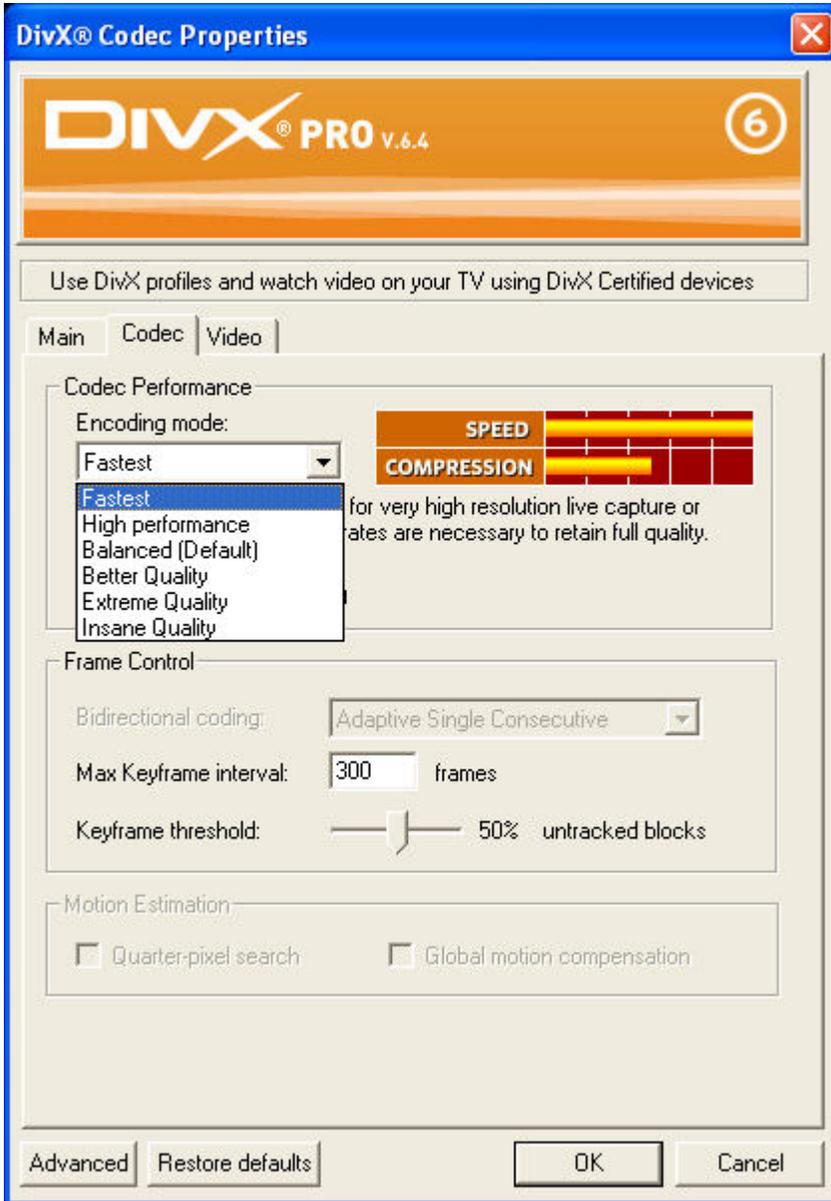


Figure 26 - DivX CODEC

DivX allows you to select various "Encoding Modes" which essentially cause the quality to be higher or lower.
HandyAvi's Quality slider has no effect.

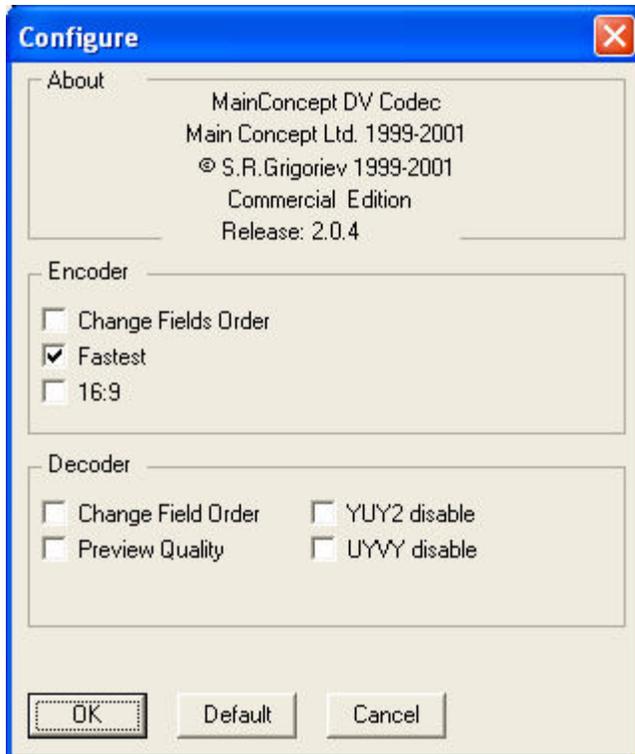


Figure 27 - DVSD Codec

DVSD allow you just two Quality options, Either "Fastest" or not. HandyAvi's Quality slider has no effect.

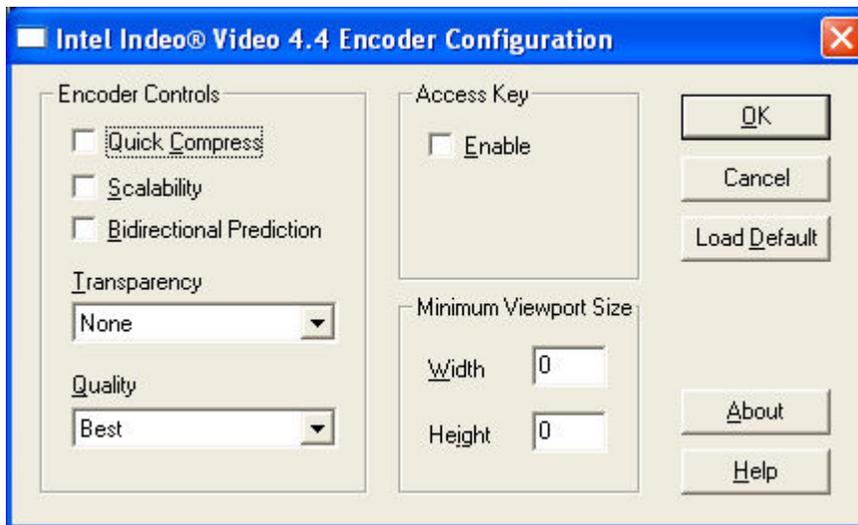


Figure 28 - IV41 CODEC

IV41 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.



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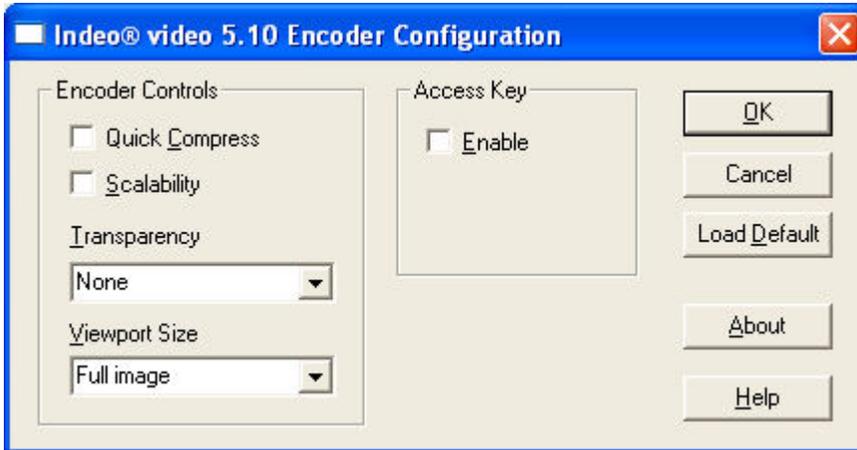


Figure 29 - IV50 CODEC

IV50 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.

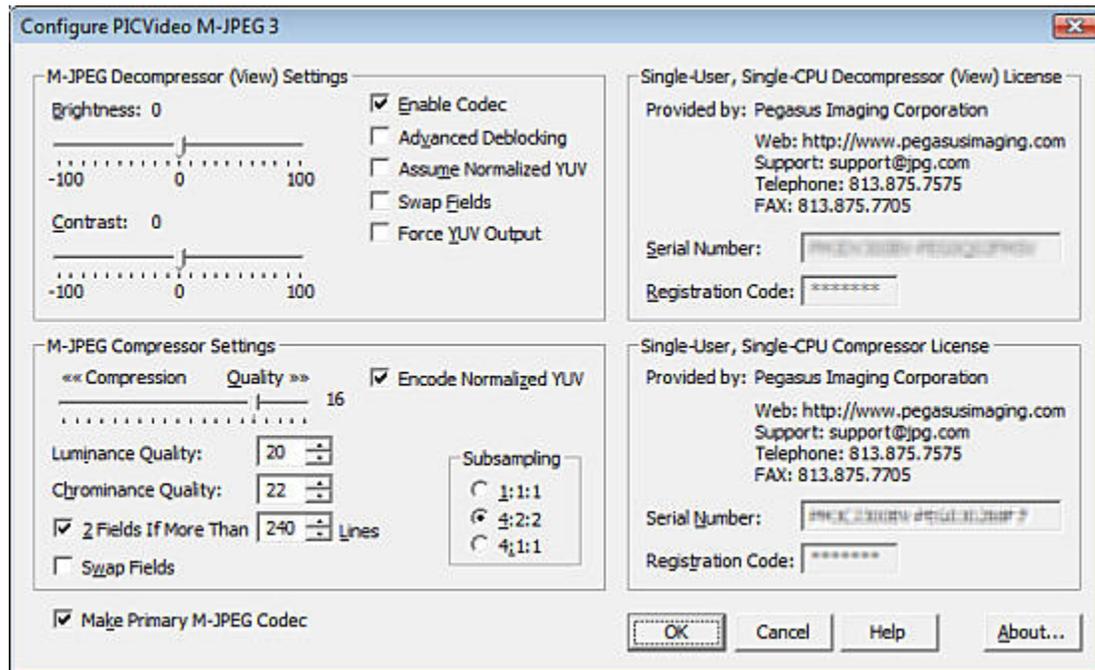


Figure 30 - PICVideo MJPG CODEC

There are at least two MJPG CODEC vendors out there. As far as we know, you have to buy an MJPG CODEC if you want to use one.

The PICVideo MJPG CODEC has a Compression-Quality slider that you can adjust to set your desired trade-off between image size and image quality.

HandyAvi's Quality slider does not appear when the PICVideo MJPG compression scheme is selected so the above panel is the only way to adjust Quality/Compression.

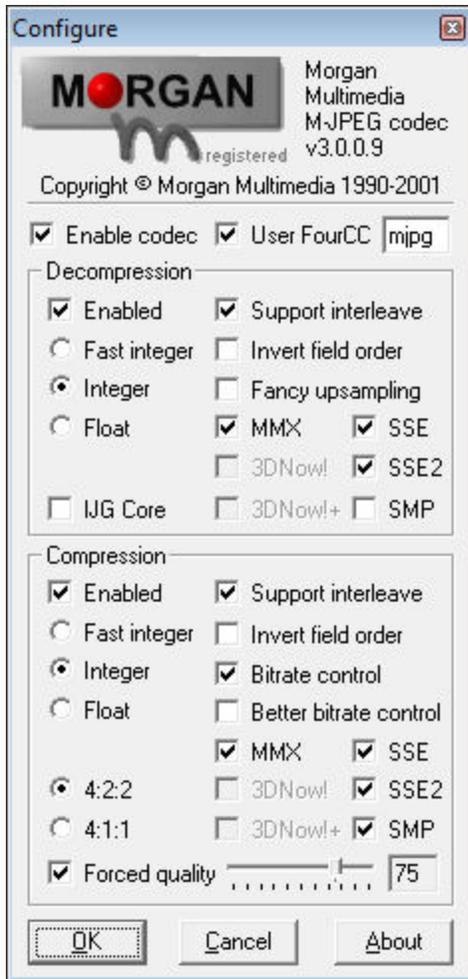


Figure 31 - Morgan Multimedia M-JPEG Codec

Morgan M-JPEG allows quality to be set if the "Forced quality" check box is checked. The value in the display box (here seen as 75) ALWAYS overrides the value set by the HandyAvi Quality sliders!

HandyAvi's Quality slider appears but has no effect.

(We ran into a problem with the above version of the Morgan CODEC in Vista when we used image sizes other than 160x120, 320x240 or 640x480. Caused a HandyAvi crash that we could not find a work-around for... We sent Email to the vendor describing the problem. Received no answer after several days. ***This CODEC seems to work just fine in Windows XP though...***

In the past, we have always used the Morgan Multimedia M-JPEG Codec but we have now installed the PICVideo M-JPEG CODEC and are using it instead on Vista.)



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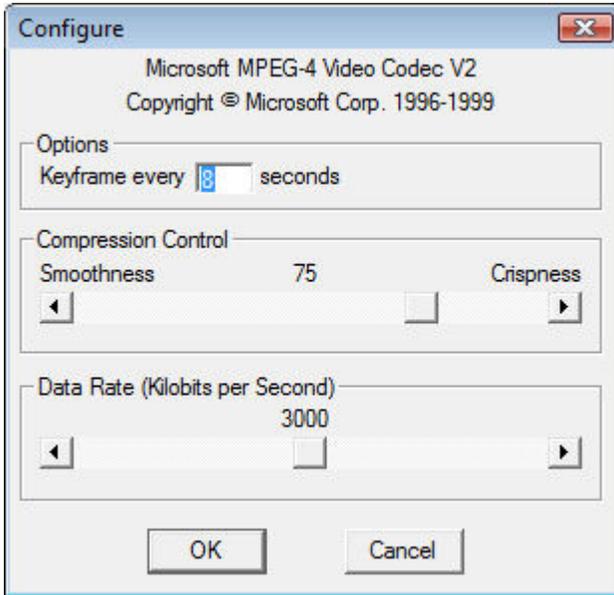


Figure 32 - mp42 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

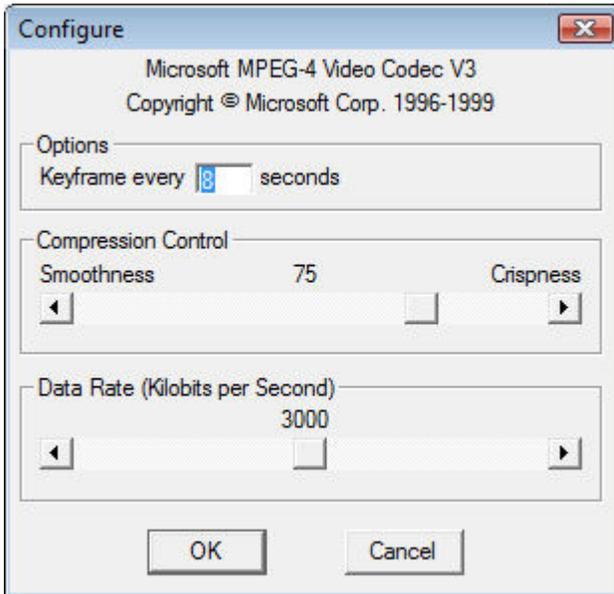


Figure 33 - MP43 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

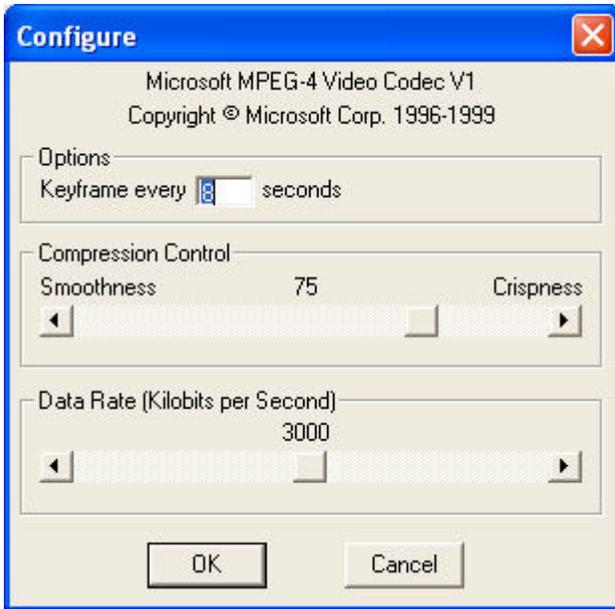


Figure 34 - MP41 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

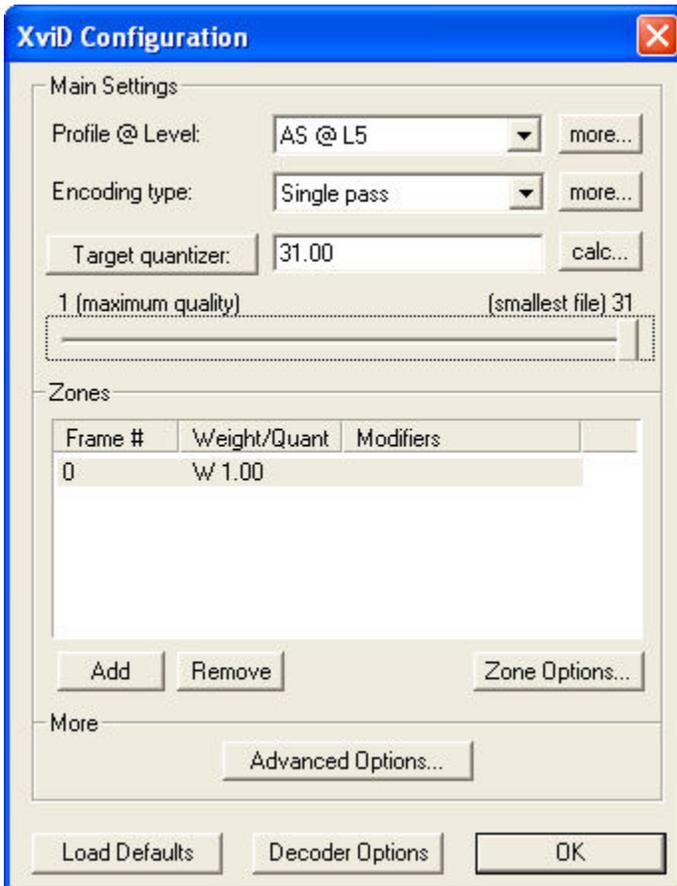


Figure 35 - XviD CODEC



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HandyAvi's Quality slider DOES control quality for this CODEC.

Create an Animation Video

Animation Video Overview

Animation refers to a sequence of images that, when played in order at sufficient speed, appear to be a film or video of something that actually happened.

Nearly everyone is familiar with Disney's animated film techniques where artists draw a series of images each of which is slightly different than the previous image. When these images are photographed in order, one image at a time, then played back at 16 frames per second, the figures in the drawings (Micky Mouse, Snow White, etc.) appear to move realistically.

HandyAvi's animation mode will allow you to create your own animation by, for example arranging a scene, adding that scene to your new movie by clicking once on the mouse, moving something in the scene, clicking the mouse again to add the new scene to your movie, etc.

As an example, you could create a movie of a flashlight moving smoothly on a table. You would do this by putting the flashlight on the table, adding the image of the scene including the flashlight to your movie, then moving the flashlight slightly, then adding that image to your movie, etc.

When finished you would have a movie that shows a flashlight moving smoothly over the table as if it were moving under its own power.

A good book on animation techniques is "Creating 3-D Animation" by Peter Lord and Brian Sibley and is based on Aardman Studios which produced "Chicken run" and "The Curse of the Were-Rabbit" featuring Wallace and Grommet. These movies were done using modeling clay. Each frame of one of these movies consists of modeling clay scenes where the clay is changed slightly for each succeeding image so as to show changing facial expressions, arms moving, etc.

Some animators use modeling clay and various props. Some use puppets. Some use drawings. You are limited only by your imagination.

How to Open the Animation Control Window

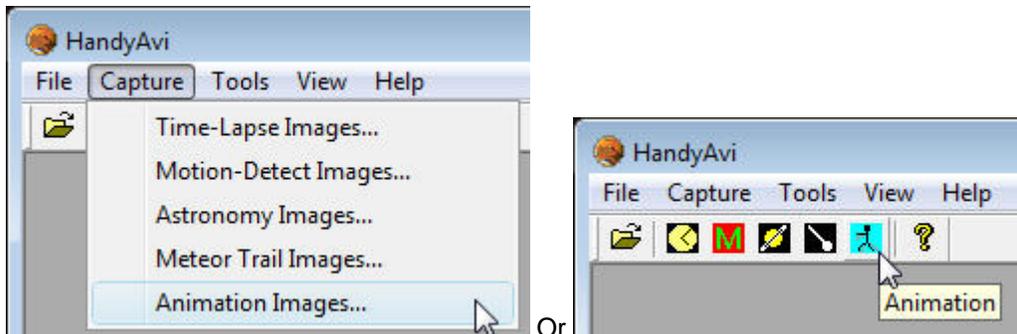


Figure 69

From the main HandyAvi window, select the "Animation Images" menu item to bring up the "Animation Capture window".

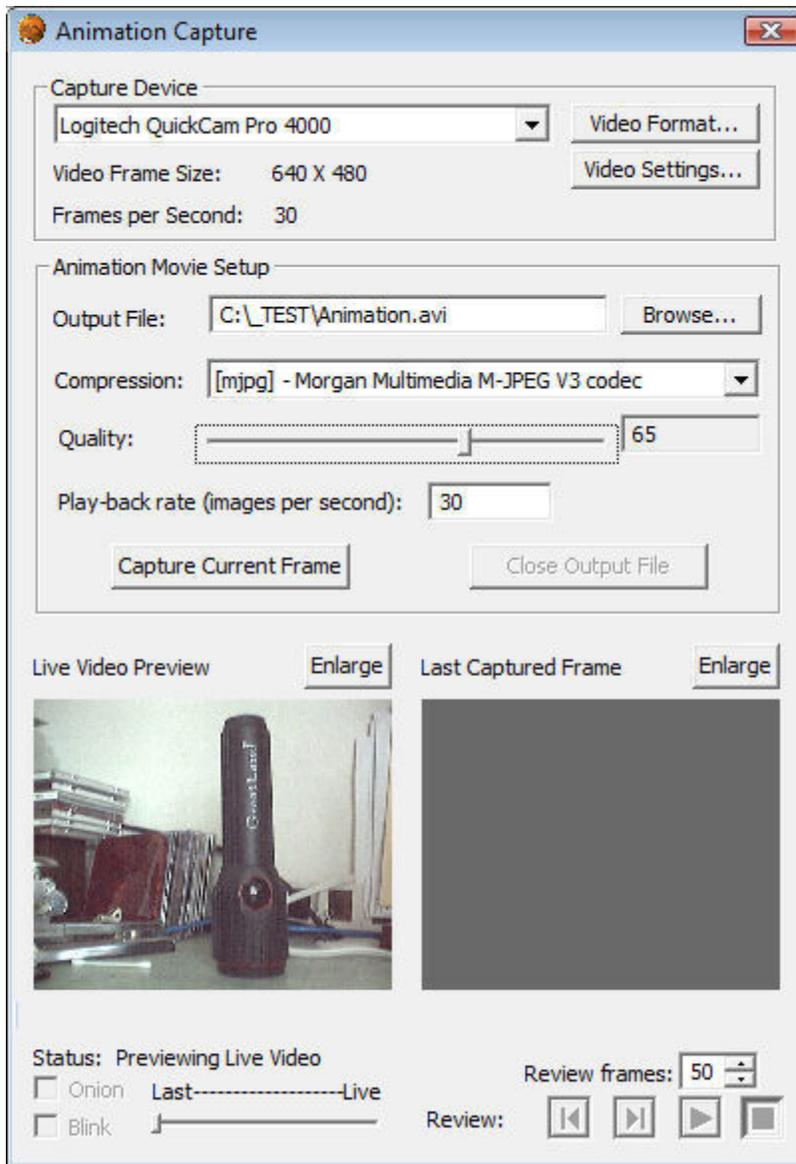


Figure 70

This window controls all of the Animation photography functions of HandyAvi.

The Capture Device Section

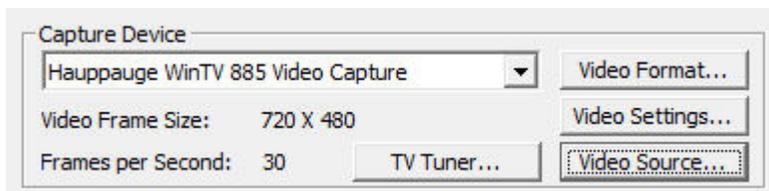


Figure 3

This section of the Capture window allows you to choose a webcam (i.e., a capture device). If you have several webcams plugged in, they will all be listed here if you click on the pull-down arrow. In addition, some other types of video capture devices may be listed here such as the



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Hauppauge WinTV PVR PCI II Capture device or the Hauppauge WinTV Video 885 Capture device. Other buttons (see below) may also appear in this section depending upon the capabilities of the selected device.

We see in the Capture Device section that the webcam currently selected is the Logitech QuickCam Pro 4000.

Its "Video Frame Size" is currently set to 640x480.

Its frame rate is set to 30 frames per second. Note that this value will sometimes be overridden by the camera drivers when the camera is in a mode where brightness and contrast are set "automatically".

The video frame size and the video frame rate can be changed by left-clicking the "Video Format" button. This will bring up the camera manufacturer's Video Format or Properties window which will allow you to make changes to basic camera functionality.

Video Format: This button causes display of a window provided by the manufacturer of your webcam. For a Logitech QuickCam Pro 4000, the window that comes up looks like this:

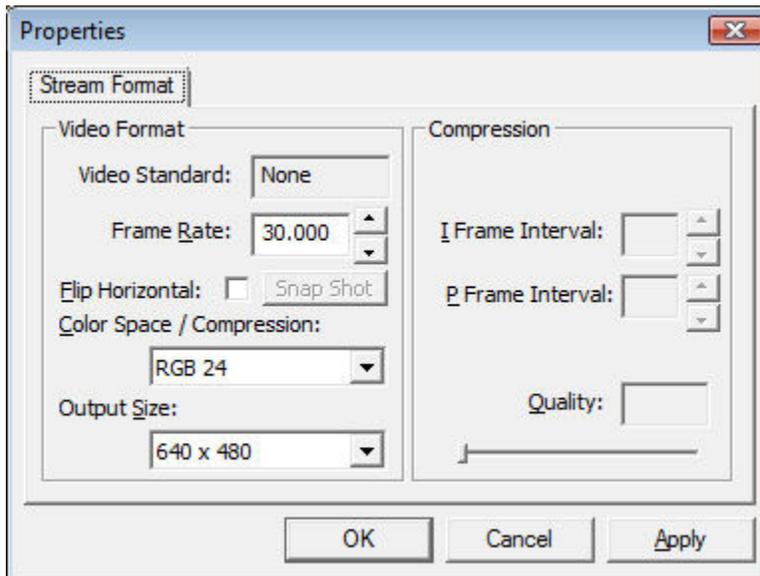


Figure 4

This window may be used to change the video format settings of your camera. In particular, the "Frame Rate" tells how many frames per second your camera will capture although your camera driver will sometimes override this if it is set to an "automatic" setting.

The Output Size selection allows you to select the frame size in pixels of the images that the camera will be taking. Both the ToUcam and the **Logitech QuickCam Pro 4000** for example, allow the image sizes shown here:

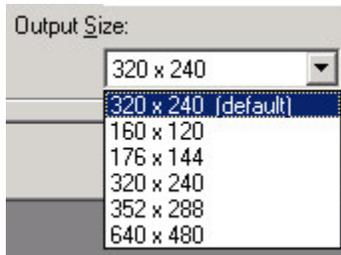


Figure 5

HandyAvi will automatically save and restore your Video Format settings if possible.

Video Settings: There is also a button called Video Settings. This will bring up the webcam manufacturer's video settings window and will allow you to change other types of camera settings such as contrast, color, brightness, sensitivity, etc., depending on how many items the camera manufacturer allows you to modify. The Video Settings window for the Logitech QuickCam Pro 4000 webcam looks like this:

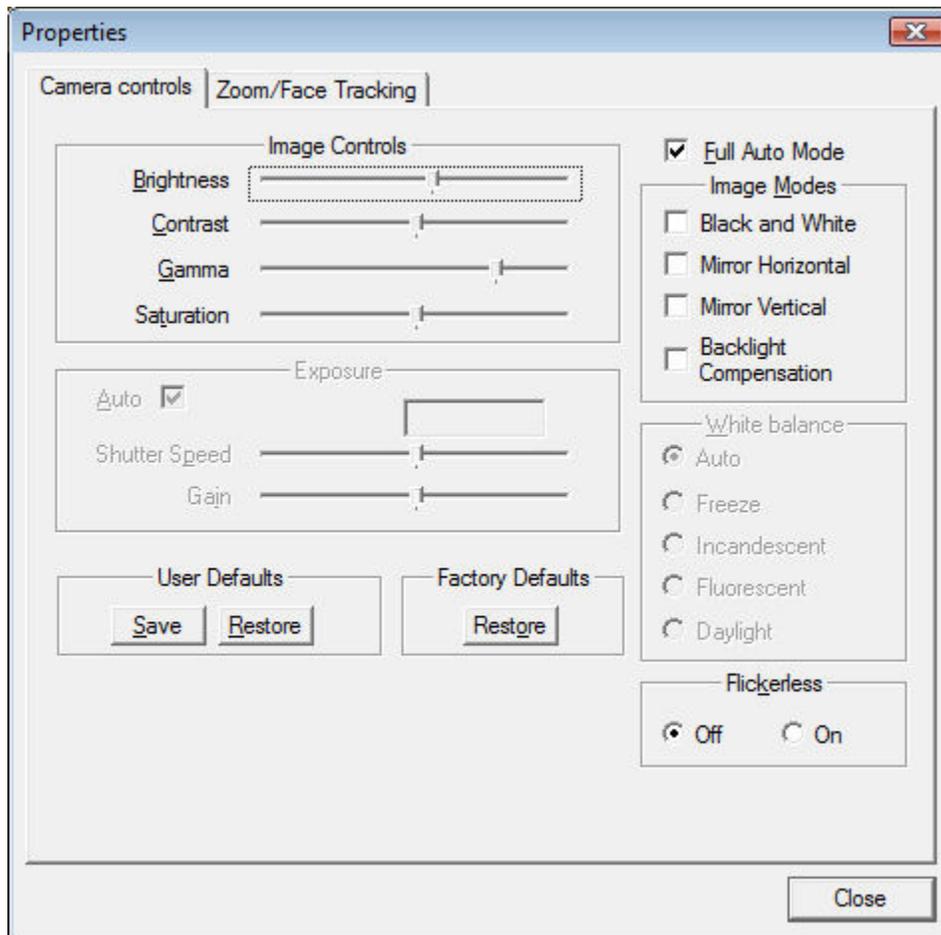


Figure 6

The image in Figure 6 shows that the camera is in "Full Auto Mode" which means that the camera will automatically adjust for changes in light levels. It will sometimes change the frame rate automatically when in this mode.

The Video Settings window for the Philips ToUcam webcam looks like this:



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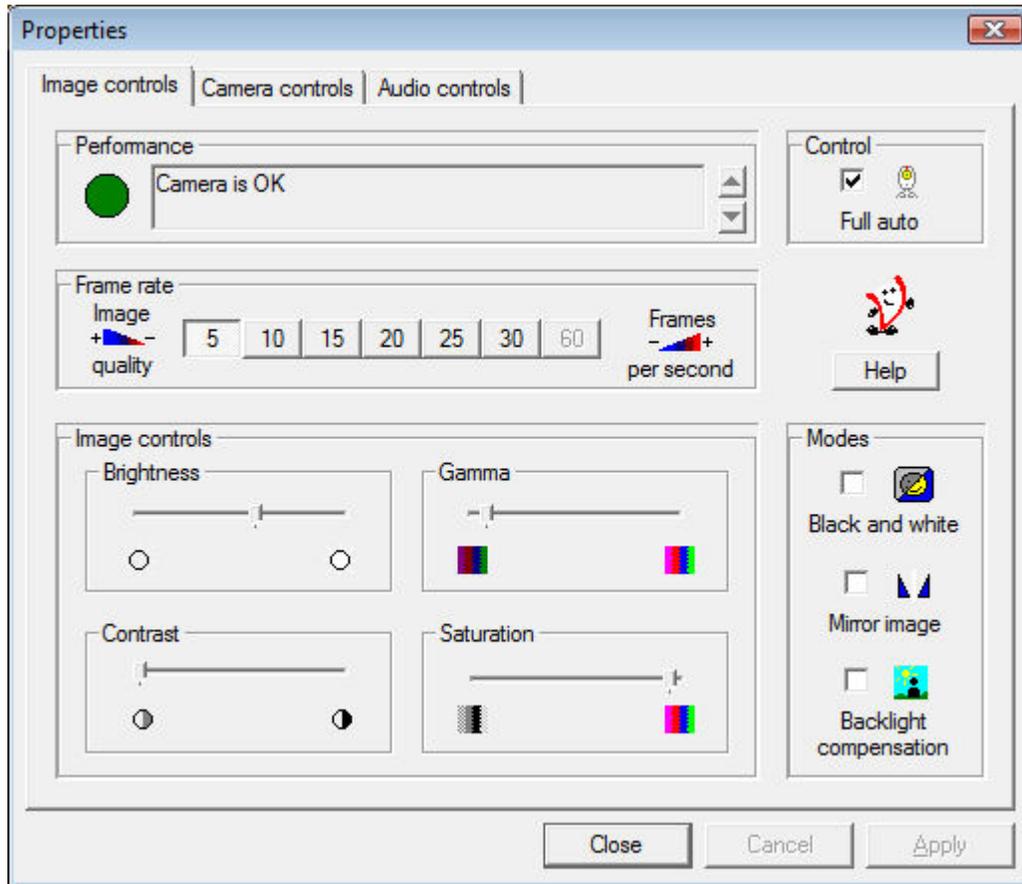


Figure 7

These controls provide a great deal of control over your webcam and might need to be adjusted to get the best results under various lighting conditions. For planetary astronomy of, for example, Saturn using a telescope, we usually take the camera out of "Full auto" and adjust the "Frame rate", "Brightness", "Contrast", etc., to provide an image that is not over-exposed. We have found that lowering the "Frame rate" is often helpful for planetary imaging.

Other webcams may have other types of video settings windows of course. The above are simply examples of webcam control features that two different manufacturers decided to provide.

IMPORTANT: if the "Full auto" control is checked in Figure 7, it can override the frame rate and set it to a lower value. Under dim lighting, the automatic settings for many webcams cause the frame rate to be reduced so that brighter images can be obtained. You can see in Figure 7 that the original frame rate of 30 frames per second has been overridden so that the frame rate is now 5 frames per second. By switching "Full auto" off, you can manually set the frame rate override to 30 if you wish to capture more frames more quickly. This is important because it can be puzzling if you are not aware of it.

Video Source: The user here has selected a "USB 2821 Device" which is a USB/Video Adapter so a "Video Source..." button is now displayed:

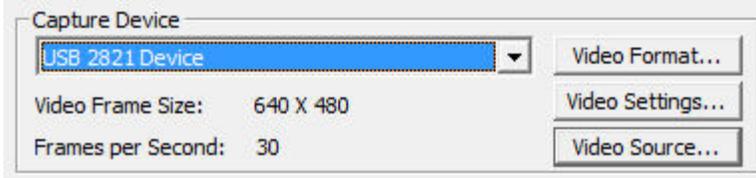


Figure 8

The "Video Source" button will be displayed ONLY when the capture device you are using supports Video Source options. (Most webcams do NOT support the "Video Source" option. However, many USB video adapters and many video boards do support the "Video Source" option.)

We have successfully used a USB 2.0 Video Adapter with Audio adapter (Model GA-VD204) which shows up as a "USB 2821 Device" with HandyAvi. We have also successfully used USB video adapters produced by five other manufacturers.

Some adapters allow EITHER Video Composite signals to be input or S-Video signals to be input. The Video Source window will allow you to choose which one will be seen by HandyAvi.

Here is what the USB 2821's "Video Source" windows looks like:

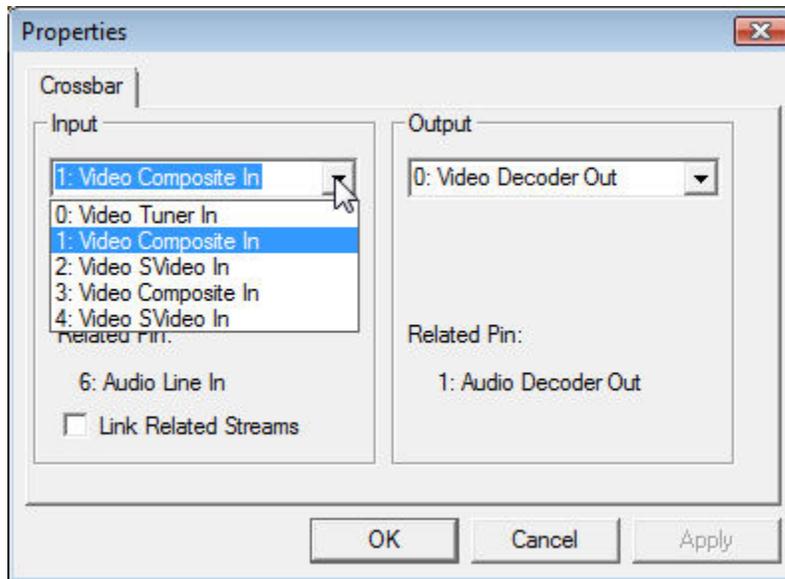


Figure 9

You can see that we have opened the "Input" pull-down. "Video Composite In" means HandyAvi will see the video stream from a camera plugged into the adapter's Composite Video input port (a standard Phono Plug).

If instead you plug an S-Video source into the adapter (from a VCR or DVD player, etc.) and choose "2: Video SVideo In" then HandyAvi will see the video stream of the S-Video device that you have plugged in.

Note that most surveillance cameras output Video Composite signals, i.e., NTSC signals in many countries, PAL in many others. We have a Watec 902H2 ULTIMATE camera that we are using for Meteor Detection. We plug its Video Composite output into the GA-VD204 adapter (or other USB-Video adapter) and then plug the adapter into the USB port. HandyAvi sees the video and everything works well.



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Note that some adapters check to see if you are using a USB 1 port or a USB 2 port. Some of them will NOT allow you to set higher resolutions (like 640 x 480) if you are using a USB 1 port. This is usually undocumented and can be puzzling which is why we are mentioning it here...

It should be noted that the Watec 902H2 ULTIMATE is an EXTREMELY sensitive low-light camera (.0001 Lux supposedly) and is more expensive than most cameras used for surveillance work. We needed the sensitivity for meteor detection. There are of course MANY cheaper cameras that output NTSC Video Composite signals that can be used with HandyAvi via a USB-Video adapter.

The user here has now selected a "Hauppauge WinTV 885 Video Capture" board:

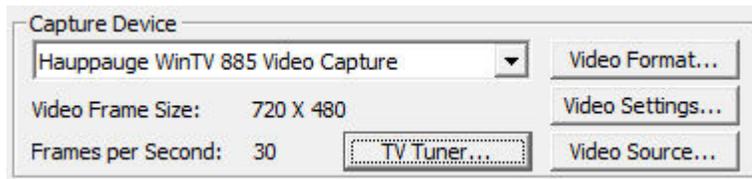


Figure 10

The "Video Source..." button now exposes this manufacturer's window:

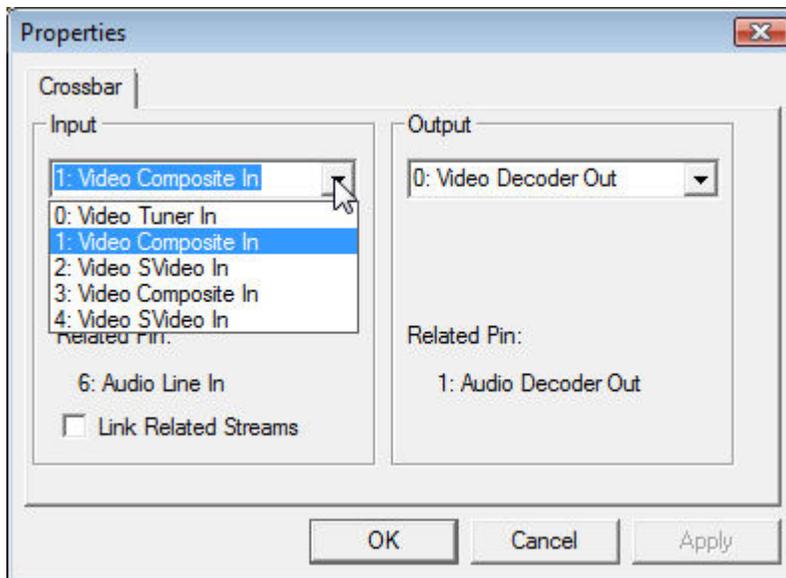


Figure 11

"Video Tuner In" means that the board is going to receive input from the TV tuner. S-Video and Composite inputs can also be selected as input sources. We don't know why this board has two "Video SVideo In" selections...

TV Tuner: The Capture Device section also now includes a "TV Tuner" button which provides access to the board manufacturer's TV Tuner settings window:

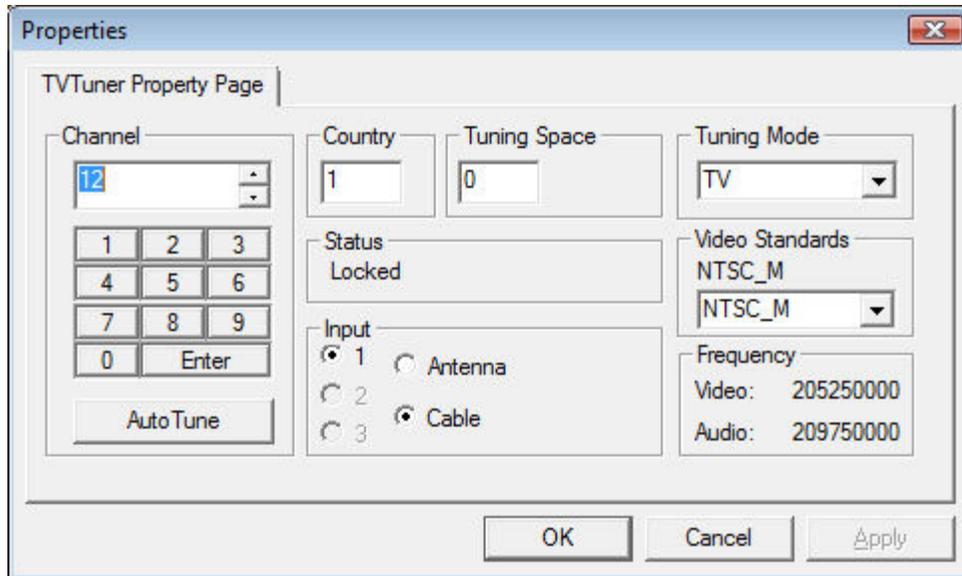


Figure 12

This window allows you to select the input television channel among other things. On this particular board, we have found that to input Channel 12, you have to enter 12 then click on "Enter" or the channel input is ignored! Usually, we would select "Antenna" unless we are connected to a cable. There is a selection for "Video Standards" which includes NTSC_M, NTSC_JM, PAL_M, PAL_N, and PAL_COMBO. The "Tuning Mode" includes "TV" and "FM".

