

# **Gerald's Column**

## **by Gerald Fitton**

This month I shall consider how you might want to process video on your next computer.

### **Video**

Last month (December 2004) has been the month for school plays and, consequently, making videos of grandchildren demonstrating their ability to perform on stage!

Three of my four grandchildren attend the same school. I am well known to the teachers because I often take and pick up the children when their parents are otherwise engaged. Consequently, when I asked (well in advance) if I could video the productions I was not even asked to sign the usual 'taking photos of children' form. I assured the teachers that I would include all members of the class on the film and give them a version on DVD.

Each of the three school productions took place in the morning and so by lunch time the same day as the production, I was able to take an unedited version on DVD back to the school for their own use. Their first use, the same afternoon, was to run the 'rushed' DVD for the class (or the classes) taking part in the show. The school will use clips from these DVDs, together with other video clips (from other sources), to produce a DVD of their 'school year'. This will be put to good use as publicity material for the school.

### **My Camcorder**

My camcorder is a rather old Panasonic NV-DS5 which uses standard DV (Digital Video) tapes. Compared with more modern digital camcorders its principal limitation is that there is no DV (Digital Video) in, only DV out. Nevertheless it serves its purpose well.

A DV tape run in Standard Play mode will record one hour's worth of digital video. In Long Play mode it will store 90 minutes worth but the quality is slightly worse. My VW-VBD1E rechargeable Li-ion batteries used to last just over 90 minutes; now they last just over an hour. I can use them with a DV tape in Standard Play mode.

### **The Computer Link**

These days it seems to be fashionable to connect everything such as printers, modems, and cameras to the computer via a USB port. My camcorder has no USB but an IEEE 1394A port. The IEEE 1394A port is usually referred to as a Firewire Port. I have had absolutely no trouble with this connection whereas I do know of people who have had trouble with connecting their cameras, even snapshot cameras, via a USB port. So, although I may be wrong about this (and I await your comments), I recommend a Firewire connection.

### **Capture**

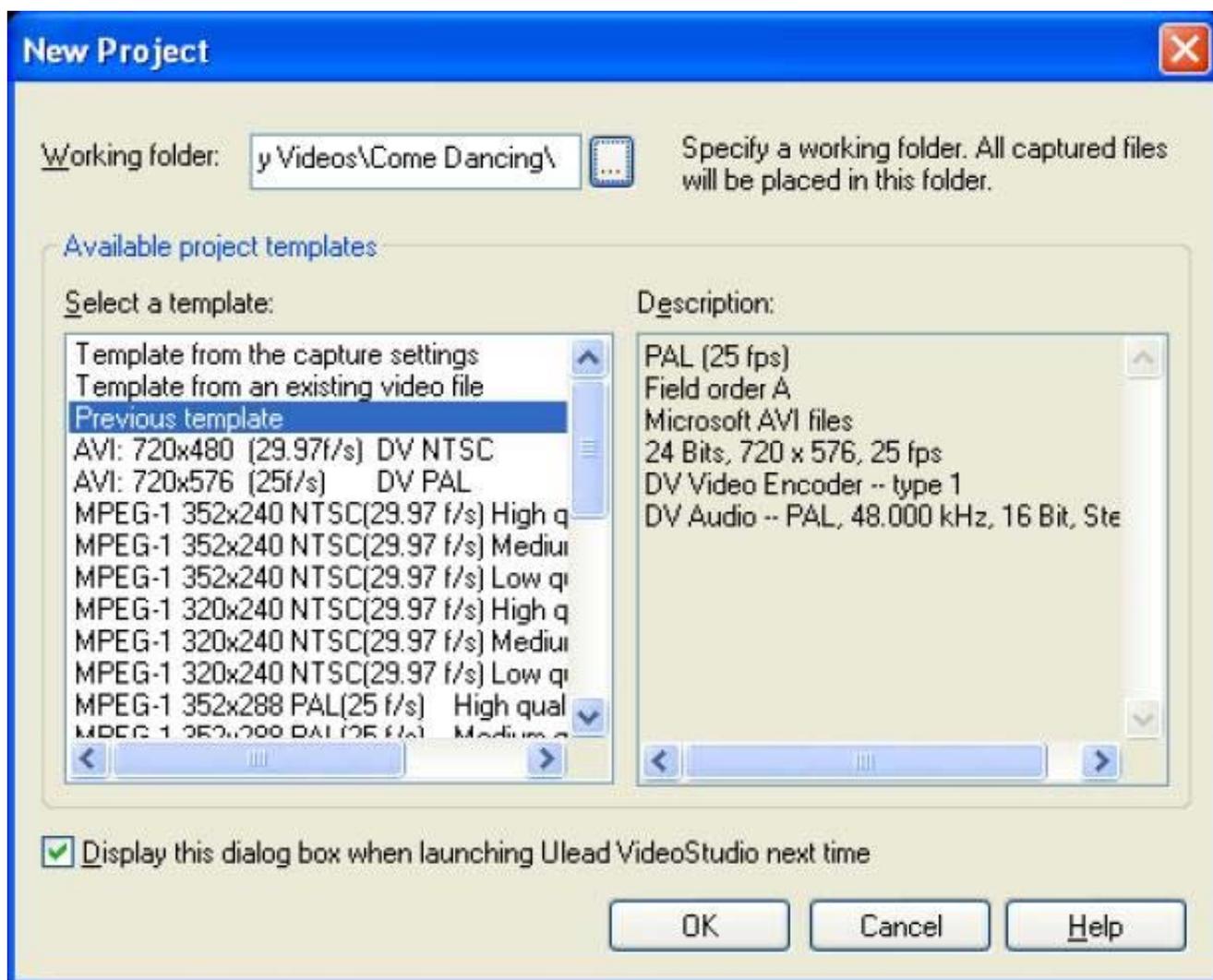
The process of transferring the video from the camcorder to the computer is known as 'Capture' or sometimes 'Video Capture' to distinguish it from capturing stills.

