T3Vid

T3D023 USA Europe

User Manual

Video Clips for

Testing and Optimisation of

Video Compression

TestVid

www.testvid.com

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T3D023_USA_Europe User manual v1.0

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Contents

1. Overview of T3D023 USA Europe

2-D / 3-D	3D Stereoscopic
Compressed/ Uncompressed	Uncompressed Left & Right (separate streams)
Description of video	Scenes from USA West (San Francisco and Las Vegas) and Europe (UK)
Purpose	Test an encoder to deal with 3D video, with all aspects of global and local motion, slow/medium/fast motion, with panning, scrolling, zooming, smooth and erratic, high/low contrast, with limited colours/vivid colours and many common subject types, plus different aspects of 3D (different negative & positive disparity, colour & luma differences). Also tests how a decoder deals with 'difficult' encoded video.
Number of clips	Total 138 Left & Right pairs: 1) 69 at 1080p30 2) 35 at 1080p24 3) 34 at 720p60
Length of video	Total of approx. 1 hour 16 minutes
Total size on disk	Approx. 784 GBytes
Video format(s)	File Nos. T3D0230nn, Resolution 1920x1080, Frame rate 29.97 T3D0231nn, 1920x1080, 29.97 T3D0232nn, 1920x1080, 23.976 T3D0233nn, 1280x720, 59.94 (where 'nn' are the numbers of the individual streams) All are progressive, YUV planar, 4:2:0 chroma, 8 bits per sample
Audio format(s)	MPEG-1 Layer II stereo 384kbps CBR 16-bit 48kHz and WAV linear PCM uncompressed stereo 1536kbps 48kHz

2. Introduction

T2Vid and ***T3Vid*** are high definition (HD) video clips designed for testing video encoders and decoders.

The ***T3Vid*** clips are stereoscopic 3-dimensional (matched left and right images); the ***T2Vid*** clips are 2-D.

Both the ***T2Vid*** and ***T3Vid*** clips come in two variants: those designed to test and stress video encoders (usually in uncompressed YUV format, some of which have associated sound); and compressed video designed to test the range of options available in a standards-compliant video decoder (in compressed format such as MPEG-4/AVC/H.264 or MPEG-2, both as elementary streams and in 'wrappers' such as MPEG-2 Transport Stream).

2.1 T2Vids and T3Vids for testing encoders (and decoders)

Each set of clips for testing encoders contains a diverse selection of clips designed to stress a video encoder in different ways. Typically this includes different movement types, different subjects, different lighting conditions, different camera movement - designed to encompass the majority of different types of difficult-to-encode items. In some cases the quality of filming is marginal - deliberately so, as this is often the hardest to encode. The majority of the filming was done hand-held, as is quite often the case with documentary and even film currently. However, in all cases there has been no video editing as such (unless otherwise stated for a specific clip) - all the separate video clips are direct decodes from the HD camera files, with no re-compression/re-encoding done. Where video editing has been done the re-encode is only at the transitions - the vast majority of these clips are also as per the original camera files.

As the video that results from encoding is often a lot more complex than 'standard' video, the encoded clips are also a good test of a decoder.

These clips are provided as sets of video clips, typically 30 - 50 in a set, lasting from 15 - 20 minutes total. These include:

- ‘standard’ HD of real-world subjects (1920x1080, 1280x720; e.g. in New York, San Francisco, London, Munich)
- as above but D-cinema resolutions (2K and 4K)
- as above but 'low' resolutions such as NTSC, D1 PAL, CIF, mobile, web, etc.
- synthetically generated, which has features such as precisely defined motion - ideal for checking such items as encoder motion estimation

The formats/resolutions provided vary from by clip set; as an example all the HD sets are provided at 1920x1080 progressive, 1920x1080 interlaced and 1280x720 progressive formats, in uncompressed YUV format, 16:9 aspect ratio.

All filming was done native HD (or higher resolution, e.g. 2K, or in some cases with camera sensors 3.8k x 2k resolution).

Most clip sets are provided in 8 bits per sample; some are available at 10-bit or 14-bits per sample.

The ***T2Vid*** clips are straightforward 2-D clips; the ***T3Vid*** clips comprise matched left and right video images. The ***T3Vid*** clips have the 'extra dimension' of varying 3-D depth: from shallow to deep 3-D effect, into or out of the picture, with additional artefacts and difficulties that can be encountered in 3-D.

2.1.1 Audio

Sound is provided for almost all clips: in some cases this is sound recorded which is directly associated with the clips, in other cases the sound comprises appropriate background or music.

In a few cases the associated audio is one of the main reasons for recording the clip so both should be viewed together (where this is the case the notes state this for the specific clip in the manual). However, note that in most cases the associated audio provided is just that which could easily be recorded at the same time as the video, typically comprising background sounds, and is often of low quality as the sound was not the primary consideration at the time of filming.

2.1.2 Software

In addition to the video and audio, utility software to process the YUV video is provided as listed in section 4 and information on YUV viewers.

2.2 T2Vids and T3Vids for testing decoders

These are designed to test standards-compliant video decoders, by providing a series of video clips where the same video source material is encoded at different bit-rates with different encoder options.

Normally each clip is provided more than one format: typically MPEG-2 and MPEG-4/AVC/H.264 elementary video formats, at both 1920x1080 and 1280x720, as well as the source video in YUV format. In addition, each clip is typically encoded into one or more 'wrapper' formats such as MPEG-2 Transport Stream, with the associated audio in an appropriate format.

The associated audio is also provided as separate elementary files.

Full information on the currently available sets of ***T2Vid*** and ***T3Vid*** clips series is at www.testvid.com.

2.3 *TestVid* logo

The ***TestVid*** logo (or a variant of it) is usually placed in the lower left corner of the video. It is a condition of the license agreement for ***TVids*** that this logo is not removed or obscured.

The logo has been carefully sized and placed to coincide with the borders of a 16x16 macroblock (where this is possible) and is static throughout each sequence, in order to have minimal effect on encoders and decoders.

2.4 Safety

The ***TVids*** are almost invariably supplied on a USB hard drive unit. This unit may be mains powered or powered directly from the USB port.

In all cases it is imperative that you carefully read and understand the safety information provided with the unit.

2.5 Backup

As the ***TVids*** are almost invariably supplied on a USB hard drive unit it is highly recommended that you make an immediate backup of the whole unit, as hard drives can of course fail. (This backup copy is in addition to the 25 copies allowed by the license agreement.)

The warranty on the hard drive is 180 days, but if it does fail it would of course take some days at least to provide a replacement unit.

3. T3D023 USA Europe Clip set description

3.1 Set content types

This set of video clips comprise a range of subjects, motion, colours, light levels designed to test and stress 3D video encoders by providing a varied set of conditions:

- subject types such as people, traffic, buildings, sky, water, trees, text..
- movement types such as panning, tracking, hand-held camera, zooming in/out
- subject motion such as into, out of or across the picture, in front of and partially behind objects, fast and slow
- lighting conditions, from bright sunlight, dull daylight, shaded areas, night-time..
- hard to encode items such as reflections, fine lines, patterns, round objects..
- varying camera properties such as depth of field, in/out-of-focus..
- and with sound associated with the clips

plus the 3D aspects of:

- different amounts of continual negative disparity (i.e. out of the screen towards the viewer, in front of the screen plane) and positive disparity (i.e. into the screen away from the viewer, behind the screen plane); sometimes varying within a scene
- different amounts of temporary (short-term) negative and positive disparity
- matched and unmatched colour between Left & Right streams
- matched and unmatched geometric properties between Left & Right streams (e.g. unmatched on zoom)

In many cases the video is harder to encode than might normally be expected, as the lighting conditions are not ideal or there is significant camera movement, or the focus varies, or the disparity is larger than is normally comfortable. These features are deliberately used as they often cause the most difficulty to 3D video encoders and represent the worst case that the encoder should encounter in 'normal / real' use.

The total time of the pairs of Left & Right clips is over 38 minutes (over 19 minutes in each of the formats).