Animation Setup and Create Movie Area

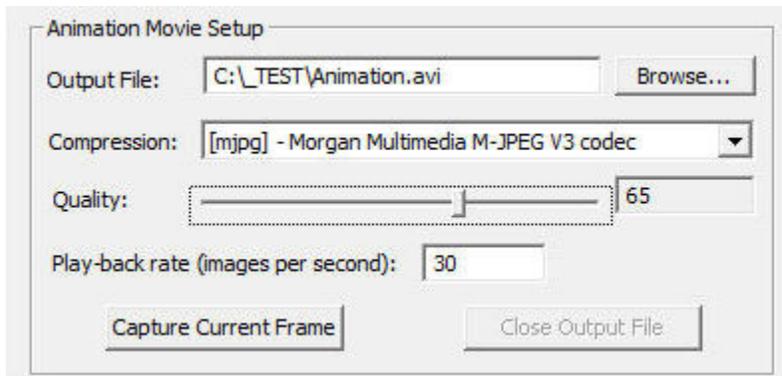


Figure 71

This section of the Animation video capture window allows you to set up the webcam for making an Animation video.

Output File: Type in the path name of the new video file you want to create.

Browse: Brings up a standard file selector window so that you can more easily place the file in a particular folder.



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Compression: Select any AVI file compression scheme resident on your computer. File compression schemes or codecs (short for coder/decoder) show up on your machine from many sources. Microsoft installs several. Your video camera may install one or more. You may download and install compression schemes from the internet. At the time of this writing, there are over 280 codecs listed at <http://www.fourcc.org>. Note that one of the selection items is called Uncompressed. If you select Uncompressed, the image data in your files will not be compressed. Your files will be LARGE. However, each image in an Uncompressed file will contain images that are **exactly** what the camera captured. Compressed images are usually slightly different from the original images because information is lost during compression. In most cases, the difference is not noticeable. Use of uncompressed images is important for some applications but not necessary or advisable for most. [Learn more about video codecs here.](#)

HandyAvi displays the FOURCC value for the compressor in brackets at the beginning of the "Compression:" line.

Note that HandyAvi will also allow you to read, work with, and display AVI files produced by other software or cameras and will select the proper decompression scheme automatically IF the required decompression scheme has been installed on your computer.

HandyAvi will also allow you to read a file that was written using one compression scheme and write a new AVI file using a new compression scheme. So you can convert AVI files from one compression scheme to another if the required codecs have been installed on your machine.

Configure: Brings up the compression CODEC's configuration window. This button only appears if the selected compression scheme HAS a configuration window.

Note that the "Quality:" slider and the quality settings in some CODECs do not "cooperate". In the case of the mjpg CODEC, the "Forced quality" slider determines the degree of JPEG compression and the "Quality" slider in the "Animation Movie Setup" window has absolutely no effect. Other CODECs we have tested do not override our "Quality:" slider.

When in doubt, you should test by setting the quality and capturing (for example) three frames of the same scene (use Time-Lapse and take one frame every 3 seconds or so). Then change the quality factor and make another movie. The size of the two resultant AVI movie files should be different.

See [Configure Window Examples](#) for information on the Configure options of various CODECs. [Learn more about video codecs here.](#)

Quality: Adjust the quality of the compression scheme. Most compression schemes create smaller files because they are actually discarding tiny image details. By discarding more and larger image details, you can produce a smaller AVI file. If the Quality is set to 100, then little or no image data is discarded and the resultant AVI file will be large. If the Quality is set to 0 then, theoretically, all image data is discarded and the resultant AVI file will contain blank images! Of course each codec is created by software people who may have thought about this and limited it so they do not throw away all of the image data even if the Quality is zero.

Note that each codec is different and some may even ignore the Quality setting or not allow it to be set. Also note that lossy compression schemes are used in many applications. JPEG is an example of a lossy compression scheme that is used in MANY applications and the fact that some of the image data has been discarded is practically unnoticeable. So compression with slightly reduced quality is a very good thing in most cases. [Learn more about video codecs here.](#)

Play-back rate (images per second): Determines how fast your frames will be displayed when you play the AVI movie that you have recorded. If you want the frames to be played in "real-time" then you should set the rate to the same rate as the camera was set to when it was recording. If

you want each frame to be presented at a very slow rate, then you could set the play-back rate to 1 second. In this case each frame of the movie would be displayed for one second when the movie is played.

Capture Current Frame: Left-mouse-click this button to capture the current frame (the one being displayed in the "Live Video Preview" window) and add it to the end of your movie file.

The Animation Display Area

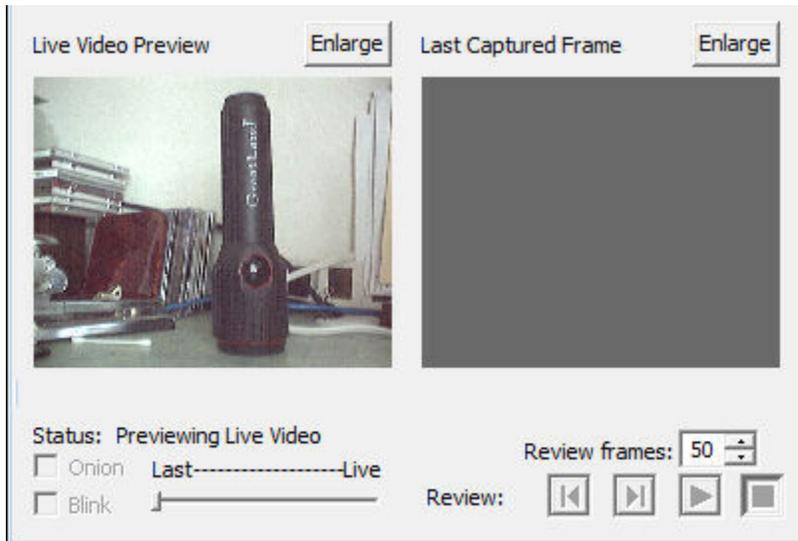
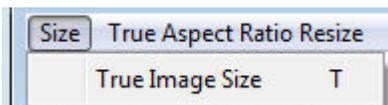


Figure 72

Enlarge: If you use one of the "Enlarge" buttons, a new window will be created containing the video image. This new window can be resized to any size by clicking and dragging an edge or corner of the window.

This new window also contains a "Size" option that will allow you to select a "True Image Size" option which will resize the window to show the actual size of the captured video images. Pressing the "t" key will also perform the True Image Size function.





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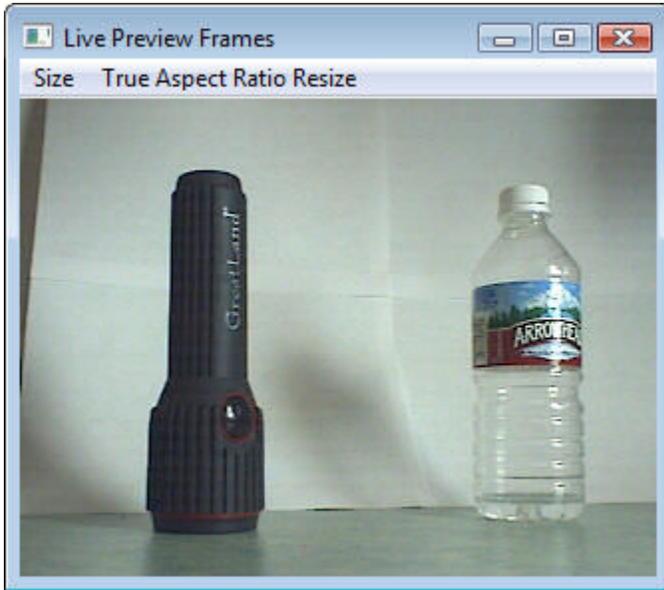
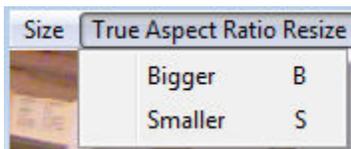


Figure 73

The above figure shows an enlarged "Live Preview Frames" window that has been sized with the "Size" option to the "True Image Size" of 320x240 which was the size selected in the [Capture Device](#) section.

There is also a "True Aspect Ratio Resize" option:



Selection of "Bigger" will resize the window to a slightly bigger size while keeping the true aspect ratio of your image. Pressing the "b" key will also perform this action.

Selection of "Smaller" will resize to a slightly smaller size while keeping the true aspect ratio of your image. Pressing the "s" key will also perform this action.

If you close an enlarged window, the images will again appear in the "Live Video Preview" window or the other window if it was the one that had been enlarged.

Onion Checkbox: Onion-skinning refers to older techniques of doing animation where a new "onion" sheet was placed over the top of the previous animation frame. You would place these sheets on a light-table which would let you see the previous animation image and the new image you were drawing on the onion sheet. This way you could judge how much difference you were making between the old frame and the new frame.

If you left click the Onion Checkbox, the video preview (coming from your camera) and the "Last Captured Frame" can be blended together and will be displayed in the "Last Captured Frame" window. The slider bar determines the transparency of each. If the slider bar is to the left, you see only the image from the camera. If the slider bar is to the right, you see only the image that was last captured. By moving the slider bar you can adjust the blending of the two images so you can see both at the same time and see differences between the new image frame and the "Last Captured Frame".

Blink CheckBox: This checkbox can only be set when the Onion checkbox is checked. Setting the blink checkbox will cause the "Last Captured Frame" and the current image from the camera to be displayed one after the other at 1/2 second intervals so you can see the motion you are creating between the two frames.

Last----Live Slider: Controls the relative transparency of the "Last Captured Frame" image and the current video image when the Onion box is checked.

Review Frames: Before capturing any frames, this field allows you to set the number of Review frames that will be captured in a circular buffer. If it is set to 50 and you have captured 100 frames in your animation video so far, then you can use the display and play buttons (below) to view the last 50 frames or to run the last 50 frames as if they were a movie.

 **Display Next Frame:** This displays the next frame in the capture buffer.

 **Display Previous Frame:** This displays the previous frame in the capture buffer.

 **Play Review Frames:** This will play all frames in the capture buffer as if they were a movie.

 **Stop Playing Review Frames:** This will stop playing review frames.

About Video Codecs

Note: You do not have to learn about codecs to use HandyAvi.

However, the purpose of a CODEC is to compress your video data so that your AVI files are smaller. So if space on your hard drive is a consideration, you will probably want to use a CODEC.

AVI files can be created either by using no compression (uncompressed) or by using one of literally hundreds of compression schemes (codecs is short for Coder/decoder) that have been created by various companies. Uncompressed files are generally MUCH larger than compressed files.

In order for HandyAvi to use a particular compression schemes, it must have been installed on your computer.

Many AVI codecs probably already have been installed on your machine. Some come from Microsoft as part of your operating system. Some come from the manufacturers of webcams that you might have installed. You can even download and install codecs from the Internet. Some are free and others are not. <http://www.fourcc.org> is a site that lists and describes almost all known codecs. If you surf to that site, you will want to click on "codec list" to see all of the codecs.

Codecs have four character names known as "Four-Character Codes" or "FOURCC" names. This is how they are identified internally so that software applications such as HandyAvi can know which codec was used to produce a particular file.

FOURCC codes are also used internally when a HandyAvi user selects a compression scheme such as "Indeo® video 5.10". "Indeo® video 5.10" has a FOURCC name of "IV50". If you have an AVI file that was encoded using IV50, you can see the IV50 codec name by opening the file in HandyAvi and using the "View/AVI File Info" menu item.



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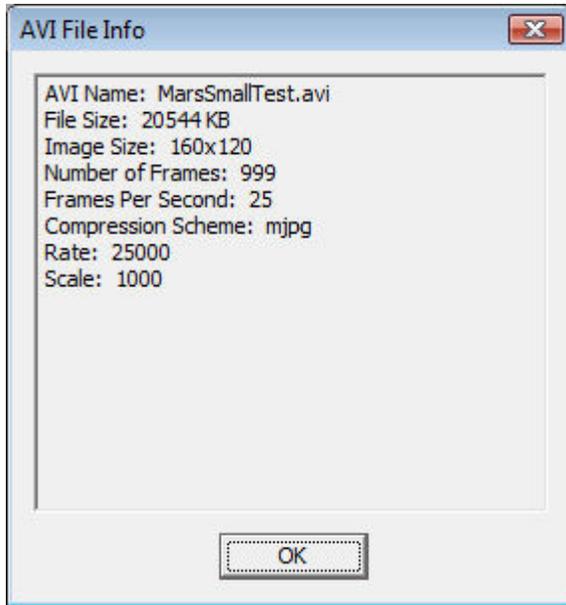


Figure 19

Figure 19 shows that the compression scheme used to compress the file "MarsSmallTest.avi" was mjpg which is the FOURCC code for the "Morgan Multimedia MJPG" codec.

HandyAvi will also attempt to open files compressed with codecs that are NOT installed on your machine. If the required codec is not installed, HandyAvi will, of course, be unable to PLAY the file but it will try to produce an AVI File Info report as shown in Figure 19 so that you will be able to identify the missing codec. If you know which codec was used, you might be able to locate an installable version of the codec via the Internet and install it. Then you would be able to play the file using HandyAvi. If you can play the file using HandyAvi then you can also use [HandyAvi's editing features](#) to create a new file using the same or a different codec and include or exclude selected frames from the new AVI file.

Many CODECs allow you to have control over the "Quality" factor or "Compression" factor that will let you make your files smaller.

[Learn more about Compression Quality.](#)

[Learn more about Configure windows.](#)

About Compression Quality

There are many video compression schemes. The purpose of a video compression scheme is to make a smaller file without sacrificing too much detail in the images.

An uncompressed AVI file is comprised of a series of bmp image files. There are actually many different bmp file formats. Each of the formats is designed to reconstruct an image pixel by pixel. Typically, AVI files are made up of bmp files which have 3 Bytes for each pixel. The three bytes contain the Red, Green, and Blue values for a pixel. Thus, a 640x480 uncompressed image requires approximately 3 x 640 x 480 bytes ("approximately" because there may be some "pad" bytes at the end of each line. There is also a small amount of header data describing the size, color content, length and width of the images, etc.) 3 x 640 x 480 Bytes is 921600 bytes or almost 1 Megabyte! If your AVI video camera is running at 30 frames (images) per second, then you will be storing 30 x 921600 Bytes per second or 27.6 Megabytes per second. 10 minutes of video would require 16,588,800,000 bytes or 16.5 Gigabytes! That is why video compression is usually a good idea! You would like to make the file smaller without messing up the images too much.

Lossless Compression

Lossless compression refers to a compression scheme that compresses the data without losing any of the "information" in the picture. If you compress an image using a lossless compression scheme, the restored image when decompressed is IDENTICAL to the original image. An example of lossless compression is "Run-Length Encoding" used in FAX machines. Run-length encoding for a black and white image consists of looking at each row of pixels in the original image and creating a file that tells how many white pixels are followed by how many black pixels, are followed by how many white pixels, etc., across the row. If you are sending a printed text document, there are usually a LOT of white pixels then a few black pixels, then a LOT of white pixels, etc., in a row. You can actually get very good compression for most faxed documents using this strategy AND it is lossless, i.e., the document that shows up at the other end is essentially identical to the original document.

Unfortunately, lossless compression cannot be done for most images. That is why lossy compression is used.

Lossy compression

Lossy compression refers to a compression scheme that compresses the data but loses some of the data. If you compress an image using a lossy compression scheme, the restored image when decompressed is NOT identical to the original image. However, if the scheme is a good one, the images will look almost identical. There are MANY lossy compression schemes some of which are very well known such as JPEG. We can use JPEG to illustrate Lossy compression.



Figure 20 - JPEG Quality Factor 99 (Very high quality) 358 Kilobytes



Figure 21 - JPEG Quality Factor 75 (high quality) 70.4 Kilobytes



Figure 22 - JPEG - Quality Factor 50 (reduced quality) 23.4 Kilobytes





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Figure 23 - JPEG - Quality Factor 10 (noticeably reduced quality) 9.9 Kilobytes

Each of the above images, when stored as a bmp file, requires 672.8 Kilobytes of storage space.

Note that bmp is lossless because it does not use compression, i.e., the image is stored with no loss of resolution or information but the file is BIG.

However when the lossy JPEG algorithms are applied and the file is stored as a JPEG file instead of a bmp file, you can see that as the quality factor decreases, the quality goes down and the storage space required goes down. (Note that some compression CODECs refer to "compression factor" instead "quality factor". A quality factor of 75 generally would mean a compression factor of 25, i.e., quality factor is 100 minus the compression factor.)

Typically, JPEG is run with a quality factor of 75. In Figure 21 above, we see that storing an image as a JPEG image with a quality factor of 75 instead of as a bmp file reduces the size of the file from 672.8 Kilobytes to 70.4 Kilobytes.

We see that it is very difficult if not impossible to see any difference between Figure 21 and Figure 22 so compression did not seem to degrade the image very much and it did reduce the file size from 672.8 Kilobytes to 70.4 Kilobytes.

We see in Figure 22 that the image has degraded slightly due to the lower quality factor of 50.

The degradation is barely noticeable if you look carefully at the side of the horse's face where the white and brown hair join you can see that the boundary is no longer smooth.

We see in Figure 23 that the image has degraded very noticeably due to the very low quality factor. The file is very small however, 9.9 Kilobytes instead of the original 672.8 Kilobytes.

The above merely illustrates the concept of lossy compression. Again, there are MANY compression schemes that have been invented. They all behave a little differently. They are all designed to reduce the size of the image file without noticeably degrading the image when it is displayed.

Why do you care? You care because the AVI files that you will be generating consist of a collection of images stored in a file. Movies are made up of many images that are displayed rapidly in succession. If you do not use compression, your AVI files will be HUGE.

See also: [Video CODECs](#), [Configure Window Examples](#).

Configure Window Examples

The following images show configuration windows associated with various [CODECs](#) that might be available on your machine.

These are accessible through the "Configure..." button that appears on the movie setup windows IF the selected "Compression" scheme has a configuration window associated with it. This shows the Movie Setup window for Time-Lapse captures so you can see where the "Configure..." button and Quality slider are.

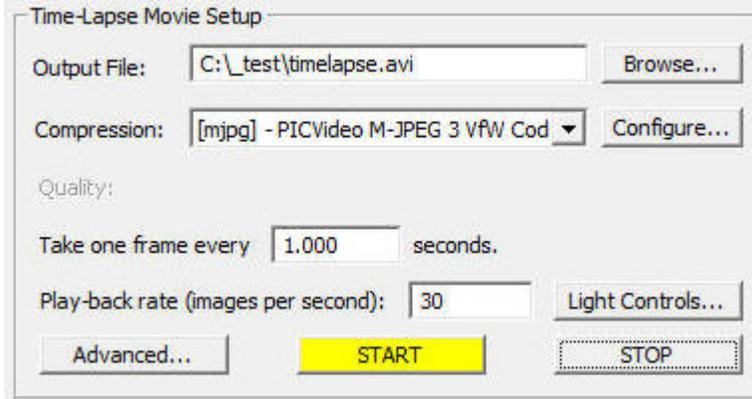


Figure 24

Below, we describe briefly the control each configuration window allows over [compression](#) [Quality](#).

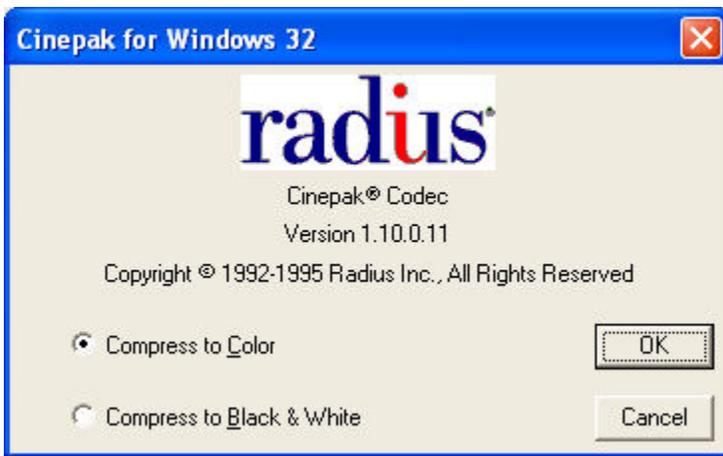


Figure 25 - Cinepak CVID CODEC

CVID has no adjustable quality option.
HandyAvi's Quality slider has no effect.



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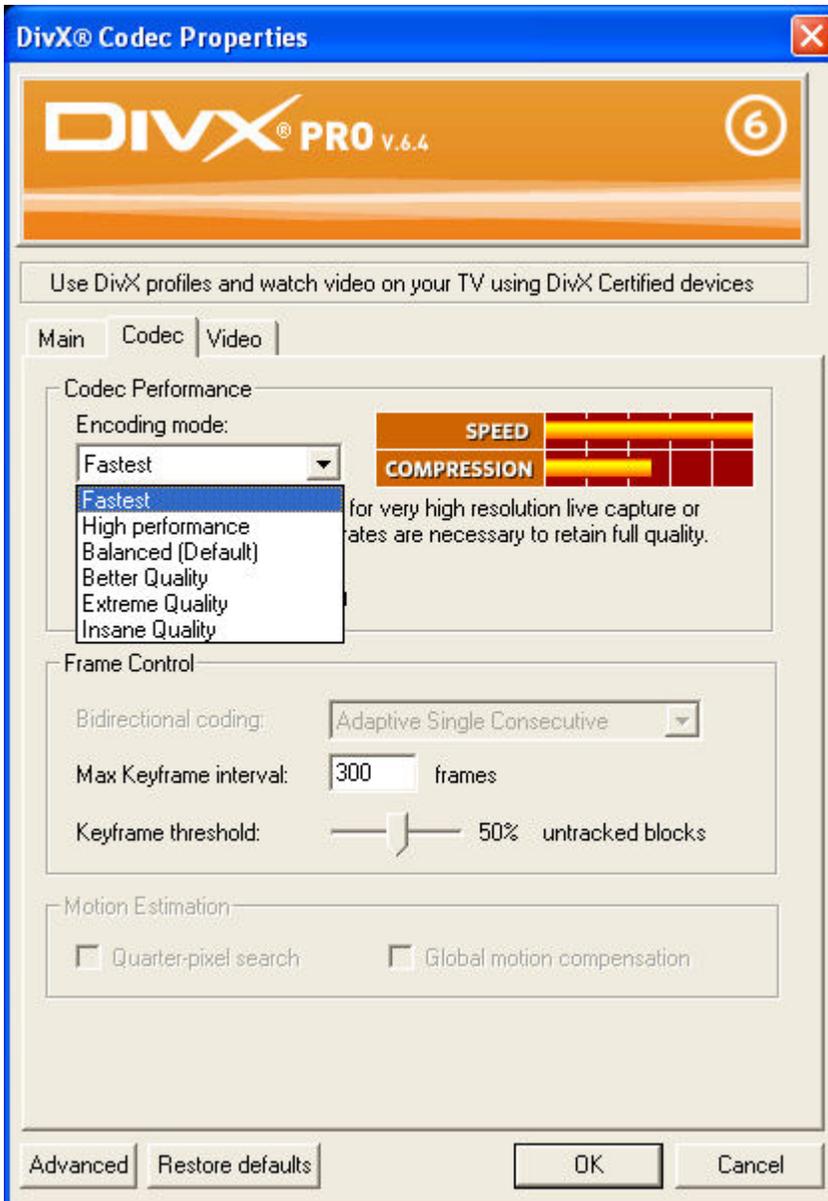


Figure 26 - DivX CODEC

DivX allows you to select various "Encoding Modes" which essentially cause the quality to be higher or lower.
HandyAvi's Quality slider has no effect.

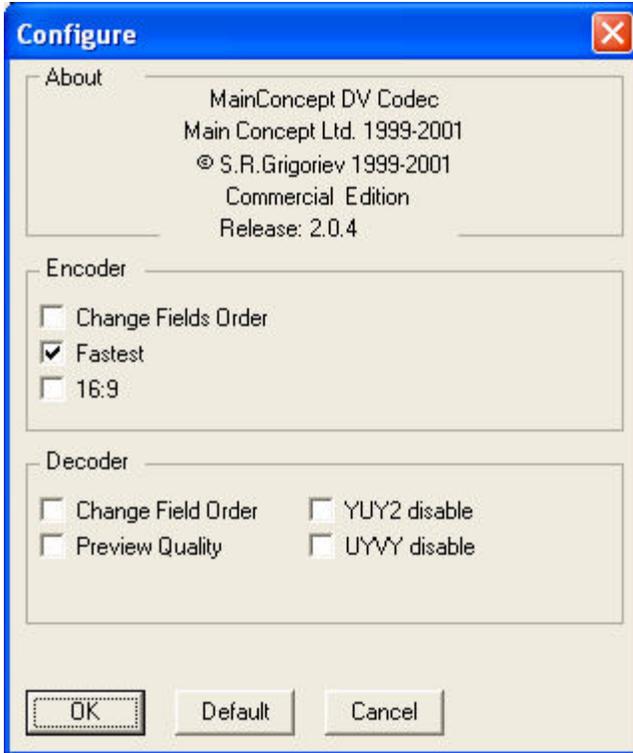


Figure 27 - DVSD Codec

DVSD allow you just two Quality options, Either "Fastest" or not. HandyAvi's Quality slider has no effect.

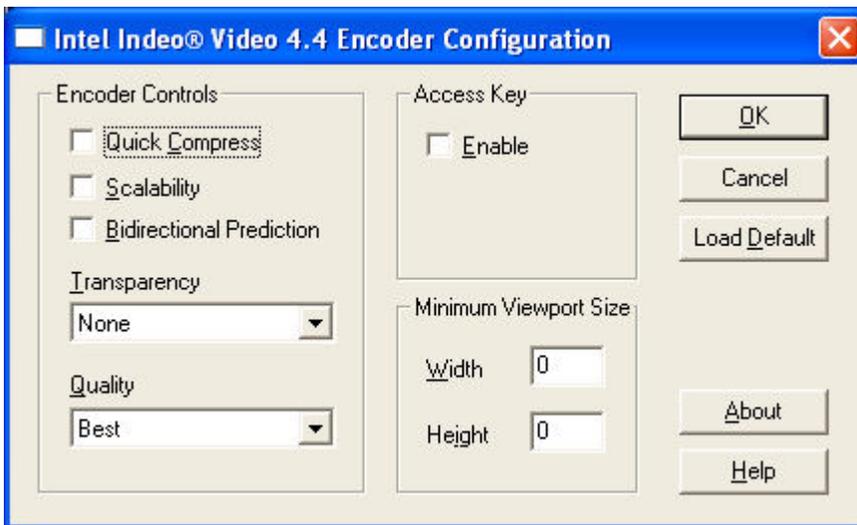


Figure 28 - IV41 CODEC

IV41 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.



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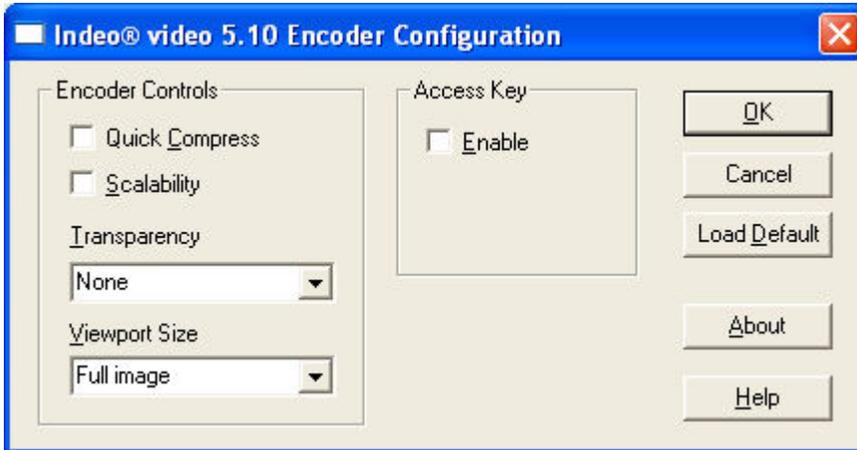


Figure 29 - IV50 CODEC

IV50 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.

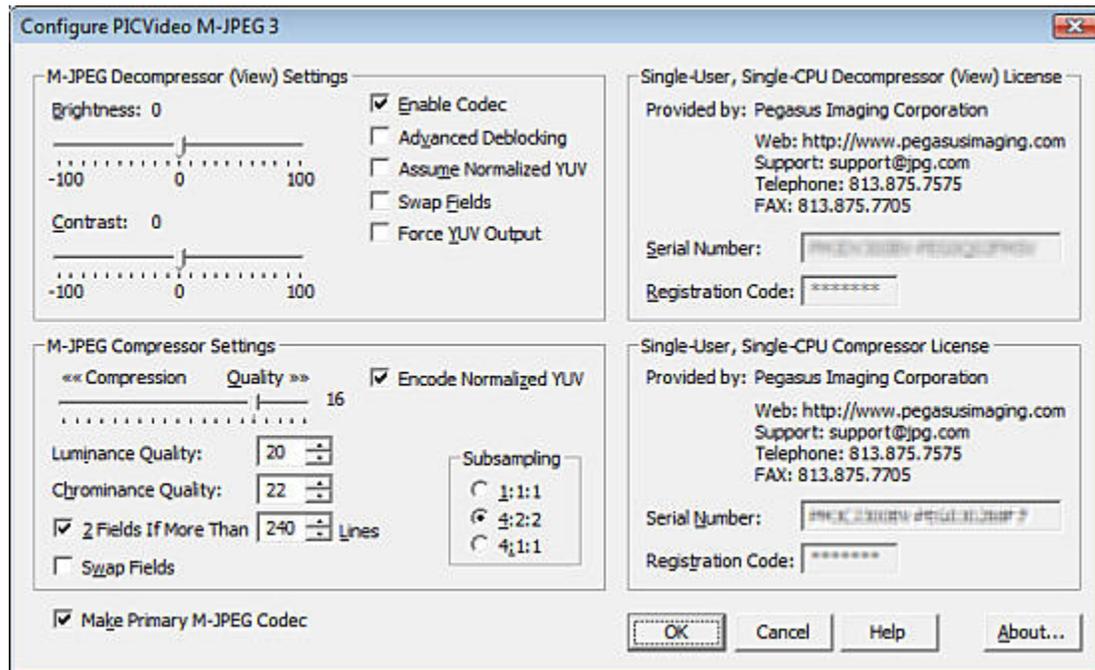


Figure 30 - PICVideo MJPG CODEC

There are at least two MJPG CODEC vendors out there. As far as we know, you have to buy an MJPG CODEC if you want to use one.

The PICVideo MJPG CODEC has a Compression-Quality slider that you can adjust to set your desired trade-off between image size and image quality.

HandyAvi's Quality slider does not appear when the PICVideo MJPG compression scheme is selected so the above panel is the only way to adjust Quality/Compression.

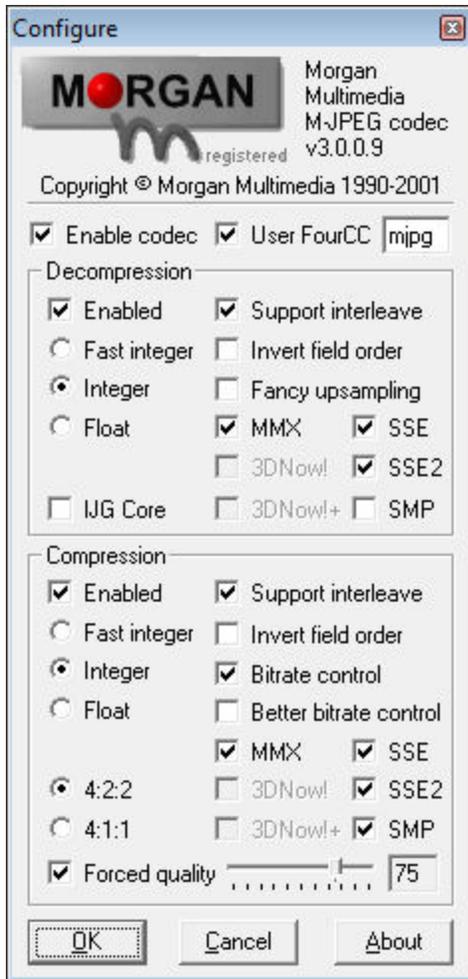


Figure 31 - Morgan Multimedia M-JPEG Codec

Morgan M-JPEG allows quality to be set if the "Forced quality" check box is checked. The value in the display box (here seen as 75) ALWAYS overrides the value set by the HandyAvi Quality sliders!

HandyAvi's Quality slider appears but has no effect.

(We ran into a problem with the above version of the Morgan CODEC in Vista when we used image sizes other than 160x120, 320x240 or 640x480. Caused a HandyAvi crash that we could not find a work-around for... We sent Email to the vendor describing the problem. Received no answer after several days. ***This CODEC seems to work just fine in Windows XP though...***

In the past, we have always used the Morgan Multimedia M-JPEG Codec but we have now installed the PICVideo M-JPEG CODEC and are using it instead on Vista.)



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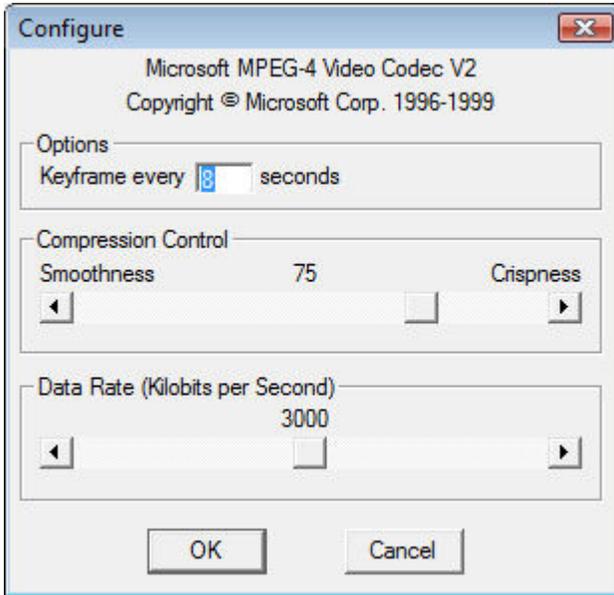


Figure 32 - mp42 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

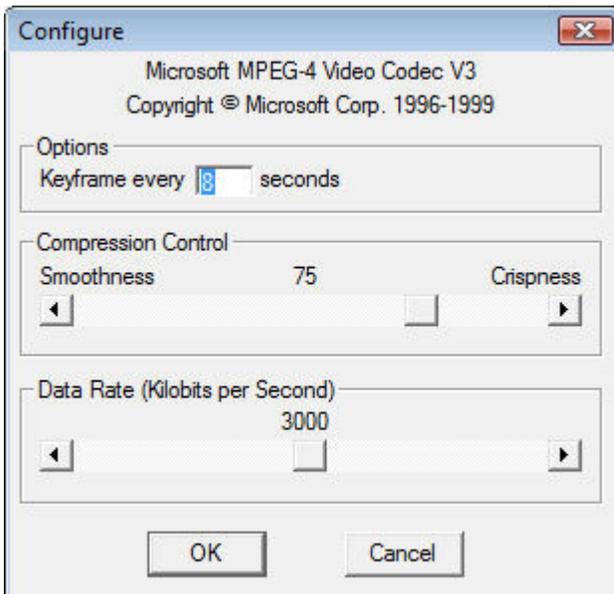


Figure 33 - MP43 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

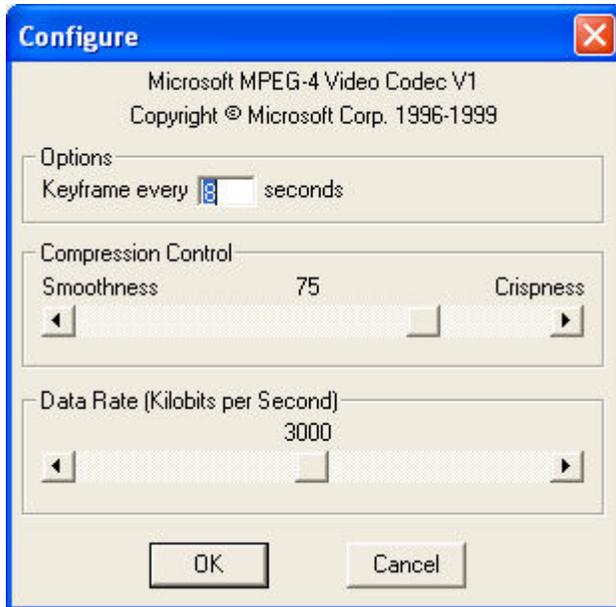


Figure 34 - MP41 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

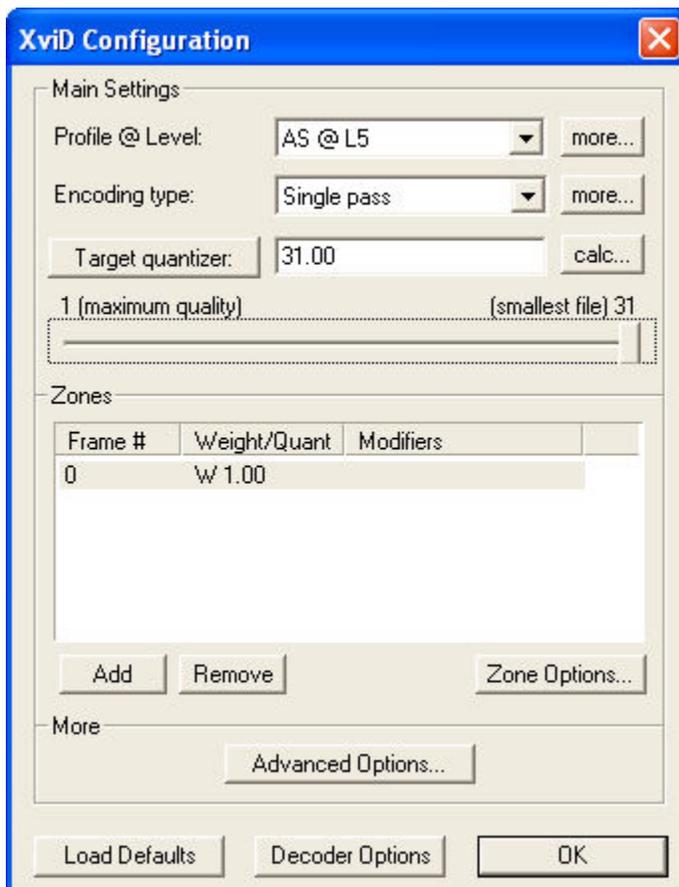


Figure 35 - XviD CODEC



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HandyAvi's Quality slider DOES control quality for this CODEC.



Telescope Controls

Telescope COM Port

In order to communicate with the telescope, the telescope must be powered up, have its RS232 port connected by a serial cable to your PC and HandyAvi must be talking to the correct COM port. The COM port can be selected by using the menu item "Tools/Telescope Port..." The following port selection window will come up.

(USB/Serial cables may be used but it should be noted that not all types of USB/Serial cables are guaranteed to work. Testing has shown that some of them do **not** meet the specifications of the Serial UART chips that they are supposed to substitute for.)

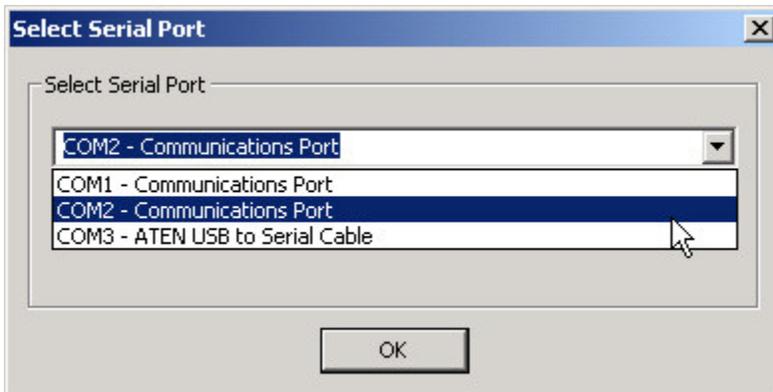


Figure 55

Note that we have been using IOGEAR's GUC232A USB/Serial cables successfully for several years with the LX-200 out in the field and have had excellent results.

Also note that for USB webcams we often need longer cables than the standard length of a webcam cable. We have very successfully used USB "repeater" or "extension" cables such as the Model G2LUB16, "IOGEAR's Premium USB Active Extension Booster Cable". These cables come in 16 foot lengths and require no separate power supplies. We have used 3 of them in series with no difficulty and their sales literature says they will work at distances of up to 75 feet. They do seem to fail if they get wet during a rainstorm however. They seem to recover when they dry out but we have never been able to dry one out in the field after it gets wet... Bring spares...

Opening the Telescope Controls

To open the telescope control panel, select the Menu item Tools/Telescope Controls. If the telescope is powered up, has a serial cable connected to your computer and if you have chosen the [correct COM port](#), the ["Telescope Controls"](#) panel will come up.



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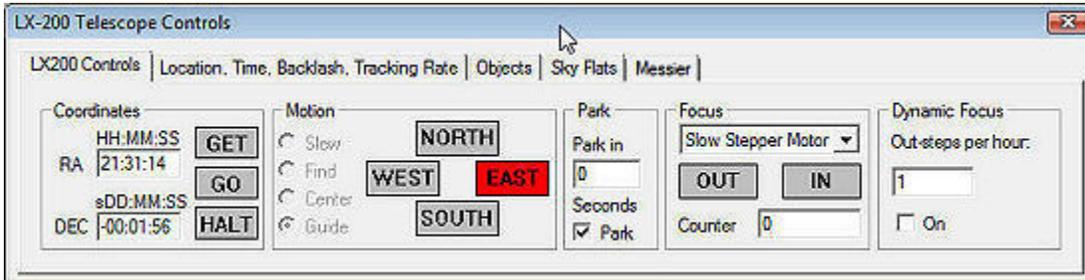


Figure 54

See [Telescope Controls](#) for further information.

Telescope Controls

First Telescope Tab - LX-200 Controls

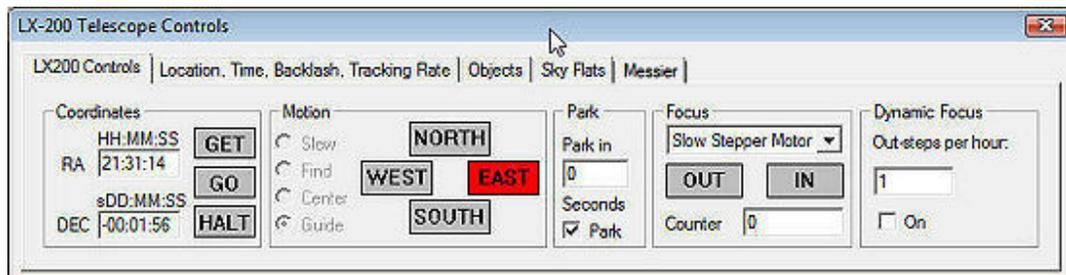


Figure 56

The above image shows what you will see if the telescope port is working and the telescope is communicating properly with HandyAvi. If everything is "well" the RA and DEC fields will contain numbers. If the telescope is not responding for any reason, the RA and DEC fields will be blank.