You need software which will execute this capture. Usually this comes as part of a video editing package. This software, used to edit your masterpiece, will offer a choice of sources which will nearly always include Firewire; only a few offer USB capture.

## File Size

Most software packages will offer to store the captured video in many different formats. In the screenshot below you will see some of them. In two later screenshots you will see others. With such a large choice it is difficult to know where to start.

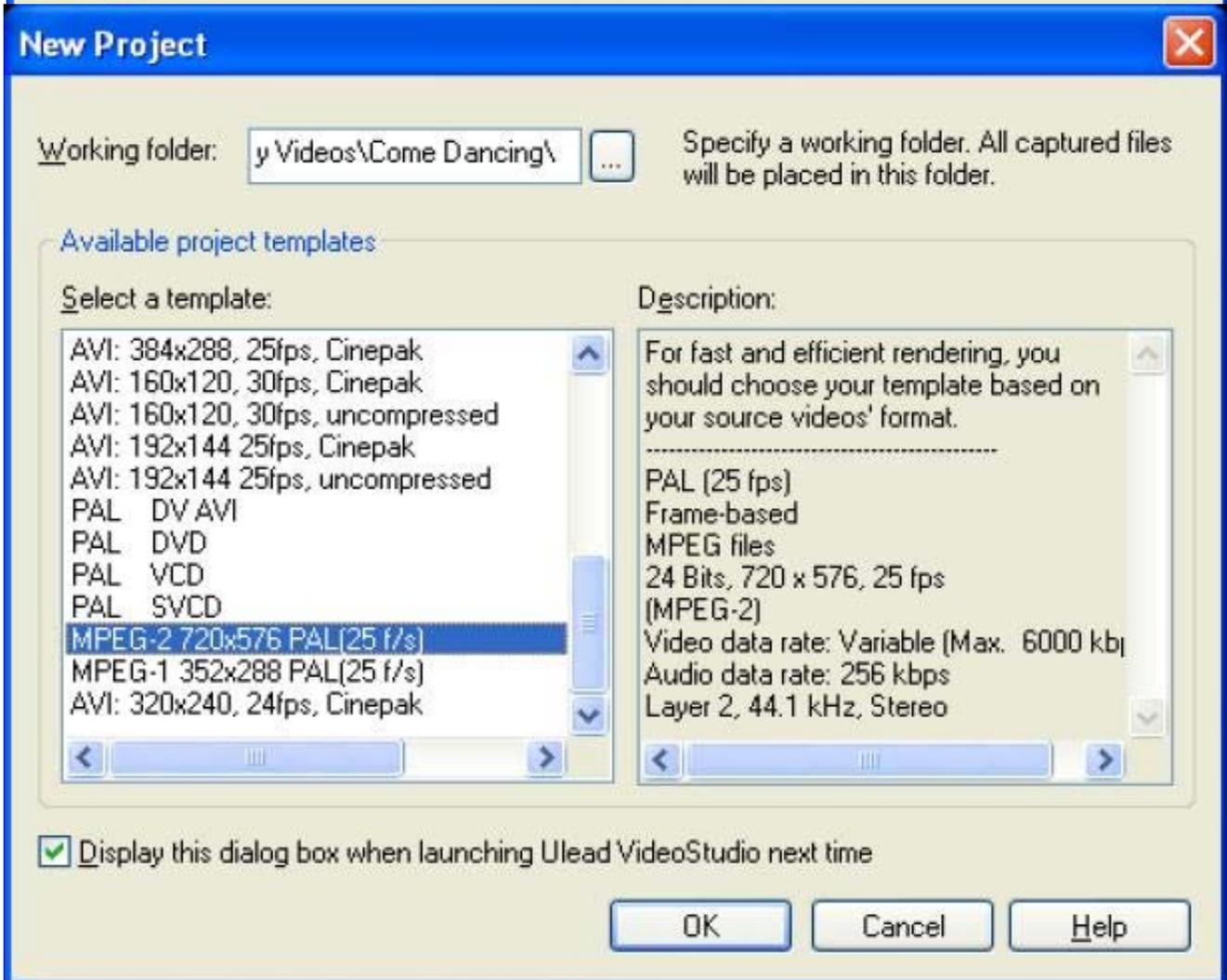
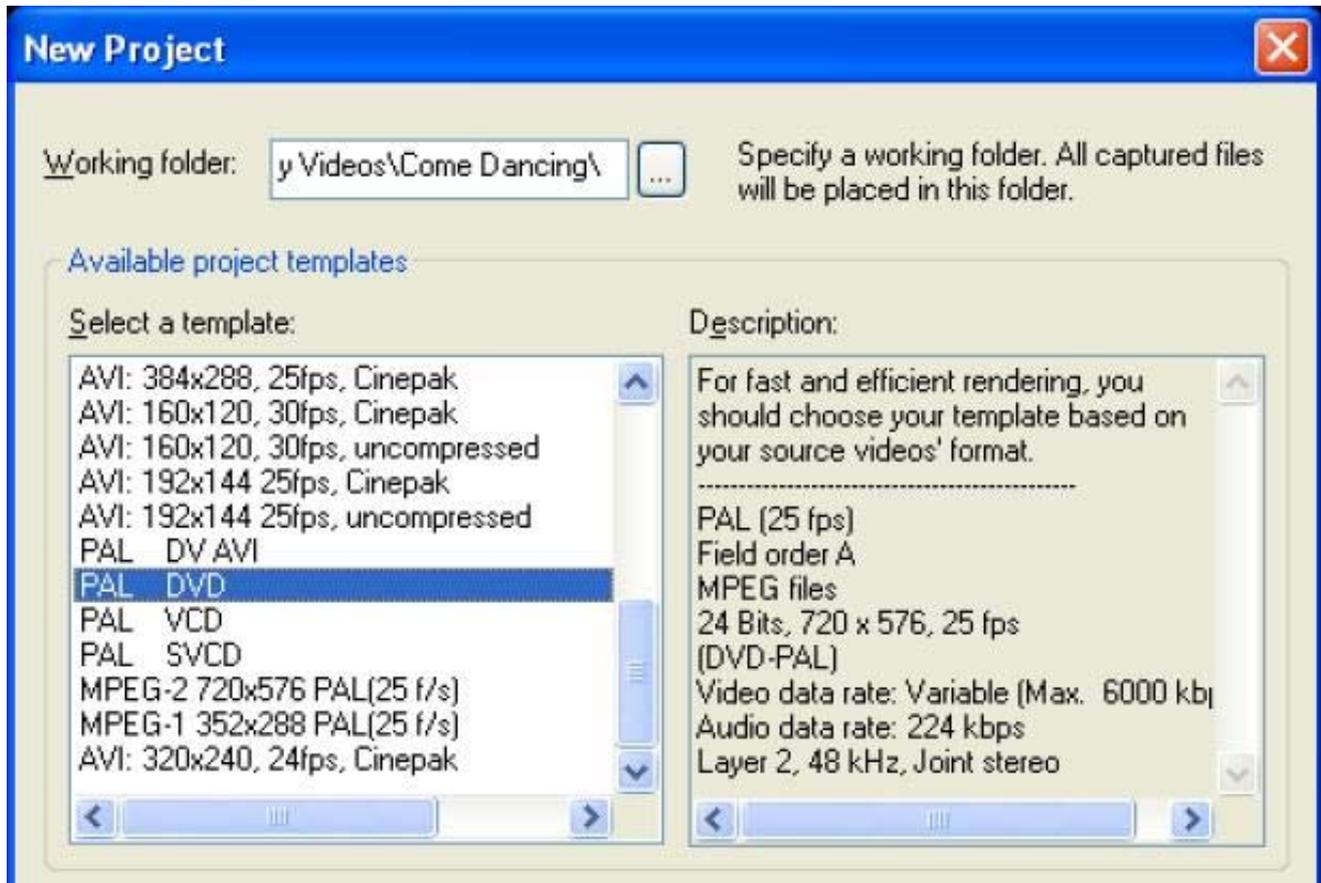
In the screenshot you will see two AVI formats. Unless you want to use the USA standard (NTSC) then you should choose the DV PAL format. I used that for my "Previous template".