3.1.1 Scene cuts / composite sequences

Although some sequences have fades/transitions within them, fast scene changes (i.e. scene cuts) are not provided within the set of clips as they are easy to do simply by adding two of the YUV files together.

One way to do this is using the DOS command window:

```
copy /b file1.yuv+file2.yuv file12.yuv
```

(where `file1.yuv` and `file2.yuv` are the two files to be added together, and `file12.yuv` is the result)

This makes a combined file '`file12.yuv`' with a scene cut at the join between the two. (This works as there are no headers on the YUV files.)

The YUV files being added together must be the same resolution, although they can be different frame rates.

The advantages with adding files together in this manner are that:

- it allows composite sequences which either contain fairly similar scenes, so that the resulting scene cut is more 'gentle', or completely different scenes, depending upon how radical a scene cut you wish to have;
- several scenes can be added together to make composite sequences with multiple different levels of scene cuts (from gentle to radical);
- and looping or very long composite sequences can be generated if required, e.g. to play continuously for an hour or more.

3.2 3D aspects of the clips provided

3.2.1 General

The 3D effect is of these sequences covers a whole range, from mild to excessive. For the purposes of testing, many of the sequences the 3D effect has deliberately made quite clear and strong

This has been done as this is a set of test sequences that is anticipated to be used for various applications:

- technical testing of 3D encoders - e.g. efficiency and speed with encoding Left and Right separately or differentially; effects on the encoder of differences Left to Right (differences not only of viewpoint caused by different amounts of 3D effect but also of colour, geometry, artefacts)
- investigation of 3D - e.g. understanding what will cause problems in different encoding, transmission and usage scenarios, user perceptions, limits on acceptability of both the source material and encoded material

Also, although mainly generated for use in a 'testing environment' with the screen sizes and viewer distances as given in section 3.2.10, it is intended that at least some of these sequences are usable with larger or smaller screen sizes / viewer distances (which in the nominal 'test environment' may give either an excessive or a very minor 3D effect).

3.2.2 Filming

3D clearly adds considerably to the aspects of filming, not least as matching of every parameter is required between Left & Right cameras/views.

All filming was done with pairs of cameras and configurations that were nominally identical (camera sensors, processors and acquisition systems where serial numbers were very close in sequence), although different camera pairs were used for filming various scenes.

3.2.3 Subject choices

The subject choices are different to those normally made compared with 2D ***Tvids*** sets, where the choice is based upon varied content which tests encoders.

For 3D, the primary motive has been to select subjects where

- the 3D effects are clear (although ranging from subtle to very pronounced)
- it is considered that the sequences would be a good test of a 3D encoder, either due to the detail/nature of the subjects (e.g. fine lines, water) or due to the differences between Left and Right
- particular aspects or problems of 3D are illustrated, e.g. objects which appear in one side but not the other at the screen edge; specular highlights in one side but not the other; grain which will be different Left to Right

- in some cases where the difficulties of 3D filming and viewing are illustrated by examples, such as with zoom or hand-held camera action (encompassing angled views)

Consequently several of the sequences are filmed in the same general locations, where clear 3D depth effects could be demonstrated.

3.2.4 Mechanical alignment of cameras

The cameras were mechanically aligned (X, Y, Z and rotationally) at the centres and as far as possible at the edges. Some 3D is produced where the cameras are not well aligned, but this test set does not include any examples of basic alignment errors, firstly, as this problem is rapidly becoming much less common, and secondly if the cameras were not well aligned during filming, this is very easily corrected in post production

3.2.5 Convergence and geometric matching

All filming was done with the cameras parallel: no convergence was used in any of the filming. This was done to avoid differential trapezoidal views Left to Right, in order to avoid the subsequent post-production corrections that would otherwise be required.

Correct alignment and use of 'identical' cameras and lenses in general resulted in good geometric matching between Left and Right. However, each of the lenses exhibited minor inconsistencies between Left and Right at each zoom level (as is normally the case and likely to continue for some time); on some of the video sequences this may be observable and where this is the case this is indicated in section 3EV.07 for the sequence concerned.

3.2.6 Interocular spacing

For each sequence the interocular spacing of the cameras is stated. In some cases this was relatively small compared to the subjects/field of view, leading to a slight 3D effect; in many cases this was larger, leading to a very distinct 3D effect. In most cases the interocular was maintained at a distance so that the 'average' negative and positive disparity was within the limits considered reasonable by Sky [see below] as this produces acceptable 3D given the anticipated screen size and viewer distance.

The actual interocular used for filming a specific sequence is given in section 3DN.07 for each sequence.

3.2.7 Negative and positive disparity

Negative disparity is the Left/Right difference that makes objects appear closer to the viewer than the screen plane, i.e. out of the screen. It is given as a negative number below.

Positive disparity is the Left/Right difference that makes objects appear to the viewer to be farther away than the screen plane, i.e. into the screen. It is given as a positive number below.

3.2.8 Average/typical and peak positive and negative disparity

For each clip a figure is given for the

- average/typical negative and positive disparity, (respectively sections 3DN.01 and 3DN.02 for each sequence) and
- peak (transitory) negative and positive disparity (respectively sections 3DN.04 and 3DN.05 for each sequence)

as a percentage of the screen width.

For some clips with significant movement it is necessary to make a judgement about average/typical values: this will usually be the most obvious elements of the foreground and background.

Many clips have very short-term large disparities (particularly negative): in many cases although the disparity is 'excessive' it is likely to be tolerated by a viewer, due to its short-term nature and context.

In any event as this is intended to be a test set for 3D, the 'rules' of acceptability are sometimes deliberately broken to allow the user to explore these limits and applicability of these rules in a user's context.

3.2.9 Location of screen plane

In the many cases the screen plane has been set in post-production at the main subject; however sometimes this is not the case in order to give the desired effect.

In most cases the screen plane does not move; however some sequences have the screen plane changing during the sequence. When this is done, the change is generally gradual and either for aesthetic reasons or in order to reduce excessive negative disparity, and is indicated by a change in the disparity percentages.

As the Left and Right sequences are provided separately, most stereo viewers allow the user to adjust the screen plane (by moving the sequences left/right), so these can be adjusted to experiment with different locations of the screen plane.

3.2.10 Screen size and viewer distance

As this is a test set of video sequences it has been assumed that they will be more often viewed in a test environment, i.e. where

- a typical large screen TV is used for viewing (approximately in the range 36"/1.0m to 60"/1.5m) at a distance of approximately 3m
- and/or a computer monitor, 22" (0.6m) or above in size is used for viewing at a distance of approximately 1m

Consequently most sequences have been filmed with the appropriate subject choice, interocular spacing and lens choice to suit this. However, there are a number of sequences where the disparities are relatively low or relatively high, making these sequences more suitable for viewing respectively on larger screens (e.g. cinema-size) at greater distance or smaller screens (e.g. mobile devices) at closer distances.

3.2.11 Floating windows

No floating windows have been applied to these sequences (as noted in 3DN.10 for each sequence), so some sequences have obvious/discomfiting window violations (i.e. where an object is visible in one eye but is completely or partially off-screen for the other eye, making 3D resolution impossible for the viewer). Where this is particularly the case this is stated in the 3D notes (section GN.08) for that particular sequence.

The user is of course free to apply floating windows if desired.

3.2.12 Colour correction

Most sequences have been colour corrected; for the majority of sequences the correction required has been limited; generally only due to a slight colour cast caused by the optics of the filming rig.

However, despite identical camera and storage settings between Left & Right, in some cases there is a distinct colour cast difference between the Left & Right cameras. The reasons for the colour cast differences were:

- specular and diffuse reflection differences within the scene between Left & Right. As the angle is slightly different between Left & Right, some objects can produce substantially different reflections (the most obvious example is a partially shiny

surface, which from one angle gives a much stronger reflection of sunlight, but from a slightly different angle simply shows its surface colour);

- light differences between Left & Right causing different camera responses. The same lenses and cameras were used Left & Right (with serial numbers very close together); however, despite this the different light entering each side would sometimes cause significantly different responses, giving a large colour cast between the Left & Right (sometimes varying within the time of a sequence)
- stray light/highlights/lens flare. Despite use of matte boxes, there were occasions when stray light impinged on the lens for one side and not the other, causing internal lens reflections or colour shifts, or significantly different responses

For these circumstances it has been partially colour corrected or not been colour corrected at all: the purpose with these sequences is to allow the user to explore the effects (encoding and visual) under these circumstances. However, for the sequences where colour correction has been partially done/not done, it has been checked that the colour differences do not detract from the 3D aspects of the clips concerned.