Note that the telescope control window is a "modeless dialog window" so it can be left up and operated in concert with the camera controls.

Also Note that we currently have the telescope in "park" mode as described below.

COORDINATES SECTION

"GET" gets the current RA and DEC from the telescope and displays them.

"GO" goes to the RA and DEC that are shown in the RA and DEC edit boxes. NOTE that the formats must be **exactly** as shown. You can **enter any valid RA and DEC** and then press "GO" and the telescope will slew to that position.

"HALT" stops the telescope motion immediately in case you notice that your camera is going to be crunched by the fork arms or your cables are stretching too much, or you simply change your mind about slewing to the selected coordinates.

MOTION SECTION

The speed can be set to any of the four indicated Meade telescope-slewing speeds. The **NORTH**, **SOUTH**, **EAST** and **WEST** push buttons are operated by using the left mouse button. These buttons work just like the buttons on the Meade keypad, i.e.,

the telescope will move in the direction indicated while the button is held down. Motion will stop when the button is released.

After motion has been completed, the coordinates are updated and displayed.

PARK SECTION

The "**Park**" feature allows you to park the telescope i.e., holds it motionless. It does this by turning on guide mode then automatically holding the "East" button down. This stops the guide motor completely so that the telescope stops tracking the sky. Why use park? If you want to leave the telescope set up for days on end so that you do not have to realign it every night, the Park mode prevents the cords from wrapping around the telescope as they would if the telescope continued tracking.

There is a time field so that you can "Park the telescope in 7200 seconds" for example.

When you click the Park box so that it is checked, HandyAvi will look at the time field and count down to zero before parking the telescope. If the time field is 0 or reaches 0 after counting down, the telescope will park immediately.

Normally, you would enter the time first then cause the Park check box to be checked.

When you uncheck the Park box, the telescope is placed in guide mode, the East button is released and the telescope again starts tracking the sky.

During "Park" the speed change buttons are "grayed out" (disabled) and the "Go" button is disabled but all other controls function normally so you can, for example, change focus or get a read-out of the telescope's RA and Dec.

The "Park" setting is remembered by HandyAvi. If you had it set when you exited HandyAvi, it will be set when you reenter HandyAvi.

If the telescope was parked, it will continue to be parked even if you exit HandyAvi.

FOCUS SECTION

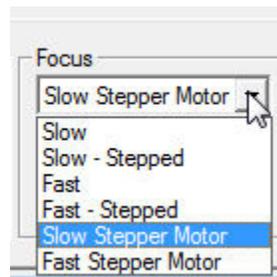


Figure 57

This section allows you to operate the Meade focusing motor.

There are two basic focusing speeds, "**slow**" and "**fast**". You can choose which speed you are using by checking or un-checking the check box. (Experience has shown that during slow speed runs, the motor often bogs down and stops so use of the fast speed might be necessary.)



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There are two "**Stepped**" modes (**Slow - Stepped** and **Fast - Stepped**) that allow you to use the Meade focuser in a much more controlled manner. When "stepping", HandyAvi transmits a motor-on, motor-off command of fixed duration.

If you hold the "IN" or "OUT" button down, the telescope will execute a series of stepped motions.

Step mode is highly recommended if you are using a standard Meade focuser with the LX-200.

Again, the counter attempts to indicate position. Each "step" provides a count of 2. This was to try to get a correlation between stepped and un-stepped focus position. Not entirely successful.

Note that the Meade focusing motor is not a stepper motor so it is almost impossible to tell accurately what the focus position is.

The two buttons, "IN" and "OUT" determine which direction the focusing motor is moving the eyepiece. They operate in the same manner that the NORTH, SOUTH, EAST, and WEST buttons do, i.e., the motor will run as long as the button is held down. The motor will stop when the button is released. Note that the button that was last pushed stays a little grayer than the other button. This will help you remember which direction you were going as you attempt to focus at 2:00 AM when your brain has shut down and the image download time (of certain CCD cameras) puts you to sleep while attempting to focus.

The counter attempts to show the position of the focusing control. The motor seems to take about one second to reach full speed in the "fast" mode. The motor seems to coast to a stop over a period of about three seconds if it was going at full speed. The algorithm HandyAvi is using does a simple linear interpolation using those numbers as an approximation. When a button is pressed, the PC time clock is accessed and the value is stored. When the button is released, the time clock is again accessed and the difference is taken yielding an elapsed time value accurate to 1 millisecond. The counter is based upon these elapsed times and the motor acceleration/deceleration values. More work on measuring acceleration/deceleration rates might make this more accurate but, at the moment, you should consider this number only a rough guide. *It is very unlikely to provide accurate positioning information.*

Once focus is achieved, the counter can be set to zero to provide at least some sense of where the focus position is/was.

There are two other focus types, "**Slow Stepper Motor**" and "**Fast Stepper Motor**". These are designed to accommodate a do-it-yourself stepper motor that is being used by the author of this section of the HandyAvi system. The Meade focus motor port on the LX-200, labeled "Focuser", puts out +19 Volts or -19 Volts depending upon which direction the Meade standard DC focusing motor should run. These voltages can be used instead as signals to control a stepper motor designed to replace the Meade DC motor. With a stepper motor, the focusing is precise and the counter will be completely accurate. (Newer Meade telescopes might have different focusing systems.)

DYNAMIC FOCUS SECTION

As the temperature drops, the telescope will shrink and the focus position will change. The Dynamic Focus control allows you to automatically compensate for the shrinkage by stepping the telescope focus any desired number of steps per hour.

Second Telescope Tab - Location and Time

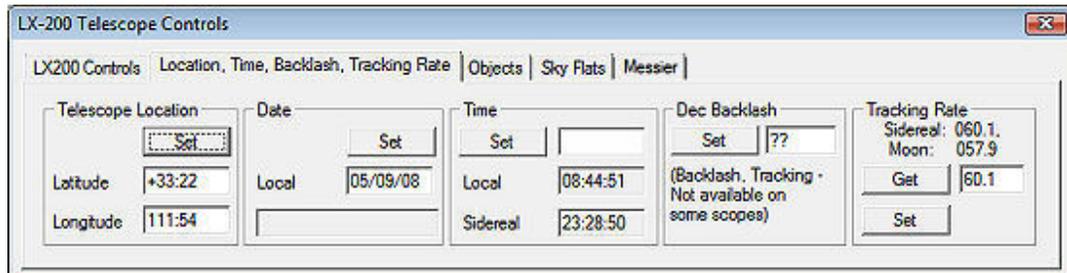


Figure 58

The above image shows the " **Location and Time, Backlash, Tracking Rate**" controls.

When one switches from "LX200 Controls" or "Objects" or "Sky Flats" to "Location and Time, Backlash, Tracking Rate", the "Get" operation of the first tab is automatically performed.

Telescope Location: Enter the coordinates of the current location of the telescope into the telescope. Type in the Latitude and Longitude then press "Set" to set the telescope's location into the telescope's internal memory.

Date: Enter the current date. Pressing "**Set**" then enters the data into the telescope. NOTE: Whenever "Set" is pressed, the telescope **updates the planet positions**. Mercury's position changes significantly from day to day so if the telescope is left set up for more than one day, pressing the "Set" button in the "Date" area will cause the planet positions to be updated and will allow Mercury and Venus in particular to be accurately found.

Time: Displays the current time and is updated every second by querying the telescope and displaying the results.

A new Local time can be entered in the edit box and then when "Set" is pressed, it will be entered into the telescope. HandyAvi also computes the corresponding **sidereal time** and enters that into the telescope also.

There is about a 1 second delay for the time setting operation so press "Set" one second early if you want to be within a second. Part of the delay is simply transmitting the data to the telescope.

The LX-200 has a **Dec Backlash** setting that can be from 0 to 100. The LX-200 software will not respond to this being set by HandyAvi but the new GPS scopes will.

The LX-200 also has a **Tracking Rate** setting that can be set at a rate to track the Moon among other things. (The Moon moves slowly but noticeably against the background stars. If you are making images of the Moon, you might want to track it at the proper rate.) Again, the LX-200 software will not respond to this being set by HandyAvi but the new GPS scopes will.



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Third Telescope Tab - Objects

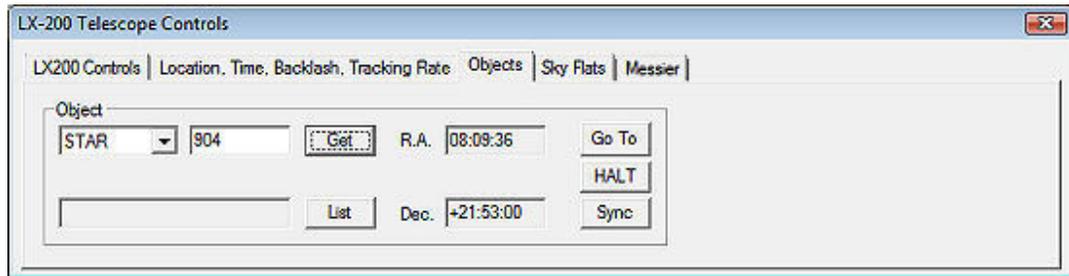


Figure 59

The above image shows the "Objects" tab.

Objects: Choose a catalog.

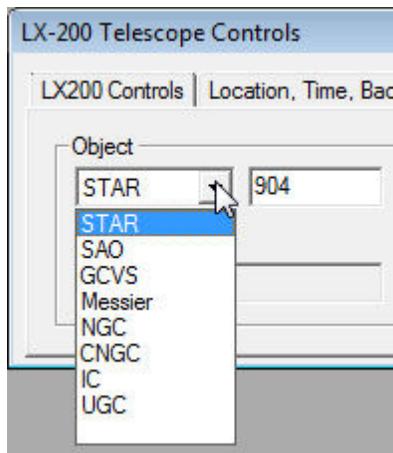


Figure 60

You can then enter an object number and either "**Get**" the coordinates of the object and display them or "**Go To**" the object which will cause the telescope to display the coordinates of the object and begin slewing to the object. Note that if you type in a number for an object that does not exist, the only indication will be that the RA and DEC will not change.

Note that the coordinates provided by a "**Get**" command are retrieved from the Telescope's data base.

Halt: Immediately stop the telescope's motion.

Sync: Causes the telescope's internal coordinate system to synchronize with the selected objects. (If your telescope is aligned and you somehow lost sync due to a power-off for example, you can locate and object in the sky, point the telescope at it, use the Object controls to select the object, "Get" its coordinates and then press "Sync". The telescope will now be able to use its internal coordinate system to go to other objects.)

These catalogs are the ones stored in the Meade LX-200 telescope. They are:

1. STAR
 - a. The STAR catalog contains the 250 brightest stars (1 through 250), 100 "interesting" double stars (251 through 350), and Sigma Octantis, the southern pole star (351).

- b. STAR 901 through 909 are the planets in order from the sun with the moon being 903 instead of the earth.
 - i. 901 - Mercury
 - ii. 902 - Venus
 - iii. 903 - Moon
 - iv. 904 - Mars
 - v. 905 - Jupiter
 - vi. 906 - Saturn
 - vii. 907 - Uranus
 - viii. 908 - Neptune
 - ix. 909 - Pluto
2. SAO
 - a. SAO catalog of stars. Meade appears to have placed as many "important" objects as possible in the other databases then filled up the rest of the space (to a total of 64,000 objects in the LX-200 - More or fewer in other Meade telescopes) with the brightest SAO objects. There are 15,928 SAO objects in the Meade database. It includes all SAO objects brighter than 7th magnitude. SAO object numbers are 6 digit numbers and they are not ordered by brightness so there are a lot of "holes", i.e., if you type in a random 6 digit number, you are unlikely to hit anything and the display will not show a new RA or DEC. If you want to try something that works, try SAO 151881, which is Sirius, or SAO 67174, which is Vega. (You could obtain the SAO catalog from an on-line source, sort by magnitude and get some idea of which numbers would work.)
3. GCVS
 - a. The GCVS catalog is a catalog of variable stars. 21,815 of them. Meade has them numbered by constellation, which consists of the first two digits followed by a 4 digit number assigned "according to the standard sequence of variable-star designations". Again, there are lots of "holes". A number such as 99999999 is sure to be unknown or unassigned. For testing purposes, you could use GCVS 860001, which is in Virgo. (Unfortunately we were unable to correlate that with anything in Megastar. Caution is advised.)
4. Messier
 - a. This is the Messier catalog of things that Charles Messier found irritatingly bothersome in his quest for new comets. These are great objects whose numbers run from 1 to 110. M 1 is the Crab nebula for example.
5. NGC
 - a. The NGC or New General Catalog is a catalog of 7840 objects, which include Galaxies, Planetary Nebulae, etc.
6. CNGC
 - a. The CNGC catalog or Computerized New General Catalog appears to be another designation for the NGC catalog within the Meade database?
7. IC
 - a. The IC or "Index Catalog" contains 5386 objects. One of them, IC 434, contains the Horse head Nebula.
8. UGC
 - a. The Uppsala General Catalog contains 12,921 Galaxies numbered, apparently, from 1 to 12921.



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List: Brings up an object list consisting of the Meade LX-200 guide stars followed by the NGC object catalog.

Object Name	R.A.	Dec.	Mag.	Size()	Other Data
Hadar	14:03:56	-60:23:00	0.6	-	144
Arcturus	14:15:40	+19:10:00	0.0	-	147
Alphekka	15:34:44	+26:42:00	2.2	-	165
Antares	16:29:28	-26:27:00	0.9	-	177
Vega	18:37:00	+38:47:00	0.0	-	214
Albireo	19:30:44	+27:58:00	3.1	-	223
Altair	19:50:48	+08:52:00	0.8	-	226
Deneb	20:41:28	+45:17:00	1.3	-	232
Enif	21:44:12	+08:53:00	2.4	-	238
Fomalhaut	22:57:44	-29:37:00	1.2	-	247
Maikab	23:04:48	+15:12:00	2.5	-	249
NGC0001	00:07:18	+27:43:00	13.0	1.9	p Gx Peg
NGC0002	00:07:18	+27:41:00	15.0	1.4	p Gx Peg
NGC0003	00:07:18	+08:17:00	14.0	0.0	p Gx Psc
NGC0004	00:07:25	+08:22:00	0.0	0.0	- Gx Psc
NGC0005	00:07:48	+35:21:00	14.0	0.0	p Gx And
NGC0006	00:08:18	+32:30:00	0.0	0.0	- - And
NGC0007	00:08:24	-29:55:00	0.0	2.5	- Gx Scl
NGC0008	00:08:48	+23:50:00	0.0	0.0	- D* Pen

Figure 61

This list is merely for convenience. Selection of an item does not currently drive the telescope. "Other Data" includes the Meade Star number, e.g., Alphekka is 165; Altair is 226.

Fourth Telescope Tab - Sky Flats



Figure 62

Astronomers using CCD cameras designed for deep-space work often require frames called "Flats" which can be used to counteract tiny imperfections and dust particles within the optics train. There are several methods of making flats including constructing a light box, covering the scope with a tee shirt, etc. One method is to take a "sky flat". This is done typically during twilight. Frames are taken of empty sky and the background sky brightness is captured and the dust particles become visible in the captured frame. The captured frame can be used later to subtract out the dust particle contribution to images of deep-space objects.

The difficult part of taking sky flats is that the sky is not empty of stars and twilight may not last long enough. HandyAvi contains an algorithm for making sky flats.

First, use the first tab (LX-200 Controls) to point the telescope at a region of the sky containing as few bright stars as possible. Set the Milliseconds field to the length of time that the telescope should move in "Center" mode.

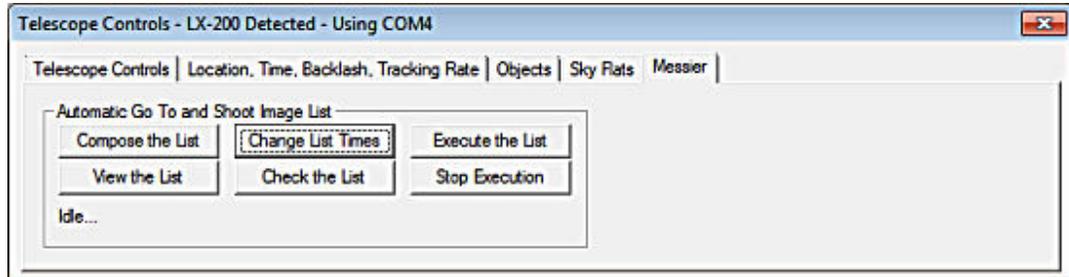
Start: Sends a command to the telescope to set its speed to "Center" (as opposed to "Guide", "Find", or "Slew" speed).

The telescope will then move North, then East, then South, then West, then North, etc.

Each move will be for the number of milliseconds that were entered in the "Milliseconds" field. This will trace a square in the sky. The purpose is to cause the star background to move quickly so that the stars, if they are dim enough, will not leave visible trails. This will allow a sky-flat to be taken either during twilight - or anytime from light-polluted skies :-).

Stop: Stops the telescope's motion and returns its speed to "Guide" mode.

Fifth Telescope Tab - Messier Marathon



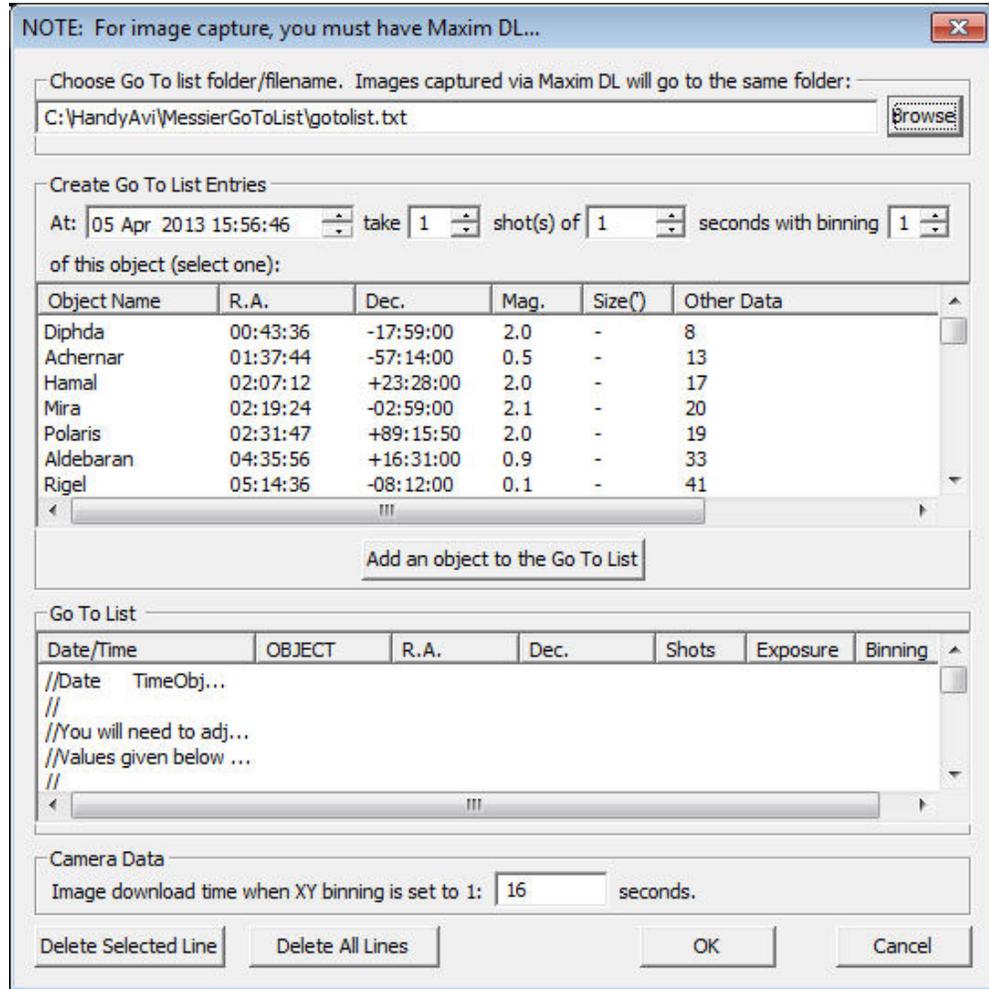
This tab can be used with an LX-200 telescope and a version of Maxim-DL that supports scripting (every version except the "Basic" version last time we checked...) We used this tab to automatically capture Messier Marathon objects in 2011 and 2013 (2012 was clouded out.) See <http://www.astroshow.com/Messier.html> for images we took using an internal test version of this system.

Compose the List:

Brings up this panel:



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Choose Go To list folder/filename.

First choose a "Go To" file that either already has data in it or create an empty file to start from scratch. We provide a complete Messier Marathon file that can be used as a starting point. We call that file a "Go To List".

When HandyAvi is installed, you can find our example GoToList.txt file in the same directory where HandyAvi was installed. For example, C:\Program Files HandyAvi\MessierGoToList. In the MessierGoToList directory, there are two files, gotolist.txt and ProcessMessierImages.vbs. You can consider these to be backup files in case you need them.

We have also copied these files C:\HandyAvi\MessierGoToList. As shown above, we chose to work in the c:\HandyAvi\MessierGotoList directory and use the GoToList.txt file that we copied to that directory. You could of course create some new directory and copy the GoToList.txt file to that directory then work in that new directory. All images captured will go to the directory that you choose to work in.

Gotolist.txt is the file we used to automatically shoot the Messier marathon in 2013. You will probably want to use it as a starting point. There are instructions in the file that will help you setup data for the year and day you plan to shoot and the Latitude and Longitude of your shooting site. Please read the instructions in the file.

The Change List Times button will greatly simplify changing the times at which each shot will begin.

ProcessMessierImages.vbs is a copy of the Visual Basic file which we used in 2013 to automatically process all of the images we shot automatically. If all images are shot, there would be 330 image files in need of processing.

ProcessMessierImages.vbs is set up to specifically accommodate our SBIG ST-4000XCM one-shot color camera so you would need to modify this file if you use a different camera. The file does illustrate how to automate initial image processing though use of Maxim DL's Scripting language.

Create Go To List Entries

You can use this to add data to the Go To list or you can hand-edit the Go To list. Note that the date/time field works by highlighting the day, or the month, or the year, or the hour, or the minute, or the second and using the spinner controls (up/down arrows) to the right of the field.

Add an Object to the Go To List

This will add the selected object to the end of the Go To list.

Again, remember that the list can be hand-edited. (See the "View the List" button below.)

Go To List section

This is a scrolling window that will let you see the current list entries. You cannot hand edit the list in this window. To hand-edit the list, see the "View the List" button below.

Camera Data - Image Download time

Your camera takes a certain amount of time to download an image. You can take a very short exposure with your camera and then time how long it takes the download to complete. Put the number of seconds in here. This value will be used when the **Change List Times** panel runs to adjust the times at which objects are scheduled for shooting.

Delete Selected Line

This will delete the line you selected in the Go To List window.

Delete All Lines

This will delete all the line in the Go To List window so you can start over.

OK

This will apply all of your changes.

Cancel

This will cancel all of your changes.

View the List

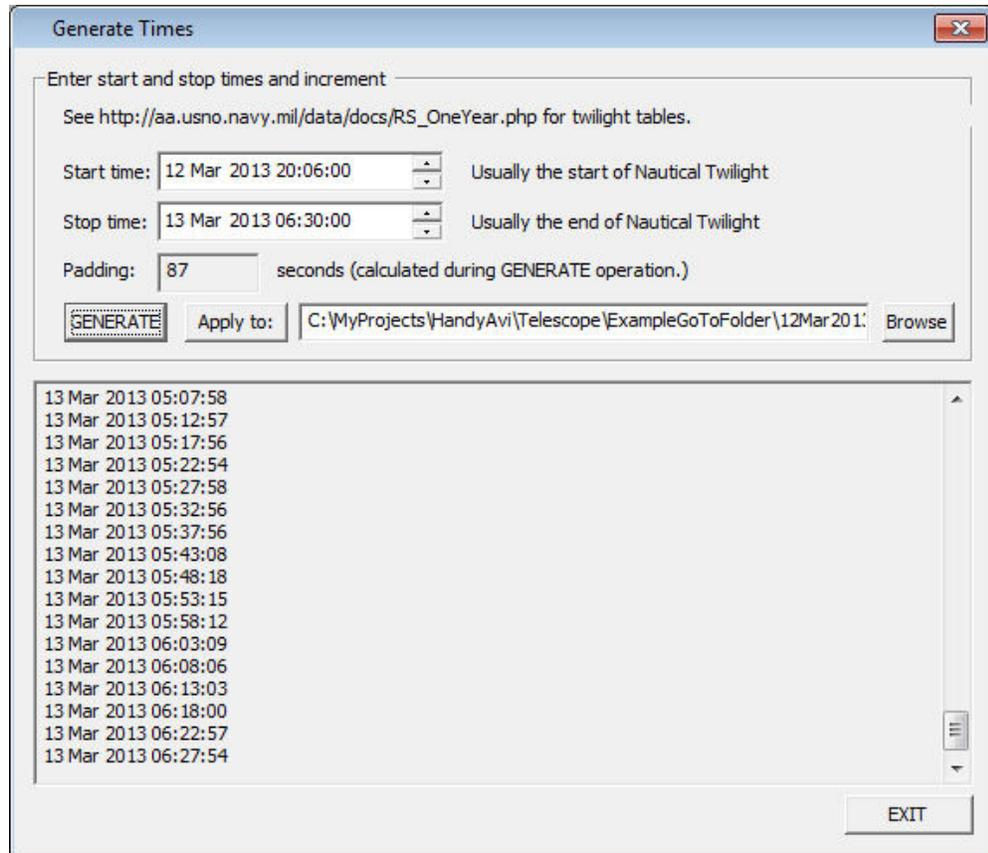
This will bring up the list in a NotePad editor so you can hand edit it if you wish to do so.

Change List Times

This will bring up the following panel:



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Start time

The time at which the FIRST image in the Go To list is to be started. Highlight the day, month, hour, minute, or second you want to change and use the arrow keys (up/down) to adjust the values.

Stop time

The time at which the LAST image in the Go To list is to be started. Highlight the day, month, hour, minute, or second you want to change and use the arrow keys (up/down) to adjust the values.

GENERATE

Calculates scope slew time (assumed to be 8 degrees per second - we issue a command to the telescope to set the "rate" to 8 degrees per second) and adjusts all times between start time and end time to allow all images in the list to be captured.

It also calculates "Padding" which is the number of seconds unused between objects. The "GENERATE" button simply generates the time values. They are applied to your gotolist.txt file only when the "Apply to:" button is clicked.

Apply to

This updates the time values in the gotolist.txt file with these newly calculated values.

Check the List

Runs set of list checks to determine if the list will execute properly with the times given.

Execute the list

Runs the list so that telescope slews to the objects, images are taken and downloaded, etc.

Stop Execution

Stops list execution. You might need to also interact with Maxim DL to get it to stop imaging.

Messier Marathon

For information on the new system for automating the shooting of all Messier objects in one night, see the "Fifth Telescope Tab" in the [Telescope Controls](#) item.

Displaying AVI Movies in HandyAvi

Displaying AVI Movies

HandyAvi can display AVI movies.

Simply use the File/Open menu item to open an AVI file. When it opens, the movie display will come up:



Figure 74

When the movie display window comes up it will look something like the above image. (If you want the movie to automatically begin playing, see the [File/Preferences](#) menu item. The default is to NOT play automatically.)

The above window is now fully resizable by grabbing a corner or an edge and dragging.

Double clicking the left mouse button on the above image will cause the image to be displayed in full screen mode...

Double clicking while in full screen mode will return you to non-full screen mode.

Controls

 **Stop:** Stop playing and reset to beginning of the movie. Pressing the down arrow key on the keyboard is the same as selecting the Stop button.



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▶ Play: When this button is pressed, the movie begins playing and the Pause button will be displayed in its place. If the movie has run to the end, pressing this button will start running the movie from the beginning. Pressing the up arrow key on the keyboard is the same as selecting the Play button. The arrow keys should be used to control the display when in full screen mode.

⏸ Pause: When this button is pressed, the movie will stop and the Play button will be displayed in its place. Pressing the down arrow key on the keyboard also invokes the "Pause" function. The arrow keys should be used to control the display when in full screen mode.

▶ Display the next frame: You can step forward through the movie a frame at a time. You can also step forward by pressing the right arrow key on the keyboard whenever the movie is not playing. The arrow keys should be used to control the display when in full screen mode.

◀ Display the previous frame: You can step backwards through the movie a frame at a time. You can also step backward by pressing the left arrow key on the keyboard whenever the movie is not playing. The arrow keys should be used to control the display when in full screen mode.

Slider: There is also a slider that will let you move quickly to any section of the movie. There is no keyboard equivalent for this function so it cannot be done in full screen mode.

There is a time field that shows the time from the beginning of the movie. The total time length of the movie is also displayed after the /. The number of the frame being displayed is shown in "Fr. #". In the above image, we see that we have paused the movie, it is displaying frame number 56 and we are 2.28 seconds into a movie whose total time-length is 8.04 seconds.

Note that additional Tools menu items and View menu items become available in HandyAvi main window when a movie file is open.

The Tools items allow frame selection and editing of the AVI movie.

The View items allow you to view AVI information stored in the AVI file such as the compression codec used to create the file.

There is also a View item to display the frame time log, the time at which each frame was captured when you made your video if you have not switched this feature off in [Preferences](#).

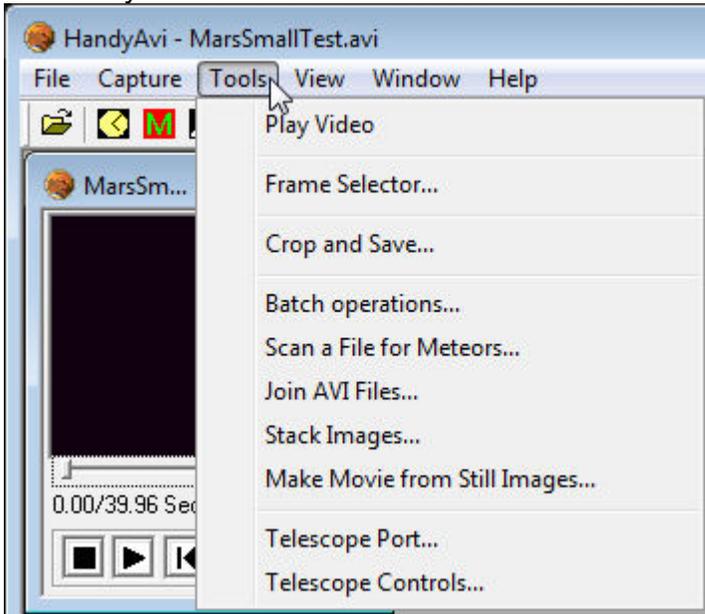
You can prevent log files from being generated if you uncheck the "Allow log files ... to be generated" in [Preferences](#).

You can cause a date/time stamp to appear on every image that you capture by setting Date and/or Time stamp options in [Preferences](#).

Tools

Tools Overview

All HandyAvi editions allow access to the tools shown in the Tools Menu:



See the [Tools Menu](#) for further information.

Crop and Save

Crop and Save

The Crop and Save feature is designed primarily for planetary photography applications. If you have an AVI file comprised of pictures of Saturn for example, then you can place a "crop box" around Saturn and create a new AVI video file containing only Saturn and the region defined by the crop box. This results in a new AVI video file whose frames are smaller than the original frames. This new AVI file can be used with HandyAvi's [image stacking tool](#) or with post-processing programs such as [RegiStax](#). The advantage is that the post-processing program will run much faster using the smaller frames. See the "[Crop and Save](#)" topic for more details on usage. See the [Crop and save tutorial](#) for making cropped planetary AVI files for astronomical imaging.

You MUST have an open AVI file (File/Open) in order to access the "Crop and Save" menu item.

This is an example of an open video file containing rather dim images of Saturn:



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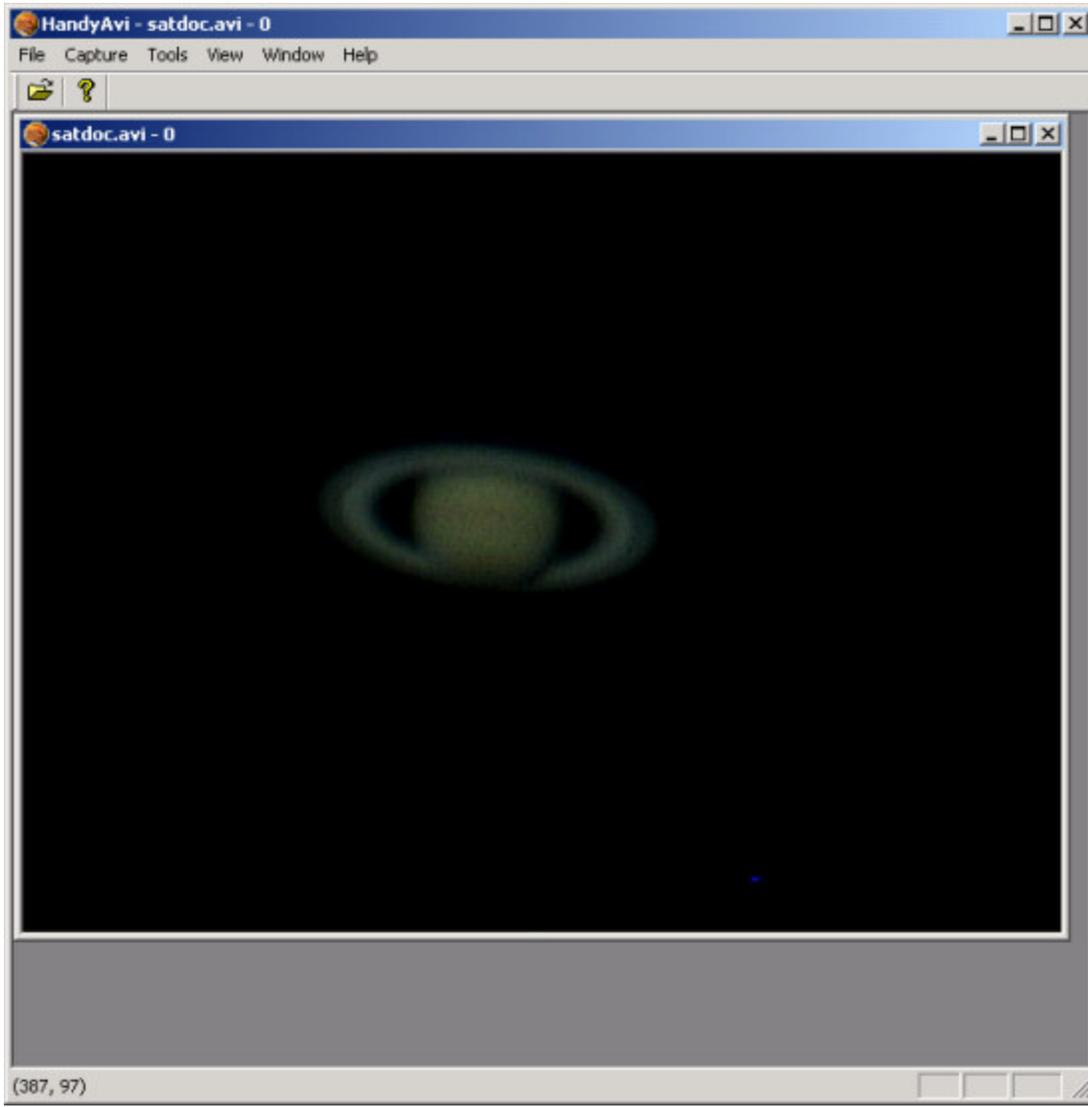


Figure 75

We now bring up the cropping tool available through the main menu:

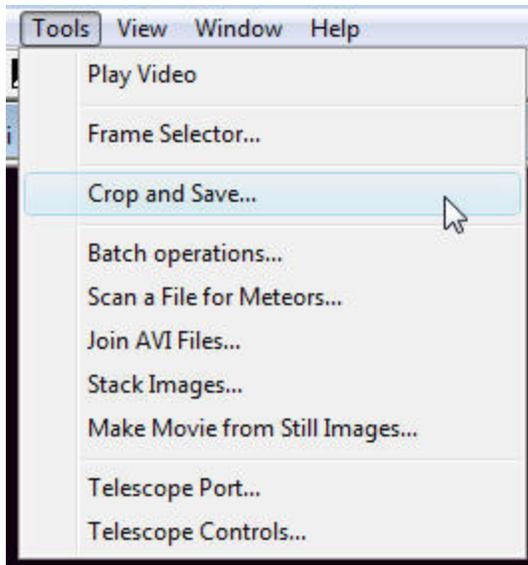


Figure 76

When you select "Crop and Save" from the "Tools" menu, a default crop box will be created on your image. A crop box selection window will also come up on top of your image:

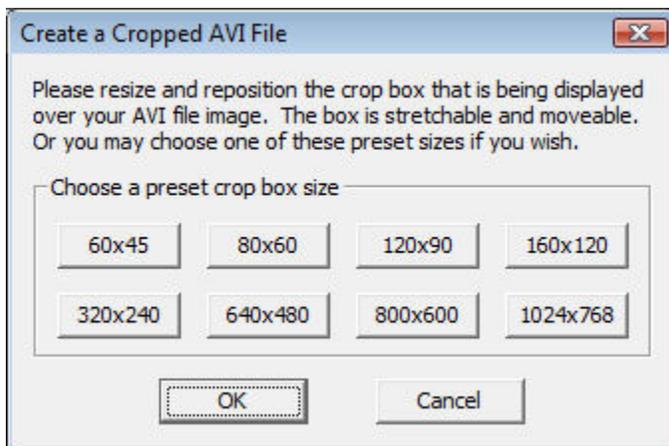


Figure 77

Move the "Create a Cropped AVI File" crop box selection window out of the way so you can see your primary subject (Saturn in this case.)

Do not close Figure 77 yet!

Use Figure 77 to select an appropriate sized crop box. (If you use one of the ones listed, compression schemes are more likely to work should you decide to create a compressed, cropped AVI file.)

Alternatively, you can grab corners or sides of the crop box to adjust its size.

The crop box can also be dragged.

Create a crop box of the appropriate size and drag it into position.

Here is what that should look like:



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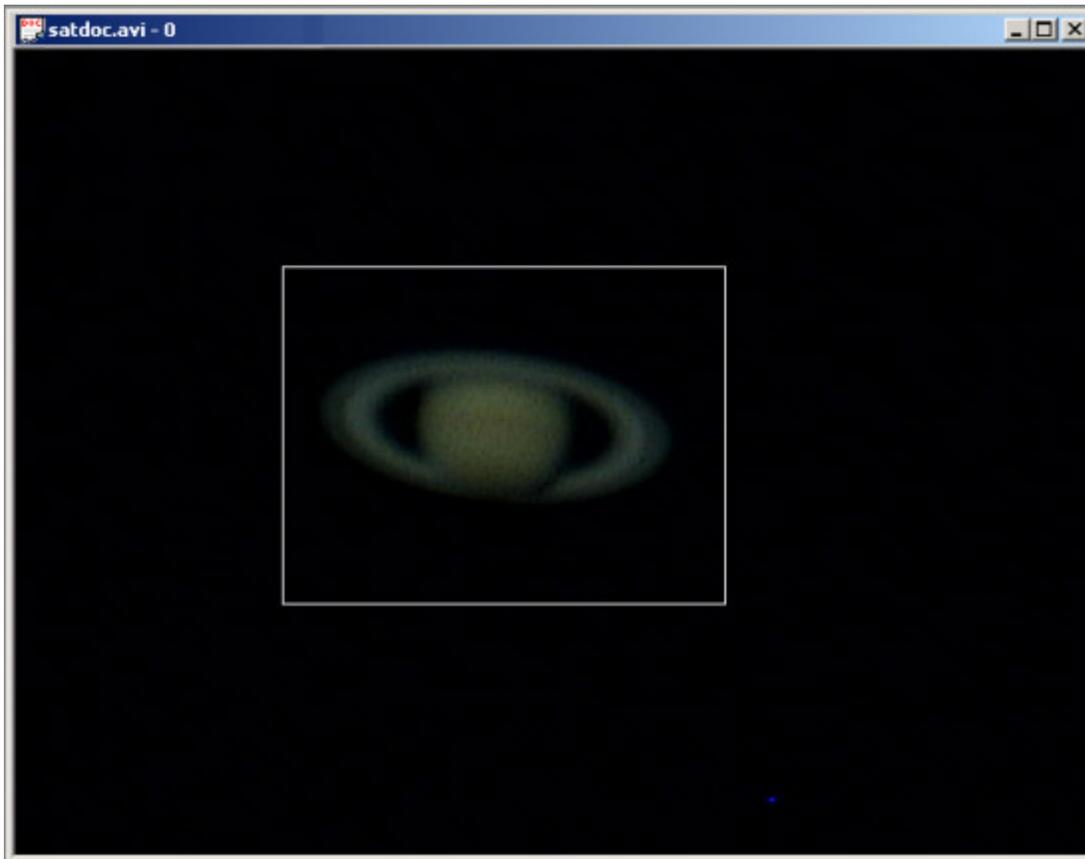


Figure 78

When you are happy with size and placement of the crop box, close the "Create a Cropped AVI File" box (Figure 77).

A file selector will appear. It will want the name of an AVI output file from you.

Provide a name for your new cropped AVI file and click OK on the file selector.

A Compression Selection window will appear. Choose your compression codec (You may wish to use "uncompressed" if you are working with astronomical images and you do not wish to sacrifice data to a ["lossy" compression scheme.](#))

Click OK after choosing the compression scheme.

Your new cropped file will now be created.

If you open it you will see this:



Figure 79

A smaller file that will allow a program like RegiStax to run much faster than it would with the larger original images.
 We could of course crop this more if we wished to do so but it looks pretty good as is and can be used as input to a program such as RegiStax.

Tutorial: Make an AVI Clip of the Best Frames

NOTE: This section is for primarily for astronomers using HandyAvi

First open an AVI file

NOTE: The AVI file used for this tutorial is in: C:\Program Files\HandyAvi\ExampleAVI\satdoc.zip if you installed HandyAvi to its default installation directory. You can unzip satdoc.zip and use satdoc.avi to replicate the steps of the tutorial below. The file is an AVI file taken from a back yard in the Phoenix area with a ToUcam webcam using a 10" Meade LX-200 and a 2X Barlow.