Generally you should choose 'AVI 720 x 576 at 25 frames per second (fps) DV PAL' because it retains the original data with the highest fidelity. I have highlighted a couple of other formats which are worth considering in the screen shots below. The 'PAL DVD' format will transfer directly to a PAL DVD whilst the 'MPEG-2' format I have highlighted is a more general format which can be imported into more packages than can the 'PAL DVD' format. Each of the school videos I shot are of about 45 minutes duration and the size of the resulting AVI file is about 9GB. This works out at about 12 GB per hour or 3.33MB/sec.

The DVD and MPEG-2 files run with a bit rate approximately 2.5 times less than this.

I believe that there are various forms of AVI file. In the screenshot you'll see that the audio is set to 48kHz, 16 bit Stereo. I do not know what "Field order:A" means nor do I understand what a "Type 1" DV Video Encoder is. I guess that it is these are parameters which are different in other variants of the AVI format.



You will see that I recorded the Strictly Come Dancing final and I am making it into a DVD.

## Permanent Storage

The most economical method of storing high quality (that is 12 GB per hour) video is to save the avi file back onto a camcorder DV tape. Most of the modern digital camcorders allow you to do this; my older Panasonic NV-DS5 doesn't. However, I have received news that there a 'gadget' which can be plugged into the 'still capture' port of the camcorder docking station which can be used as a 'hack'! I have it on order!

## Conversion Without Loss

I suppose it is an obvious comment, but it is always possible to compress a file or reduce the frame resolution but, once information has been lost, it can never be recovered.

I use the memory hungry AVI format as my master for all conversions. This strategy ensures that I always start with the best quality version of my masterpiece.

My understanding is that transfers between DV on the camcorder tape and the AVI format on the hard drive is without loss and so can be repeated as often as desired without loss. I do not have the equipment (yet) to discover if this is true.

## Pixels

I know that some more recent software can handle the 16:9 wide screen format. I am not (yet) familiar with the detail so I shall concentrate on the 4:3 format in what follows.