Whether a sequence has been colour corrected or not is stated in section 3DN.08 for each sequence.

3.2.13 Camera synchronisation ('genlock')

One of the challenges of 3D filming is to ensure that the camera shutters are synchronised, i.e. the cameras are 'genlocked' together.

The term 'shutter' refers to film cameras and does not really apply to digital cameras where there is no mechanical shutter (such timing is done electronically), but the term is still used and can be applied as the effect is very similar.

If the cameras are not synchronised (genlocked), an object which is moving is recorded at one place in one camera can appear at a different place in the other camera. For example, if the cameras are not genlocked, an object falling vertically may appear near the top of the frame in the Left Camera - as this is the time when the Left camera shutter was 'open' - but appear more towards the middle of the frame in the Right camera. Clearly this will give some difference between Left and Right, which will therefore appear as a 3D effect - but it is not. In many cases this 'false' 3D effect is not noticeable; in some cases it is.

Some 3D is still being made where the cameras are not genlocked e.g. because lower cost cameras were used which do not have this facility, or there was an error during production. Therefore a few of each of the 1080p and 2K sequences have the cameras not genlocked, however, care has been taken to ensure that the synchronisation difference in these cases is relatively small and there is no overall effect from the lack of genlock, so that the sequences concerned are still entirely usable. (In most cases the timing difference is small and it is hard to tell that the sequences are not genlocked, even with examination of the sequences frame-by-frame.) Essentially, the lack of genlock is a very minor factor and only perceivable on very small movement differences on some of the small scene elements of the sequences concerned.

Where a sequence has the cameras not genlocked this is indicated in section 3EV.07 for the sequence concerned, as 'Not genlocked'.

3.2.14 Post-production

Post-production has been limited to only that required: generally only that needed to set the 3D disparity. All post-production was done either floating point or minimum at 16-bits per component, 4:4:4, and each operation done on the video was checked to ensure that the original could be reproduced with zero change of data at 12-bits resolution (by applying the operation forwards then in reverse and checking that there was no difference with the original camera data input).

3.2.15 Notes on 3D aspects

For each sequence notes relevant to the 3D aspects of the sequence are given in section GN.08 of each sequence.

3.2.16 Sky Television recommendations for 3D content

BSkyB Television in the UK has recently launched a 3D TV channel. For content providers wishing to submit content, BSkyB has produced a specification of requirements.

Note: the information which is provided below has been paraphrased from the BSkyB document and inclusion of comments in the document below is for reference and convenience only; the original document from BSkyB should be referred to.

Recommendations:

- negative disparity should not exceed 1% for majority of the time
- positive disparity should not exceed 2% for majority of the time
- peak (transitory) negative disparity should not exceed 2.5%
- peak (transitory) positive disparity should not exceed 4%

These values are given for a screen size of 46" to 70" diagonal (1.2m to 1.8m); recommended viewer distance is not stated.

Where the description of each sequence states if the sequence is 'Within the Sky spec' in sections 3DN.03 and 3DN.06 for each sequence it is the above limits which are referenced.

3.2.17 Displays for viewing the 3D sequences

This section provides some information on 3D displays; see section 4.1 for details of the technical requirements for playing the stereoscopic video (computer and software requirements).

There are two aspects to this:

- the choice of viewing technology, e.g. interlaced, over-under, colour coded, alternate frames, checker-board..
- the choice of display itself, e.g. 3D polarised monitor with passive glasses, pair of projectors, 'standard' (non-3D) TV, head-mounted display, shutter display and glasses, auto-stereoscopic display..

Each viewing technology and display has its own merits and drawbacks; it is up to the user to decide which is optimal for their own requirements.

In testing this set of sequences, two viewing technologies were mainly used:

- interlaced with polarised monitor and passive glasses
- colour-coded with standard monitor and colour-coded glasses

These were chosen as they were considered the most widely available and/or easily accessible, although each has advantages and disadvantages:

Viewing method	Advantages	Disadvantages
Polarised passive glasses with interlaced display	Used for 3D theatrical presentations No change of colour Good separation of Left and Right Relatively little light loss	Reduces vertical resolution of Left and Right by half Gives 'interlaced' effect 3D is affected when image is rotated/rotational movement Viewing angle limited vertically (to +/- 4 degrees of a specific height on, on some displays)
Colour-coded (passive) glasses with standard display	No loss of vertical resolution (no interlaced effect) Viewing angle limited only by standard display	Display of some colours is poor

3.2.18 T3vid logo

The ***T3vid*** logo has deliberately not been made 3D, in order to have as little impact as possible on encoders which do differential encoding (i.e. encode the difference in the Right from the Left).

It is also aligned on a 16-bit macroblock boundary, is static throughout the sequence and is of a dark colour, designed to be unobtrusive: when viewing the video, in practice it can easily be ignored (although it is generally not at the apparent depth of the nearby video or at screen plane depth).

3.3 Individual clips provided

276 YUV clips are provided, comprising 138 pairs of Left & Right clips as below:

1080p (both 30p and 24p frame rates):

- 1920x1080 progressive
- YUV 4:2:0 (i.e. each frame of Y is 1920x1080; each frame of U and V is 960x540)
- 8-bits (one byte) per sample
- Y planes are unsigned nominally 16-235 but may go into the range 0-255
- U and V planes are centred at 128 and are nominally 16-240 but may go into the range 0-255

1080p30:

- 29.97 frames per second

1080p24:

- 23.976 frames per second

720p60:

- 1280x720 progressive
- YUV 4:2:0 (i.e. each frame of Y is 1280x720; each frame of U and V is 640x360)

- 8-bits (one byte) per sample
- Y planes are unsigned nominally 16-235 but may go into the range 0-255
- U and V planes are centred at 128 and are nominally 16-240 but may go into the range 0-255
- 59.94 frames per second

At all resolutions the clips are:

- planar YUV (i.e. a frame of Y followed by a frame of U followed by a frame of V)
- no headers of any kind
- top picture row first
- 16:9 picture aspect ratio
- square pixels

All of the clips were filmed at the respective frame rates (i.e. 59.94 / 29.97 / 23.976 fps), although the YUV may be re-played / encoded at any speed (such as 60, 50 or 25 fps).

3.4 Format of video on disk

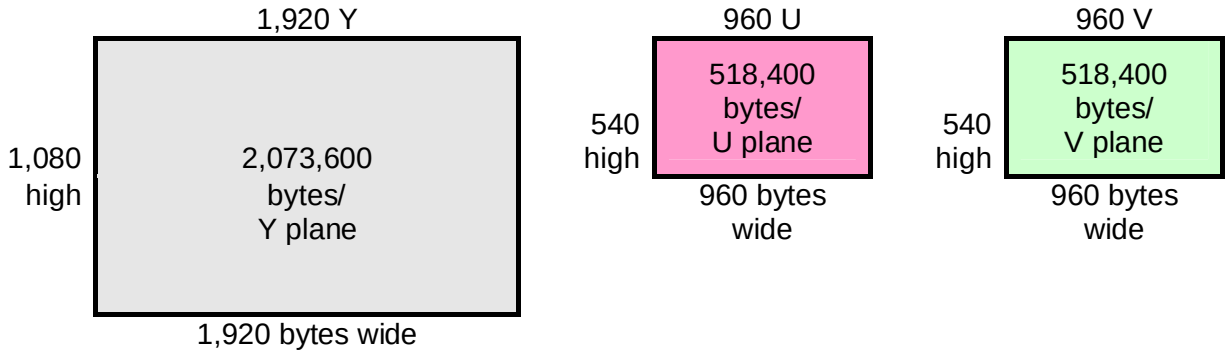
All the YUV video is stored in planar form, i.e. a plane of Y followed by a plane of U followed by a plane of V.