Use the File/Open menu item to open an AVI file. We will open the file named "satdoc.avi". The first frame of the AVI file will be displayed on the screen like this:



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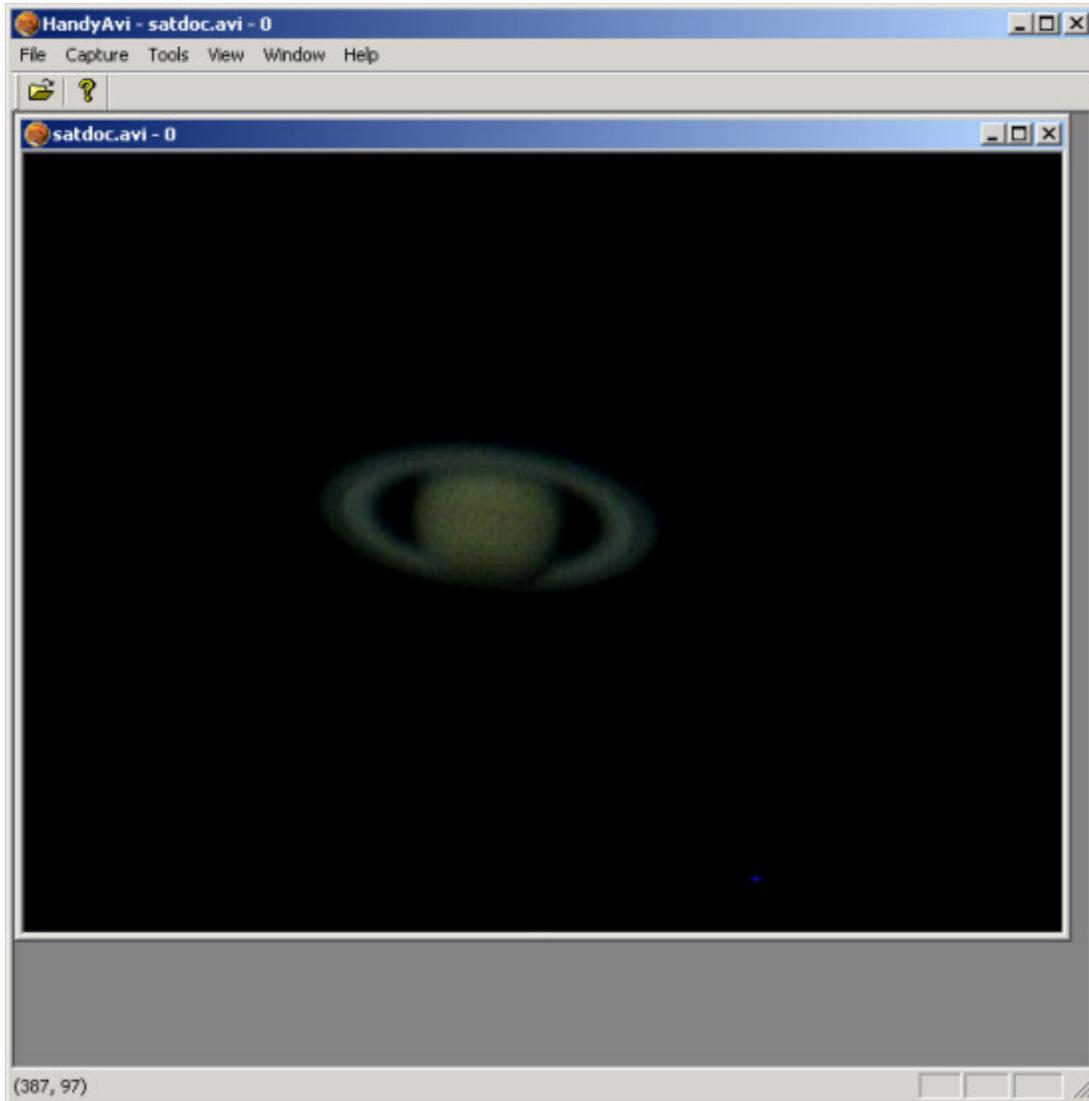


Figure 80

IMPORTANT: If no AVI movie file has been loaded, the menu items "Tools" and "Window" will be hidden and unavailable.

The AVI movie shown in Figure 80 includes a lot of wasted space around the image of Saturn. This wasted space can be eliminated by "cropping" the AVI movie file. This will speed up subsequent operations.

[Use the cropping tool!](#) to create a cropped version of the AVI file in Figure 80.

The cropped AVI file will look like this when it is opened:



Figure 81

The above cropped file is a much smaller file that will allow a post-processing program like RegiStax to run much faster than it would with the larger original images.

We could of course crop this more if we wished to do so but it looks pretty good as it is so we will continue to the next step.

Find the Best Frames

We now select the menu item Tools/Frame Selector. This brings up the frame selector window:



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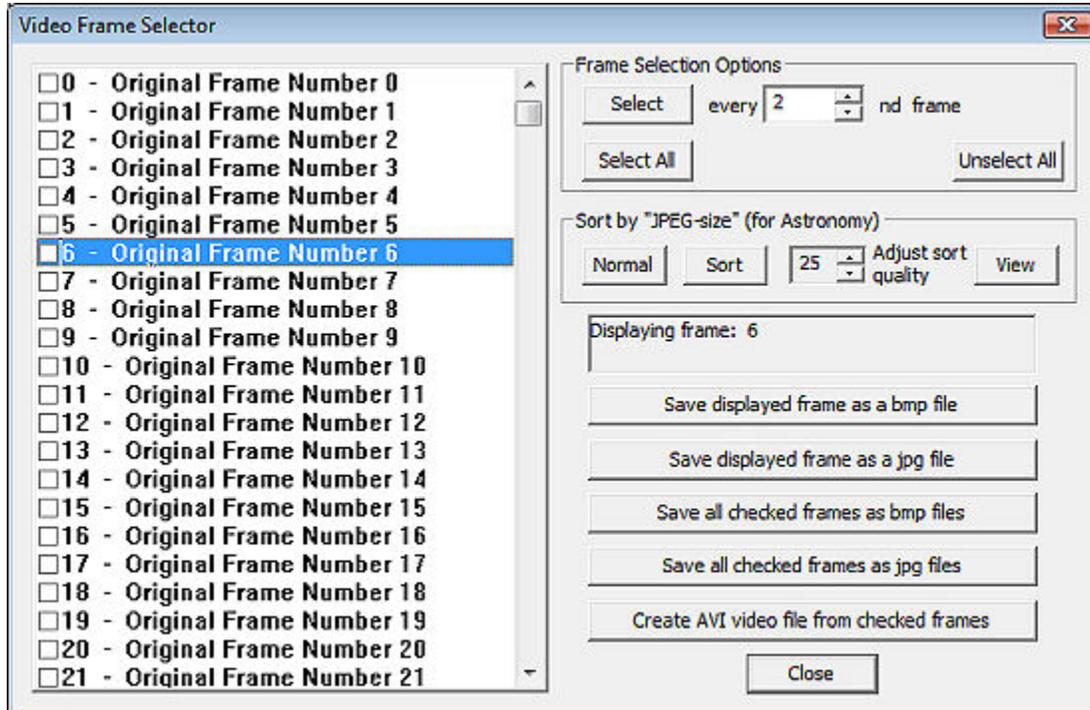


Figure 82

This window interacts with the image display to display the most recently selected image. Clicking on any check box displays the image of the associated frame. Multiple selections may be made using standard CTRL-left-mouse-click operations or click and drag operations, etc., in accordance with standard Microsoft Windows conventions.

The sorting area allows the images to be sorted either into "Normal" order which is the order they appear in the AVI file or by "JPEG size" which sorts them according to the **size** of their JPEG file equivalents. Blurry images compress better than non-blurry images so the size of the file can easily determine a sort order. It is important to note that JPEG allows a "quality" factor that runs from 1 to 100. Higher factors allow finer image details to be saved. If the factor is set to 100, then very little compression occurs and noisy images are compressed the least. This means that a noisy image would be selected as "better" than the same image without the noise. By adjusting the "sort quality" you can select the amount of detail you wish to sort on and avoid the noise.

The spinner buttons associated with the "Adjust sort quality", when you click on them, will cause the JPEG-compressed-decompressed image to be displayed (as if you stored the image using the selected quality factor then displayed the resultant image.) You can then immediately see the resolution of features that will be sorted on. Here is how that looks for various values of sort quality:

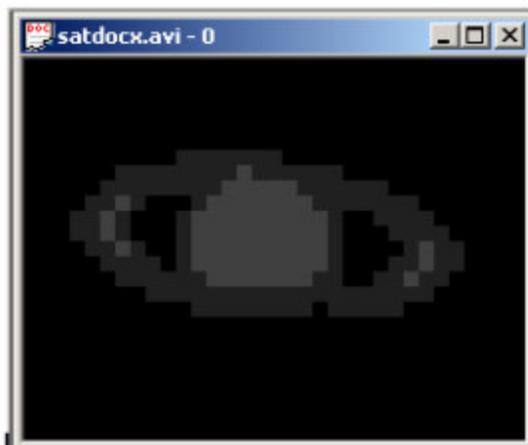


Figure 83 - Quality = 1

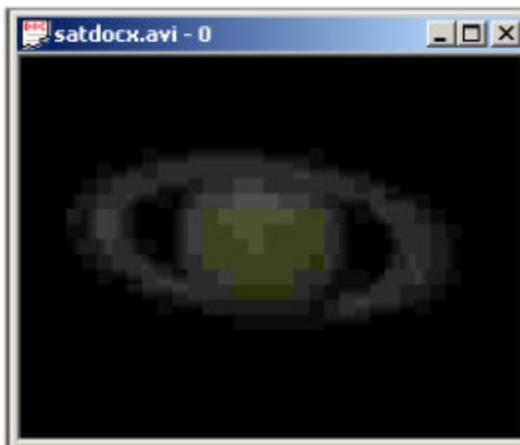


Figure 84 - Quality = 6

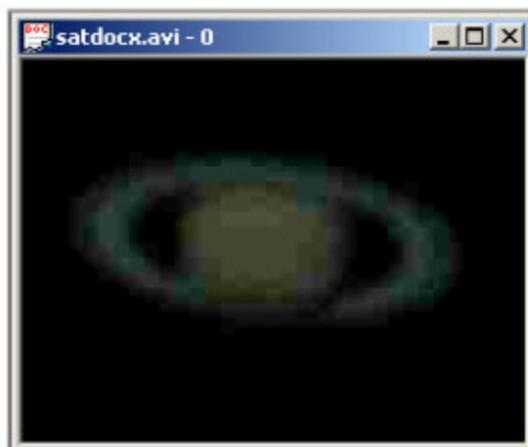


Figure 85 - Quality = 10



Figure 86 - Quality = 25



Figure 87 - Quality = 50



Figure 88 - Quality = 100

Note that the noise in the image shows up very well with quality set to 50 and 100 but is not so evident with quality set to 25. What is usually done is to start with high quality settings, and then reduce the setting until the noise no longer predominates. We then invoke the sort algorithm by



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clicking on sort. All features bigger than the noise features participate in the sorting process and we sort on actual planetary features instead of noise. Note that the images are displayed as they are processed. Various counters display which frame is being worked on as the sorting process is carried out.

NOTE that the button labeled "View", when depressed, causes the JPEG-compressed-decompressed image to be displayed instead of the original AVI frame. It comes on automatically when you are adjusting the sort quality. **Turn it off when you want to see the actual AVI images as they are in your AVI file.**

Here is the result of sorting on two different "Adjust sort quality" values: 25 and 26:

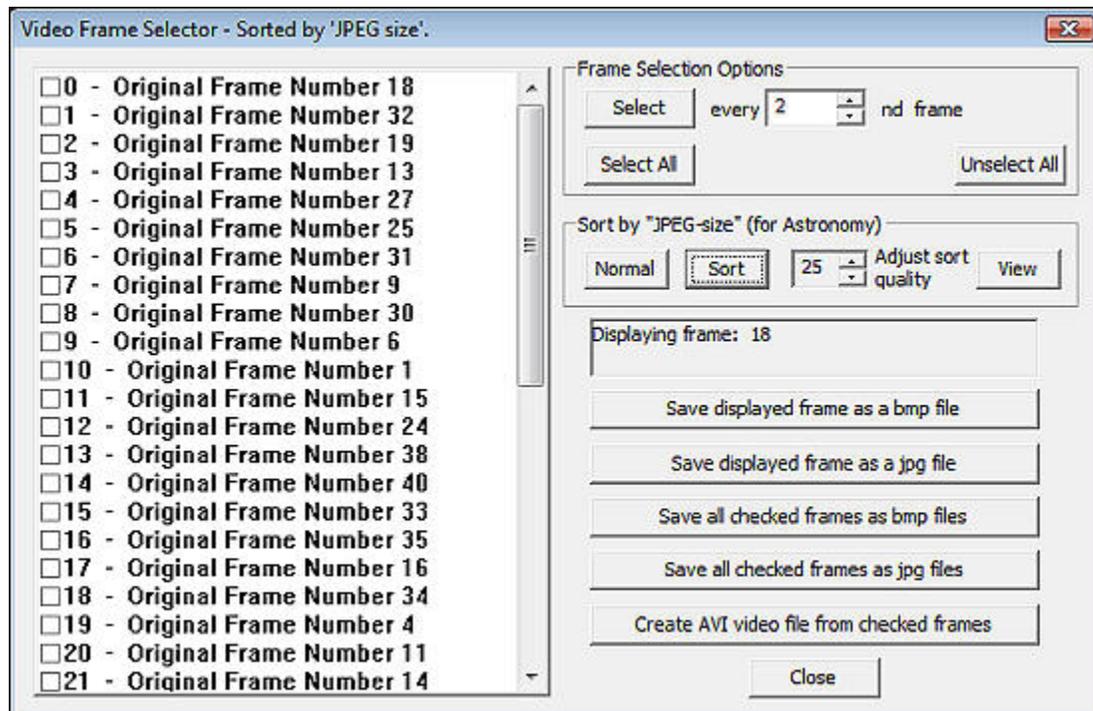


Figure 89

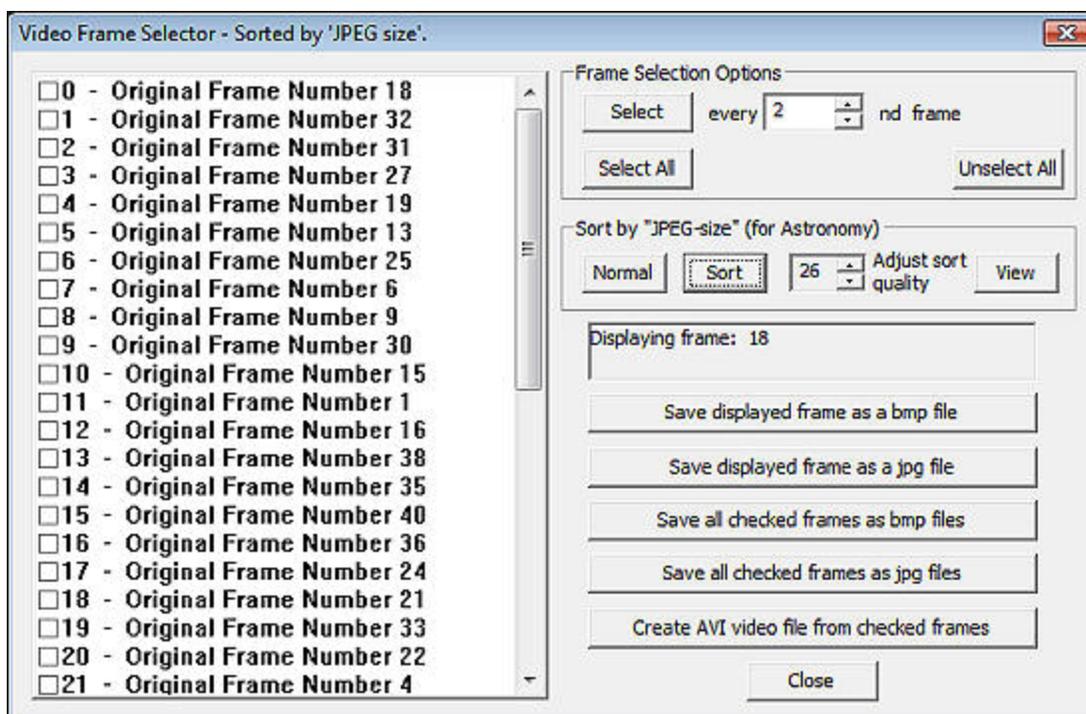


Figure 90

These quality values are somewhere close to the threshold where noise begins to be a factor for these particular images in this particular AVI file.

Frame 18 was selected as the best frame for both of the above Quality settings:



Figure 91 - Frame 18

Whether frame 19 is "better" than frame 31 is a good question:



Figure 92 - Frame 19



Figure 93 - Frame 31



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However both values of Quality identified Frame 39 as the worst frame:



Figure 94 - Frame 39

Save the Best Frames

We can now create a new AVI file from the best frames by [selecting the first N frames](#) in the Video Frame Selector window then left-clicking the "Create AVI video file from selected frames" button. This will bring up a standard file selector window and you can choose the directory and name for the new file. If you click "Save" then a new AVI file will be generated containing the frames you selected. The frames will appear in the new AVI file in the order they were in within the Video Frame Selector window. The resultant AVI file can now be used as input to [RegiStax](#) for example. The frames are smaller and consist of the "best" images that were in your original AVI file. RegiStax will run faster and, hopefully, produce a better image. The new file is also smaller so can be saved more easily. The author of this section of code saved ALL Mars images he took during the close approach in 2003. The smaller files archive better and will be easier to work with in the future as better image processing techniques are developed.

Frame Selector

The Frame Selector

The Frame selector allows new AVI movie files to be created containing only the selected images from the original AVI movie file. In addition, individual frames can be turned into .bmp files. There is also a special sorting feature for astronomical images that will put images into a "best" to "worst" order. This is very handy for creating a new smaller video containing the "best" frames. The new smaller video can be used as input to an astronomy post-processing program such as RegiStax to produce "stacked" images whose detail and definition greatly surpasses that of any individual original frame. See "[The Frame Selector](#)" for more details on usage. See the [Frame Selection Tutorial](#).

You MUST have an open AVI file (File/Open) in order to access the "Frame Selector" menu item.

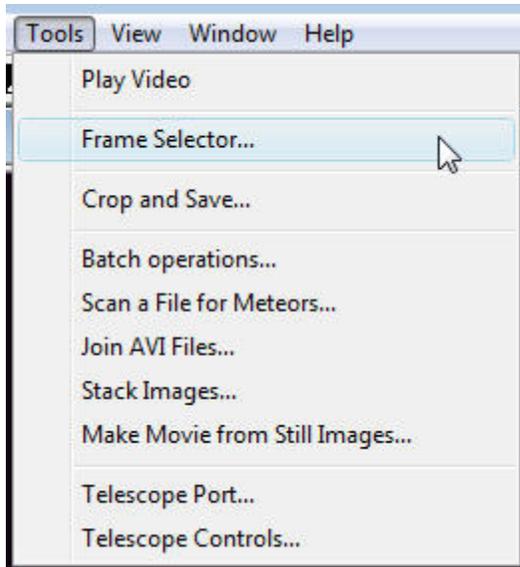


Figure 95

The Frame Selector menu item brings up the Video Frame Selector window:

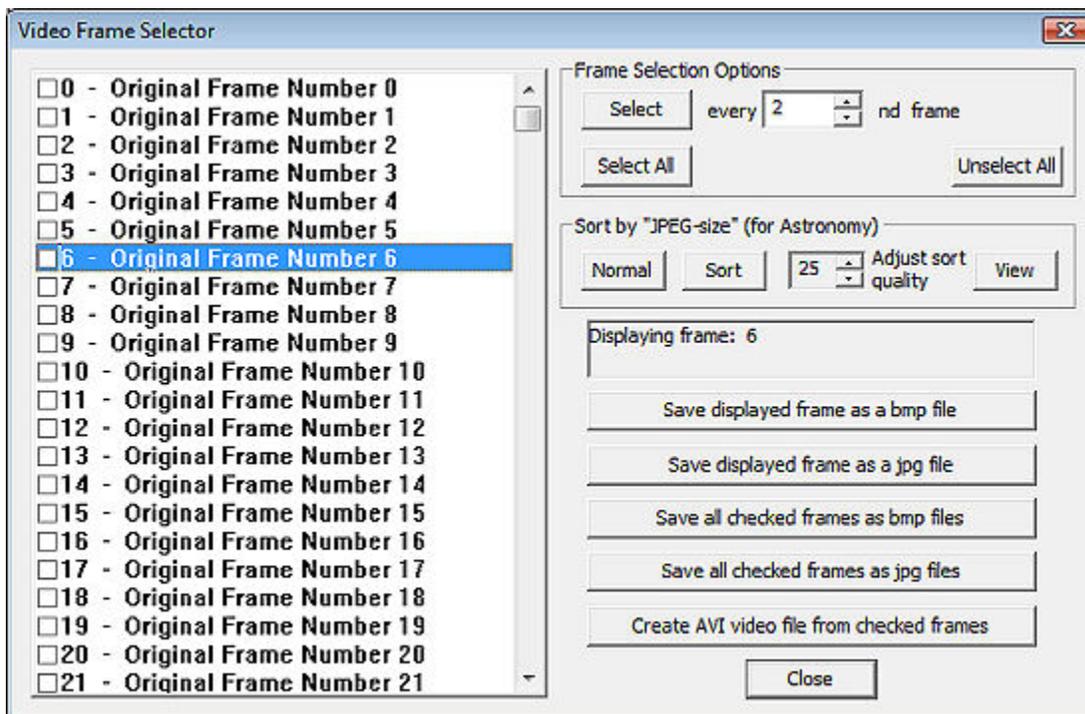


Figure 96

The top sub-window lists all frames in the AVI file. There is a check box on the left that allows you to **select** a frame or any number of frames. Standard Microsoft click and drag conventions are utilized. See [The Frame Selection Tutorial](#) for more information. The most recently selected item is displayed in the main display window. The numbers on the left are frame index numbers. The numbers on the right are the numbers of the original frames in the AVI file. (After sorting, as described below, the numbers on the right still refer to the original frame order in the AVI file but they appear in order of how good the image is from best to worst.)

The **Frame Selection Options** box provides additional control over frame selection.



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Select: Select every second, or every third, or every fourth..., frame based on the number entered either by type-in or by using the spinner control. This is useful for making a time-lapse movie from a normal movie.

Select All: Select all of the frames.

Unselect All: deselect all of the frames.

For astronomers:

Apply size: frame sorting algorithm allows you to sort in

Normal: List the frames in the order that they appear in the AVI file.

Sort: Sort the frames and list them in sorted order with the "best" frames being listed first and the worst frames listed last.

Adjust sort quality: Select the JPEG compression quality factor. Use this to minimize the effect of noise when the sorting is done.

View: View an image as it would appear if you saved it to a file then redisplayed it. It shows the effect of the quality factor.

A high quality factors does not compress an image very much and retains all of the noise effects.

A low quality factor causes the image to appear more "blocky" and eliminates the high spatial frequency components of the image, i.e., the components that are the tiniest features in the image such as noise.

To sort the images from "best" to "worst", you should set the compression quality factor so that the images displayed when the "View" button is down are just a tiny bit blockier than the noise in the image. This will minimize the effect of the noise when the images are sorted. The images will sort much better if the noise specks do not dominate the sorting method.

A quality factor of 26 usually does a good job but this will vary depending upon the noisiness of the image.

There is a "**comment window**" that tells which frame is being displayed and whether you are seeing the original frame or seeing the compressed/decompressed version that is shown when the "**View**" button is depressed.

Save displayed frame as a bmp file: A standard Microsoft file selector window will appear allowing you to choose a directory and file name for the new bmp file. You can save the currently selected (highlighted) frame (the frame currently being displayed) as a .bmp file.

Save displayed frame as a jpg file" A standard Microsoft file selector window will appear allowing you to choose a directory and file name for the new jpg file. You can save the currently selected (highlighted) frame (the frame currently being displayed) as a .jpg file.

Save all checked frames to bmp files: Save each checked frame to its own .bmp file.

Save all checked frames to jpg files: Save each checked frame to its own .jpg file.

Create AVI video file from checked frames: This will bring up a standard Microsoft file selector window which will allow you to choose a directory and file name for the new AVI file. You can create a new AVI file from the checked frames.

Close: Closes the Video Frame Selector window.

If the Video Frame Selector Window is closed then reopened, it will display frames in the order they were in when you closed the window. The Video Frame Selector Window is specific to whichever AVI file has "focus".

The Frame Selection Tutorial

If you try to find instructions for Microsoft's standard item-selection windows you will find that not much information exists in a form that is readily obtainable and/or understandable.

In HandyAvi, the check box functionality has been purposely separated from the text selection functionality.

Clicking on a check box is now different from clicking on the text to the right of the check box.

The following images are from the HandyAvi "Video Frame Selector" dialog window. The accompanying text will show you how to select multiple items in the list.

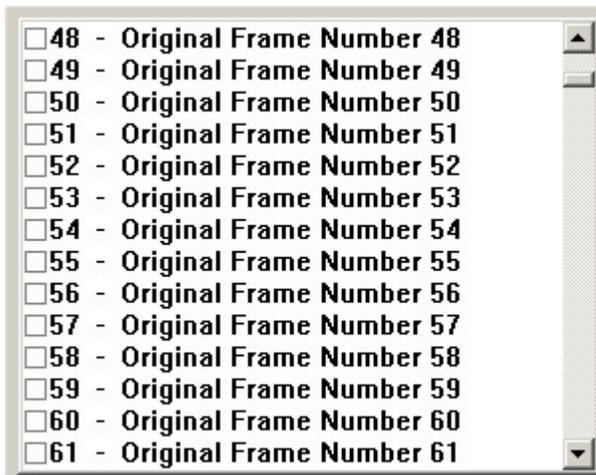


Figure 97

We have moved the vertical slider so that item 48 through 61 are visible in the list control window.



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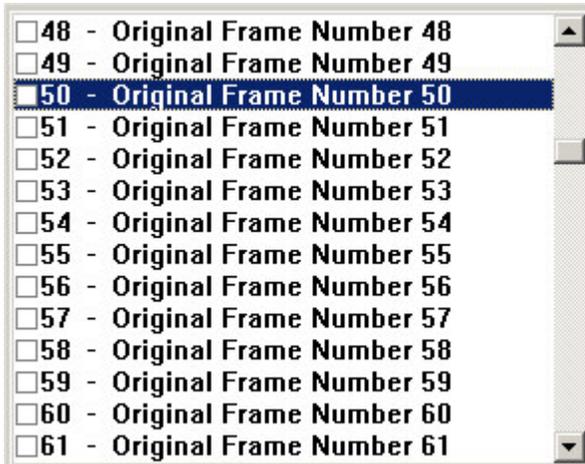


Figure 98

Now we have placed the cursor over item 50's text that is to the right of the check box and clicked the left-mouse button. This highlights (selects) item 50 but does NOT cause the item to be checked.

NOTE that clicking on the text to the right of a check box "selects" the list item and highlights it but the check box state remains unchanged.

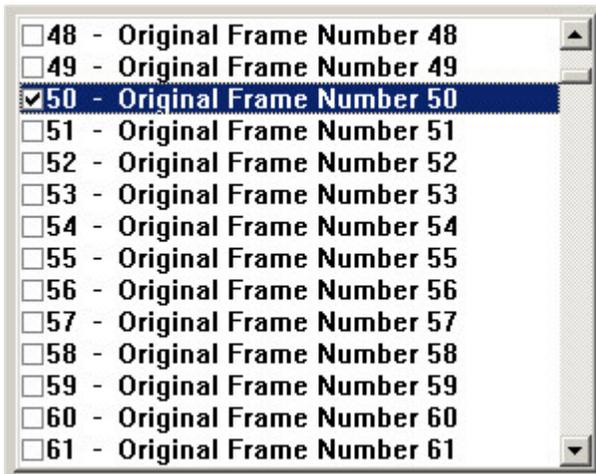


Figure 99

Now we have placed the cursor over item 50's check box and clicked the left-mouse button. This highlights (selects) item 50 AND sets the check box. If we click on some other item's check box OR text, item 50's check box will continue to be set and the other item will be selected and or checked.

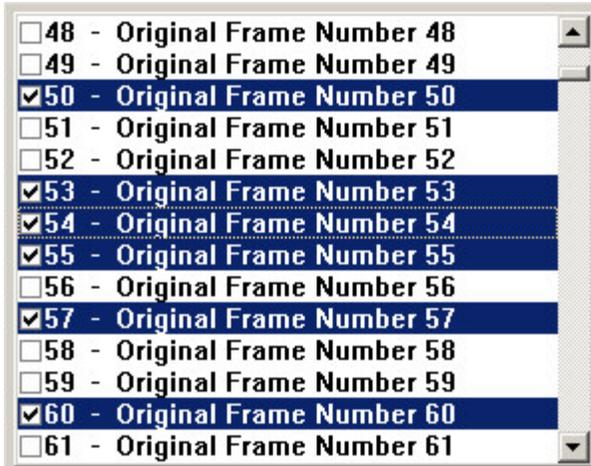


Figure 100

We can select multiple items by simply clicking the check box of each item we wish to select.

However, there is a faster way to select multiple frames.

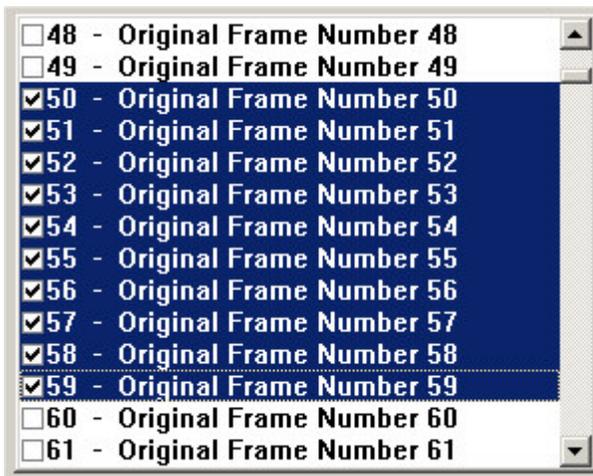


Figure 101

We can select a block of items if we click on the text instead of on the check boxes. There are several ways to do this:

1. Click on the first item. Hold the Shift key down and press the "up arrow" or the "down arrow". The items in the window will scroll and be selected as they scroll. (The first item can be thought of as an "anchor" where everything from the "anchor" to the "current item position" is selected.)
2. Click on the first item. Move the slider so the last item of a block you want to select is in the window. Then press and hold the shift key down and click on the last item of the block. This will select the entire block.
3. Click on the first item and hold the left mouse button down. While holding the button down, drag the cursor down until it is outside the window. The items will scroll and be selected as they become visible. The scrolling speed will increase or decrease depending on how far outside of the window the cursor is.

At this point, we can release the shift key if we were using it.



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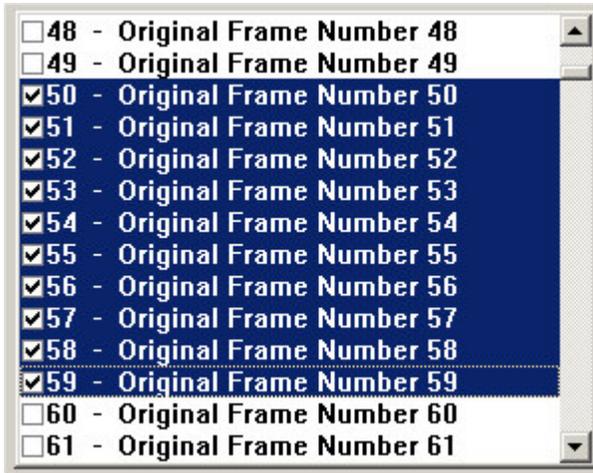


Figure 102

Now while the block is selected, if we click one of the check boxes, all of the selected items will become checked. If we again click one of the selected item's check box, all of the items will become UNchecked. This toggling of check boxes can be repeated indefinitely.

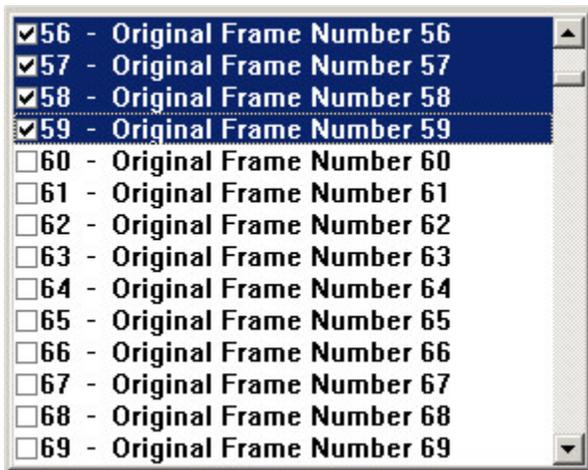


Figure 103

We previously selected the block of items 50 through 59. We have now moved the scroll bar so that more items are visible. If we hold the shift key down and place the cursor over item 67 then press the left mouse button, the additional items are added to the block. (We established an "anchor" in Figure 101 - Item 50 - and it is still the "anchor"). Now release the shift key.

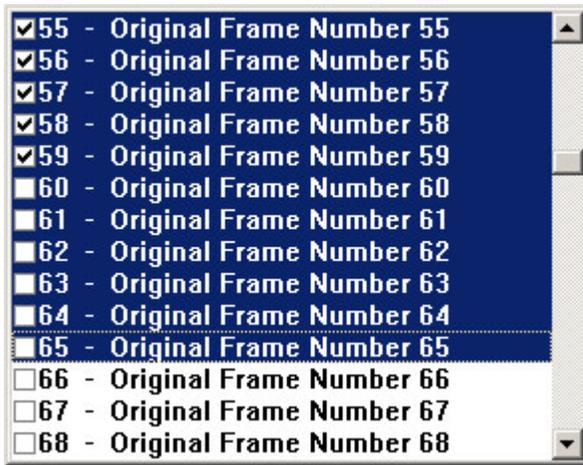


Figure 104

NOTE however that the check marks within the new part of the selected area are not checked. This is easily remedied by clicking the check box of one of the unchecked items in the selected region.

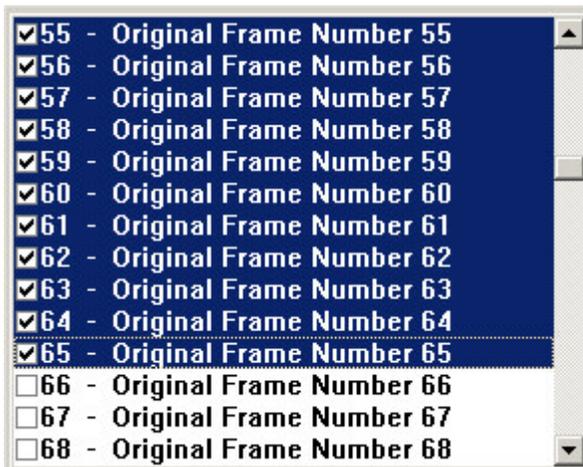


Figure 105

Note that the above procedure can be used to select ALL of the items and then either set or clear all of their check boxes.

So now you should be able to select any block of items for inclusion in a new AVI file produced by HandyAvi.

Typically, you will sort the images then select the first one or two hundred items and create a new AVI file from them.

Create Time-Lapse movies from regular movies

Batch Processing

Create Time-Lapse Movies from Regular Movies



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HandyAvi has a batch processing mode that can be found under the Tools menu where it is shown as "[Batch Operations](#)"

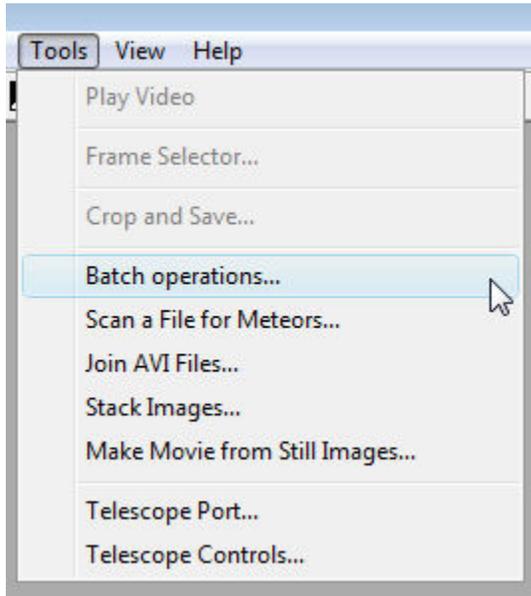


Figure 106

Batch Processing allows you to create Time-Lapse AVI movie files from regular AVI movie files. For example, if you have a regular AVI movie file that was shot at 30 frames per second, you can convert it to a Time-Lapse movie by selecting (for example) every 30th frame. The new movie would show the action at 30 times the speed of the original movie.

"Batch" means that you can list a bunch of AVI files and have them all converted without having to start them one at a time and constantly watch to see when one has completed so that you can start the next one. HandyAvi will accept a list of AVI files and automatically convert them to Time-Lapse files.

Here is the Batch Processing control panel showing a list of files selected by the user and showing the list of output files created by HandyAvi:

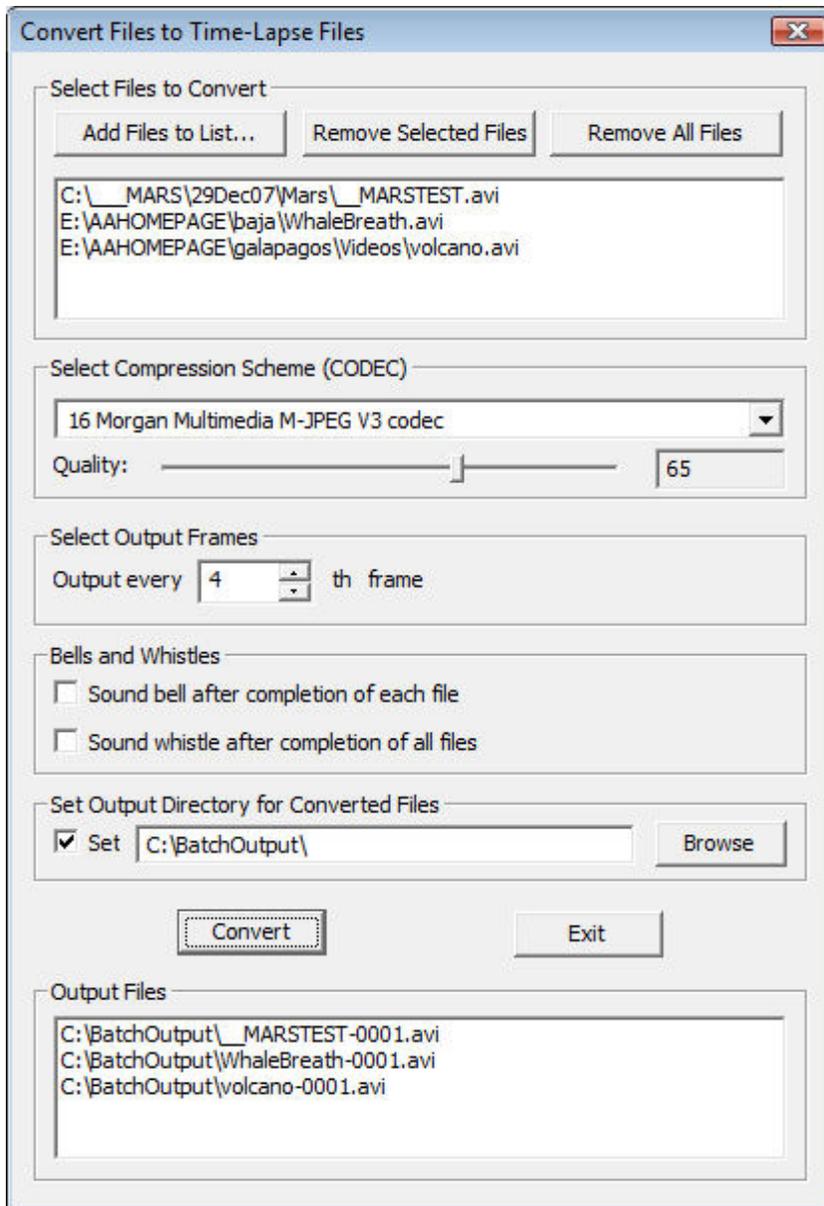


Figure 107

Select Files to Convert

Add Files to List ... This brings up a standard Microsoft file selector. You may select as many files as desired. After selecting files, you may select more files by again using "Add Files to List...". You may select files from different directories on subsequent invocations of "Add Files to List...".

Remove Selected Files: The file list is a standard Microsoft Multiple Selection Dialog window which means you can select (highlight) one or more files. The selected files will be removed from the list. The actual files themselves will not be deleted; the selected items will merely be removed from the list.



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Remove All Files: This will remove all files from the list so that you can start over again if necessary. Again, the actual files themselves will not be deleted; all items will merely be removed from the list.

Select Compression Scheme ([CODEC](#))

Codec list: There is a pull-down list of compression [CODECs](#) that exist on your machine. You can select one of them to compress the data so that the Time-Lapse movies that you are building are smaller than they would be otherwise. The list is numbered for convenience.

Please note that some CODECs are "installed" and some are "uninstalled". We have chosen to use an asterisk to designate "uninstalled" CODECs. Normally, you would see only the "installed" CODECs. Normally you would use only one of the "installed" CODECs. We have chosen to list ALL of the CODECs, both installed and uninstalled, to provide greater flexibility in the batch processing mode.

IMPORTANT! You should test any CODEC you want to use by using it to create a Time-Lapse movie from a regular movie. Then see if the new Time-Lapse movie will play properly.

There are literally hundreds of CODECS that have been written by all sorts of people. Some of the CODECs comply with standards and some don. Some work well and some don. HandyAvi does not make any alterations to your original movies so the danger is only that new movies that you produce with certain CODECs might not play - or all of the new frames might be blank, green, images (We've seen that with one of the CODECs on one of our machines!)

Quality: This allows adjustment of the compression factor. Some compression CODECs allow a "Quality" adjustment which will affect the size of the compressed file. If Quality is set high (85 to 100), the file will be larger (less compressed). If Quality is set low (0 to 20), the file will be smaller (more compressed). HOWEVER, highly compressed files often have poor image quality. [Compression](#) is typically achieved by discarding image "information" which means that the resultant image is degraded. If the chosen CODEC does not support Quality adjustments, the slider will be hidden.

Select Output Frames

Output every 12th frame: The example above shows that the user selected the number "12". This means that a new Time-Lapse movie generated by "Convert" will contain every 12th frame of the original movie. The other frames will not be present in the new movie. The action in the new movie will appear to be speeded up by a factor of 12. You may choose values other than 12 of course. If you choose 100, the action in a newly generated movie would be speeded up by a factor of 100. This is the setting that actually does the Time-Lapse operation.

Bells and Whistles

Sound bell after completion of each file: If this box is checked then a bell will sound after completion of each file conversion.

Sound whistle after completion of all files: If this box is checked then a whistle will sound after all files have been converted.

Set Output Directory for Converted Files

Set: Check this box if you want to send ALL output files to a directory (folder) that you choose. If this box is unchecked, then the each output file will be sent to the directory (folder) that the input file resides in.