Contrary to what I said in an earlier article, the 'standard' for the PAL TV used in the UK is considered to be 720 x 576 pixels. This is exactly 4:3 format. Although in the UK the TV is said to have 625 lines, not all these lines have picture information on them. Indeed, with the vertical picture having only 576 pixels it is only possible to display 576 lines at most!

All three of the formats I highlighted above retain this 720 x 576 pixel resolution. The format which is shown on the screenshot as 'PAL DVD' runs audio at 48kHz (like AVI) but in the 'MPEG-2' format highlighted, this is reduced to 44.1kHz. This reduction represents a small (possibly not noticeable) loss.

One obvious downgrade is to reduce the number of pixels. Halving both the horizontal and vertical resolution will cut file sizes and bit rates by a factor of four. The usual standard for is not 360 but 352 pixels across the horizontal width. The standard is 352 x 288. I have to say that when I have played a video I know is 352 x 288 on a 20 inch TV most people can't tell the difference between that and the same video at 720 x 576. I can tell the difference because I know exactly what I am looking for!

The format known as PAL VCD (Video Compact Disc) is 352 x 288 pixels with 44.1kHz audio. It is possible to store a little over an hour of video on a conventional CD using this format. Nearly all modern DVD players will read this format perfectly. I have distributed copies of a video in VCD format (to friends and relatives) because it is much cheaper than DVD and the difference in quality is not immediately apparent to most viewers.

There is a little used format called PAL SVCD (Super Video Compact Disc) in which the horizontal resolution is cut to 480 pixels but the vertical resolution is retained at 576! Some stand alone DVD players will play this format but many, indeed most, will not. A typical SVCD will run for about 35 minutes.

I have an iPAQ h4150 which I bought primarily to use as part of a Satellite Navigation System for my car. However, it can be used to display both still pictures and video. When used for video the screen is 320 x 240 pixels. The file format best suited to this display is a version of WMV ('Windows Media Video') 320 x 240 which runs at 25 frames per second.

Some of the more recent PDAs (Personal Digital Assistant?) have a screen resolution of 640 x 480. With appropriate software WMV 640 x 480 can be saved and transferred to these newer PDAs. If your master is 720 x 576 pixels then 640 x 480 loses information.

## **Compression**

The MPEG format can be used as an alternative to the WMV format.

In general MPEG-2 is used for higher resolutions such as 720 x 576 with MPEG-1 being preferred for lower resolutions such as 320 x 240 pixels.

If we regard the AVI file (12 GB per hour) as our (without loss) 'standard' then the 'best' MPEG-2 format compresses the file by a factor of about 2.5 whilst retaining the same (pixel) resolution. Of course it is possible to use MPEG-2 with compression ratios up to 6 times greater than this. By this I mean files which are  $2.5 * 6 = 15$  times smaller than the AVi file rather than a mere 2.5 times smaller!

There is an even wider range of MPEG-1 formats available for lower resolution pictures. At the moment I am still on a dial up Internet connection so I am still experimenting with these and low resolution, high compression WMV formats.

Using a WMV format I have been able to produce about 10 seconds of 640 x 480 video with a file size of less than 700 kB. At a resolution of 320 x 240 pixels the file is 150kB but, with the lowest resolution of 160 x 120 pixels the file size is only 50 kB! Certainly with this smallest file size it is possible to send a few short clips from a dial up connection or even include it on the Archive monthly disc!

Rather than use the smallest file size I have included a 20 second clip in WMV format saved at a resolution of 320 x 240 pixels. It runs at 25 frames per second. It is a 20 second clip from a 3 minute video. The original is on 8mm cine film shot in 1964! I hope that you will find a means of playing it!

## **Communication**

Thanks for all your emails, letters and discs. These days I am finding an increasing number of my correspondents are sending me CDs they have burned rather than floppies. That is because the files they are sending me are much larger than can be fitted onto a floppy. I guess it is a sign of the times?

I am in the process of changing over from a dial-up to a broadband connection. Until that is operating properly please don't send me huge files as an email attachment. My filter may reject it!

Please contact me by email (preferred) or by letter if you have any questions or comments. You can email me at <Archive@abacusline.demon.co.uk>. When I get on Broadband this address will change.