3.4.1 1080p (1920x1080 progressive 4:2:0 8-bit): same format for 30p and 24p

Byte 0 in the file is the Y data of the pixel at top left of the first frame.

One frame of Y, U and V:

Plane of Y followed by plane of U followed by plane of V



Valid video data ranges:

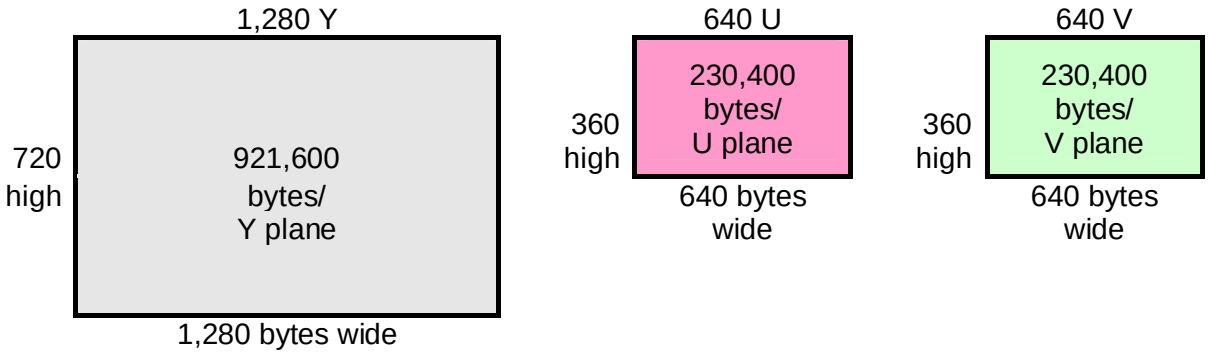
- Y: 16 - 235
- U and V: 16 - 240

3.4.2 720p60

Byte 0 in the file is the Y data of the pixel at top left of the first frame.

One frame of Y, U and V:

Plane of Y followed by plane of U followed by plane of V



Valid video data ranges:

- Y: 16 - 235
- U and V: 16 - 240

3.5 Audio

Audio clips are provided for every video clip, matching the video length. In the vast majority of cases this was the actual audio recorded with the video.

Where the audio provided was not recorded with the video, similar/appropriate audio is provided, matched in time-length. This is denoted by '`_sim_`' in the audio filename (instead of '`_act_`', denoting actual audio recorded at the time).

Clearly the main point of the ***Tvids*** is video testing, so the audio supplied is intended to be used to check timing/correlation during the encode process rather than to be particularly useful as standalone audio. Consequently, this audio has not been cleaned up or normalised and nor was much time spent in ensuring good audio recording during filming.

All the audio clips are provided in two formats:

- MPEG-1 Layer II stereo 384kbps CBR 16-bit 48kHz and
- WAV linear PCM uncompressed stereo 1536kbps 16-bit 48kHz

4. Software to view & process YUV video

4.1 Viewing/playing the stereoscopic video

This section explains some of the technical requirements for playing the stereoscopic video (computer and software requirements); see section 3.2.17 for some information on 3D displays.

4.1.1 Computer requirements of viewing the stereoscopic video

The ***Tvids*** YUV files within this set require a high performance computer in order to play the video in real-time at full frame rates. The sustained continuous data rates required are:

- **1080p29.97** 188MBytes/sec (94Mbytes/sec for each of Left & Right)

This means that the above rates must be achieved using disk arrays, solid state disks or with the video loaded into RAM disk.

Useful references as starting points for system recommendations are given on the websites for Aja (www.aja.com) and BlackMagic Design (www.blackmagic-design.com) although various companies provide information about how this can be achieved / the configuration of system required to achieve this. A list is given on the **TestVid** website under Support at:

http://www.testvid.com/highperfpc.html

TestVid accepts no responsibility or liability for use of any of the information on the pages listed.

4.1.2 Stereoscopic viewers/players

There are a number of stereoscopic viewers/players available: a list is given on the **TestVid** website under Support at:

http://www.testvid.com/stereoviewers.html

Links are provided to the respective web pages for each program. Note that some of these are more than just viewers.

TestVid accepts no responsibility or liability for download or use of any of the programs listed; the user should carefully examine the license agreement that applies to the software concerned.

However, note that the stereoscopic viewers listed may not import YUV uncompressed files directly: the YUV files may need to be wrapped e.g. in an AVI. Whether or not a particular viewer does import directly YUV files is given on the above **TestVid** web page, although even if listed as not supported it is advisable to check the status of this aspect directly with the software provider as updates do of course occur.

There are a number of choices available in order to view the stereoscopic video:

- wrap the YUV within an AVI file and use a stereoscopic viewer (support for viewing YUV files when wrapped in an AVI is much more common in stereoscopic viewers)
- use an AVS file to reference the YUV
- convert the YUV into a different format acceptable to the chosen stereoscopic viewer
- play the YUV video out in real-time on SDI and use an adaptor to display the two SDI inputs

Each of the above options is discussed below.

The individual Left & Right YUV files can be viewed using the viewers listed in 4.2.

4.1.3 Wrap the YUV within an AVI file

There are a number of programs to do this; probably the easiest is to use a program called FFMPEG. This is used as a command line program: it can easily be found using a search engine.

Usage:

```
ffmpeg -r 60 -s 1920x1080 -i <infile.yuv> -vcodec copy <outfile.avi>
```

where

- `-r 60` sets the frame rate to 60 frames/sec
- `-r 1920x1080` sets the input frame size (FFMPEG cannot guess this from the YUV)
- `<infile.yuv>` is the input YUV filename
- `<outfile.avi>` is the output AVI filename

4.1.4 Use an AVS file to reference the YUV

AviSynth is an open source program that 'frame serves' video to other programs.

Using AVS files and AviSynth as below allows the YUV files to be loaded directly into various programs such as VirtualDub, Adobe Premiere and Adobe After Effects.

The steps involved are:

- install AviSynth [find it by an internet search]
- copy the custom DLL `'RawSourceTV.dll'` to the computer [`rawsourceTV.dll` is in the \Software folder on the USB disk unit]
- write a text AVS file which references the YUV file - example below

The next step varies with the program:

- with VirtualDub, simply use File Open to open the AVS file [NOT the YUV] and the YUV will be rendered in the VirtualDub display

or

- with Adobe Premiere or After Effects, install the plug-in `'Premiere CS AVS Importer 1.0RC1 Setup.exe'`
- then open the AVS files like any other video file

The advantage with using Adobe Premiere or After Effects is that these can then be used to do real-time output on HD-SDI, by using a plug-in card such as available from BlackMagic Design or Aja.

An example AVS file contains just the following 2 lines of text:

```
loadplugin("c:\vidtools\avisynth\rawsource\rawsourceTV.dll")
RawSourceTV("I:\T3D023_USA_Europe\Video_1080p30_8b_420_YUV\T3D023001_Monorail_1920x1080p30_8b_P420.yuv", pixel_type="I420", width=1920, height=1080)
```

Example AVS files are provided for all the YUV files in the folder

\Example_AVS_files

However please note that in each of the AVS files, the folders for the

- location of `rawsourceTV.dll`
- and the drive letter/location of the YUV files may need to be altered.

4.1.5 Convert YUV to another format

As the purpose of this set of ***Tvids*** sequences is to test encoders (and presumably purchased for this purpose), the user will have a means to encode the YUV sequences into a compressed format such as MPEG-2, H.264/MPEG-4/AVC, MVC or other, so can then view the compressed sequences.

4.1.6 Stereo YUV output on SDI

The same method can be used for stereoscopic video as for 2D video: see section 4.3.