Browse: The Browse button brings up a directory selector that will allow you to select the output directory. You can also create a new directory here.

Note: You can also type in a directory name. If the directory path/name that you type in does not exist, a message box will pop up warning you about this and the directory path will revert to its previous setting.

Convert: Left-click this button to begin processing. HandyAvi uses "streaming" to do the frame selection and conversion operations. This is the fastest possible way to do the conversion. HandyAvi should be as fast or faster than any other similar conversion software.

Cancel: Left-click this button to cancel the "Convert files to Time-Lapse Files" dialog window. (Exit or clicking the "X" box in the upper right-hand corner of the dialog window will exit the "Convert files to Time-Lapse Files" dialog window AND save your current settings such as the compression scheme you chose. Cancel will not save your current settings.) NOTE that if a "Convert" operation is in progress, "Cancel" will not cause conversion to stop. Use the Esc (Escape) key to terminate processing if you change your mind about completing the batch job.

Exit: Exits the "Convert files to Time-Lapse Files" dialog window AND saves your current settings.

Output Files: This window shows the path and name of each new file as it is being created. When a file is converted, the new file is created in the same directory as the original file unless you used the "Set output directory for converted files" option by checking the "Set" check box. The new file has the same name as the original file EXCEPT that a unique suffix is added to the file name. For example, if "C:\directory1\myFile.avi" were the original file, the new file would be named "C:\directory1\myFile.avi-0001.avi". If "C:\directory1\myFile.avi-0001.avi" already existed, then the new file would be named "C:\directory1\myFile.avi-0002.avi". The suffix will count up until there is no pre-existing file of the same name. This way, no files are ever overwritten and the conversion process can run unattended.

Esc (Escape) key: If you have started a long conversion process and then decide you wish to quit the conversion operations, press the Esc key. This will bring up a dialog requester window asking you "Would you like to terminate batch processing?" "Yes" will terminate. "No" will continue processing.

Scan an AVI File for Meteors

Scan an AVI File for Meteors

Overview

This HandyAvi feature allows you to scan an existing AVI file for meteors.



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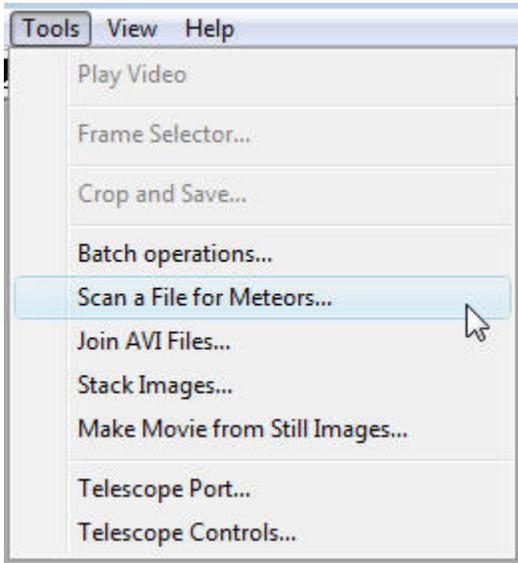


Figure 108

Instead of getting the input from a webcam, this method gets its input from an AVI file. When the AVI File has been entered and the file has been opened successfully, the frames are automatically displayed in the "Live Video Preview" window just as if they had been coming from a live webcam. All frames are sent. After the last frame is sent, the program starts over with the first frame and again sends all frames. During this time the system is in the "Monitoring sensitivity adjustments" mode. This mode is actually running the meteor detection routines. The "Monitoring sensitivity adjustments" mode allows you to set the "Sensitivity" slider as well as "Advanced" settings to set up motion sensitive areas. (See the [Scan AVI File Movie Setup Section](#) below.) The system continues to loop through all frames until the "START" button is pressed.

When START is pressed the system immediately sends the first through the last frame while scanning for meteors. The output file will contain all meteor sequences detected. After the last frame has been scanned, a message box will come up saying "AVI Output File Finished..." The system performs a "STOP" and is then again in the "Monitoring sensitivity adjustments" mode where all frames are repeatedly sent to the "Live Video Preview" window.

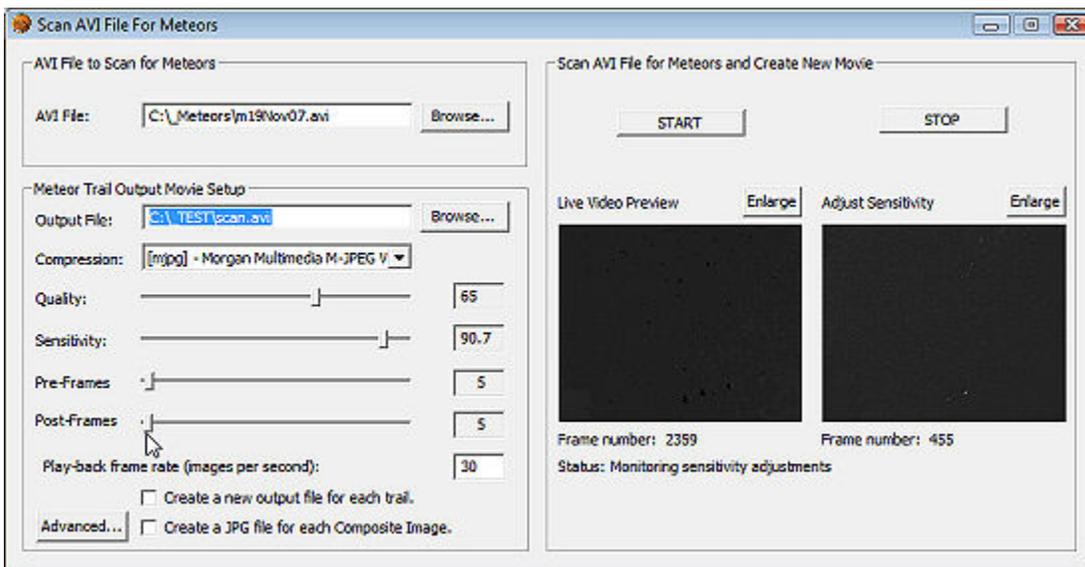


Figure 109

Select an Input File

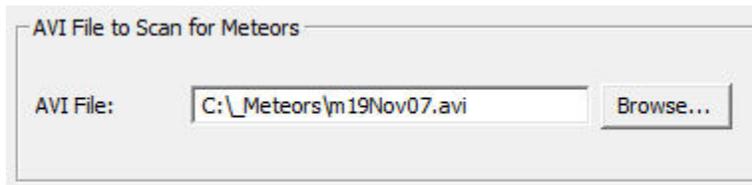


Figure 110

Enter the path name for a file you wish to scan for Meteors.

Note: This will also scan files containing lightning strokes. To trigger a scan, a frame has to contain an image that has some pixels brighter than those in the previous frame. Lightning, as well as meteors, has this property.

Scan AVI File Movie Setup Section

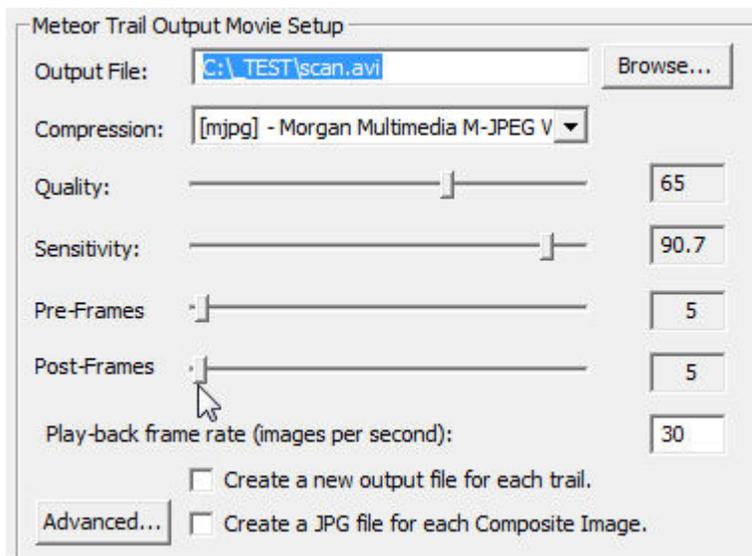


Figure 111

This section of the Scan AVI file for Meteors video capture window allows you to set up the webcam for making a Scan AVI file for Meteors video.

Output File: The "Output File" field allows you to type in the path name of the new video file you want to create.

Browse...: Brings up a standard file selector window so that you can more easily place the file in a particular folder.

Compression: The **Compression** field allows you to select any AVI file compression scheme resident on your computer. File compression schemes or "CODECs" (for coder/decoder) show up on your machine from many sources. Microsoft installs several. Your video camera may install



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one or more. You may download and install compression schemes from the internet. At the time of this writing, there are over 280 CODECs listed at <http://www.fourcc.org>. Note that one of the selection items is called "Uncompressed." If you select "Uncompressed", the image data in your files will not be compressed. Your files will be LARGE. However, each image in an "Uncompressed" file will be exactly what the camera captured. This is important for some applications. [Learn more about video CODECs here.](#)

HandyAvi displays the FOURCC value for the compressor in brackets at the beginning of the "Compression: line.

Note that HandyAvi will also allow you to read a foreign AVI file and will select the proper decompression scheme automatically IF the required decompression scheme has been installed on your computer.

HandyAvi will also allow you to read a file that used one compression scheme and write a new AVI file using a new compression scheme. So you can convert AVI files from one compression scheme to another if the required CODECs have been installed on your machine.

Quality: The "Quality" slider lets you adjust the "quality" of the compression scheme. Most compression schemes create smaller files because they are actually discarding tiny image details. By discarding more and larger image details, you can produce a smaller AVI file. If the "Quality" is set to 100, then little or no image data is discarded and the resultant AVI file will be large. If the Quality is set to 0 then, theoretically, all image data is discarded and the resultant AVI file will contain blank images! Of course each codec is created by software people who may have thought about this and limited it so they do not throw away all of the image data even if the "Quality" is zero. Note that each codec is different and some may even ignore the "Quality" setting. Also note that "lossy" compression schemes are used in many applications. JPEG is an example of a "lossy" compression scheme that is used in MANY applications and the fact that some of the image data has been discarded is practically unnoticeable. So compression with slightly reduced quality is a very good thing in most cases. [Learn more about video compression and CODECs here.](#)

Sensitivity: The "Sensitivity" slider lets you set up the Meteor Trail Detection sensitivity. When you have not yet pressed "start" to take a movie, the right-hand image (Adjust sensitivity) of the "Create Movie" section registers a frame and increases the counter by one for each frame that "triggered" the motion detection algorithm.

If the sensitivity is set high, to 100 for example, then simple camera noise will trigger the motion detection algorithm and the counter will count up rapidly indicating that nearly all frames seen by the camera are seen as motion frames. If you press Start with this setting, every frame would be a "trigger" frame and cause nearly everything to be sent to the output AVI video file. You typically do not want to do this.

Before pressing start, you should play with the sensitivity setting and set it just below the point where the counter stops counting. Basically you are setting the camera noise threshold. After this is set properly, then the only things that should trigger the motion detection would be true motion events such as meteors, airplanes, lightning flashes, etc.

Setting a sensitivity value essentially sets a noise threshold above which, trigger events are recognized.

HandyAvi employs a sophisticated implicit dark-frame algorithm to suppress camera noise and cosmic ray noise. This method operates on-the-fly, without interfering with normal frame-capture, i.e., no "dead time" is involved.

The algorithm allows stars to move slowly across the frame (if the camera is unguided) without triggering an event. It also suppresses triggering on star scintillation (twinkling) caused by the Earth's atmosphere or on cosmic ray events or on camera noise.

The sensitivity can be set during capture as well as before or after. This allows you to adjust the sensitivity and test it while a video is being made. You will be able to see which frames are captured by looking at the "Last Motion Detect" frame window in the [Scan AVI File for Meteors and Create New Movie](#) .

Changing the sensitivity while meteor trail capture is underway is not recommended because each trigger event will cause the writing of a whole sequence of frames. The next trigger frame will not be seen until the write is complete making it difficult to determine the true sensitivity. That is why we allow the sensitivity to be set BEFORE starting the Create Movie function.

Pre-Frames: The "**Pre-Frames**" slider allows you to specify how many image frames preceding the trigger frame will be written to your AVI output file. Allowable values are 0 to 250. When a meteor or other motion is detected, the system will write out as many frames, preceding the trigger frame, as specified. Then the trigger frame will be written out and additional frames will be written out if motion continues to be detected. After no motion has been detected, "post-frames" are written out.

Note: If you click on a slider you can then use the left and right arrow keys on the keyboard to make fine adjustments.

Post-Frames: The "**Post-Frames**" slider allows you to specify how many image frames following the last detected motion will be written to your AVI output file. Allowable values are from 1 to 250.

We recommend that you set this to 5 or more since this value also establishes a time-window for further motion detection.

For example, let's say that 6 "Pre-frames" and 5 "Post-frames" are specified. When a meteor or other motion is detected (the "trigger" event), the system will write out the 6 frames that immediately preceded the motion event frame. Then the trigger frame will be written out. Then motion detection will continue as the 5 "Post-frames" are written out. If motion is detected during the writing of the "Post-frames", image capture to the AVI file will continue and 5 new frames will be scheduled. Motion detection and frame writing will continue in this manner as long as motion persists. Eventually, no more motion will be detected and HandyAvi will then stop recording frames and wait for a new motion event.

Note: If you click on a slider you can then use the left and right arrow keys on the keyboard to make fine adjustments.

Advanced: This button will bring up the Advanced Meteor Detect Settings window.



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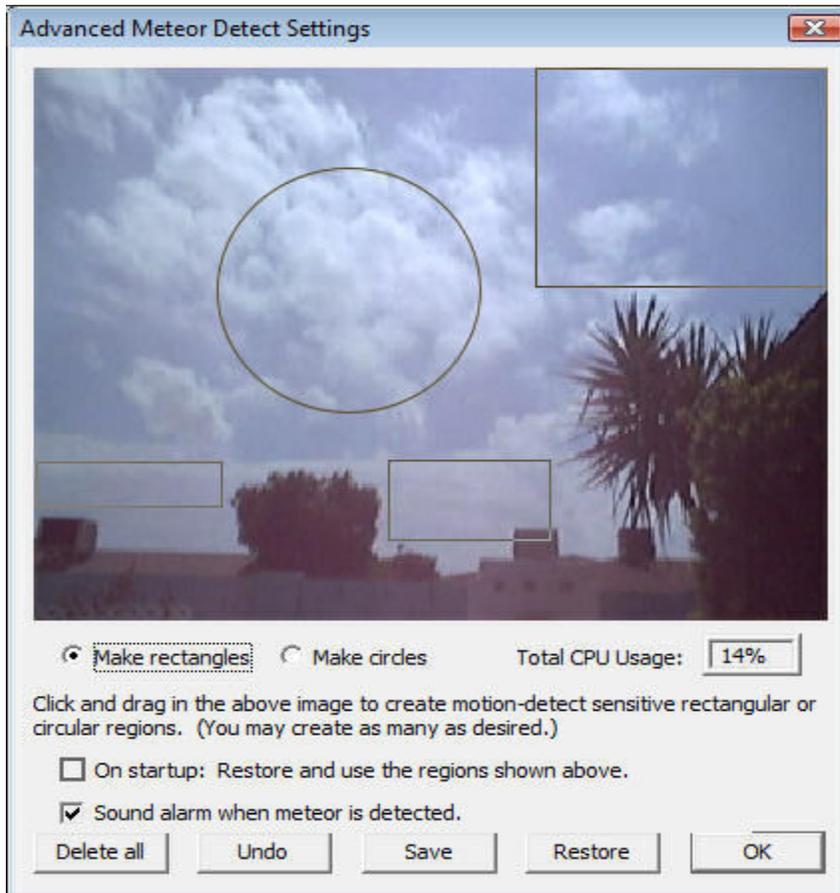


Figure 112

By left-mouse-clicking and dragging, motion-detect sensitive areas can be placed on the window. In the case shown, we were considering a setup for lightning capture. (The circle is probably not what we want in this case but serves to illustrate the use of circular regions.) When the wind blows, the palm fronds blow and could trigger the motion detection algorithm. By setting up rectangular and circular motion sensitive areas that do NOT include the palm fronds or trees but include much of the sky, we avoid the problem. The only areas that will trigger motion detection are the areas within the rectangles and circles.

Note that overlaps are not a problem. (The overlapped regions get examined more than once for motion however which can degrade performance slightly. (If you created 100 large overlapped regions, you might cause enough performance degradation to be significant. There is no need to do that, so don't do that! ☺)

Also note that placing circles and/or rectangles can be done ahead of time or on the fly AFTER recording has been started. The effect of each rectangle is IMMEDIATE.

A "Total CPU Usage" box has been added so that you can see immediately the effect your choices are having on performance. If you place one tiny rectangle on the screen, you will see the CPU usage go down. No rectangles or circles mean that the entire image is being examined for motion. The performance registered is a reasonably accurate of the load being placed on the system by the motion detection routines and will be about the same whether you have STARTed video capture or are still setting up for video capture. If the CPU usage reaches 100, frames might be skipped occasionally.

Note that circles require more CPU time than rectangles. Circles were added to support meteor detection users who have full-sky panoramic cameras and who want to avoid automobile lights and other disturbances occurring at the horizon(s).

Create a new output file for each trail: This was requested by a user who was trying to separate each meteor track from other meteor tracks so that he could determine the time of the track among other things. (Note that there is a [log file](#) for every AVI file created that contains frame times.)

If you check the box, then each recorded trail will automatically be put into a new AVI file. (Up to 9999 files.)

The new file names are generated automatically. Checks are made to ensure that the new file name does not match an existing file name. In case of a match, the file name suffix counts up until it finds a name that is not being used. New file names are the same as the original file name except that they contain a suffix such as "-0001". For example, if the original file is named "myAviFile.avi" then when its track has completed, it will be closed and a new file with the name "myAviFile-0001.avi" will be generated. If that name is not already the name of an existing file in the current folder then it will be used as the name of a new recording file. Recording will continue with no intervention required on the part of you, the user.

Notes:

Frames taken by the camera will appear in the current "Live Video Preview" frame visible in the [Scan AVI File for Meteors and Create New Movie](#) area.

Frames being written out in response to a trigger event and being sent to your video output file will appear briefly/rapidly in the "Last Motion Detect" frame area visible in the [Scan AVI File for Meteors and Create New Movie](#) area.

After completion of a trail, a "composite" image will appear in the "Last Motion Detect" frame area. If you were capturing a meteor for example, the entire meteor track would be shown in this one frame.

Scan AVI File for Meteors and Create New Movie



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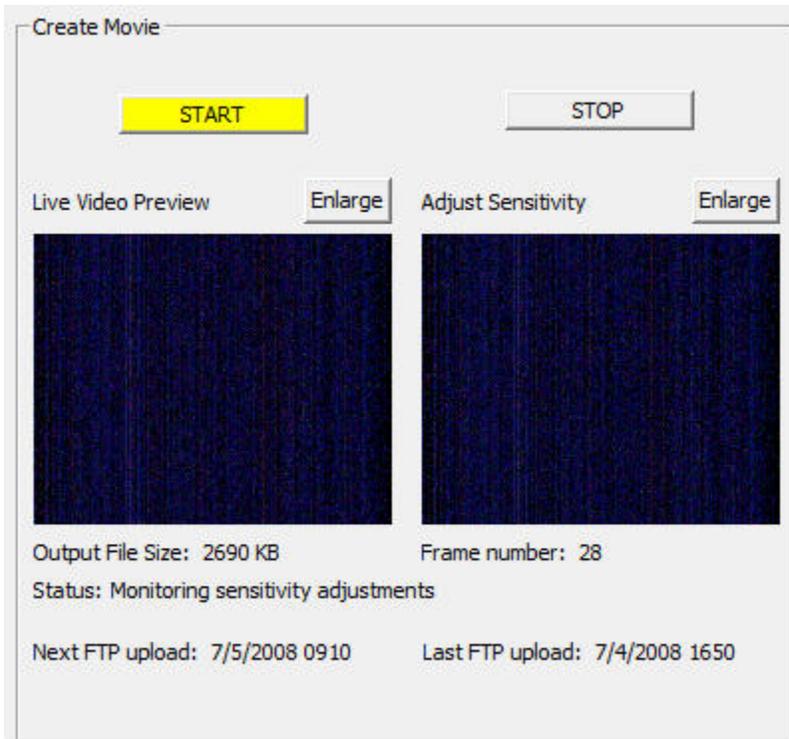


Figure 113

Start: The "**Start**" button starts the meteor trail movie making process.

NOTE: Output files will automatically be limited to less than 2 Gigabytes, the AVI file size limit. A new file with a unique new name will be generated and used automatically whenever the limit is about to be exceeded. See [Preferences](#) for more information about [Maximum AVI File Size](#).

Stop: The "**Stop**" button stops the meteor trail movie making process.

Enlarge: If you use one of the "**Enlarge**" buttons, a new window will be created containing the video image. This new window can be resized to any size. This new window also contains a "Size" option that will allow you to select "True Image Size" which will resize the window to show the actual size of the captured video images.

If the video is being directed to an enlarged window, no video will be sent to the corresponding window in Figure 113 so it will be blank while the enlarged window is open.

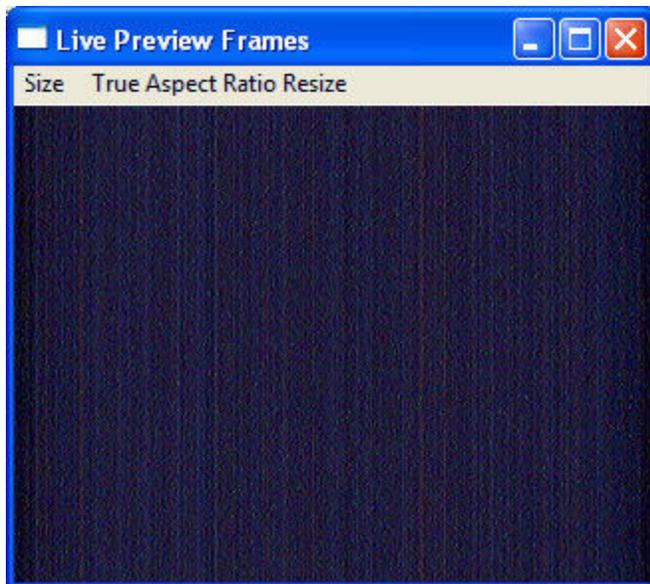


Figure 114

The above image shows an enlarged "Live Preview Frames" window that has been sized with the "Size" option to the "True Image Size" of 320x240 which was the size of the images within the chosen AVI file.

About Video Codecs

Note: You do not have to learn about codecs to use HandyAvi.

However, the purpose of a CODEC is to compress your video data so that your AVI files are smaller. So if space on your hard drive is a consideration, you will probably want to use a CODEC.

AVI files can be created either by using no compression (uncompressed) or by using one of literally hundreds of compression schemes (codecs is short for Coder/decoder) that have been created by various companies. Uncompressed files are generally MUCH larger than compressed files.

In order for HandyAvi to use a particular compression schemes, it must have been installed on your computer.

Many AVI codecs probably already have been installed on your machine. Some come from Microsoft as part of your operating system. Some come from the manufacturers of webcams that you might have installed. You can even download and install codecs from the Internet. Some are free and others are not. <http://www.fourcc.org> is a site that lists and describes almost all known codecs. If you surf to that site, you will want to click on "codec list" to see all of the codecs.

Codecs have four character names known as "Four-Character Codes" or "FOURCC" names. This is how they are identified internally so that software applications such as HandyAvi can know which codec was used to produce a particular file.

FOURCC codes are also used internally when a HandyAvi user selects a compression scheme such as "Indeo® video 5.10". "Indeo® video 5.10" has a FOURCC name of "IV50". If you have an AVI file that was encoded using IV50, you can see the IV50 codec name by opening the file in HandyAvi and using the "View/AVI File Info" menu item.



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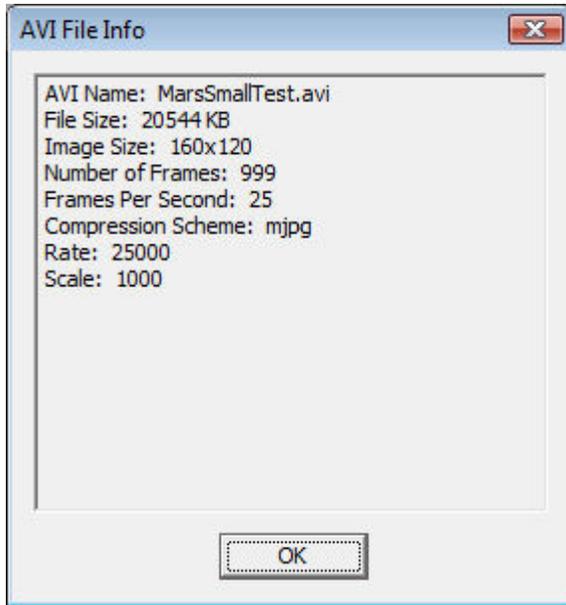


Figure 19

Figure 19 shows that the compression scheme used to compress the file "MarsSmallTest.avi" was mjpg which is the FOURCC code for the "Morgan Multimedia MJPG" codec.

HandyAvi will also attempt to open files compressed with codecs that are NOT installed on your machine. If the required codec is not installed, HandyAvi will, of course, be unable to PLAY the file but it will try to produce an AVI File Info report as shown in Figure 19 so that you will be able to identify the missing codec. If you know which codec was used, you might be able to locate an installable version of the codec via the Internet and install it. Then you would be able to play the file using HandyAvi. If you can play the file using HandyAvi then you can also use [HandyAvi's editing features](#) to create a new file using the same or a different codec and include or exclude selected frames from the new AVI file.

Many CODECs allow you to have control over the "Quality" factor or "Compression" factor that will let you make your files smaller.

[Learn more about Compression Quality.](#)

[Learn more about Configure windows.](#)

About Compression Quality

There are many video compression schemes. The purpose of a video compression scheme is to make a smaller file without sacrificing too much detail in the images.

An uncompressed AVI file is comprised of a series of bmp image files. There are actually many different bmp file formats. Each of the formats is designed to reconstruct an image pixel by pixel. Typically, AVI files are made up of bmp files which have 3 Bytes for each pixel. The three bytes contain the Red, Green, and Blue values for a pixel. Thus, a 640x480 uncompressed image requires approximately 3 x 640 x 480 bytes ("approximately" because there may be some "pad" bytes at the end of each line. There is also a small amount of header data describing the size, color content, length and width of the images, etc.) 3 x 640 x 480 Bytes is 921600 bytes or almost 1 Megabyte! If your AVI video camera is running at 30 frames (images) per second, then you will be storing 30 x 921600 Bytes per second or 27.6 Megabytes per second. 10 minutes of video would require 16,588,800,000 bytes or 16.5 Gigabytes! That is why video compression is usually a good idea! You would like to make the file smaller without messing up the images too much.

Lossless Compression

Lossless compression refers to a compression scheme that compresses the data without losing any of the "information" in the picture. If you compress an image using a lossless compression scheme, the restored image when decompressed is IDENTICAL to the original image. An example of lossless compression is "Run-Length Encoding" used in FAX machines. Run-length encoding for a black and white image consists of looking at each row of pixels in the original image and creating a file that tells how many white pixels are followed by how many black pixels, are followed by how many white pixels, etc., across the row. If you are sending a printed text document, there are usually a LOT of white pixels then a few black pixels, then a LOT of white pixels, etc., in a row. You can actually get very good compression for most faxed documents using this strategy AND it is lossless, i.e., the document that shows up at the other end is essentially identical to the original document.

Unfortunately, lossless compression cannot be done for most images. That is why lossy compression is used.

Lossy compression

Lossy compression refers to a compression scheme that compresses the data but loses some of the data. If you compress an image using a lossy compression scheme, the restored image when decompressed is NOT identical to the original image. However, if the scheme is a good one, the images will look almost identical. There are MANY lossy compression schemes some of which are very well known such as JPEG. We can use JPEG to illustrate Lossy compression.



Figure 20 - JPEG Quality Factor 99 (Very high quality) 358 Kilobytes



Figure 21 - JPEG Quality Factor 75 (high quality) 70.4 Kilobytes



Figure 22 - JPEG - Quality Factor 50 (reduced quality) 23.4 Kilobytes





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Figure 23 - JPEG - Quality Factor 10 (noticeably reduced quality) 9.9 Kilobytes

Each of the above images, when stored as a bmp file, requires 672.8 Kilobytes of storage space.

Note that bmp is lossless because it does not use compression, i.e., the image is stored with no loss of resolution or information but the file is BIG.

However when the lossy JPEG algorithms are applied and the file is stored as a JPEG file instead of a bmp file, you can see that as the quality factor decreases, the quality goes down and the storage space required goes down. (Note that some compression CODECs refer to "compression factor" instead "quality factor". A quality factor of 75 generally would mean a compression factor of 25, i.e., quality factor is 100 minus the compression factor.)

Typically, JPEG is run with a quality factor of 75. In Figure 21 above, we see that storing an image as a JPEG image with a quality factor of 75 instead of as a bmp file reduces the size of the file from 672.8 Kilobytes to 70.4 Kilobytes.

We see that it is very difficult if not impossible to see any difference between Figure 21 and Figure 22 so compression did not seem to degrade the image very much and it did reduce the file size from 672.8 Kilobytes to 70.4 Kilobytes.

We see in Figure 22 that the image has degraded slightly due to the lower quality factor of 50.

The degradation is barely noticeable if you look carefully at the side of the horse's face where the white and brown hair join you can see that the boundary is no longer smooth.

We see in Figure 23 that the image has degraded very noticeably due to the very low quality factor. The file is very small however, 9.9 Kilobytes instead of the original 672.8 Kilobytes.

The above merely illustrates the concept of lossy compression. Again, there are MANY compression schemes that have been invented. They all behave a little differently. They are all designed to reduce the size of the image file without noticeably degrading the image when it is displayed.

Why do you care? You care because the AVI files that you will be generating consist of a collection of images stored in a file. Movies are made up of many images that are displayed rapidly in succession. If you do not use compression, your AVI files will be HUGE.

See also: [Video CODECs](#), [Configure Window Examples](#).

Configure Window Examples

The following images show configuration windows associated with various [CODECs](#) that might be available on your machine.

These are accessible through the "Configure..." button that appears on the movie setup windows IF the selected "Compression" scheme has a configuration window associated with it. This shows the Movie Setup window for Time-Lapse captures so you can see where the "Configure..." button and Quality slider are.

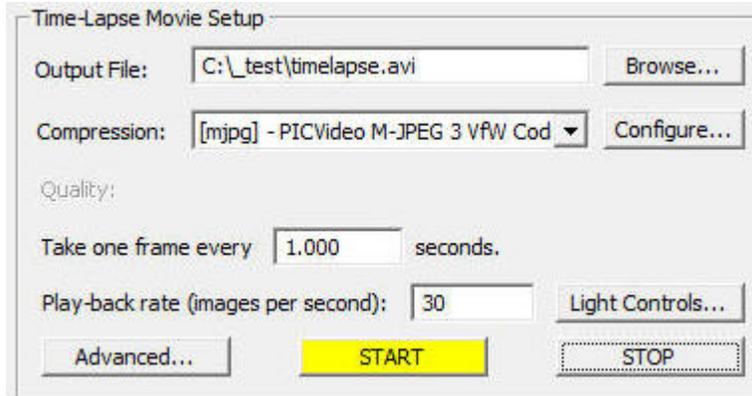


Figure 24

Below, we describe briefly the control each configuration window allows over [compression Quality](#).

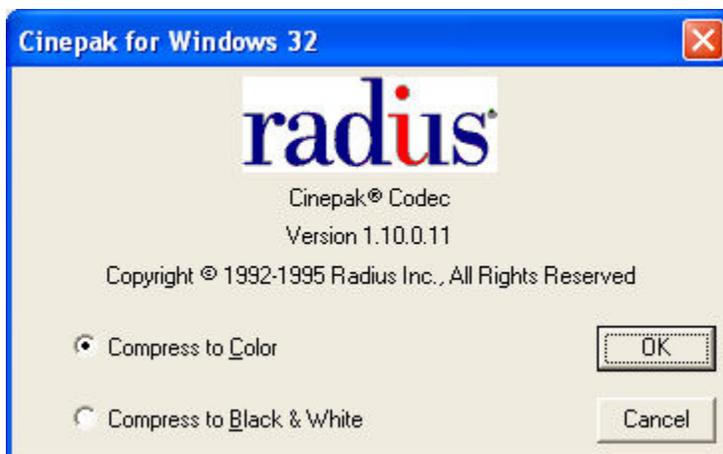


Figure 25 - Cinepak CVID CODEC

CVID has no adjustable quality option.
HandyAvi's Quality slider has no effect.



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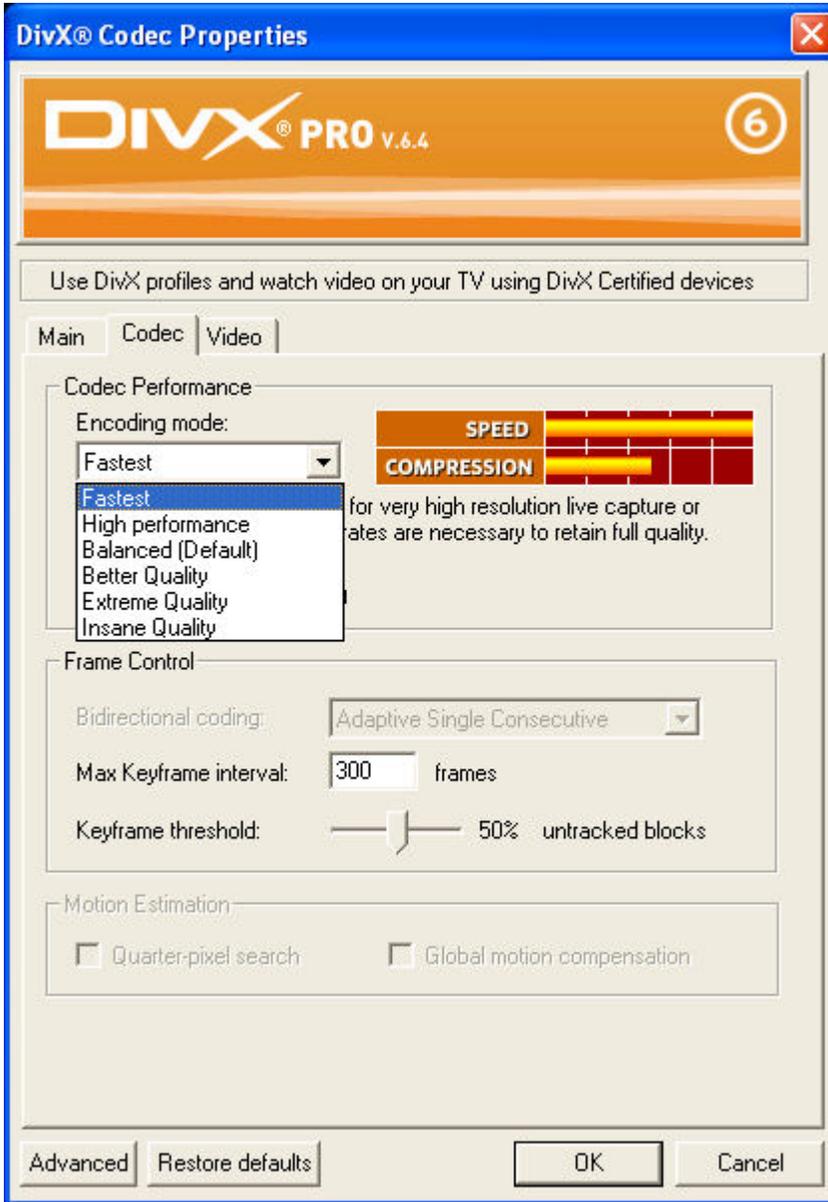


Figure 26 - DivX CODEC

DivX allows you to select various "Encoding Modes" which essentially cause the quality to be higher or lower.
HandyAvi's Quality slider has no effect.

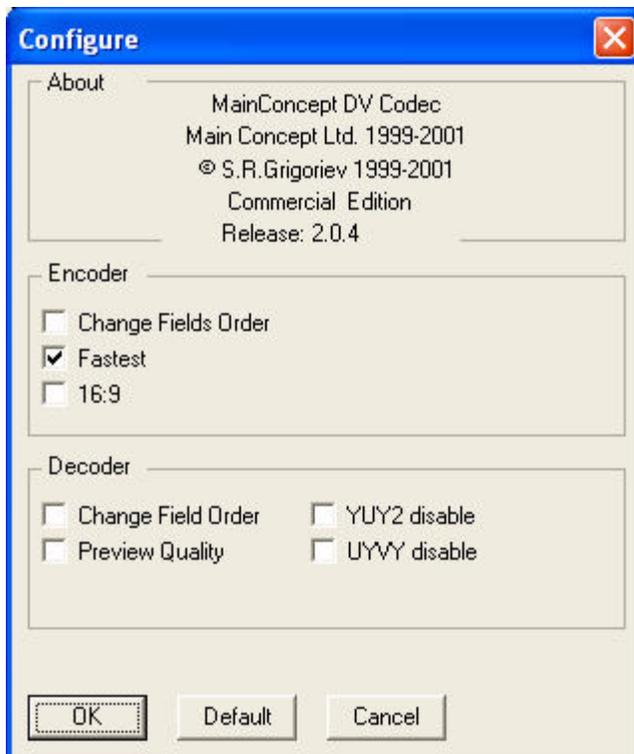


Figure 27 - DVSD Codec

DVSD allow you just two Quality options, Either "Fastest" or not. HandyAvi's Quality slider has no effect.

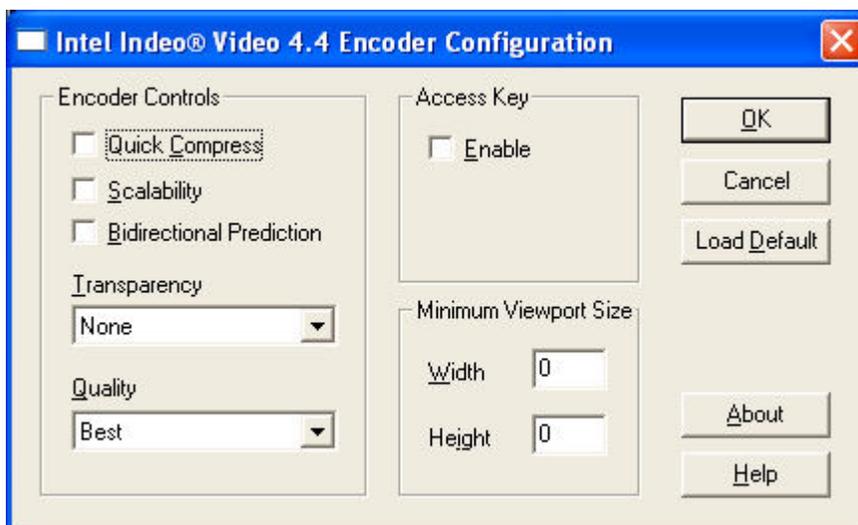


Figure 28 - IV41 CODEC

IV41 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.



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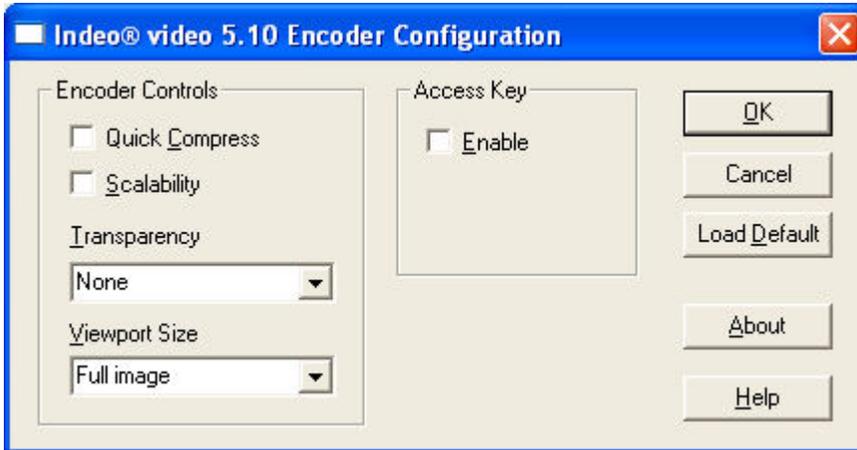


Figure 29 - IV50 CODEC

IV50 allows just two Quality settings, "Quick Compress" or not. HandyAvi's Quality slider DOES control quality for this CODEC.

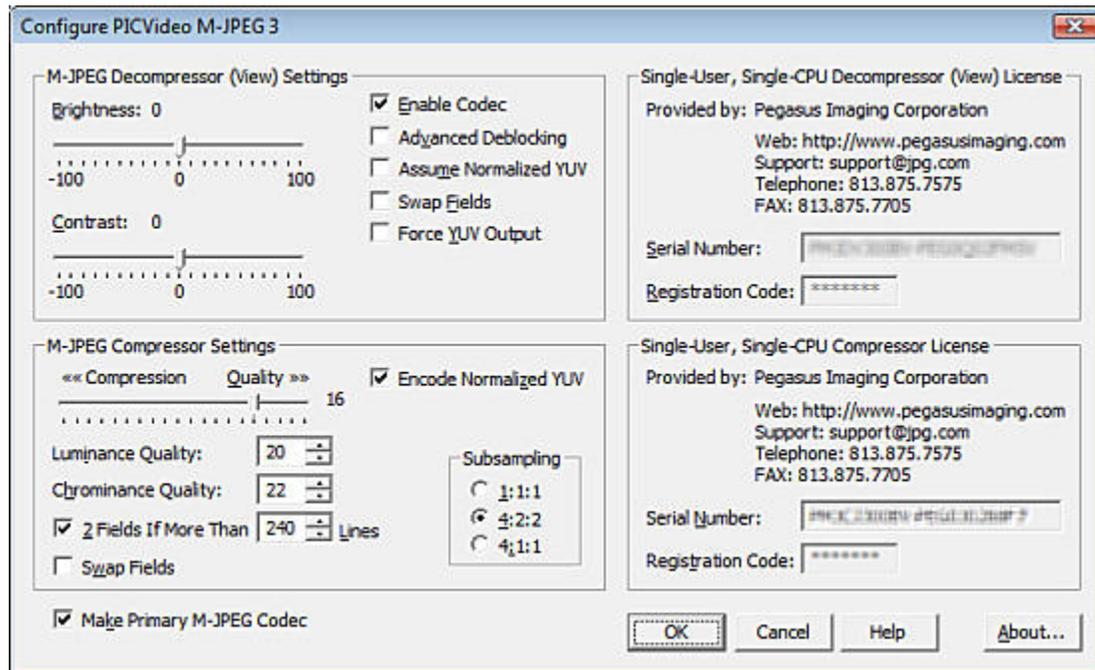


Figure 30 - PICVideo MJPG CODEC

There are at least two MJPG CODEC vendors out there. As far as we know, you have to buy an MJPG CODEC if you want to use one.