4.2 Viewing the YUV video (individual Left or Right)

There are a number of software programs for viewing YUV files: a list is given on the **TestVid** website under Support at:

http://www.testvid.com/yuvviewers.html

Links are provided to the pages where the YUV viewers can be downloaded.

Note that these programs only show one YUV stream at a time.

4.3 Real-time play-out of the YUV video

The YUV files provided are suitable for direct use with video encoders, but in some circumstances it may desirable to play-out the YUV in real-time on an SDI / ASI / DVI / HDMI link.

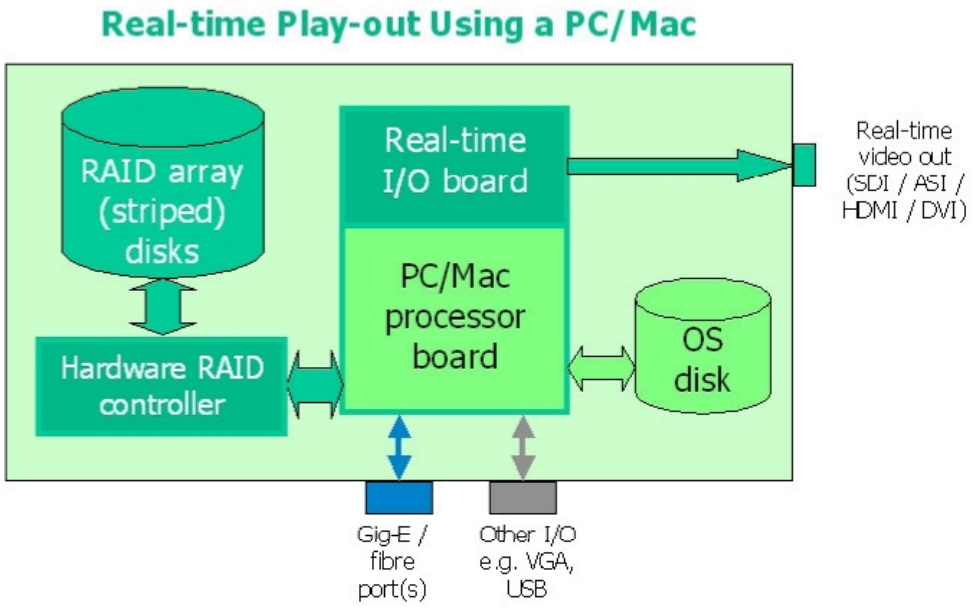
Essentially, the issue is to get the uncompressed ***Tvids*** YUV files from disk onto an SDI / ASI / DVI / HDMI interface via a specialised I/O board.

All video servers, many hardware encoders and a large proportion of other professional broadcast equipment have internal hard disks and Gig-E Ethernet interfaces. This allows the ***Tvids*** to be directly copied over the Ethernet network onto the hard disk, and play-out from there.

Where it is required to produce an SDI / ASI / DVI / HDMI stream as input to other equipment, this can be done relatively straightforwardly, using:

- a high performance PC / Mac
- with high speed RAID hard disks
- with an appropriate SDI etc. I/O board, e.g. from Aja, BlackMagic Design or Bluefish444
- and software to control moving the video from disk onto the I/O interface

A schematic of the required set-up is:



See the **TestVid** website:

http://www.testvid.com/support.html

More detailed information is provided, including a page on "broadcast applications" and the steps required are covered in some detail in the white paper, "Real-Time Play-out of YUV Video in a Broadcast Environment"

4.4 Software tools provided

The following software is provided:

Software tool	Purpose
`yuvmake1088`	Add extra lines at the top/bottom of a 1920x1080 YUV file to make it 1920x1088
`yuvletterbox`	Alter provided video by making it appear 'letterboxed' (i.e. with black bands top and bottom of each frame) or 'pillarboxed' (with black bands left and right)

Note

1. The software tools are provided solely for the use of the purchaser of the license to use this set of video clips and may not be used with other video or provided to other persons/organisations.
2. The use of these software tools is only on the basis of complete acceptance of the license agreement as given in section below. The fact of using these software tools gives your explicit consent to abide by the terms of the license agreement.

4.4.1 License agreement relating to the software tools provided

This license agreement below applies to all software listed in this section 4.4.

The software program(s) is/are provided to the user without any license fee or royalty on an "as is" basis, solely as an incidental part of the clip set and do not form part of the contract.
TestVid disclaims any and all warranties, whether express, implied, or statutory, including any implied warranties or merchantability or of fitness for a particular purpose.
The user makes use of this/these program(s) at their own risk. In no event shall **TestVid** be liable for any incidental, punitive, or consequential damages of any kind whatsoever arising from the use of this/these program(s).

This disclaimer of warranty extends to the user of this/these program(s) and user's customers, employees, agents, transferees, successors and assigns.

The software program(s) is/are provided solely to the purchaser of the relevant set of ***TVids*** and may not be sent to or copied to any other person or organisation or used with any other video

4.4.2 yuvmake1088

This is a command line program for adding 8 additional lines to 1080 vertical resolution video, to make it 1088 vertically i.e. an integer multiple of 16.

This assumes the video is 1920x1080, 4:2:0, 8-bits per sample.

All the lines added are greyscale, set to one grey colour.

Usage:

```
yuvmake1088 <inputfile.yuv> <p> <n> <c>
```

where

- `<inputfile.yuv>` is the input filename which is 1080 lines vertically (must have extension `.yuv`)
- <p> = progressive or interlaced input file, set to ‘p’ or ‘i’
- <n> = the number of the 8 lines to add at the top of each frame (0, 2, 3, 6 or 8). ‘0’ means add zero lines at the top i.e. at 8 lines at the bottom; ‘8’ means add 8 lines at the top and zero at the bottom; ‘4’ means add 4 at top and bottom, etc.
- <c> = greyscale colour to add, number 16-235. 16=black; 235=white. Numbers less than 16 will be set to 16; greater than 235 will be set to 235.

The filename for the output file, with the extra 8 lines added, will be

`inputfile_1088.yuv` (the ‘`_1088`’ is added by `yuvmake1088`)

The output file is put in the same folder as the input file.

4.4.3 yuvletterbox

This is a command line program for creating a black band at the top & bottom of each frame (or left & right), by over-writing the video data in these bands. The luminance of the 'black' band may be set; the size of the bands top and bottom (left/right) may be set. The ***Tvids*** logo is moved to remain visible in the bottom left corner of the video data.

1080p (1920x1080) videos are 16:9 picture aspect ratio (1.777:1).

Common picture aspect ratios with areas of letterbox / pillarbox are:

Picture aspect ratio	1080p (1920x1080)
Default	**Number of black lines top & bottom**
1.777:1 (16:9)	0, 0
Letterbox	**Number of black lines top & bottom**
1.85:1	21, 21
2.35:1	131, 132
Pillarbox	**Number of black lines left & right**
1.33:1 (4:3)	240, 240
14:9 (1.56:1)	117, 118

Usage:

```
yuvletterbox <inputfile.yuv> <xsize> <ysize> <nnn>     (cont'd)
                        <f> <blk> <l> <tl> <br>
```

where

- `<inputfile.yuv>` is the input filename (must have extension `.yuv`)
- `<xsize>` = horizontal resolution of the input file (must be multiple of 2)
- `<ysize>` = vertical resolution of frame of the input file, e.g. set to 1080 for 1920x1080p (must be multiple of 4)
- `<nnn>` = number of video frames to process. Set to 0 to process all frames. If `<nnn>` is greater than the number of frames then all frames will be processed
- `<f>` = format, i.e. progressive or interlaced input file, set to 'p'
- `<blk>` = 'black' colour to add, number 16-235. 16=black; 235=white. Numbers less than 16 will be set to 16; greater than 235 will be set to 235.
- `<l>` = letterbox or pillarbox, set to 'l' or 'p'. If set to 'l' (for letterbox) then the values for `<tl>` and `<br>` are used respectively for the top and bottom of the video; if set to 'p' (for pillarbox) then the values for `<tl>` and `<br>` are used respectively for the left and right of the video
- `<tl>` = the number of the lines (columns) to over-write at the top (left) of each frame with the `<blk>` value. Valid values are 0 to 400
- `<br>` = the number of the lines (columns) to over-write at the bottom (right) of each frame with the `<blk>` value. Valid values are 0 to 400

As an example:

```
yuvletterbox inputfile.yuv 1920 1080 0 p 16 l 21 21
```

will produce a letterboxed version of the `inputfile.yuv` file, 1920x1080, all frames, progressive, black colour 16, with 21 black lines top and bottom (making a visible picture aspect ratio of 1:85:1)

The filename for the output file, with the letterboxed/pillarboxed content will be

`inputfile_LBOX.yuv` if `<l>` = 'l', or (the '_LBOX' is added by `yuvletterbox`)

`inputfile_PBOX.yuv` if <l> = 'p', or (the '_PBOX' is added by `yuvletterbox`)

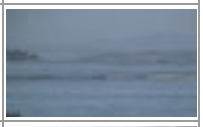
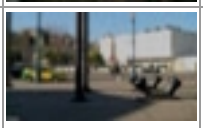
The output file is put in the same folder as the input file.

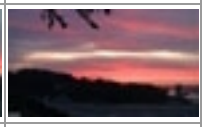
5. List of clips

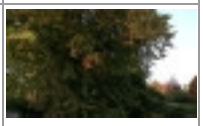
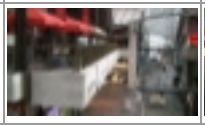
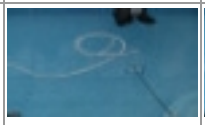
5.1 Clips summary

- Total time of sequences: **approx. 1 hour 16 mins**
  (all sequences added together)

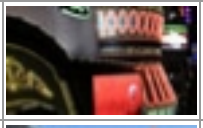
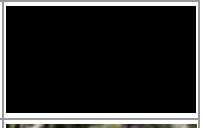
Clip number(s)	Title	Main purposes	Duration (mins:secs: frames)	Begin	End
1080p30 sequences ***Numbers T3D0230nn***					
T3D023001	Monorail	Straightforward codec efficiency test in reasonably complex scene	00:25:05		
T3D023002	Night_travelator	Codec stress test with lots of moire fringing and irregular movment, with strong 3D depth and 2D depth cues	01:21:16		
T3D023003	Venetian_crossing	Complex scene with 3D depth clearly changing as people walk towards camera	00:26:00		
T3D023004	Golden_Gate	Nightmare test for an MVC type differential 3D encoder with continual left-right movement, variable scales left-right on zoom and fine lines (making motion vector tracking hard); NOTE overstrong 3D when zoomed	00:37:17		
T3D023005	Fountain	Codec stress test with many similar small areas	00:25:00		
T3D023006	Boat_masts	3D depth perception test with many similar objects (boat masts) at various depths	00:51:22		
T3D023007	Roadside_trees	Codec efficiency test with continual random global movement and rotation	00:33:06		
T3D023008	MGM	Codec banding test with large monochromatic areas	00:21:00		
T3D023009	The_Strip	Static global scene with motion vector tracking efficiency and global zoom	00:59:18		
T3D023010	Roller_coaster	Rapid motion vector tracking stress test	00:44:20		

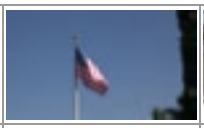
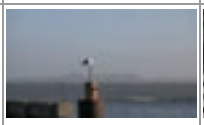
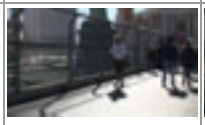
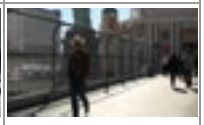
T3D023011	Pier39_lions	Codec efficiency test with animal fur and water	00:18:05		
T3D023012	Strolling	Simple codec test with tracked subjects (people) changing in size substantially	00:27:28		
T3D023013	Cable_car_turn	Efficiency test with slow/limited movment but complex scene	00:45:23		
T3D023014	Paris_night	3D depth perception test in a high-contrast but generally dark scene, with high grain	00:24:12		
T3D023015	Real_thing	Codec efficiency test with medium speed pan and complex scene	00:43:28		
T3D023016	Down_n_up	Gradual global change of view, testing codec response to distortion of view	00:39:07		
T3D023017	Capt_Joey	Depth perception where lens and atmospheric distortions cause some differences left to right	01:02:03		
T3D023018	Cloudy_NY	Codec stress and efficiency test where scene changes from simple to complex via a zoom out	00:30:11		
T3D023019	Tropicana_Ave	Complex scene with good test of motion vector tracking of many objects (cars) moving in different directions	00:23:09		
T3D023020	Tree_alley	Difficult codec stress test with innumerable almost identical object (leaves) with random and relatively rapid global motion	00:16:19		
T3D023021	Rigging_palms	MVC-type codec stress test where there are some significant differences left-right due to light flares and colour differences	00:43:28		
T3D023022	Neon_night	Codec test with focus differences left-right	00:52:02		
T3D023023	SF_pan	Rapid pan test with initially complex scene then blurred display then fine lines	00:20:04		
T3D023024	Flag_poles	Codec test with slow scroll up/down and banding test with monochromatic background; plus substantial color and brightness differences left-right	00:45:00		
T3D023025	Bay_bridge	Stress test with rapid right-wards pan	00:40:11		

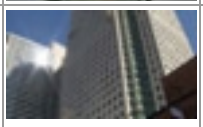
T3D023026	Up_the_hill	Codec stress and 3D stress test with rapid pan and rapid change in depth	00:19:00		
T3D023027	Stars_n_Stripes	MVC-type codec efficiency test with small differences left-right	00:22:15		
T3D023028	People_passing	3D perception affect with subjects too close	00:24:17		
T3D023029	Paris_day	Simple codec efficiency test with high detail but also large monochromatic area	00:18:13		
T3D023030	NYNY	Codec efficiency and stress test in complex scene with global motion	00:25:22		
T3D023031	Japanese_garden	Difficult codec stress test with many very similar objects (leaves) with some bright and dark areas	00:18:00		
T3D023032	High_offices	Codec stress test with many similar patterns, so macroblock/motion vector errors should be easily spotted	00:15:05		
T3D023033	Traffic	Codec test with objects increasing in size rapidly	00:29:08		
T3D023034	Footbridge	3D perception when I/O is too large for some subjects as they approach the camera	00:19:08		
T3D023035	Red_sunset	Difficult 3D perception and codec test where much of background is similar (sky) and subject (bridge) is very dark	00:12:10		
720p60 sequences ***Numbers T3D0233nn*** **1080p30 sequences** ***Numbers T3D0231nn***					
T3D023302; T3D023102	Silver_dome	General 3D view of complex scene, static background	00:39:56		
T3D023303; T3D023103	PedXing	3D view with detailed background and short duration peak negative disparity	00:34:42		
T3D023304; T3D023104	Ice_cream_van	3D effect with global motion and transitory large negative disparity	00:36:32		
T3D023305; T3D023105	Cafe_by_docks	Depth perception with multiple curved shiny objects (metal charis)	00:34:06		