The PICVideo MJPG CODEC has a Compression-Quality slider that you can adjust to set your desired trade-off between image size and image quality.

HandyAvi's Quality slider does not appear when the PICVideo MJPG compression scheme is selected so the above panel is the only way to adjust Quality/Compression.

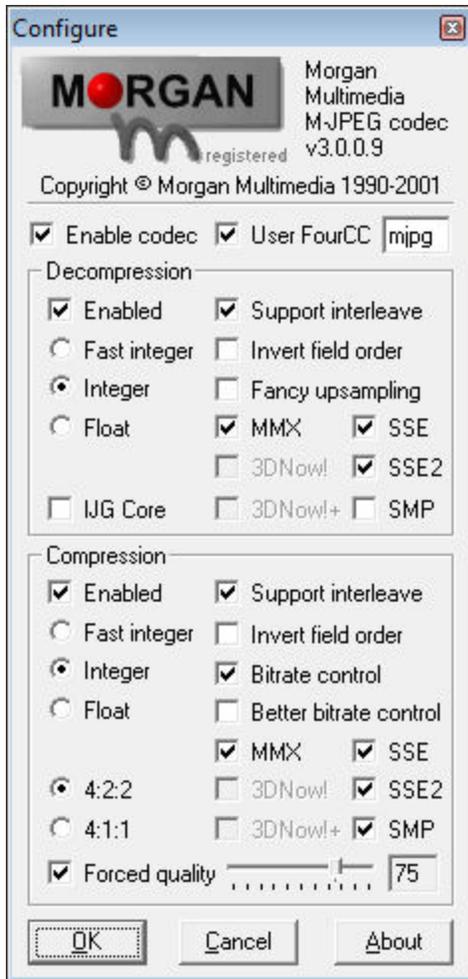


Figure 31 - Morgan Multimedia M-JPEG Codec

Morgan M-JPEG allows quality to be set if the "Forced quality" check box is checked. The value in the display box (here seen as 75) ALWAYS overrides the value set by the HandyAvi Quality sliders!

HandyAvi's Quality slider appears but has no effect.

(We ran into a problem with the above version of the Morgan CODEC in Vista when we used image sizes other than 160x120, 320x240 or 640x480. Caused a HandyAvi crash that we could not find a work-around for... We sent Email to the vendor describing the problem. Received no answer after several days. ***This CODEC seems to work just fine in Windows XP though...***

In the past, we have always used the Morgan Multimedia M-JPEG Codec but we have now installed the PICVideo M-JPEG CODEC and are using it instead on Vista.)



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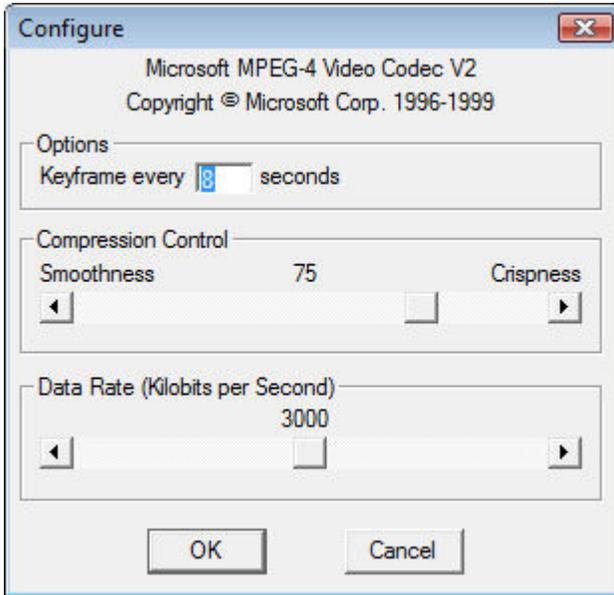


Figure 32 - mp42 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

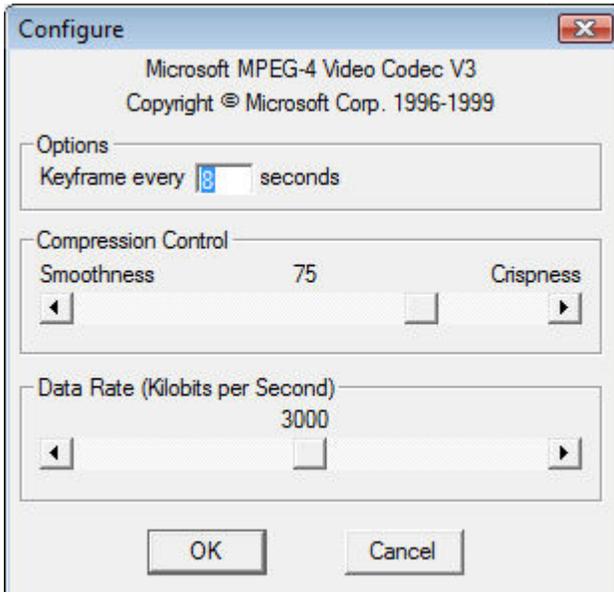


Figure 33 - MP43 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

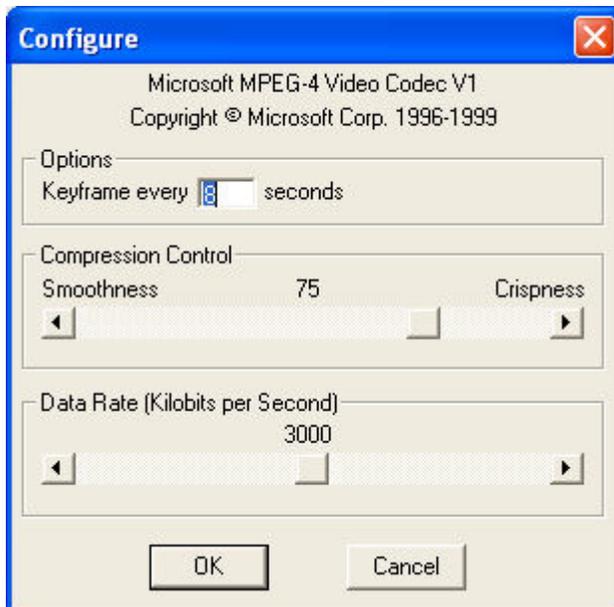


Figure 34 - MP41 CODEC

We were unable to determine any effect when the "Smoothness" slider was changed. HandyAvi's Quality slider is not visible.

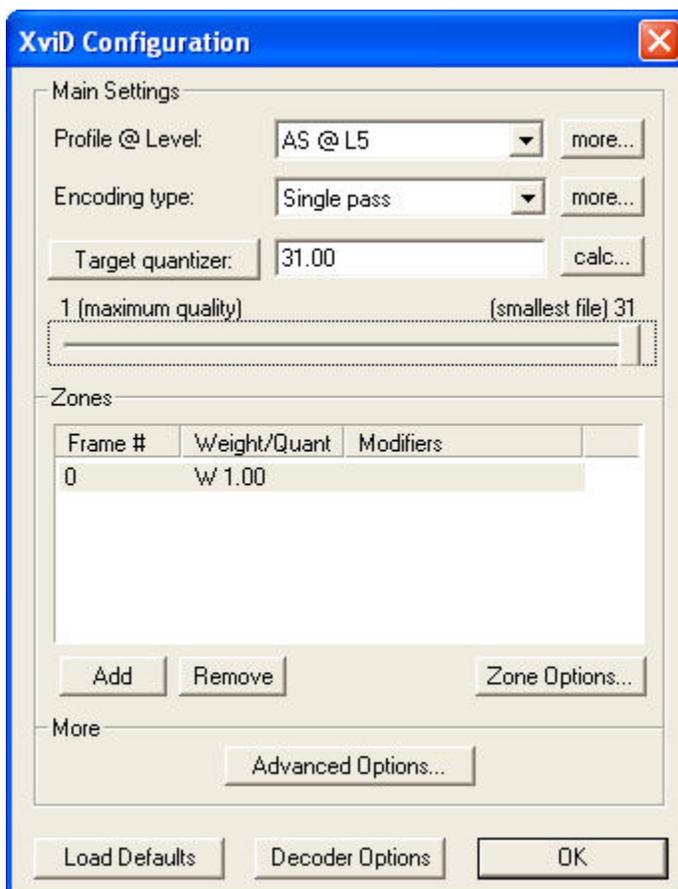


Figure 35 - XviD CODEC



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HandyAvi's Quality slider DOES control quality for this CODEC.

Join AVI Files

Join AVI Files

This tool creates one AVI file from two or more AVI files by splicing them together.

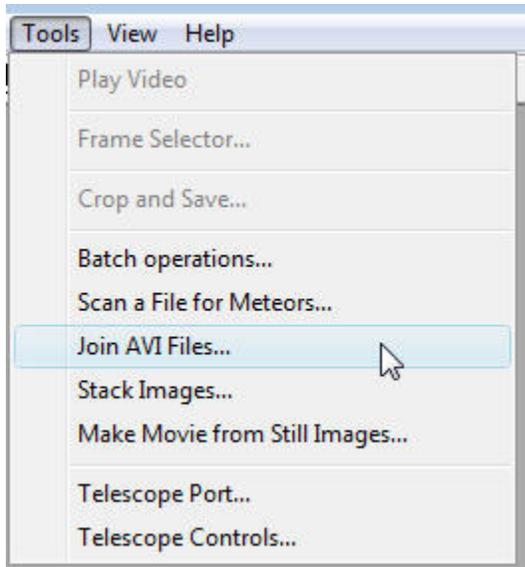


Figure 115

NOTE: The size of images in the files following the first file will be resized automatically to match the size of images in the first file. This means that videos with different image sizes can be joined.

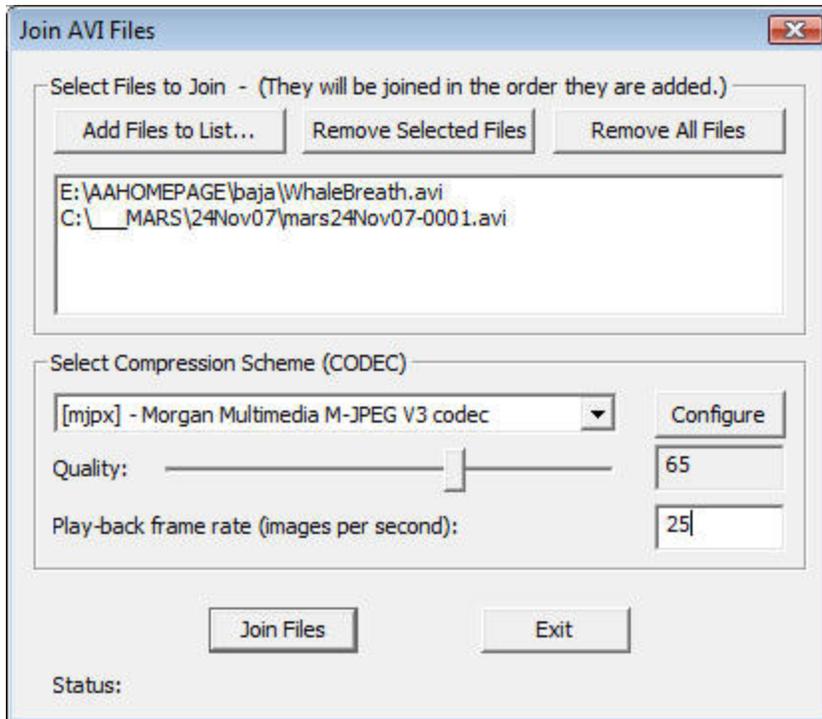


Figure 116

Above is the window that controls the AVI file joining process.

Select Files to Join

Add Files to List: This button brings up a file selector allowing you to select AVI files to include in the list. This may be used multiple times to list as many files as desired.

Remove Selected Files: This button will remove files that are highlighted. Files may be highlighted by clicking on them. Normal Microsoft conventions apply, i.e., control-left-mouse-click to select files one at a time or shift-left-click and drag to select multiple files.

Remove All Files: This will remove all files from the list so you can start over.

Select Compression Scheme

Pull-down window: Allow you to select the compression scheme that will be used in the new movie.

Quality: If the compression scheme allows a quality setting, this field will be shown and you can set the quality. Quality determines the size of the output file. It also determines the quality of the images in the output file. High quality images are larger than low quality images. However, images of very low quality typically look awful. Most people use qualities of at least 65 or better.

Play-back frame rate: This determines how many images are played back per second when the new movie is viewed. A setting of 1 would look like a slide-show with one second between each frame.

You might want to set this to the frame-rate the camera was operating at when it made the movie.



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You can determine the frame rate of a movie by opening the movie in HandyAvi (use the File menu) and then use the View menu item "AVI File Info..." to bring up the "AVI File Info" window:

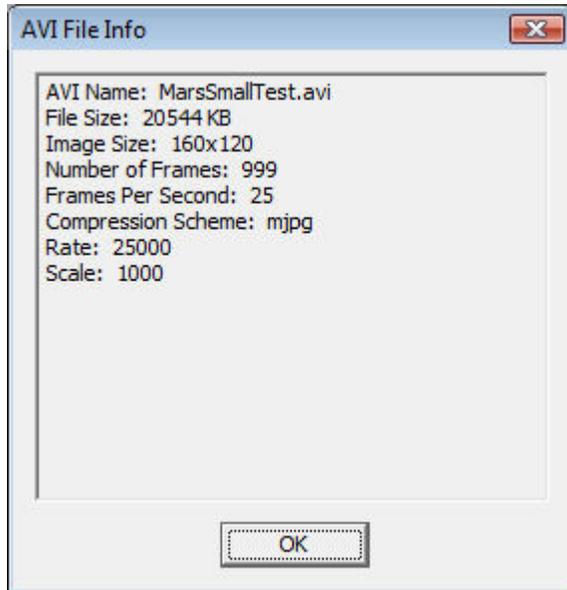


Figure 117

Join Files

Join Files: Starts the file joining operation.

Stack Images

Stack Images

Image stacking is a technique that is primarily used for improving astronomical images. When you try to photograph a planet such as Jupiter through a telescope, the Earth's atmosphere continuously distorts the image so that the images usually look pretty blurry, they dance around a lot and they contain a lot of noise. However, by taking several hundred images, "registering" (aligning their centers) then "stacking" them (adding them all together pixel-by-pixel then dividing each pixel by the number of images) the blurriness diminishes and amazing detail often emerges. (You might also want to consider using the freeware program [RegiStax](#) which is a truly excellent image stacking program.)

Select the "Stack Images" tool:

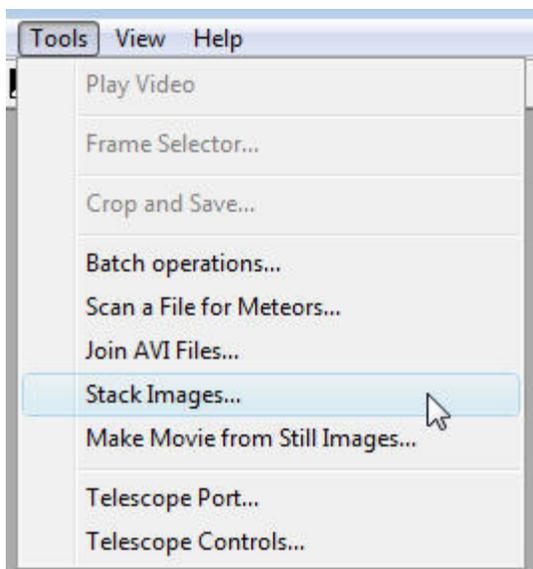


Figure 118

That brings up the Stack Images control window:

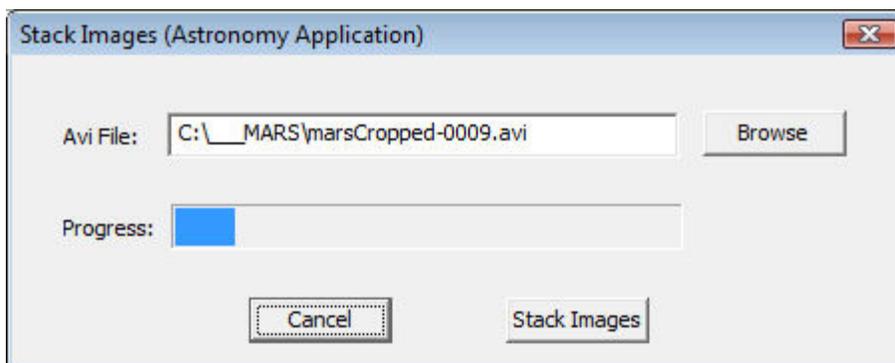


Figure 119

Browse: Brings up a file selector window. Select an AVI file containing the images you want to stack. In the above example, the marsCropped-0009.avi file was captured using the "[Create an astronomy Video](#)" capture mode.

Progress: If the image stacking process is underway, the progress bar will proceed from left to right indicating the progress of the stacking algorithm. You can see in the above example that image stacking is about 1/10th finished.

Stack Images: Begin the image stacking operation. Stacking can be aborted using the Escape key or the Cancel button.

Cancel: If image stacking was NOT underway, this causes the "Stack Images" window to close. If image stacking IS underway, a message box pops up asking "Would you like to abort image stacking?". If you answer yes, the frames that have already been processed will be averaged and displayed in a Stacked Image Window.

Stacked Image window: After stacking has completed (either by normal completion or by Cancel or Escape key) a "Stacked Image Window" will be displayed showing the result of the image stacking operation:



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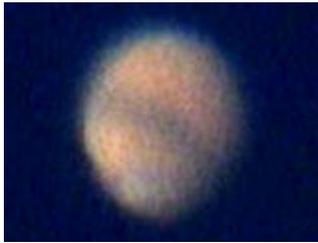


Figure 120 - One original image

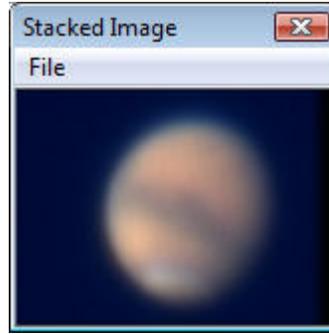


Figure 121 - Stacked image

This window has a File menu item that will let you save the stacked image as a JPG file or a BMP file:

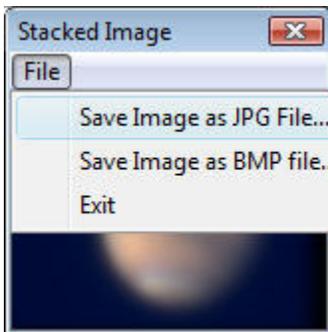


Figure 122

Make a Movie from Still Images

Make Movie From Still Images

HandyAvi will let you make a movie from a collection of JPG or BMP images:

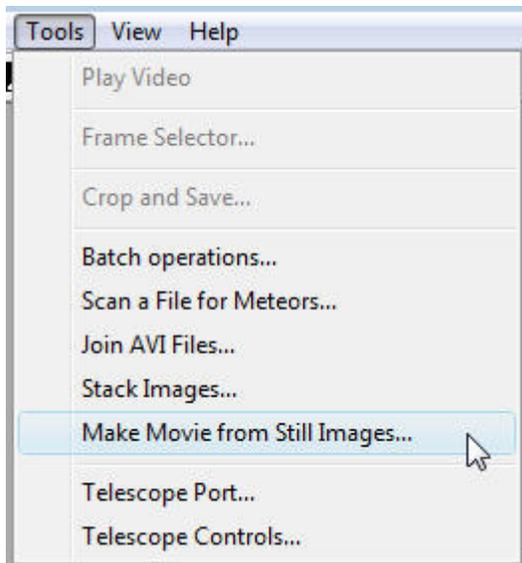
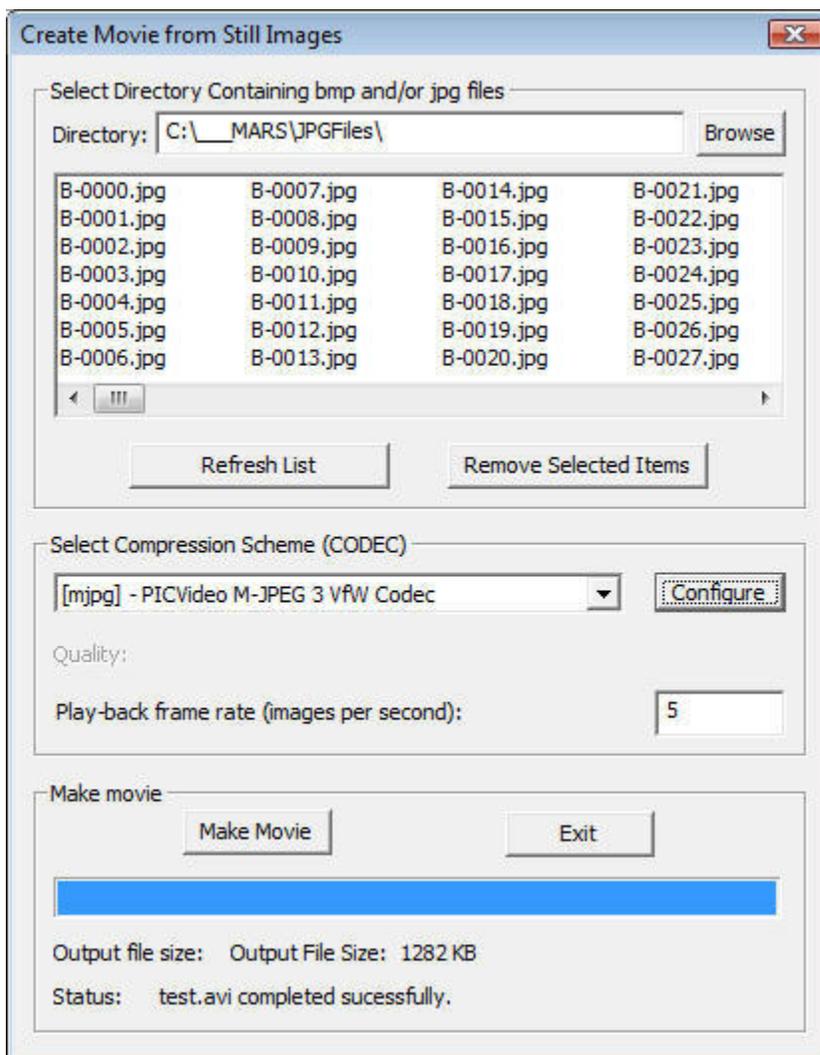


Figure 123

This will bring up the "Create Movie from Still Images" control window:





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Figure 124

The Directory Selector Section

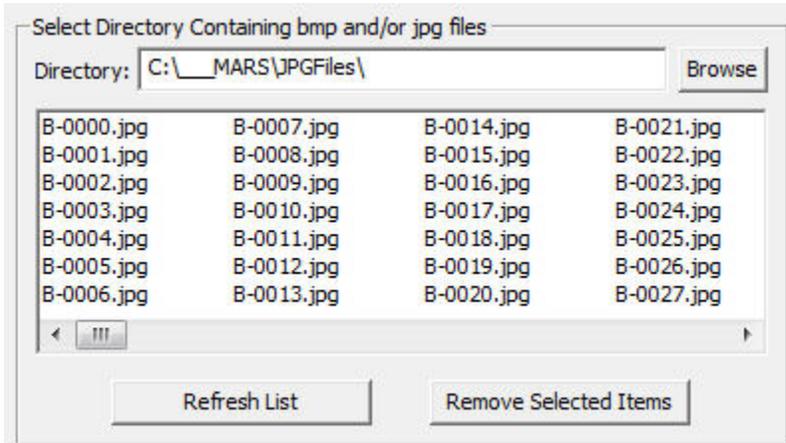


Figure 125

Browse: Select a directory that contains the JPG and/or BMP images that you want to make into a movie. The movie will be made from the items in the list. The first frame of the movie will be from the first file in the list. The second frame will be from the second file in the list. To specify the order of the frames, you have to name them so they will be listed in order. (The system presents the list in sorted order.)

The first file in the list will determine the image size. **All** subsequent images in the list will be stretched to be the same size as the size of the first image. For example, if the first image is a 640x480 pixel image and the next image is a 100x100 pixel image, the 100x100 pixel image will be stretched before being added to the output AVI file. It will be stored as a 640x480 pixel image.

Refresh List: Reads the file names from the directory restores all file names that you might have removed.

Remove Selected Items: Select file names to be removed from the list then click on "Remove Selected Items". The names will be removed from the list. The movie will be generated only from the files shown in the list.

The Select Compression Scheme Section

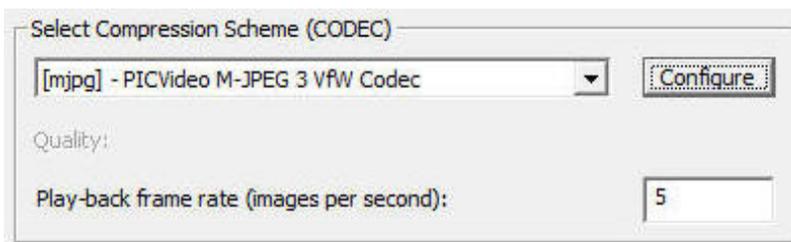


Figure 126

Compression pull-down: Select any AVI file compression scheme resident on your computer. File compression schemes or codecs (short for coder/decoder) show up on your machine from many sources. Microsoft installs several. Your video camera may install one or more. You may download and install compression schemes from the internet. At the time of this writing, there are over 280 codecs listed at <http://www.fourcc.org>. Note that one of the selection items is called

Uncompressed. If you select Uncompressed, the image data in your files will not be compressed. Your files will be LARGE. However, each image in an Uncompressed file will contain images that are exactly what the camera captured. Compressed images are usually slightly different from the original images because information is lost during compression. In most cases, the difference is not noticeable. Use of uncompressed images is important for some applications but not necessary or advisable for most. [Learn more about video codecs here.](#)

HandyAvi displays the FOURCC value for the compressor in brackets at the beginning of the "Compression:" line.

Note that HandyAvi will also allow you to read, work with, and display AVI files produced by other software or cameras and will select the proper decompression scheme automatically IF the required decompression scheme has been installed on your computer.

HandyAvi will also allow you to read a file that was written using one compression scheme and write a new AVI file using a new compression scheme. So you can convert AVI files from one compression scheme to another if the required codecs have been installed on your machine.

Configure: Brings up the compression CODEC's configuration window. This button only appears if the selected compression scheme HAS a configuration window.

Note that the "Quality:" slider and the quality settings in some CODECs do not "cooperate". In the case of the mjpg CODEC, the "Forced quality" slider determines the degree of JPEG compression and the "Quality" slider in the above window has absolutely no effect. Other CODECs we have tested do not override our "Quality:" slider.

When in doubt, you should test by setting the quality and capturing (for example) three frames of the same scene (use Time-Lapse and take one frame every 3 seconds or so). Then change the quality factor and make another movie. The size of the two resultant AVI movie files should be different.

See [Configure Window Examples](#) for information on the Configure options of various CODECs. [Learn more about video codecs here.](#)

Quality: Adjust the quality of the compression scheme. Most compression schemes create smaller files because they are actually discarding tiny image details. By discarding more and larger image details, you can produce a smaller AVI file. If the Quality is set to 100, then little or no image data is discarded and the resultant AVI file will be large. If the Quality is set to 0 then, theoretically, all image data is discarded and the resultant AVI file will contain blank images! Of course each codec is created by software people who may have thought about this and limited it so they do not throw away all of the image data even if the Quality is zero.

Note that each codec is different and some may even ignore the Quality setting or not allow it to be set. Also note that lossy compression schemes are used in many applications. JPEG is an example of a lossy compression scheme that is used in MANY applications and the fact that some of the image data has been discarded is practically unnoticeable. So compression with slightly reduced quality is a very good thing in most cases. [Learn more about video codecs here.](#)

Play-back frame rate (images per second): Determines how fast your frames will be displayed when you play the AVI movie that you have recorded. If you want the frames to be played in "real-time" then you should set the rate to the same rate as the camera was set to when it was recording. If you want each frame to be presented at a very slow rate, then you could set the play-back rate to 1 second. In this case each frame of the movie would be displayed for one second when the movie is played.

The Make Movie Section



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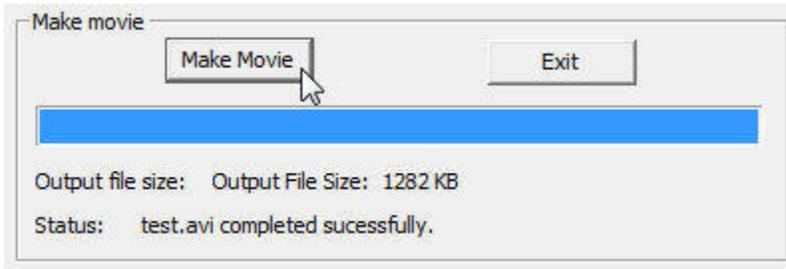


Figure 127

Make Movie: Brings up a File Selector window where you will enter the name for your output AVI movie file. After receiving the output file name, the system will begin making a movie from all of the JPG and/or BMP files contained in the directory selected in the Directory Selector Section. The progress bar will indicate how far along the process has gotten.

Exit: Exit the "Make a Movie From Still Images" tool.

Telescope Controls

Telescope COM Port

In order to communicate with the telescope, the telescope must be powered up, have its RS232 port connected by a serial cable to your PC and HandyAvi must be talking to the correct COM port. The COM port can be selected by using the menu item "Tools/Telescope Port..." The following port selection window will come up.

(USB/Serial cables may be used but it should be noted that not all types of USB/Serial cables are guaranteed to work. Testing has shown that some of them do **not** meet the specifications of the Serial UART chips that they are supposed to substitute for.)

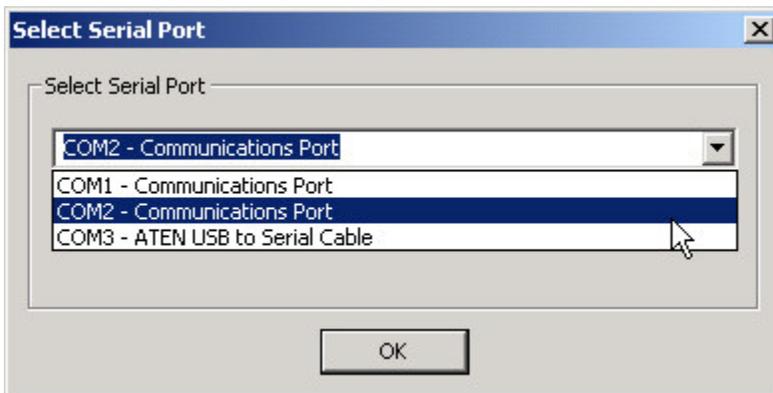


Figure 55

Note that we have been using IOGEAR's GUC232A USB/Serial cables successfully for several years with the LX-200 out in the field and have had excellent results.

Also note that for USB webcams we often need longer cables than the standard length of a webcam cable. We have very successfully used USB "repeater" or "extension" cables such as the Model G2LUB16, "IOGEAR's Premium USB Active Extension Booster Cable". These cables come in 16 foot lengths and require no separate power supplies. We have used 3 of them in series with no difficulty and their sales literature says they will work at distances of up to 75 feet.

They do seem to fail if they get wet during a rainstorm however. They seem to recover when they dry out but we have never been able to dry one out in the field after it gets wet... Bring spares...

Opening the Telescope Controls

To open the telescope control panel, select the Menu item Tools/Telescope Controls. If the telescope is powered up, has a serial cable connected to your computer and if you have chosen the [correct COM port](#), the "[Telescope Controls](#)" panel will come up.

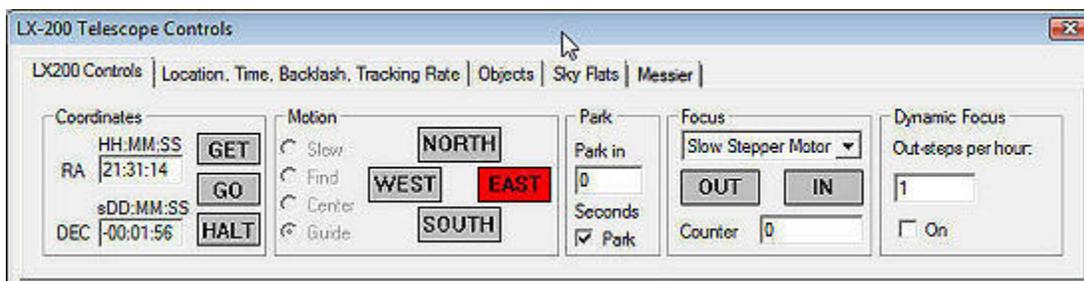


Figure 54

See [Telescope Controls](#) for further information.

Telescope Controls

First Telescope Tab - LX-200 Controls

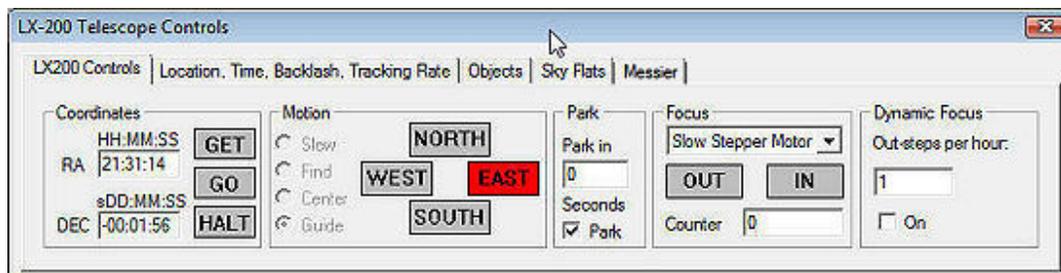


Figure 56

The above image shows what you will see if the telescope port is working and the telescope is communicating properly with HandyAvi. If everything is "well" the RA and DEC fields will contain numbers. If the telescope is not responding for any reason, the RA and DEC fields will be blank.

Note that the telescope control window is a "modeless dialog window" so it can be left up and operated in concert with the camera controls.

Also Note that we currently have the telescope in "park" mode as described below.

COORDINATES SECTION

"GET" gets the current RA and DEC from the telescope and displays them.

"GO" goes to the RA and DEC that are shown in the RA and DEC edit boxes. NOTE that the formats must be **exactly** as shown. You can **enter any valid RA and DEC** and then press "GO" and the telescope will slew to that position.



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"**HALT**" stops the telescope motion immediately in case you notice that your camera is going to be crunched by the fork arms or your cables are stretching too much, or you simply change your mind about slewing to the selected coordinates.

MOTION SECTION

The speed can be set to any of the four indicated Meade telescope-slewing speeds. The **NORTH**, **SOUTH**, **EAST** and **WEST** push buttons are operated by using the left mouse button. These buttons work just like the buttons on the Meade keypad, i.e., the telescope will move in the direction indicated while the button is held down. Motion will stop when the button is released.

After motion has been completed, the coordinates are updated and displayed.

PARK SECTION

The "**Park**" feature allows you to park the telescope i.e., holds it motionless. It does this by turning on guide mode then automatically holding the "East" button down. This stops the guide motor completely so that the telescope stops tracking the sky. Why use park? If you want to leave the telescope set up for days on end so that you do not have to realign it every night, the Park mode prevents the cords from wrapping around the telescope as they would if the telescope continued tracking.

There is a time field so that you can "Park the telescope in 7200 seconds" for example.

When you click the Park box so that it is checked, HandyAvi will look at the time field and count down to zero before parking the telescope. If the time field is 0 or reaches 0 after counting down, the telescope will park immediately.

Normally, you would enter the time first then cause the Park check box to be checked.

When you uncheck the Park box, the telescope is placed in guide mode, the East button is released and the telescope again starts tracking the sky.

During "Park" the speed change buttons are "grayed out" (disabled) and the "Go" button is disabled but all other controls function normally so you can, for example, change focus or get a read-out of the telescope's RA and Dec.

The "Park" setting is remembered by HandyAvi. If you had it set when you exited HandyAvi, it will be set when you reenter HandyAvi.

If the telescope was parked, it will continue to be parked even if you exit HandyAvi.

FOCUS SECTION

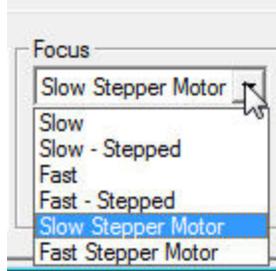


Figure 57

This section allows you to operate the Meade focusing motor.

There are two basic focusing speeds, "**slow**" and "**fast**". You can choose which speed you are using by checking or un-checking the check box. (Experience has shown that during slow speed runs, the motor often bogs down and stops so use of the fast speed might be necessary.)

There are two "**Stepped**" modes (**Slow - Stepped** and **Fast - Stepped**) that allow you to use the Meade focuser in a much more controlled manner. When "stepping", HandyAvi transmits a motor-on, motor-off command of fixed duration.

If you hold the "IN" or "OUT" button down, the telescope will execute a series of stepped motions.

Step mode is highly recommended if you are using a standard Meade focuser with the LX-200.

Again, the counter attempts to indicate position. Each "step" provides a count of 2. This was to try to get a correlation between stepped and un-stepped focus position. Not entirely successful.

Note that the Meade focusing motor is not a stepper motor so it is almost impossible to tell accurately what the focus position is.

The two buttons, "IN" and "OUT" determine which direction the focusing motor is moving the eyepiece. They operate in the same manner that the NORTH, SOUTH, EAST, and WEST buttons do, i.e., the motor will run as long as the button is held down. The motor will stop when the button is released. Note that the button that was last pushed stays a little grayer than the other button. This will help you remember which direction you were going as you attempt to focus at 2:00 AM when your brain has shut down and the image download time (of certain CCD cameras) puts you to sleep while attempting to focus.

The counter attempts to show the position of the focusing control. The motor seems to take about one second to reach full speed in the "fast" mode. The motor seems to coast to a stop over a period of about three seconds if it was going at full speed. The algorithm HandyAvi is using does a simple linear interpolation using those numbers as an approximation. When a button is pressed, the PC time clock is accessed and the value is stored. When the button is released, the time clock is again accessed and the difference is taken yielding an elapsed time value accurate to 1 millisecond. The counter is based upon these elapsed times and the motor acceleration/deceleration values. More work on measuring acceleration/deceleration rates might make this more accurate but, at the moment, you should consider this number only a rough guide. *It is very unlikely to provide accurate positioning information.*



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Once focus is achieved, the counter can be set to zero to provide at least some sense of where the focus position is/was.

There are two other focus types, "**Slow Stepper Motor**" and "**Fast Stepper Motor**". These are designed to accommodate a do-it-yourself stepper motor that is being used by the author of this section of the HandyAvi system. The Meade focus motor port on the LX-200, labeled "Focuser", puts out +19 Volts or -19 Volts depending upon which direction the Meade standard DC focusing motor should run. These voltages can be used instead as signals to control a stepper motor designed to replace the Meade DC motor. With a stepper motor, the focusing is precise and the counter will be completely accurate. (Newer Meade telescopes might have different focusing systems.)

DYNAMIC FOCUS SECTION

As the temperature drops, the telescope will shrink and the focus position will change. The Dynamic Focus control allows you to automatically compensate for the shrinkage by stepping the telescope focus any desired number of steps per hour.

Second Telescope Tab - Location and Time

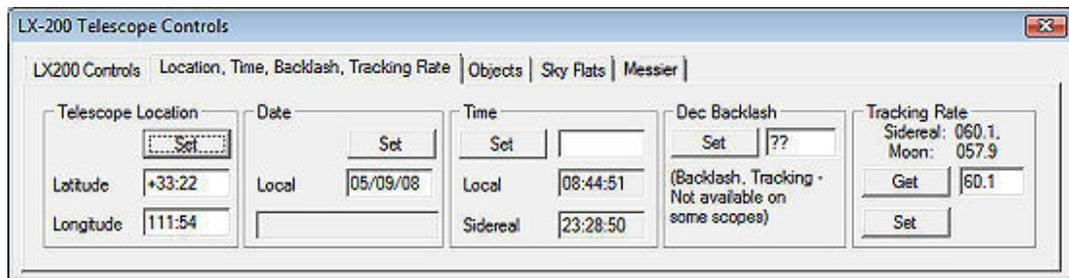


Figure 58

The above image shows the "Location and Time, Backlash, Tracking Rate" controls.

When one switches from "LX200 Controls" or "Objects" or "Sky Flats" to "Location and Time, Backlash, Tracking Rate", the "Get" operation of the first tab is automatically performed.

Telescope Location: Enter the coordinates of the current location of the telescope into the telescope. Type in the Latitude and Longitude then press "Set" to set the telescope's location into the telescope's internal memory.

Date: Enter the current date. Pressing "**Set**" then enters the data into the telescope. NOTE: Whenever "Set" is pressed, the telescope **updates the planet positions**. Mercury's position changes significantly from day to day so if the telescope is left set up for more than one day, pressing the "Set" button in the "Date" area will cause the planet positions to be updated and will allow Mercury and Venus in particular to be accurately found.

Time: Displays the current time and is updated every second by querying the telescope and displaying the results.

A new Local time can be entered in the edit box and then when "Set" is pressed, it will be entered into the telescope. HandyAvi also computes the corresponding **sidereal time** and enters that into the telescope also.

There is about a 1 second delay for the time setting operation so press "Set" one second early if you want to be within a second. Part of the delay is simply transmitting the data to the telescope.

The LX-200 has a **Dec Backlash** setting that can be from 0 to 100. The LX-200 software will not respond to this being set by HandyAvi but the new GPS scopes will.

The LX-200 also has a **Tracking Rate** setting that can be set at a rate to track the Moon among other things. (The Moon moves slowly but noticeably against the background stars. If you are making images of the Moon, you might want to track it at the proper rate.) Again, the LX-200 software will not respond to this being set by HandyAvi but the new GPS scopes will.

Third Telescope Tab - Objects

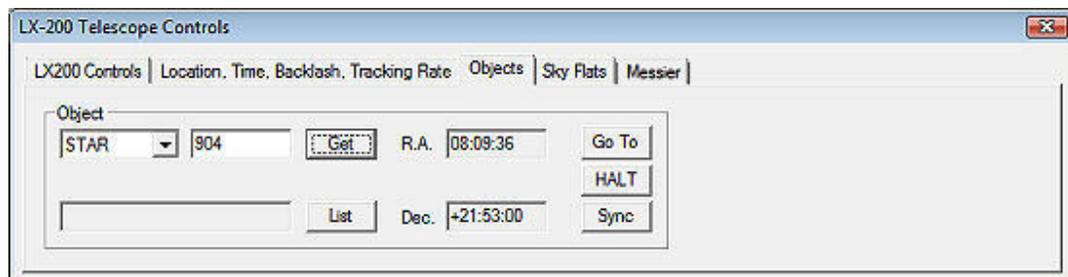


Figure 59

The above image shows the "Objects" tab.

Objects: Choose a catalog.