T3D023306; T3D023106	Ferry_arrives	Low depth subject and background but depth perception on water	00:33:02		
T3D023307; T3D023107	Big_Ben	Multiple crossing movement close to camera with detailed objects a long way away	00:26:48		
T3D023308; T3D023108	Suspension_br	Initially mild 3D effect of man-made structures changes to much stronger 3D effect of trees, with fade/transition	00:37:43		
T3D023309; T3D023109	Traffic_twds	3D perception of objects rapidly approaching the cameras, passing close	00:36:42		
T3D023310; T3D023110	Cabot_Tower	Effect on 3D perception with random movement (including rotation), irregular foreground (grass) man-made structure and largely monochrome blue sky	00:51:10		
T3D023311; T3D023111	Shopping_mall	3D effects starts strongly, becomes much milder with detailed and contrasting scene, ending more strongly also	00:41:29		
T3D023312; T3D023112	Train_comes_n_goes	3D perception with fade/transition and short zoom	00:34:48		
T3D023313; T3D023113	Pool_shark	'Codec and 3D perception nightmare', where motion vector tracking is not possible and it is impossible to judge the depth of the majority of the scene and objects seem to be floating (which of course they are)	00:28:42		
T3D023314; T3D023114	Centre_fast	Effect on 3D perception of very rapid movement causing motion blur	00:12:19		
T3D023315; T3D023115	Soccer	Effect on 3D perception with evident differences caused by lens differences	00:24:53		
T3D023316; T3D023116	Blaise_woods	Random movement (including rotation) where most of the scene looks very similar); global motion but little subject motion	00:41:43		
T3D023317; T3D023117	Duck_truck	3D perception with noticeable colour differences	00:38:06		
T3D023318; T3D023118	St_Pauls	Perception where object with strong 3D effect is very close to the cameras and leads into the scene	00:23:58		
T3D023319; T3D023119	Waterfall	Largely static shot but sunlit waterfall causes different views in left & right	00:45:01		

T3D023320; T3D023120	Portents	Mild 3D effect but clearly distanced layers of elements (the 'tents')	00:22:57		
T3D023321; T3D023121	Street_ performer	Perception of 3D when there are significant window violations at both sides	00:36:03		
T3D023322; T3D023122	Footbridge	Perception of 3D when the moving subjects (the people) are substantially obscured	00:55:33		
T3D023323; T3D023123	Fountains	3D perception with smoothly changing angle	01:13:00		
T3D023324; T3D023124	Mall_at_night	3D perception where subjects are dark and edges not easily distinguishable from the background for much of the time	00:44:39		
T3D023325; T3D023125	Musical_reflecti ons	Effect on 3D when much of the scene is either at different angles or distorted geometry or both	00:35:41		
T3D023326; T3D023126	Suspension_br _zoom	Example of problems with zooming when using 'identical' lenses	00:21:46		
T3D023327; T3D023127	Garden	General 3D view with substantial detail and movement (including rotation)	00:19:46		
T3D023328; T3D023128	Balloons	Illustration of issues when interocular far too wide for subject distance (i.e. people walking past close to camera, although the balloons are OK to view)	00:15:12		
T3D023329; T3D023129	The_Matthew	General 3D view of complex scene, with smooth scrolling and panning	00:43:39		
T3D023330; T3D023130	Falafel_King	Complex scene where camera movement is random and jerky, and objects are distances from very close to the camera to far away	00:16:21		
T3D023331; T3D023131	String_quartet	Medium 3D effect but hand-held camera movement	00:27:02		
T3D023332; T3D023132	Number_7_boat	Very mild 3D effect	00:19:32		
T3D023333; T3D023133	Night_cars	3D effect with substantial lens flare and high contrast, plus fast approach to/going away from cameras	00:33:12		

T3D023334; T3D023134	Follow_that_ship	General 3D view with hand-held camera and complex scene	00:13:13		
T3D023302; T3D023102	Roundabout	Generally medium 3D but effect of transitory excessive negative disparity	00:50:39		
1080p24 sequences		***Numbers T3D0232nn***			
T3D023201	Cable_car_turn	Excessive I/O, with people close to the camera and the cable car and background in excess positive depth	00:40:22		
T3D023202	Travelator	Codec efficiency with global movement in and circular objects	01:87:04		
T3D023203	Strolling	Easy to determine 3D depth as people walk to/from the camera	00:42:02		
T3D023204	Fountain	3D impossible to discern due to light reflections on the water being different left-to-right (although background 3D is clear)	00:19:01		
T3D023205	Pier39_lions	Good 3D effect and motion vector tracking as boat passes behind poles	00:34:20		
T3D023206	Tropicana_double	Motion vector test with speeded-up motion and 3D test with zooms (and variances left-to-right)	00:41:17		
T3D023207	NYNY	Complex scene with many fine details, to test motion vector tracking	00:25:01		
T3D023208	Monorail	Test of 3D on zoom in with varying geometry of nominally identical lenses	00:33:06		
T3D023209	Neon_night	3D test with high contrast and varying focus left-to-right	00:47:13		
T3D023210	City_Hall	3D depth perception with blurred scene due to rapid movement	00:19:18		
T3D023211	Japanese_garden	Difficult codec test with many areas similar with great detail and rapid random global motion	00:23:21		
T3D023212	SF_trip	High contrast scene with sunlight and shade	00:18:06		

T3D023213	Forbes_Island	Mild 3D with monochromatic sky	00:18:16		
T3D023214	Boat_masts	3D depth is excessive in the distance and perception difficult in complex scene of boat masts	00:55:14		
T3D023215	People_passing	High negative depth to test viewer discomfort	00:15:03		
T3D023216	Real_Thing	Smooth pan test of codec motion vectors	00:43:21		
T3D023217	Paris_night	3D and codec test during dark picture with grain	00:55:15		
T3D023218	Roller_coaster	3D test with rapid global motion	00:29:00		
T3D023219	MGM	Codec efficiency test with large monochromatic areas	00:16:18		
T3D023220	Golden_Gate	3D effect on zoom in where 3D effect varies from mild to excessive	00:32:17		
T3D023221	Footbridge	Excessive I/O where people near to camera have excess negative disparity and background building excess positive disparity	00:27:03		
T3D023222	Golden_sunset	3D effect in dark and grainy image	00:16:01		
T3D023223	The_Strip	3D test with multiple transitions and zoom in	00:27:11		
T3D023224	Down_n_up	Motion vector tracking with smooth global motion; plus 3D effect during transition	00:20:23		
T3D023225	Roadside_trees	Good clear 3D depth but also random rotational global motion	00:34:21		
T3D023226	Venetian_crossing	Good example of depth changing as people walk towards camera	00:48:11		
T3D023227	Rigging_palms	Complex scene with excessive I/O and flare in one view only affecting 3D	00:45:12		

T3D023228	Seagull	Difficult motion vector tracking with rapid random rotation and excessive depth at the end	00:34:12		
T3D023229	Cloudy_Liberty	Test with large grey areas and fine details	00:26:23		
T3D023230	High_offices	Rapid global motion in highly patterned scene with depth increasing to the top of buildings	00:17:19		
T3D023231	Embarcadero	3D example with 'good' depth in and out but clear color differences left-to-right	00:26:04		
T3D023232	Arts_palace	A night-time scene extremely difficult for a 3D codec	00:13:01		
T3D023233	Tree_alley	Very difficult codec motion vector test with many similar areas and rapid rotational global motion	00:32:13		
T3D023234	Paris_day	Clear 3D, with lots of similar detail on the tower and fast motion	00:33:01		
T3D023235	SF_harbour	Codec efficiency and 3D perception during rapid global right-wards pan	00:32:09		

5.2 Clip features

5.2.1 PDF file searching for specific clip features

The PDF of the user manual may be searched to find clips that match the given CF-words ('CF'= Clip Feature).
The majority of the CF-words relate to aspects of the clip such as lighting and subject matter; those that pertain to 3D are denoted as 'CF3D-…'.

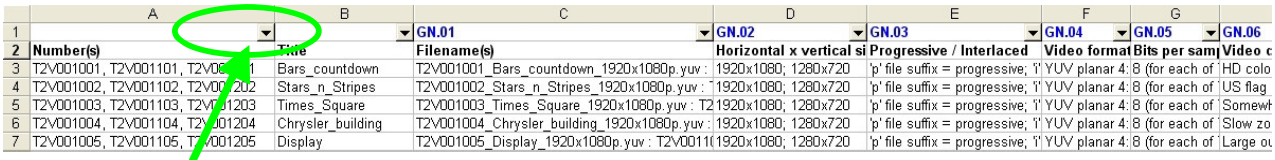
5.2.2 Excel file sorting for specific clip features

In addition to the PDF of this manual, an Excel file is provided which lists all the clips and the clip features in columns. This spreadsheet is in Excel .xls format (compatible with Excel versions from 97-2000 and later).