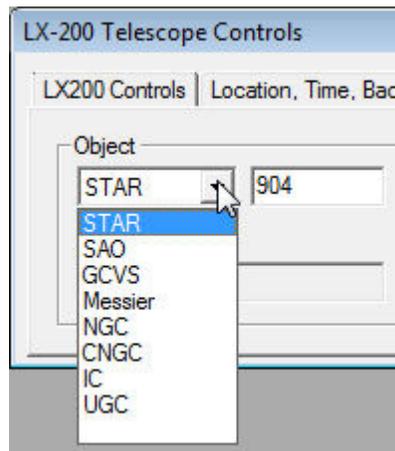


Figure 60

You can then enter an object number and either **"Get"** the coordinates of the object and display them or **"Go To"** the object which will cause the telescope to display the coordinates of the object and begin slewing to the object. Note that if you type in a number for an object that does not exist, the only indication will be that the RA and DEC will not change.

Note that the coordinates provided by a **"Get"** command are retrieved from the Telescope's data base.

Halt: Immediately stop the telescope's motion.



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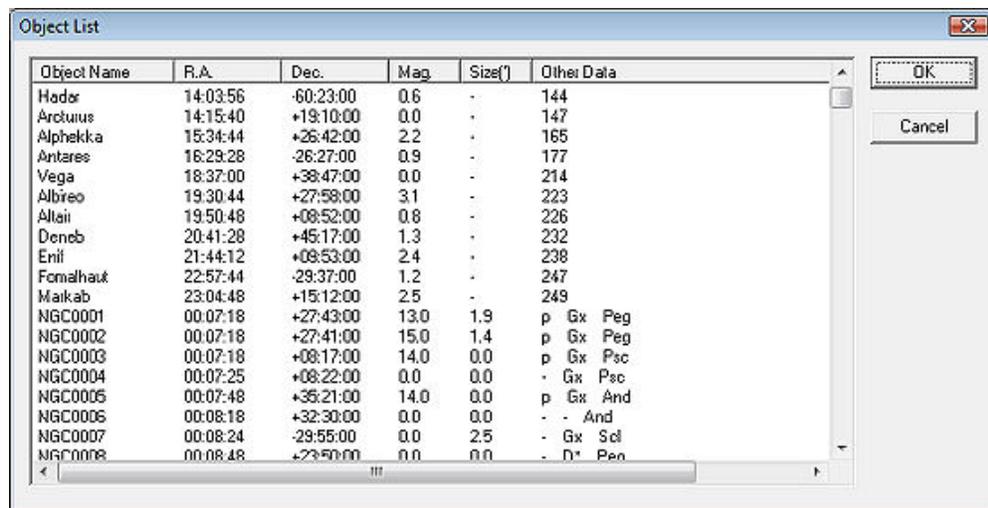
Sync: Causes the telescope's internal coordinate system to synchronize with the selected objects. (If your telescope is aligned and you somehow lost sync due to a power-off for example, you can locate and object in the sky, point the telescope at it, use the Object controls to select the object, "Get" its coordinates and then press "Sync". The telescope will now be able to use its internal coordinate system to go to other objects.)

These catalogs are the ones stored in the Meade LX-200 telescope. They are:

1. STAR
 - a. The STAR catalog contains the 250 brightest stars (1 through 250), 100 "interesting" double stars (251 through 350), and Sigma Octantis, the southern pole star (351).
 - b. STAR 901 through 909 are the planets in order from the sun with the moon being 903 instead of the earth.
 - i. 901 - Mercury
 - ii. 902 - Venus
 - iii. 903 - Moon
 - iv. 904 - Mars
 - v. 905 - Jupiter
 - vi. 906 - Saturn
 - vii. 907 - Uranus
 - viii. 908 - Neptune
 - ix. 909 - Pluto
2. SAO
 - a. SAO catalog of stars. Meade appears to have placed as many "important" objects as possible in the other databases then filled up the rest of the space (to a total of 64,000 objects in the LX-200 - More or fewer in other Meade telescopes) with the brightest SAO objects. There are 15,928 SAO objects in the Meade database. It includes all SAO objects brighter than 7th magnitude. SAO object numbers are 6 digit numbers and they are not ordered by brightness so there are a lot of "holes", i.e., if you type in a random 6 digit number, you are unlikely to hit anything and the display will not show a new RA or DEC. If you want to try something that works, try SAO 151881, which is Sirius, or SAO 67174, which is Vega. (You could obtain the SAO catalog from an on-line source, sort by magnitude and get some idea of which numbers would work.)
3. GCVS
 - a. The GCVS catalog is a catalog of variable stars. 21,815 of them. Meade has them numbered by constellation, which consists of the first two digits followed by a 4 digit number assigned "according to the standard sequence of variable-star designations". Again, there are lots of "holes". A number such as 99999999 is sure to be unknown or unassigned. For testing purposes, you could use GCVS 860001, which is in Virgo. (Unfortunately we were unable to correlate that with anything in Megastar. Caution is advised.)
4. Messier
 - a. This is the Messier catalog of things that Charles Messier found irritatingly bothersome in his quest for new comets. These are great objects whose numbers run from 1 to 110. M 1 is the Crab nebula for example.

5. NGC
 - a. The NGC or New General Catalog is a catalog of 7840 objects, which include Galaxies, Planetary Nebulae, etc.
6. CNGC
 - a. The CNGC catalog or Computerized New General Catalog appears to be another designation for the NGC catalog within the Meade database?
7. IC
 - a. The IC or "Index Catalog" contains 5386 objects. One of them, IC 434, contains the Horse head Nebula.
8. UGC
 - a. The Uppsala General Catalog contains 12,921 Galaxies numbered, apparently, from 1 to 12921.

List: Brings up an object list consisting of the Meade LX-200 guide stars followed by the NGC object catalog.



Object Name	R.A.	Dec.	Mag.	Size(')	Other Data
Holar	14:03:56	-60:23:00	0.6	-	144
Arcturus	14:15:40	+19:10:00	0.0	-	147
Alphekka	15:34:44	+26:42:00	2.2	-	165
Antares	16:29:28	-26:27:00	0.9	-	177
Vega	18:37:00	+38:47:00	0.0	-	214
Albireo	19:30:44	+27:58:00	3.1	-	223
Altair	19:50:48	+08:52:00	0.8	-	226
Deneb	20:41:28	+45:17:00	1.3	-	232
Enif	21:44:12	+09:53:00	2.4	-	238
Fomalhaut	22:57:44	-29:37:00	1.2	-	247
Maikab	23:04:48	+15:12:00	2.5	-	249
NGC0001	00:07:18	+27:43:00	13.0	1.9	p Gx Peg
NGC0002	00:07:18	+27:41:00	15.0	1.4	p Gx Peg
NGC0003	00:07:18	+08:17:00	14.0	0.0	p Gx Psc
NGC0004	00:07:25	+08:22:00	0.0	0.0	- Gx Psc
NGC0005	00:07:48	+35:21:00	14.0	0.0	p Gx And
NGC0006	00:08:18	+32:30:00	0.0	0.0	- - And
NGC0007	00:08:24	-29:55:00	0.0	2.5	- Gx Scf
NGC0008	00:08:48	+23:50:00	0.0	0.0	- D* Pen

Figure 61

This list is merely for convenience. Selection of an item does not currently drive the telescope. "Other Data" includes the Meade Star number, e.g., Alphekka is 165; Altair is 226.

Fourth Telescope Tab - Sky Flats



LX-200 Telescope Controls

LX200 Controls | Location, Time, Backlash, Tracking Rate | Objects | **Sky Flats** | Messier

Telescope Motion

HH:MM:SS Milliseconds

RA 21:35:19 0

sDD:MM:SS

DEC -00:01:56 Start Stop

Figure 62

Astronomers using CCD cameras designed for deep-space work often require frames called "Flats" which can be used to counteract tiny imperfections and dust particles within the optics train. There are several methods of making flats including constructing a light box, covering the scope with a tee shirt, etc. One method is to take a "sky flat". This is done typically during twilight. Frames are taken of empty sky and the background sky



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brightness is captured and the dust particles become visible in the captured frame. The captured frame can be used later to subtract out the dust particle contribution to images of deep-space objects.

The difficult part of taking sky flats is that the sky is not empty of stars and twilight may not last long enough. HandyAvi contains an algorithm for making sky flats.

First, use the first tab (LX-200 Controls) to point the telescope at a region of the sky containing as few bright stars as possible. Set the Milliseconds field to the length of time that the telescope should move in "Center" mode.

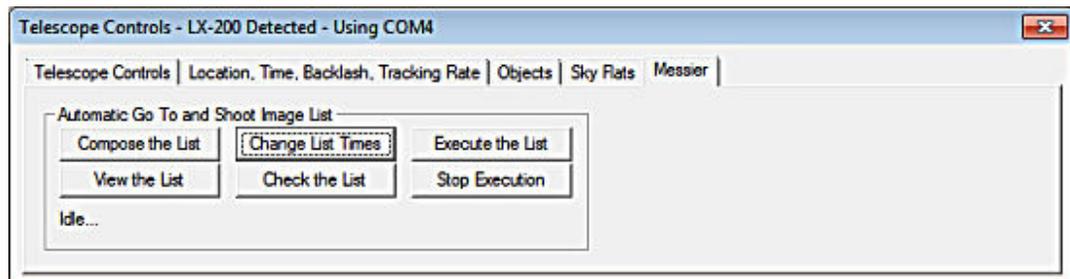
Start: Sends a command to the telescope to set its speed to "Center" (as opposed to "Guide", "Find", or "Slew" speed).

The telescope will then move North, then East, then South, then West, then North, etc.

Each move will be for the number of milliseconds that were entered in the "Milliseconds" field. This will trace a square in the sky. The purpose is to cause the star background to move quickly so that the stars, if they are dim enough, will not leave visible trails. This will allow a sky-flat to be taken either during twilight - or anytime from light-polluted skies :-).

Stop: Stops the telescope's motion and returns its speed to "Guide" mode.

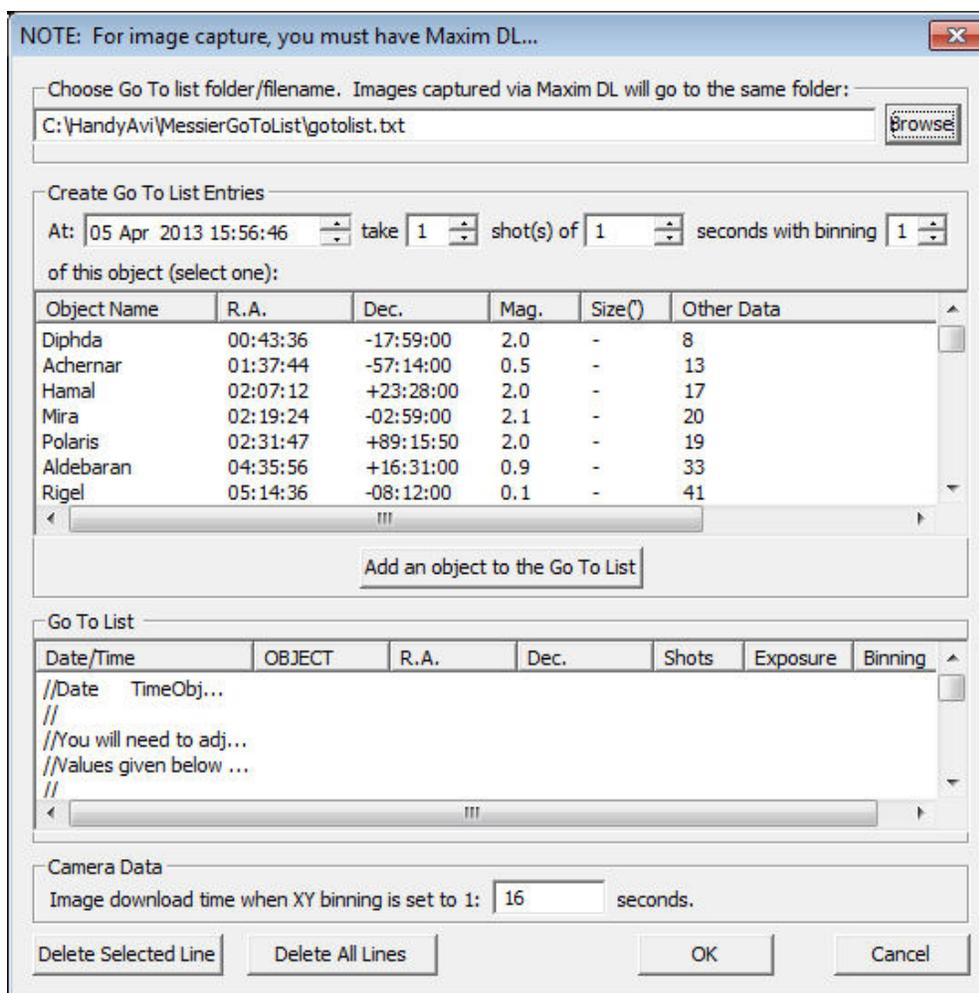
Fifth Telescope Tab - Messier Marathon



This tab can be used with an LX-200 telescope and a version of Maxim-DL that supports scripting (every version except the "Basic" version last time we checked...) We used this tab to automatically capture Messier Marathon objects in 2011 and 2013 (2012 was clouded out.) See <http://www.astroshow.com/Messier.html> for images we took using an internal test version of this system.

Compose the List:

Brings up this panel:



Choose Go To list folder/filename.

First choose a "Go To" file that either already has data in it or create an empty file to start from scratch. We provide a complete Messier Marathon file that can be used as a starting point. We call that file a "Go To List".

When HandyAvi is installed, you can find our example GoToList.txt file in the same directory where HandyAvi was installed. For example, C:\Program Files HandyAvi\MessierGoToList. In the MessierGoToList directory, there are two files, gotolist.txt and ProcessMessierImages.vbs. You can consider these to be backup files in case you need them.

We have also copied these files C:\HandyAvi\MessierGoToList. As shown above, we chose to work in the c:\HandyAvi\MessierGotoList directory and use the GoToList.txt file that we copied to that directory. You could of course create some new directory and copy the GoToList.txt file to that directory then work in that new directory. All images captured will go to the directory that you choose to work in.

Gotolist.txt is the file we used to automatically shoot the Messier marathon in 2013. You will probably want to use it as a starting point. There are instructions in the file that will help you setup data for the year and day you plan to shoot and the Latitude and Longitude of your shooting site. Please read the instructions in the file.



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The Change List Times button will greatly simplify changing the times at which each shot will begin.

ProcessMessierImages.vbs is a copy of the Visual Basic file which we used in 2013 to automatically process all of the images we shot automatically. If all images are shot, there would be 330 image files in need of processing.

ProcessMessierImages.vbs is set up to specifically accommodate our SBIG ST-4000XCM one-shot color camera so you would need to modify this file if you use a different camera. The file does illustrate how to automate initial image processing though use of Maxim DL's Scripting language.

Create Go To List Entries

You can use this to add data to the Go To list or you can hand-edit the Go To list. Note that the date/time field works by highlighting the day, or the month, or the year, or the hour, or the minute, or the second and using the spinner controls (up/down arrows) to the right of the field.

Add an Object to the Go To List

This will add the selected object to the end of the Go To list.

Again, remember that the list can be hand-edited. (See the "View the List" button below.)

Go To List section

This is a scrolling window that will let you see the current list entries. You cannot hand edit the list in this window. To hand-edit the list, see the "View the List" button below.

Camera Data - Image Download time

Your camera takes a certain amount of time to download an image. You can take a very short exposure with your camera and then time how long it takes the download to complete. Put the number of seconds in here. This value will be used when the **Change List Times** panel runs to adjust the times at which objects are scheduled for shooting.

Delete Selected Line

This will delete the line you selected in the Go To List window.

Delete All Lines

This will delete all the line in the Go To List window so you can start over.

OK

This will apply all of your changes.

Cancel

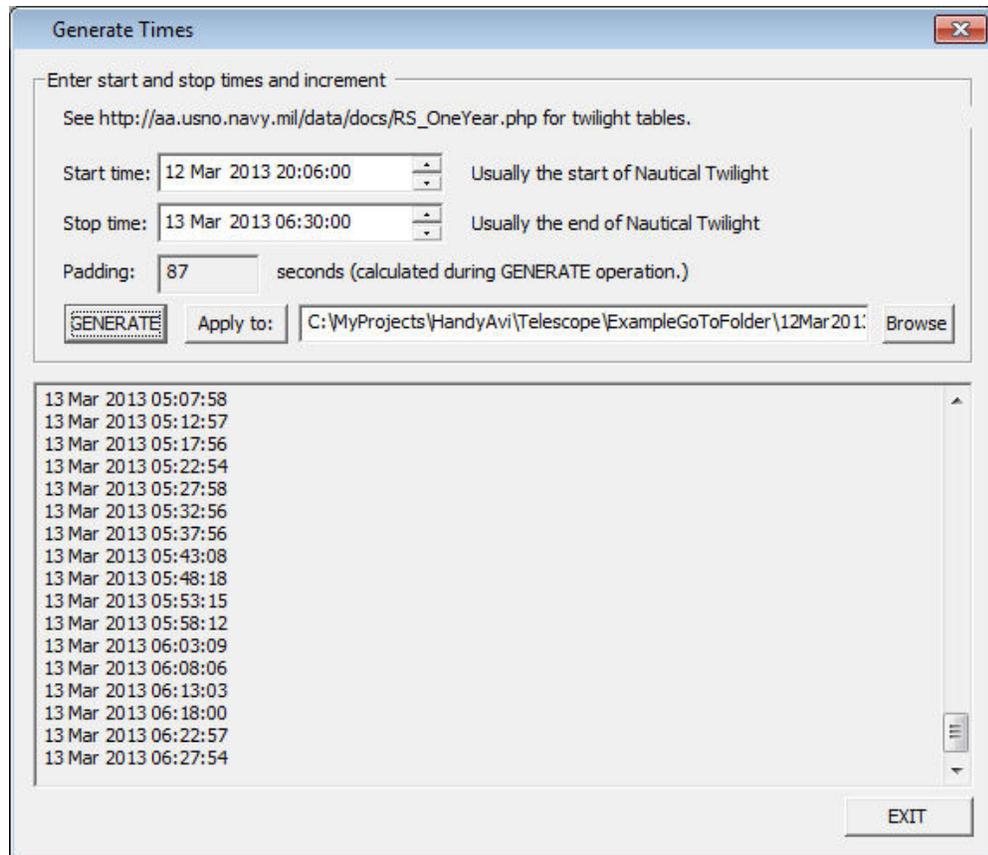
This will cancel all of your changes.

View the List

This will bring up the list in a NotePad editor so you can hand edit it if you wish to do so.

Change List Times

This will bring up the following panel:



Start time

The time at which the FIRST image in the Go To list is to be started. Highlight the day, month, hour, minute, or second you want to change and use the arrow keys (up/down) to adjust the values.

Stop time

The time at which the LAST image in the Go To list is to be started. Highlight the day, month, hour, minute, or second you want to change and use the arrow keys (up/down) to adjust the values.

GENERATE

Calculates scope slew time (assumed to be 8 degrees per second - we issue a command to the telescope to set the "rate" to 8 degrees per second) and adjusts all times between start time and end time to allow all images in the list to be captured.

It also calculates "Padding" which is the number of seconds unused between objects. The "GENERATE" button simply generates the time values. They are applied to your gotolist.txt file only when the "Apply to:" button is clicked.

Apply to

This updates the time values in the gotolist.txt file with these newly calculated values.

Check the List

Runs set of list checks to determine if the list will execute properly with the times given.



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Execute the list

Runs the list so that telescope slews to the objects, images are taken and downloaded, etc.

Stop Execution

Stops list execution. You might need to also interact with Maxim DL to get it to stop imaging.



Preferences

Preferences

The preferences window allows you to set preferences. **It is under the File menu.**

Except for File Recycling (which applies only to Time-Lapse capture and Motion-detect capture) preferences are "global", i.e., they apply to **all** the capture modes.

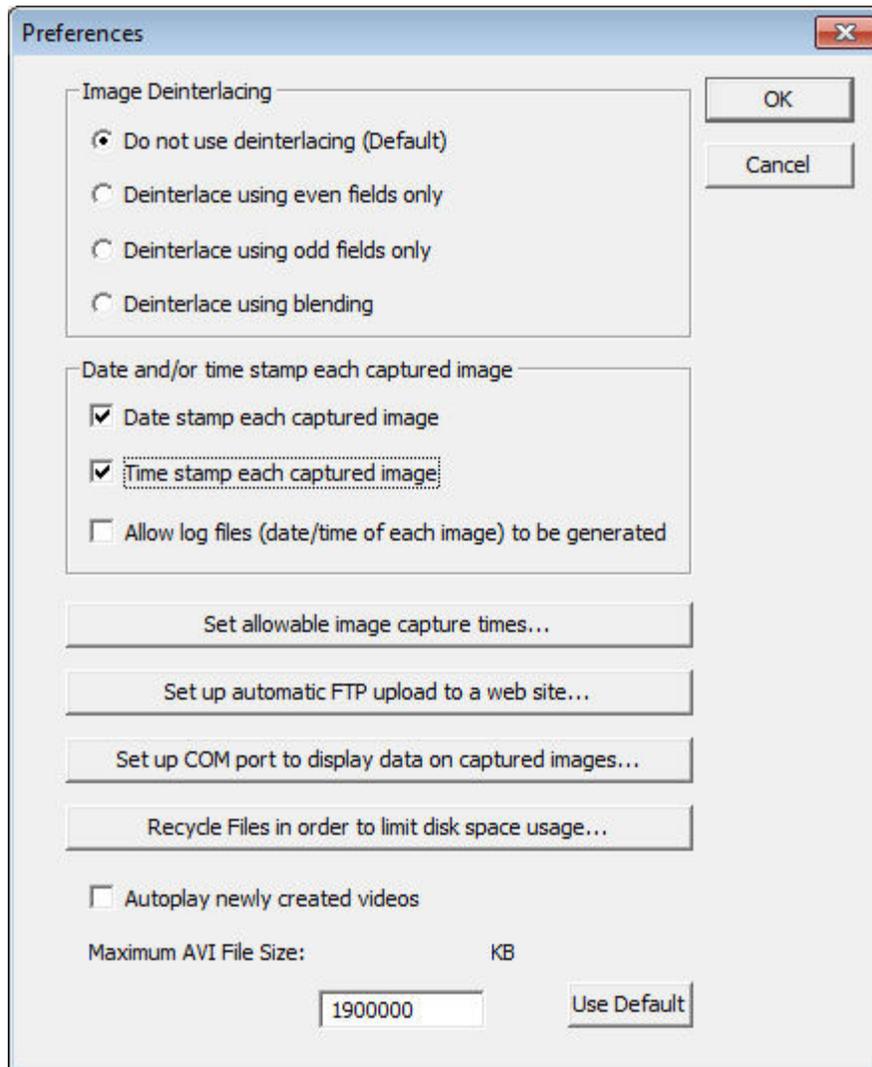


Figure 128

Image Deinterlacing

What is interlacing and deinterlacing?

Interlacing originated when early television engineers worked to solve television image display problems. Each television "frame" or image was "painted" on the screen one line at a time starting at the top of the picture tube. If you do that, the screen appears to flicker



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rapidly. One way to solve that would have been to use "long persistence" phosphors such as those used in radar scopes where the image fades away slowly. However that would make television images look blurred. The television engineers discovered that if they painted every OTHER line of a frame (the odd lines for example) then painted the lines skipped the first time (the even lines for example) that the flickering would be minimized, i.e., the viewer wouldn't notice any flickering. So one full television frame then consisted of all the odd lines of a scene followed by the even lines of the scene. Basically two images taken at slightly different times, "interlaced" together.

That works great for television. However, for digital images, it doesn't work so well. The two frames (images) are taken at slightly different times and the scene might change slightly during the time interval. Also the two frames can be slightly out of alignment. This leads to noticeable "scan lines" within the images.

Certain cameras produce interlaced video (NTSC cameras for example.) You can see "scan lines" in the video images produced by such cameras. Deinterlacing will make the images look better generally.

Deinterlacing options are as follows:

1. **Even Fields Only:** Replaces each odd numbered line in the image with the immediately succeeding even numbered line.
2. **Odd Fields Only:** Replaces each even numbered line in the image with the immediately preceding odd numbered line.
3. **Blending:** Replaces each pixel of each line of the image with the average value of that pixel and the corresponding pixel of the immediately succeeding line

The deinterlacing options were added to HandyAvi to accommodate people who have cameras that are producing files containing interlaced images. If your files do not contain interlaced images, then you will probably NOT want to use the deinterlace option.

Deinterlacing is supported only if you have DirectX installed.

IMPORTANT: You normally would not use deinterlacing on images that were not interlaced to begin with. When working with non-interlaced files, your Preferences window should have the "Do not user deinterlacing (Default)" option checked as shown above.

Note: HandyAvi will output images as they appear when you display them within HandyAvi. If you choose to deinterlace input images, the HandyAvi output will consist of deinterlaced images. If you do not check the deinterlacing check box in the preferences window, then no deinterlacing operations will occur.

Examples:



Figure 129 - Interlaced



Figure 130 - Deinterlaced

Note: The above images are 2x their original size to better show the interlacing artifacts.

From the Paint Shop Pro manual:

"Video images can contain visible scan lines caused by television signals that update every second set of scan lines in each frame. In these images, every second set of lines can be missing or can be out of alignment with other lines. Use the Deinterlace feature to eliminate missing or misaligned lines from your image and to reconstruct missing information. If the image contains any noise, it may become more visible after removing the scan lines."

NTSC: (National TV Standards Committee) A color TV standard developed in the U.S. and Administered by the FCC. NTSC broadcasts 30 interlaced frames per second (60 half frames per second, or 60 "fields" per second in TV jargon) at 525 vertical lines of resolution.

Deinterlacing improvements were added to HandyAvi 2.09 and later versions. Previous versions of the software only performed the deinterlacing during "Frame Selector" or "Crop and Save" movie building. Deinterlacing, if selected, now occurs immediately whenever an image is received from the camera. The screen display also shows deinterlacing effects immediately in the image preview panes.

Date and/or time stamp each captured image

This section controls whether capture images are date and/or time stamped. It also determines whether or not image date/time log files are generated.

Date stamp each captured image: When checked, each image captured to your AVI file by ANY of the capture modes (time-lapse, motion-detect, astrophotography, meteor trail or animation) will contain a date stamp in the lower left-hand corner.

Time stamp each captured image: When checked, each image captured to your AVI file by ANY of the capture modes (time-lapse, motion-detect, astrophotography, meteor trail or animation) will contain a time stamp in the lower left-hand corner. It will be immediately to the right of the date stamp if you also checked date stamping.

Allow log files (data/time of each image) to be generated: By default, [log files](#) are generated for each AVI file listing the date and time of each frame. Unchecking this option prevents these log files from being generated.

Set Allowable Image Capture Times...

The panel that comes up allows you to control the times during which images may be captured and added to your AVI file. This panel applies to ALL of the capture modes, Time-Lapse, Motion-Detect, Astrophotography, Meteor Trail, and Animation.



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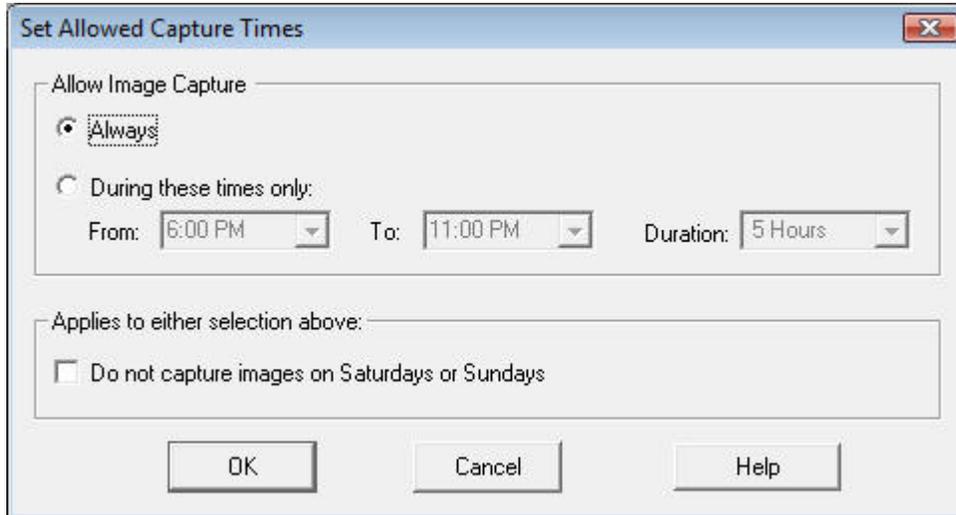


Figure 131

Always: Image capture is always allowed. This is the default.

During these times only: Image capture will be allowed ONLY during the times specified.

Do not capture images on Saturdays or Sundays: This overrides both the "Always" and "During these times only" settings. This allows you to prevent capture of, for example, time-lapse activity at a construction site when no work is being done during the weekends. The "Always" and "During these times only" are still effective on week-days.

Set up Automatic FTP Upload to a Web Site...

This panel allows you to set up FTP communications and automatically upload your latest video to your Web Site. (We added this option to satisfy a request from a user at Loch Ness in Scotland who has a video camera set up on the lake and wants to automatically upload his latest time-lapse video to his web site. Users can then view his latest 24 hour Loch Ness surveillance video. Maybe somebody will eventually see Nessie?)

Figure 132

Set up FTP communication parameters

This section allows you to enter information required to open an FTP session to your Web Site.

Server Name: Your Internet Service Provider (ISP) provides you with a Server Name, User Name, and User Password for you to access your web site via FTP. Enter your Server Name in this box.

User Name: Enter your FTP User Name in this box.

User Password: Enter your FTP User Password in this box.

Port Number: IF your ISP told you to use some port OTHER THAN Port 21, enter it here. Otherwise, enter 21 in this box. 21 is what is normally used by most sites.

Active or Passive: Default is Active. Some ISPs block Active though so you can set it to Passive if you need to.



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Remote Directory: Enter the remote directory path, i.e., the path to the directory on your web site where you want your video files to be uploaded to.

Select: This will bring up a window that will show files and directories on your remote web site:

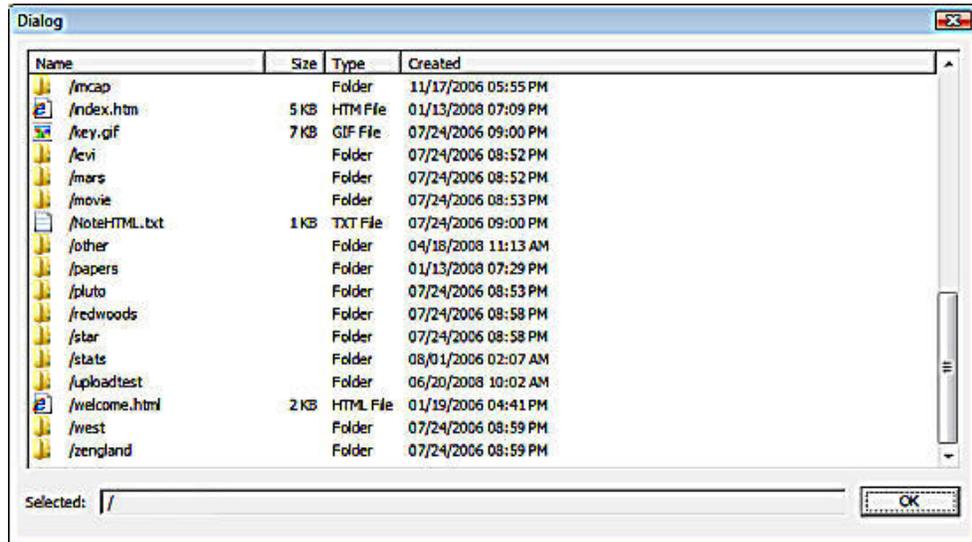


Figure 133

Double-click on one of the folder icons to "select" that folder. The folder will then be "selected" and its contents will be displayed. The first folder in the list is a "." folder (not shown above because we've paged down to show the "upload test" directory.) When a "." folder is double-clicked, the system will move up one directory in the hierarchy and list that directory.

You might want to test the directory connection before using the Select button.

Test Connection - Upload Test File: This will cause a short video test file to be uploaded to the selected remote directory on your web site. This will test the connection. Error messages will appear if the connection is unavailable or if the user ID and/or password is not correct.

Test Connection - Upload then Delete Test File: This will cause a short video test file to be uploaded to the selected remote directory on your web site. That short test file will then be deleted from the selected remote directory on your web site. Error messages will appear if the connection is unavailable or if the user ID and/or password is not correct.

Set up COM port to display data on captured images...

Click this button to bring up the following panel:

This Preference item was created to accommodate a researcher who wanted to write the current temperature of some experimental apparatus on each captured image. It lets you choose a serial port and send and receive data. The data sent consists of an initialization string if one is necessary. Then a series of "data request strings" are sent to "ask" the device at the other end of the serial port to send its data. The "data request strings" are separated by semicolons.

In the example shown above, the user has selected the COM3 port. The COM3 port is connected (for illustrative purposes and because it was readily available!) to a Meade Telescope. The user has entered two data requests separated by a semicolon. The first is ":GD#" which is the Meade serial command for "Get Declination". The second is ":GR#" which is the Meade serial command for "Get Right Ascension".

The user then clicked "Connect Serial Port." (The button shown above now says "Disconnect Serial Port" since the port is connected.)

The user then clicked "Send Data Request String" to test the system. The system then sent ":GD#" to the telescope which returned "-55β29:58#". The "#" sign in the returned data is used as a line terminator so the serial subsystems will know when all of the data for the last request has been received. These "#" signs are omitted from the displayed data. The system then sent ":GR#" to the telescope which returned "07:22:328#". The "#" signs are omitted so the "Returned data" field shows "-55β29:58 07:22:328". (We don't know why the scope returns a "β" instead of a "." but it does and in the software we wrote for scope control elsewhere in HandyAvi, we look for the "β" and replace it with a "." so that the user will not be confused by it... :-))



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A space was placed in front of each returned item and they were then displayed in the "Returned data" box. This essentially tested the setup and verified that it worked.

When the Activate check box is activated, then before each captured image of any capture mode (Time-lapse, Motion-detect, Animation, Astronomy, or Meteor-Detect) the system will open the serial port, send the initialization string (if there is one), send the first data request string and read the returned data and append it to a character string, then send the second data request string and read the returned data and append it to a character string, etc., until no more semicolon separated strings are found. The serial port will then be closed.

The accumulated character string containing the results of the serial reads will then be displayed on the current image following the date stamp and time stamp if they are active.

If they are not active then the accumulated character string will be displayed where the date stamp and or time stamp would have been displayed.

Note that the serial port opening, getting data, closing operations take time. Tests show that you will be limited to a frame capture rate not much greater than two frames per second... This is sufficient for most imaging purposes and certainly for most time-lapse imaging purposes.

Parameters

Select Serial Port

Select the serial port from the drop-down list. If the port says "Ready" it is available for use. If it says "Busy" it is either being used by another process or somehow locked up and unavailable for use.

Refresh Port List

This will rerun the algorithm to locate all serial ports.

Currently Selected Port

This shows the port that has been selected and that will be used for communications.

Baud

Combo Box allows you to set the baud rate for serial communications. (The other parameters are assumed to be 8, 1, and none.) The baud rate cannot be set when the port is connected. In the image shown above, the serial port IS connected so the baud rate is grayed out. When the port is disconnected, you will be able to set the baud rate.

Asynchronous

This check box allows you to switch from Synchronous Serial I/O to Asynchronous Serial I/O. Some serial devices might need you to choose between Synchronous and Asynchronous. Best way to test perhaps is to choose a setting while the port is disconnected, then connect the port and issue a few Data Request Strings to see if the returned results are correct. Use the setting that gives the best, most consistent results. When you hit OK then this setting will be

remembered and will be used when we retrieve your data for display on the captured images.

Enter initialization string if required (If not Leave blank)

If the device on the other end of the serial port needs to receive some sort of initialization string before it can begin receiving data requests, enter it here. The system will not try to read the serial port to see if the initialization string responded with a text message.)

Enter Data Request String

Enter data request strings here. You can enter more than one data request. They must be separated by semicolons. For example if you have a device that gets temperature, humidity and air pressure and the commands to provide the data are "getTemp", "getHum" and "getAP", then you would enter "getTemp;getHum,getAP".

Test

Connect Serial Port

If the port is disconnected, this button will say "Connect Serial Port". Click on this button to connect the serial port.

Disconnect Serial Port

If the port is connected, this button will say "Disconnect Serial Port". Click on this button to disconnect the serial port.

Port Status

The port status will give the current status of the serial port, either "Connected" or "Disconnected".

Send Initialization String

This will transmit the initialization string to the serial port. If you are testing, and your device requires an initialization string, click on this button to send the initialization string.

Send Data Request String

Click on this button to send the data request(s).

Returned Data

This box will contain the returned data from the device in response to the data request string(s). Each returned string will have an additional blank space place in front of it so that it will be displayed properly on captured images when the Activate check box is checked

Activate

While capturing images, send the Data Request String and display the returned data on the image.



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If this item is checked, the requests for data will be active during all image capture operations and you will see the data in the field at the bottom left corner of your captured images.

OK

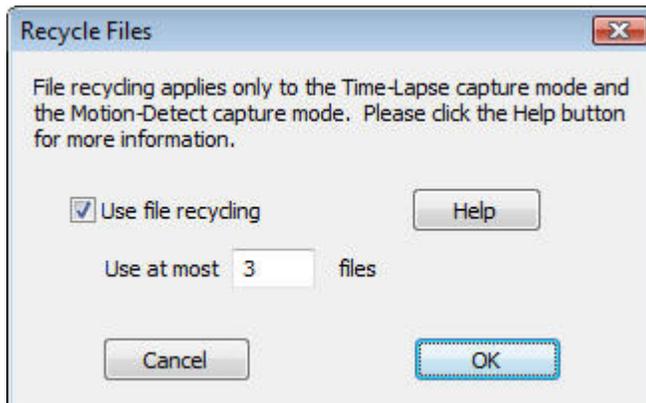
Clicking this will save the data so it will be remembered and saved data will be used during image capture.

Cancel

Clicking this will cause any new changes that you made to be discarded.

Recycle files in order to limit disk space usage...

Click this button to bring up the "Recycle Files" panel:



This panel controls File Recycling.

File Recycling applies ONLY to the Time-Lapse and Motion-Detect capture modes.

When file recycling is active, and you are using either the Motion-Detect or Time-Lapse mode, the system will create and use one new file every day up to the "Use at most N files" value where N is the number of files you want to use.

Example of use: Say you enter a file name of "A.avi" into the "Output File" name field of the "[Motion Detect Movie Setup](#)" panel. If "Use file recycling" is checked, then, when you hit the Start button in the "[Motion Detect Movie Setup](#)" panel, the file name will be automatically changed to "A-0001.avi" and that will be used as the first file. At midnight, that file will be closed and a new file with the name "A-0002.avi" will be created and used.

At midnight each night, a new file will be generated up to the "Use at most" number you entered. In this case, we are using 3 files so the third file used will be named "A-0003.avi". When midnight arrives, the file name will then be changed to "A-0001.avi", i.e., it will be recycled (overwritten.) At midnight each night, the next file will be used (overwritten.) This way, you should never generate more than three files and your disk should never fill up. You might wish to keep 2 weeks of data or 14 files for normal business operations.

Note that the OLDEST file is always selected for reuse. The "Date Modified" date is used to determine this. If you generate your own files and they are created out of order, they will still be used in date order not file name order.

Use file recycling - File recycling is active only when this box is checked.

Use at most N files - Enter the number of files you wish to use as your set of recycling files. The minimum number of files allowed is 2. There is no maximum number but you should limit the number to something reasonable. (Maximum AVI file size is 2 Gigabytes. Normally your files will not get this big. If you have 100 Gigabytes of disk space available, then you could set N to 50 and you would not exceed the 100 Gigabytes available.)

Help - Brings up this help window that describes file recycling.

Autoplay newly created videos

Select this option if you want movies to automatically begin playing when you open them.

Maximum AVI File Size

AVI files are limited to 2 Gigabytes. We have provided a default maximum AVI file size of 1.9 Gigabytes. What this means is that if you are recording data to an AVI file using one of the Capture menu items, and the size of the file exceeds the limit, then the current file will be closed and a new file will be created. The system will continue recording to the new file. A new file will be created and used whenever the current file exceeds the size limit. The new file names are generated automatically. Checks are made to ensure that the new file name does not match an existing file name. In case of a match, the file name suffix counts up until it finds a name that is not being used. New file names are the same as the original file name except that they contain a suffix such as "-0001". For example, if the original file is named "myAviFile.avi" then when its length exceeds 1.9 Gigabytes, it will be closed and a new file with the name "myAviFile-0001.avi" will be generated. If that name is not already the name of an existing file in the current folder then it will be used as the name of a new recording file. Recording will continue with no intervention required on the part of you, the user.

What this means is that you don't have to worry about creating files that are unreadable because they exceed the AVI file size limit. If you are using HandyAvi for surveillance, it means that you can record data without worry. (Up until your hard drive fills up of course.)

Why is there a 2 Gigabyte limit? It is because of the internal structure of AVI files. AVI files are composed of images but they also contain "pointers" that allow software systems to rapidly locate various pieces of data. One of the data areas is at the end of the file and is an index to all of the image frames. Near the beginning of the file there is a pointer to the beginning of the index. The amount of space provided for that pointer is just big enough to hold the number that represents 2 Gigabytes. If your file exceeds the limit, the pointer will not point to the index and the file will be useless. So it is important that file not be allowed to exceed the size limit. HandyAvi handles this for you automatically.

AVI File Frame Time Log



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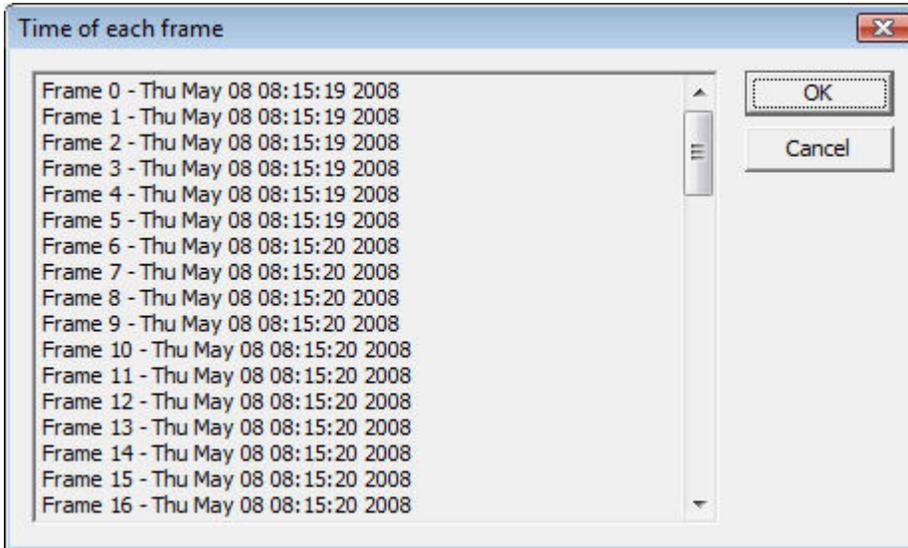


Figure 134

When an AVI file is open and when it is the "active" window, then the View/AVI File Frame Time Log menu item will bring up the above window showing the time of each frame in the AVI file. This is handy when the motion-detect mode is being used for surveillance. The above data can be copied to a text file by selecting the text then doing CTRL-c, CTRL-v into a text file pane. You can correlate frames and times by opening the Tools/Frame Selector menu item and looking at individual frames.

The frame time logs can be eliminated by unchecking the "Allow log files (date/time of each image) to be generated" option in the [Preferences](#) panel.



Command Line Parameters

Command-Line Parameters

HandyAvi has several command-line parameters that you might want to use.

NOTE: You cannot use two or more of these at the same time. Only one is allowed at a time. The first one encountered on a command line will be used and others will be ignored.

-runtimelapsecapture: When HandyAvi starts up with this parameter, it will bring up the Time Lapse Capture control window and begin making a movie. The new movie will be placed in a file with a new unique name.

-runmeteorcapture: When HandyAvi starts up with this parameter, it will bring up the Meteor Capture control window and begin making a movie. The new movie will be placed in a file with a new unique name.

-runmotiondetectcapture: When HandyAvi starts up with this parameter, it will bring up the Motion Detect Capture control window and begin making a movie. The new movie will be placed in a file with a new unique name.

-runastronomycapture: When HandyAvi starts up with this parameter, it will bring up the Astronomy Capture control window and begin making a movie. The new movie will be placed in a file with a new unique name.

-runanimationcapture: When HandyAvi starts up with this parameter, it will bring up the Animation Capture control window and begin making a movie. The new movie will be placed in a file with a new unique name.

-n: This option can follow any one of the above. If you wish to start more than one instance of HandyAvi from the command line, this can be used to eliminate camera selection conflicts. You can set "n" to be a number such as 1, or 2, or 3, ... depending on how many cameras you are using and which one you want this instance of HandyAvi to use.

How do you use a command-line parameter?

- In windows XP, bring up the Start/Run window and type in HandyAvi followed by one of the command-line parameters such as:

HandyAvi -runmotiondetectcapture
Or **HandyAvi -runtimelapsecapture -2** (This will connect to the second camera.)

Then hit Enter.

- In Windows Vista, there is a "start search" box within the Start area. type HandyAvi **-runmotiondetectcapture** for example into the "Start Search" box and hit Enter.

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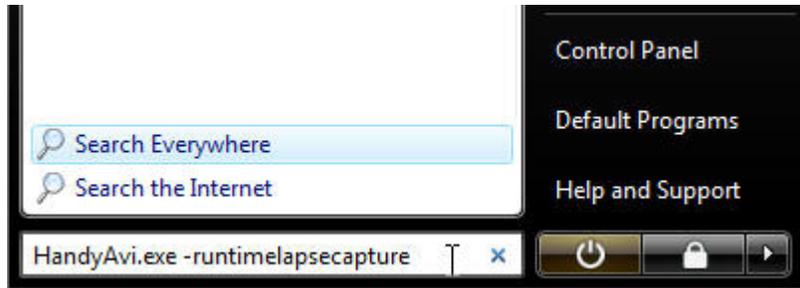


Figure 135

- You could also modify the Properties of a "Shortcut" to include the command-line parameter so that it will take effect when you double-click the shortcut:

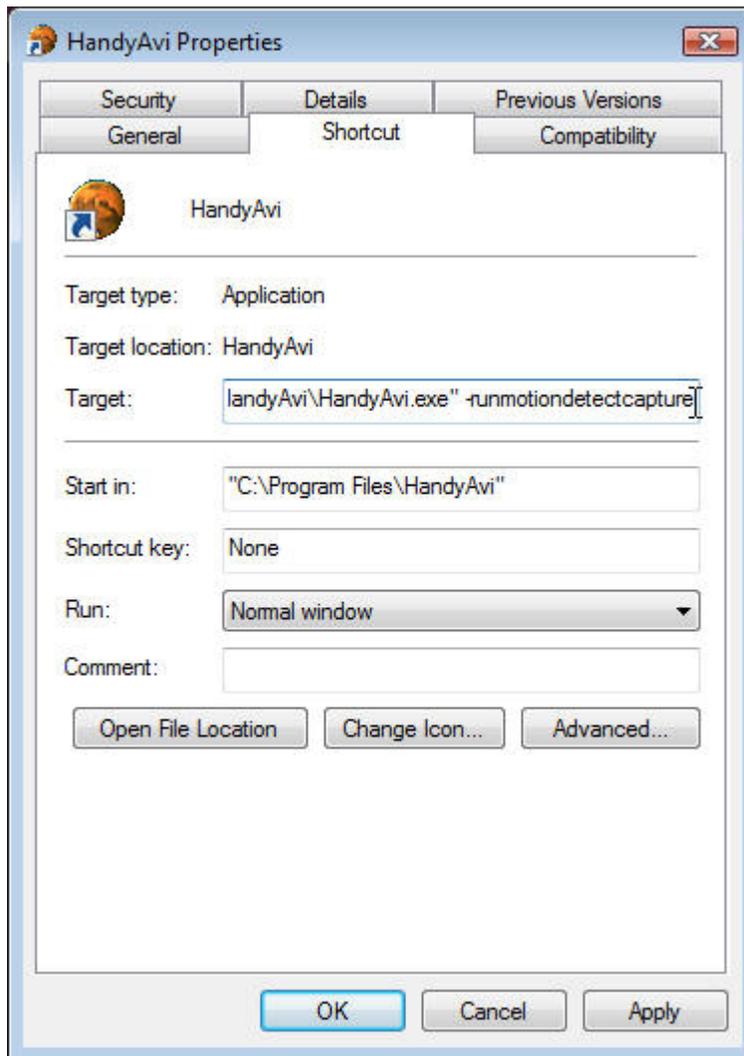


Figure 136

How can I make sure that motion detection operations (or meteor detection operations, or time-lapse operations, or ...) will continue automatically after a power failure?

Make HandyAvi run (with one of the command-line parameters) whenever your machine starts up.

On XP and Vista:



1. Right click the HandyAvi shortcut icon,  , that was placed on the "desktop" during HandyAvi installation:
2. In the window that comes up, select "Create Shortcut". This will create a copy of the shortcut and place it on the desktop.
3. Right-click the shortcut and select Properties.
4. Add the "**-runmotiondetectcapture**" string (or one of the other command-line strings if you are doing one of the other capture operations) to the "Target:" line after "HandyAvi". Make sure there is a blank before the minus sign.
5. Click the Start button (lower left of the main windows screen, i.e., the "desktop"), click "All Programs", right-click the Startup folder, and then click Open.
6. Drag the copy of the HandyAvi shortcut into the Startup folder.
7. The next time you start Windows, HandyAvi will run automatically, and when it runs, it will begin a new motion detect operation and begin capturing data as if it had never been interrupted. It will be using a new file name however so it doesn't overwrite your previous file. It will use the usual rules for creating new file name. See Maximum AVI File Size notes under [Preferences](#) for information on how unique file names are assigned.

If the power failed, how do I recover the file that was interrupted?

Simply use HandyAvi (file/open) to open the file.

See "[Recovery of an incomplete file](#)".



HandyAvi Registration

Purchase

The "Purchase HandyAvi" menu item will bring up a browser and take you to <http://www.AZcendant.com> where you may purchase a license for HandyAvi.

Install Key

When you [purchase HandyAvi](#) through the Internet, a key will be E-mailed to you. The message will look something like this but will contain YOUR personal key instead of the key shown below:

Dear user,

Thank you very much for registering HandyAvi. You will find your personal registration key below:

```
---KEY BEGIN KEY---  
KngKJOLScZeeeM8rLiNCN0s/hp9DHN  
EX3IF3MTshXezxDPIXIRgidiohPruvE  
u0GKxCVP3ks3TWi5+NJZmhsCPkqMUh  
xeOdvS ZDNqTCvJq1FPbuZH4AOae0WM  
bHewqtz3HI+Fkjn0jVk8nIgEI7Bb3D  
mXUG4sA+tZQZ9PtwsEPwA=  
---KEY END KEY---
```

To register HandyAvi using this key, right-click this message. This will cause a popup menu to be displayed. Use the "Select All" command in the popup menu. The menu will disappear, and this message will change its color (become selected). Then right-click this message again to display the popup menu again and select the "Copy" command. Now run HandyAvi and select "Register" in the "Unregistered Version" dialog window. A "Key entry window" will appear. Click the "Paste Key" button in the "Key entry" dialog window. Then click OK in the "Key entry window". HandyAvi will install the registration key and exit. Please restart HandyAvi. If the key was entered correctly and was valid, the "Unregistered version" window should NOT appear. If you then select the Help menu item "Registered to...", a dialog window will be displayed showing your registration data. If you see your data (i.e., the displayed data is not blank), it means your key is working and all shareware restrictions have been removed from your version.

Note that it is OK to copy the entire message into the "Key entry window" since the key will be located and extracted from the message by internally looking for the start and end labels.

When you start HandyAvi and have not yet purchased a license, the following window will come up:



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Figure 137 - "Unregistered Version" dialog window

OK: Will continue execution of HandyAvi. However, if there are no trial days left, as shown above, HandyAvi will exit.

Buy Now!: Will bring up your web browser and display the <http://www.AZcendant.com> web page where you may buy a license to run HandyAvi.

Register: Will bring up the "Key entry" window. When you purchase a license to run HandyAvi, you will receive a key by Email. You will copy the key from the Email into the Key entry edit box.

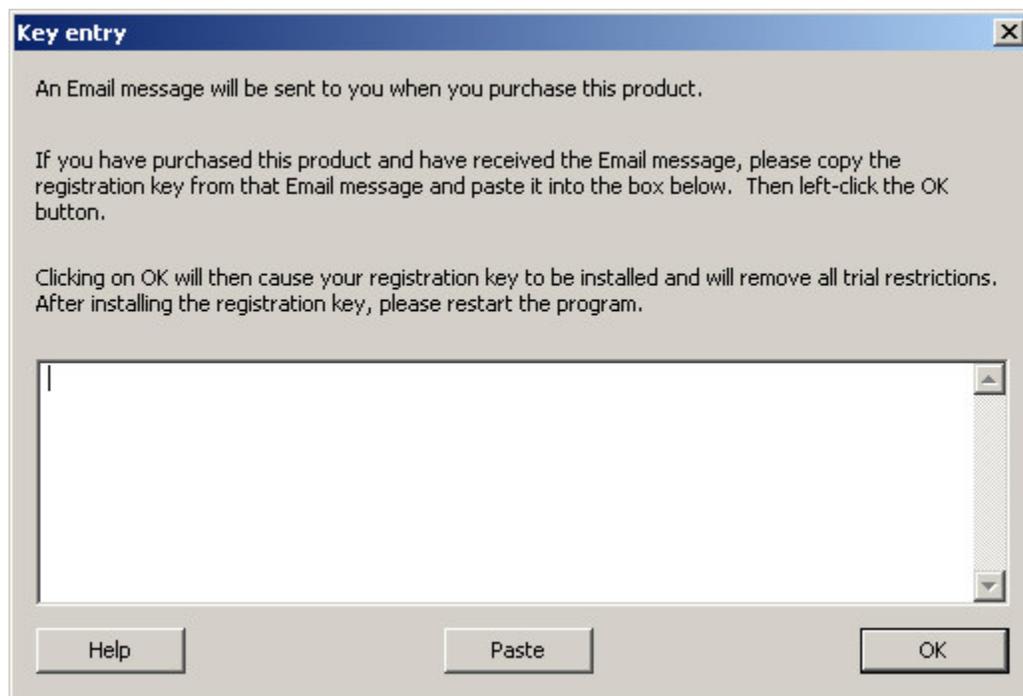


Figure 138 - Key Entry Dialog Window

Help: Bring up this help section (Install Key).

Paste: Paste the contents of the Microsoft Paste Buffer into the edit box. (When you do a "Copy" operation, the copied data goes into a "paste buffer" and is then available for "paste" operations in various applications.)

OK: Will install the key. If the edit box is empty, no change will be made to the installed key. HandyAvi will exit in any case. When HandyAvi is restarted and if the key was valid, you should not see the "Unregistered Version" dialog window again.

It is also possible to display [your registration data](#).

Registered To

Under the Help menu item, there is a menu item, "Registered to..." that will display a dialog window showing your registration data. The data shown below is for "Joe Use". If no data is shown, then the program has not been registered.



Figure 139 - "Registered to" Dialog Window



Check for New Versions

Check for New Versions. . .

This [Help item](#) will briefly access the [AZcendant web site](http://www.AZcendant.com) and get the contents of a file containing the version number of the latest version of HandyAvi. The version number of your copy of HandyAvi will be compared with the latest version of HandyAvi available from the <http://www.AZcendant.com> web site. A window will appear displaying you your version number and the latest version number. If you wish to obtain the new version you can visit the <http://www.AZcendant.com> web site and download the latest version and install it.

NOTE: The upgrade to a new version is normally FREE. Your current license will work. You do not have to reinstall your license. Simply download and install the upgrade and you are immediately in business.

Here is what the "Check for New Versions..." window looks like this:



Figure 140

When HandyAvi closes, it will, if you allow it to do so, automatically run the "new version" check. You have the following choices:

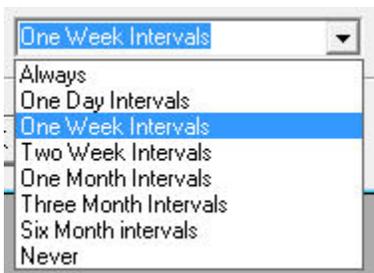


Figure 141



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HandyAvi keeps track of the time when the last version check was done.

When HandyAvi closes and IF the interval has elapsed and IF a more recent version is found, then the "Check for New Versions of HandyAvi" dialog window will be displayed. Otherwise, no window is displayed and HandyAvi exits promptly.

No window will be displayed during HandyAvi closing unless a new version is found.

No check will ever be done if you choose "Never" as the "Automatically check for new versions" interval.



Troubleshooting

Troubleshooting

DEP or "Data Execution Prevention"

A HandyAvi customer alerted us to this potential problem. Microsoft introduced something called "Data Execution Prevention" in Windows XP. Its purpose is to prevent executable code (programming statements) from running in areas that are "data" areas rather than "program" areas. Its purpose is to provide extra protection for your environment.

We didn't think we were doing anything to trigger DEP but the customer was trying to run HandyAvi on a "Windows 2003 Server" that had "hardware DEP". He said that when he tried to bring up a file selector to tell where to put his output file, that HandyAvi exited. We are and have been using the Microsoft standard "CFileDialog class" (which in our opinion shouldn't trigger a problem.) We have been unable to replicate the problem on our machines. (If we can't replicate it, then in general, we can't fix it.) We are not the only ones with this potential problem evidently. Microsoft has a list of major third-party programs that need to be excluded from DEP.

We believe that Window 2003 Servers probably default to turning on DEP for EVERYTHING.

DEP can be turned off on a per-application basis, or turned off entirely.

If you experience a problem when you try to Browse for a file, you might want to try going to Control Panel/System/Advanced/Performance Settings/Data Execution Prevention and set it this way:



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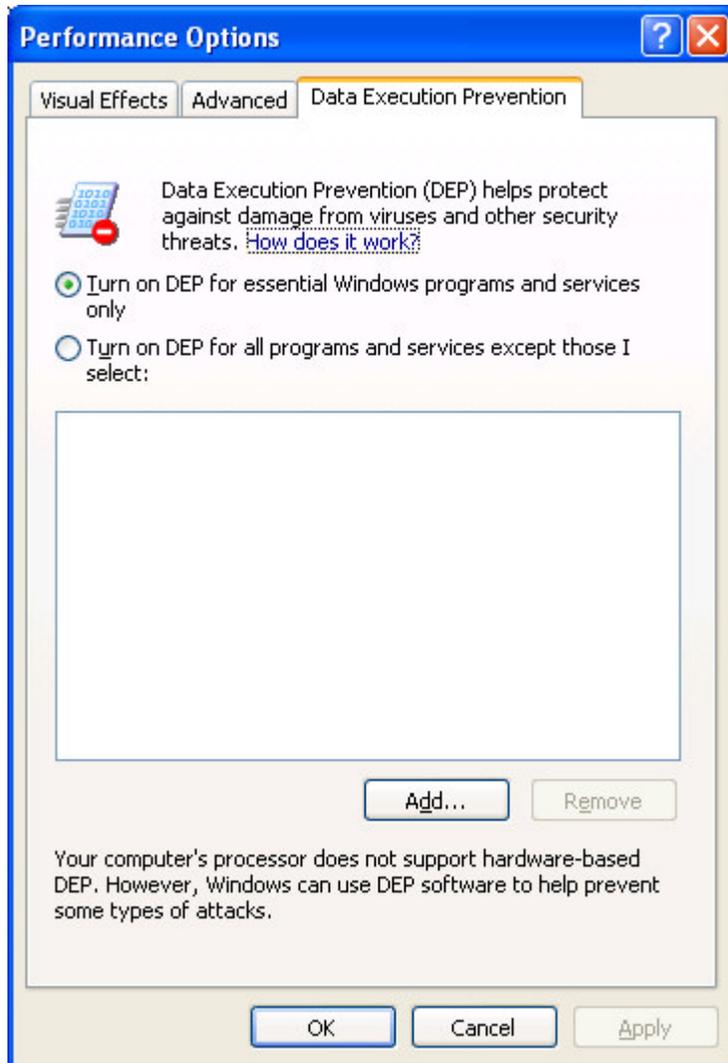


Figure 142

SelectNthFilter Installation

We created a DLL, SelectNthFilter.dll, which allows us to process the video in "stream" mode which makes the batch processing system fast as possible since the frames are processed without having to wait for them to be retrieved or displayed at their recorded frame rate.

We were surprised to learn that the filter we created, SelectNthFilter.dll, requires "Microsoft .NET Framework Version 2.0" in order to be "registered" so that it will run properly with the other video filters in the chain that do the work. SelectNthFilter.dll is the subsystem that selects the output frames according to the number you entered in "Select Output Frames".

At the time this document was written, you could obtain Microsoft .NET Framework Version 2.0 from <http://www.microsoft.com/downloads>. Or do a Google search on "Microsoft Framework 2.0".

After installing Microsoft .NET Framework Version 2.0, please reinstall HandyAvi so that SelectNthFilter.dll will become registered.

We were then further surprised (VERY surprised!) to learn that SelectNthFilter.dll was dependent on a DLL that is installed when you install the compiler but does NOT exist on other machines! Our testing showed that everything was working but the installation was apparently failing on other machines. We have located the rogue DLL and it is now being distributed with our code as of release 3.2 so we hope we seen the last of the SelectNthFilter installation problems!

Note that if you wish to operate HandyAvi **without** Microsoft“.NET Framework Version 2.0, all of the other functions of HandyAvi should work. Only the "[Batch Processing](#)" feature of HandyAvi is dependent upon ".NET Framework Version 2.0" being present.

Crash Handler

HandyAvi contains a "Crash Handler" that can be used to send us information if HandyAvi crashes for some reason. We promise to look carefully at any of these that we receive and fix the problem if we can figure out what caused it. You can help by sending us the report AND by providing some additional text indicating what you were doing at the time of the crash. Every clue helps immensely. Our goal is to provide RELIABLE, TROUBLE-FREE software and we strive to continuously improve our product.

Send us Email if you encounter a problem <http://www.Support@AZcendant.com>

We try to answer all Email as quickly as possible. We will work hard to resolve as quickly as possible any problem you might encounter.

Recovery of An Incomplete AVI File

Recovery of an incomplete AVI file

If a file being captured was not "closed" properly due to a power failure, software failure, process kill operation, or anything else that interrupts HandyAvi processing so that HandyAvi does not get a chance to close the AVI file properly, it is possible to recover the AVI file automatically.

How do I recover a file that was interrupted (not closed properly)?

Simply use HandyAvi (file/open) to open the file.

HandyAvi will see, that in the same directory as your AVI file, there is also a file with the same name as your AVI file except that it has a ".AVX" suffix. The AVX file contains information that HandyAvi will use to reconstruct essential parts of your AVI file when it was not "closed" properly. HandyAvi will automatically repair your AVI file and open it. After successfully repairing the file, the .AVX file will be deleted.

Several customers have reported that this automatic recovery feature worked excellently for them. We did a LOT of testing to be sure that this recovery feature would work. HandyAvi is probably the only AVI file generation program that has this recovery feature.

We thought this feature was essential for surveillance operations where you cannot afford to lose any data.



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We wanted HandyAvi to be at least as reliable as a tape recorder and the addition of this recovery scheme has satisfied that requirement.

If for some reason, the AVI file cannot be opened after automatic recovery is attempted, the AVI file and the AVX file will be unchanged.

PLEASE NOTE that the AVI file, even if it was not completed (closed properly), still contains ALL of the images that were captured.

If you have something of critical importance that somehow cannot be recovered automatically (unlikely), please contact us through our web site (<http://www.AZcendant.com>). We understand the AVI file structures in great detail so we may be able to reconstruct your data. In this case, we would need both the AVI file and the AVX file. (No guarantees but we would give it a try...).



Tips

HandyAvi Tips

This section contains some tips you might find useful.

Can I upload new AVI files to an internet site automatically.

HandyAvi now has a Set up Automatic Upload do a Web Site option in the [Preferences](#) panel under the [File Menu](#).

Can I use a Digital Video camera with HandyAvi?

At least one of our customers is successfully doing so and wrote this to us:

"The Sony HDR-HC1E has a setting called iLink CONV. This needs to set to ON to convert HD DV video to DVI, or the computer will not recognise the format."

We of course have not been able to test all possible video input devices. There are LOTS of them out there.

We have followed Microsoft standards however so this greatly increases the likelihood that a particular device will work with HandyAvi.

- We have tested many webcams. All of them we have tried work well with HandyAvi.
- We have tested many USB-Video adapter cables. All of them we have tried work well with HandyAvi.
- We have tested some video boards such as the WinTV boards sold by Hauppauge and have obtained good results.

When in doubt though, we recommend that you try your video device with a trial version of HandyAvi before purchasing HandyAvi.

Camera Tips

Tips regarding various cameras, adapters, and video boards we have *actually* used and how we have connected them to our computer. We are currently running Windows Vista on our development machines. (We also test HandyAvi on Windows 2000 and Windows XP of course.)

Definitions

We define some terms here so that you will know for sure what we are talking about further down this page.



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1. Webcam - small camera that plugs directly into the USB port on a PC computer. Manufacturers include Philips, Logitech, Labtec, Creative Labs, Microsoft and others. Webcam chips come in two varieties:
 - CCD - Preferred by astronomers because of better performance in low-light conditions, i.e., they tend to be more sensitive.
 - CMOS - Cheaper
2. NTSC - the output signal produced by most hand-held video cameras, DVD players, VHS players, security cameras. NTSC is the signal used by broadcast television (prior to digital television anyway). NTSC is a VERY widely used video standard in MANY countries. (NTSC is used in the USA.)
3. PAL - Similar to NTSC but it is used in even MORE countries than those using NTSC! (PAL is used in Europe.)
4. S-Video - a video signal that is delivered by a 4 pin circular plug. Typically a better quality signal.
5. Phono plug - Plug that was developed for audio applications but often also used to deliver video signals.
6. BNC connector - specialized coaxial cable connector used on high-quality equipment. It "locks" with a twist so cannot be jerked loose like a phono plug.

Webcams

The cameras we've tested with and use to make our own movies include the following:

1. **Philips PCVC 740K ToUcam.** A favorite among amateur astronomers. This is a CCD camera that works well in low-light conditions. No longer in production.
2. **Philips SPC 900 NC/00 PC Camera.** Also a favorite among amateur astronomers. This is also a CCD camera and appears to be the successor to the PCVC 740K.
3. **Logitech Quickcam VC.** An older CMOS camera that we test with because its driver is "peculiar". (Unlike most other camera drivers, the Quickcam driver does not "go away" when the camera is unplugged. We had to do extra work to protect you from this anomaly.)
4. **Logitech Quickcam 4000.** A CMOS camera that seems to perform pretty well under low-light conditions. (We have had good results making movies of Jupiter, etc.) The driver for this camera does a better job of removing itself when the camera is unplugged than does the Quickcam VC.

USB Video Adapters

USB Video Adapters allow NTSC and PAL cameras to be connected to the computer's USB port.

In order to connect a typical surveillance camera to HandyAvi, you need an adapter that converts NTSC to USB.

These adapters are readily available and many companies are selling them.

There is a lot of variation however and each type of adapter has its own features. Some have "quirks". We wonder why different adapters have different restrictions on image sizes supported...

"USB 2.0 Video Adapter with Audio"

We have successfully used a "USB 2.0 Video Adapter with Audio" device with HandyAvi. This adapter seems to work well and we've used it during the Geminid meteor shower to capture meteor trails with a Watec WAT-902H2 Ultimate camera. This adapter allows selection of image sizes of 160x120, 176x144, 320x240, 352x240, 640x240, 640x480, 720x240, 720x480, 352x480 or 360x480. Powers itself from the USB port. No external power supply is required.

"EasyCAP Video Adapter with Audio"

We have also successfully used the "EasyCAP Video Adapter with Audio" (Model Number DC60) device with HandyAvi. It has some peculiarities though that you should be aware of.

USE CAUTION WHEN USING THIS DEVICE. DO NOT UNPLUG IT FROM THE USB PORT IF IT IS SELECTED FOR CAPTURE.

Also, it defaults to "TV Tuner" mode so is not initially looking for your camera. In HandyAvi, you will need to bring up one of the Capture modes such as "Time-Lapse Images..." You should see an item in the Capture Device list that says "Syntek STK1150". This is the EasyCap device. Select it then click on Video Source. That will bring up the manufacturer's "Properties" window seen below.

The device comes up with "TV Tuner" set. (It doesn't come with a TV Tuner so that is a pretty strange default...) Change that to "Composite Video". It defaults also to PAL /B so select NTSC/M if you are in the USA using NTSC video. (**NTSC /M** is North American **NTSC**, **NTSC/J** is Japanese **NTSC**.) In Europe, you probably will want to select one of the PAL types. Close the window.

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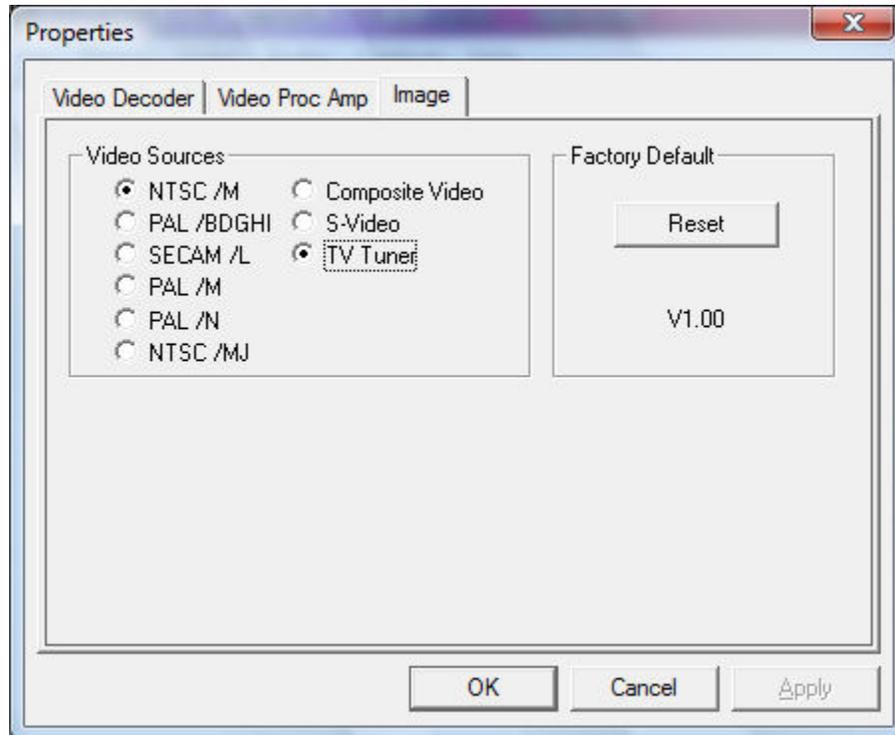


Figure 143

Be prepared to wait for 60 seconds until video shows up in the Live Video Preview window. This delay also occurs after you change "Video Format...".

We have completed our investigation into this strange delay behavior. The EasyCap device creates a 60 second delay when its audio is not attached. We attached the audio (but we don't "use" it in HandyAvi) in our new *unreleased* version of HandyAvi and the delay no longer occurs. However unplugging the device from the computer's USB port when it is selected causes applications using EasyCap to "hang". This is true for for the "Ulead Video Studio SE" application that ships with EasyCap and it also occurs in all other software systems we've tested using EasyCap. This appears to be a problem with the EasyCap driver. We've been unable to locate a driver update.

AGAIN, USE CAUTION WHEN USING THIS DEVICE. DO NOT UNPLUG IT FROM THE USB PORT IF IT IS SELECTED FOR CAPTURE.

It also initializes with a default image size of 720x576. To change the image size, select "Video Format..." in HandyAvi. Strangely, you will see that none of the possible selections are 720x576! However, you can select one of the following: 160x120, 176x144, 320x240, 352x240, 352x288, 640x480 or 720x480. Powers itself from the USB port. No external power supply is required.

Diamond Multimedia "One Touch Video Capture"

We have successfully used this adapter with HandyAvi. The adapter seems to work well.

This adapter allows selection of image sizes of 352x576, 352x288 or 720x576 only.

Powers itself from the USB port. No external power supply is required.

We obtained three other manufacturer's adapters for testing and had good results with all of them.

NTSC Cameras

We have a **Watec WAT-902H2 Ultimate** camera that produces an NTSC signal.

Why this camera? Because it is one of the most sensitive cameras that is currently being manufactured. It is sensitive to .0001 Lux according to the manufacturer. This is VERY sensitive to very low levels of light and ideal for certain astronomy applications such as making videos of meteors and, possibly, meteor strike flashes on the dark side of the moon (although no one has successfully captured a meteor strike flash yet... You could be the first...)

We bought a RadioShack cable that has a Female BNC connector on one end and a Male Phono plug on the other end.

We connect the cable's BNC connector to the camera's BNC connector then we plug the phono plug into a USB Video Adapter.

We bought a "**USB 2.0 Video Adapter with Audio**". It has a female phono plug that accepts a male phono plug. The other end has a USB plug.

We plug the USB end into the computer's USB port.

Then we bring up HandyAvi and open Capture/Time-Lapse Images...

We see, in the Capture Device list, an item that says: "USB 2821 Video". If the camera is powered up, we see its video in the "Live Video Preview" window. Similarly for the other Capture menu modes.

We upgraded the "Capture Device" panels of our various "Capture" methods to display the "Video Source" for adapters or other video devices that allow a choice of video input. The "**USB 2.0 Video Adapter with Audio**" allows input from either an NTSC or PAL camera video source. In addition, it can accept data from an S-Video source.

If HandyAvi is connected to a device that offers a choice of video sources, it will now display a "Video Source..." button in the "Capture Device" panel allowing you to bring up the manufacturer's source selection window.

Video Boards

We have two video boards:

WinTV PVR-250

This board is normally used to watch television on a PC. The PVR-250 board has:

1. A TV input Phono jack
2. An S-Video composite video input jack



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3. An audio input jack (Line-in)
4. A remote control (IR) receiver socket

The TV input Phono jack can be used to input an NTSC signal from a camera or a VCR.

The board will also deliver video signals from an S-Video device such as a VCR or DVD player.

HandyAvi now has a "Video Source" button that accesses this board's "Crossbar" properties allowing you to select the input and output modes.

WinTV HVR-1800

This board came with our "HP Media Center PC."

This board displays in the "Capture Device" area as a "**WinTV 885**" board.

HandyAvi now exposes the manufacturer's "TV Tuner" window if their driver supports this feature. This board's driver does support this feature.

We can change channels and view Television from within HandyAvi using this board.

We have also successfully fed the NTSC signal from our NTSC cameras into the Composite Video port of the WinTV device and have successfully accessed the camera's video using HandyAvi.

There were two different "Composite Video" choices and we had to try each one to see which one would deliver a signal.

The video produced by this board looks exceptionally clean! Very sharp images...

This board allows selection of output image sizes of 80x60, 88x72, 128x96, 160x120, 176x144, 240x176, 240x180, 320x240, 352x240, 352x288, 640x240, 640x288, 640x480, 720x240, 720x288 or 720x480.

Things that didn't work

We bought an "**InstantDVD+MP3**" device from ADS Tech because it looked like it might work with HandyAvi. We tried to make it work with HandyAvi then finally wrote the manufacturer.

We received the following reply:

"Unfortunately, because this device is hardware encoded, it requires specific software for its video capture correctly. So basically, it will only be compatible with the software that it is bundled with for the video capture aspect of the device."

(We still think that with enough research we might get it to work but we are not devoting time to that at the moment given that good USB video adapters work well with HandyAvi. We tried again more recently but the device doesn't even show up in the USB device list shown by Microsoft's Device Manager. Very puzzling... Very non-standard?)



Menus

File Menu Commands

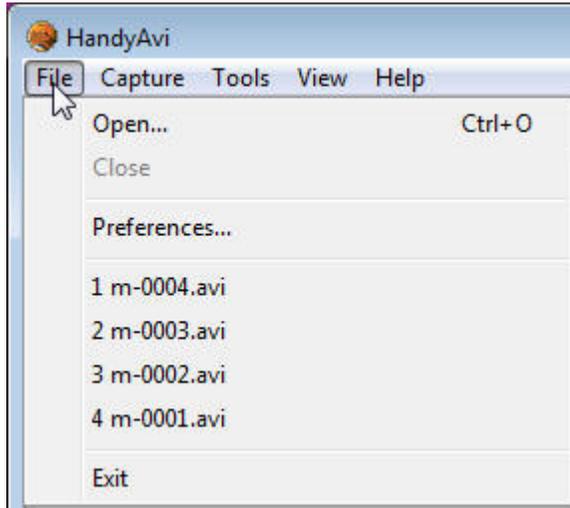


Figure 144

The **File** menu offers the following commands:

- [Open](#) Opens an AVI file.
- [Close](#) Closes an opened AVI file.
- [Preferences](#) Allows preferences to be set such as deinterlacing interlaced video images.
- [Exit](#) Exits HandyAvi.

Capture Menu

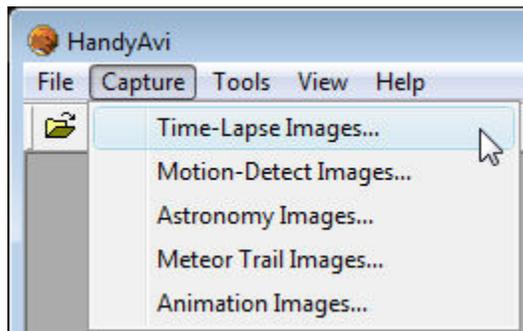


Figure 145

The capture menu allows you to choose the type of AVI file you wish to create.

- [Time-Lapse Images](#) Set up HandyAvi to do time-lapse imaging.
- [Motion-Detect Images](#) Set up HandyAvi to do motion-detection imaging.
- [Astronomy Images](#) Set up HandyAvi to do astronomical imaging.
- [Meteor Trail Images](#) Set up HandyAvi to do meteor trail imaging.
- [Animation Images](#) Set up HandyAvi to do animation

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Tools Menu

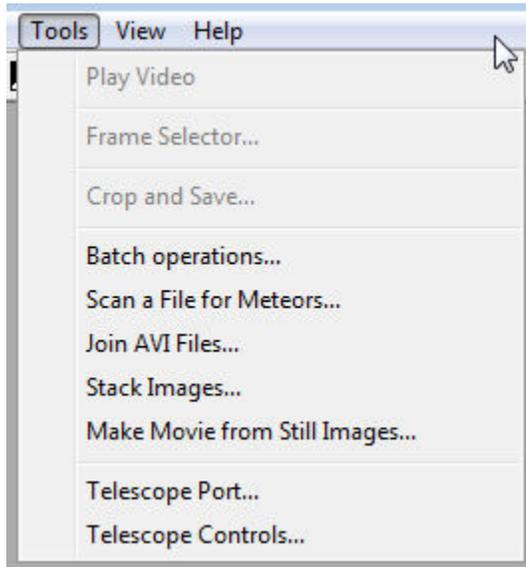


Figure 146 - No movie file is open

Open an AVI movie file by using the File->Open menu item or by clicking and dragging an AVI file onto the HandyAvi window.

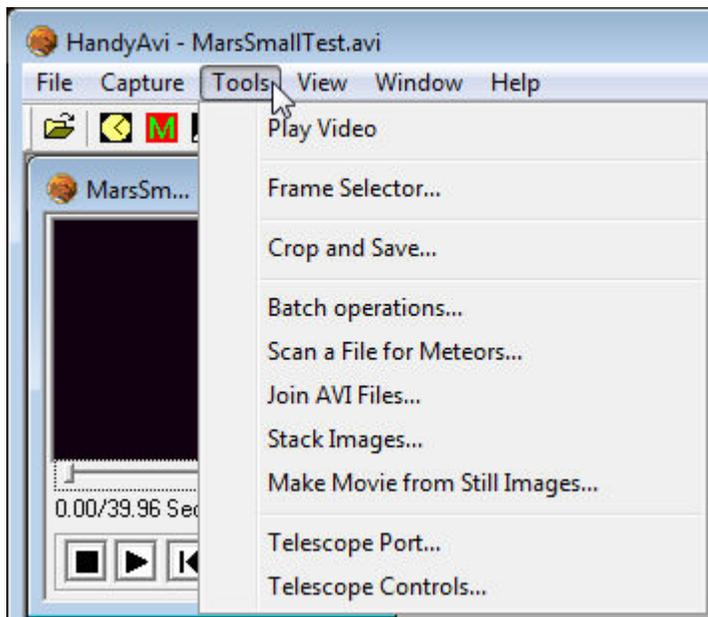


Figure 147 - At least one movie file is open

[Play Video...](#)

Reinitializes the active AVI file and plays the movie from the beginning. This menu item is not active (grayed) unless an AVI file is open for playing within HandyAvi.

[Frame Selector...](#)

Opens the AVI file Frame Selector feature. This menu item is not active (grayed) unless an AVI file is open for playing within HandyAvi.

Crop and Save...	Opens the AVI file Crop and Save feature when an AVI file is open on the screen. This menu item is not active (grayed) unless an AVI file is open for playing within HandyAvi.
Batch Operations...	Creates Time-Lapse movies from non-Time-Lapse movies. If you already have an AVI movie file and you would like to create a Time-Lapse movie from it, this will allow you to do it.
Scan a File for Meteors...	Scans an existing AVI file for meteors and creates a new AVI file containing only the meteor tracks that were detected.
Join AVI Files...	Creates one AVI file from two or more AVI files by splicing them together.
Telescope Port...	Opens the telescope communications port so that the proper port may be selected.
Telescope Controls...	Opens the telescope controls panel which provides control over any telescope that responds to Meade LX-200 commands.

View Menu

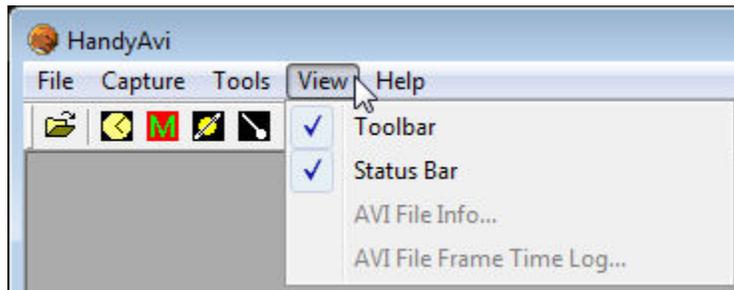


Figure 148 - The menu when no movie file is open.

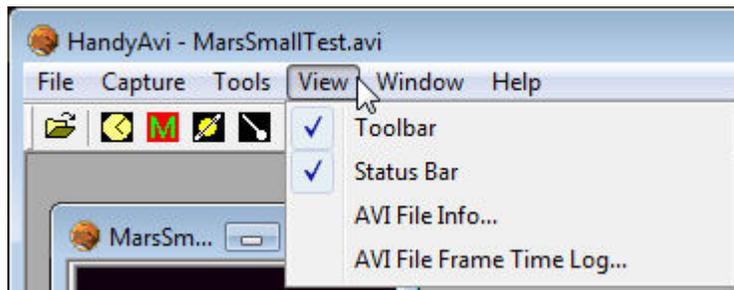


Figure 149 - The menu when a movie file is open.

The **View** menu offers the following commands:

[Toolbar](#) Shows or hides the toolbar.

[Status Bar](#) Shows or hides the status bar.

[AVI File Info...](#) Displays file information for the selected AVI file.

[AVI File Frame Time Log...](#) Displays the time log showing the time of each frame of a selected AVI file.

Window Menu



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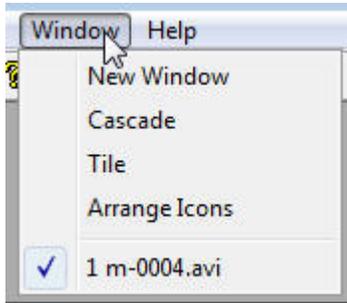


Figure 150

The **Window** menu offers the following commands, which enable you to arrange multiple views of multiple documents in the application window:

NOTE: The “Window menu is hidden unless at least one AVI movie file is open.

[Cascade](#) Arranges windows in an overlapped fashion.

[Tile](#) Arranges windows in nonoverlapped tiles.

[Arrange Icons](#) Arranges icons of closed windows.

Help Menu

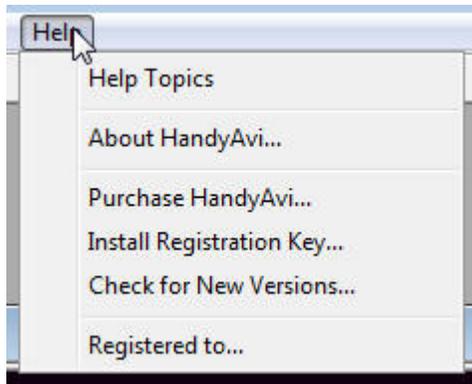


Figure 151

The **Help** menu offers the following commands, which provide you assistance with this application:

[Help Topics](#) Offers you an index to topics on which you can get help.

[About](#) Displays the version number of HandyAvi.

[Purchase HandyAvi...](#) Go to <http://www.AZcendant.com> to purchase a HandyAvi license.

[Install Registration Key...](#) Install registration key. A key is obtained via Email when you purchase HandyAvi.

[Check for New Versions. . .](#) Check for new versions of HandyAvi via the internet.

[Registered To...](#) Displays registration data for current user.

ToolBar window



Figure 152

The toolbar window shown above allows rapid selection of AVI File open, Time-Lapse capture, Motion-Detect capture, Astronomical Image Capture, Meteor-Detect capture and Animation capture.



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