There are two tabs in the spreadsheet:

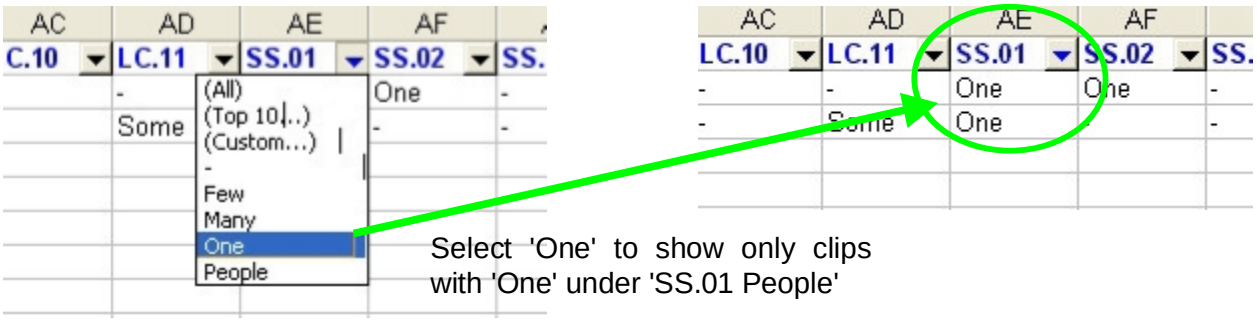
- the first tab has the clip set title: this has all the items listed in the manual for the clip
- the second tab "Clip features" just lists the individual clips, with the list of their clip features and individual columns for each individual clip feature.

Probably the "Clip features" tab is easiest to use to find specific clips with specific features, although every column may be sorted for specific features, by clicking on the drop-down arrow adjacent to each column heading (the examples below are from the T2V001 USA East clip set)



	A	B	C	D	E	F	G	
1			GN.01	GN.02	GN.03	GN.04	GN.05	GN.06
2	Number(s)	Title	Filename(s)	Horizontal x vertical si	Progressive / Interlaced	Video format	Bits per sam	Video c
3	T2V001001, T2V001101, T2V00 1	Bars_countdown	T2V001001_Bars_countdown_1920x1080p.yuv :	1920x1080; 1280x720	'p' file suffix = progressive; 'i'	YUV planar 4:	8 (for each of	HD colo
4	T2V001002, T2V001102, T2V00 202	Stars_n_Stripes	T2V001002_Stars_n_Stripes_1920x1080p.yuv :	1920x1080; 1280x720	'p' file suffix = progressive; 'i'	YUV planar 4:	8 (for each of	US flag
5	T2V001003, T2V001103, T2V 1203	Times_Square	T2V001003_Times_Square_1920x1080p.yuv : T2	1920x1080; 1280x720	'p' file suffix = progressive; 'i'	YUV planar 4:	8 (for each of	Somewh
6	T2V001004, T2V001104, T2 001204	Chrysler_building	T2V001004_Chrysler_building_1920x1080p.yuv :	1920x1080; 1280x720	'p' file suffix = progressive; 'i'	YUV planar 4:	8 (for each of	Slow zo
7	T2V001005, T2V001105, T 001205	Display	T2V001005_Display_1920x1080p.yuv : T2V0011	1920x1080; 1280x720	'p' file suffix = progressive; 'i'	YUV planar 4:	8 (for each of	Large ou

Click arrow to get drop-down list of items in this column (example below for 'SS.01 People')



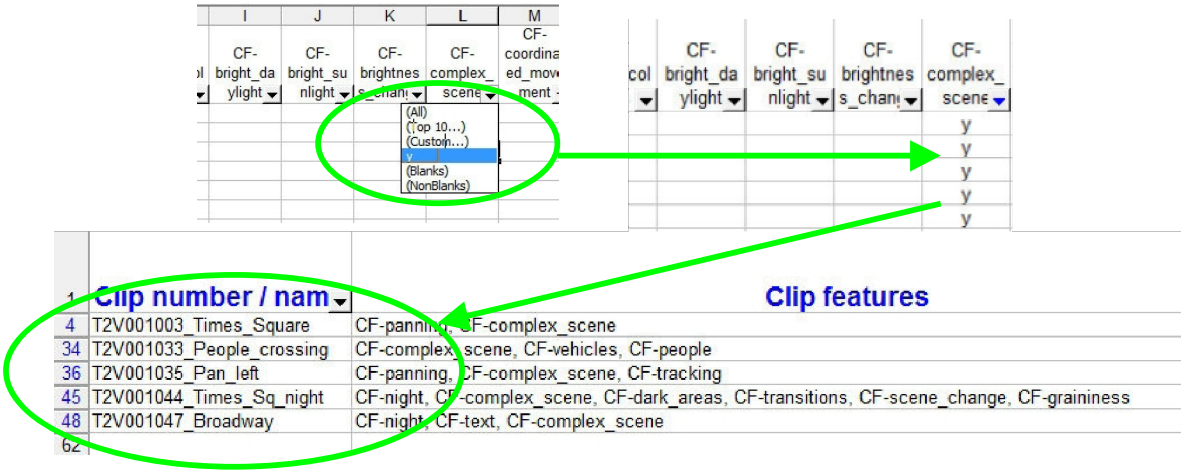
Select 'One' to show only clips with 'One' under 'SS.01 People'

Note that this first tab on the spreadsheet is roughly 100 columns wide (from column A to column CZ), so it may be helpful to use the 'Freeze Panes' feature (on the 'Window' menu in Excel 2000 and 2003) or split windows to keep the clip number visible.

The "Clip features" tab appears and can be sorted as indicated below:

	A	B	C	D	E	F	G
1	Clip number / nam	Clip features	CF-animal	CF-angl	CF-bandin	CF-black_background	CF-bright_daylight
2	T2V001001_Bars_countdown	CF-text, CF-dark_areas, CF-patterns, CF-black_background, CF-round_objects, CF-transitions, CF-large_monochromatic				y	
3	T2V001002_Stars_n_Stripes	CF-bright colours, CF-large_monochromatic, CF-movement_across					
4	T2V001003_Times_Square	CF-panning, CF-complex_scene					
5	T2V001004_Chrysler_building	CF-zoom_in, CF-fine_details, CF-low_contrast, CF-dull_daylight					
6	T2V001005_Display	CF-high_contrast, CF-rapid_changes					
7	T2V001006_Smiling	CF-faces, CF-people					
8	T2V001007_Traffic_duty	CF-faces, CF-text, CF-people					
9	T2V001008_Empire_State	CF-patterns, CF-scroll, CF-faces, CF-hand_held					
10	T2V001009_FDNY	CF-out_of_focus, CF-vehicles					
11	T2V001010_Checked_caps	CF-people, CF-movement_out, CF-patterns					
12	T2V001011_Gold_statue	CF-water, CF-patterns, CF-large_monochromatic					
13	T2V001012_Eyewitness_news	CF-moving_text					

Selecting a drop-down menu and clicking on 'y' reduces the list to those that have that CF value:



5.2.3 List of 'CF' ('clip features') words used

The PDF of the user manual may be searched to find clips that match the given CF-words ('CF'= Clip Feature).

3D specific:

CF3D-effect_mild	CF3D-effect_medium	CF3D-effect_strong
CF3D-effect_excessive	CF3D-peak_negative	CF3D-peak_positive
CF3D-effect_change		
CF3D-perception_hard	CF3D-viewer_discomfort	CF3D-window_violation
CF3D-diff_colour	CF3D-diff_elements	CF3D-diff_geometry
CF3D-diff_not_genlocked		
CF3D-Sky_spec_yes	CF3D-Sky_spec_no	
CF3D-zoom	CF3D-rotation	CF3D-fast_movement
CF3D-contrast	CF3D-grain	

Meanings of the 3D-specific CF-words above:

CF3D-effect_mild CF3D-effect_medium CF3D-effect_strong CF3D-effect_excessive	How strong the 3D effect in general is perceived to be for the clip, when viewed with the screen size and distance as described in section 3.2.10 At least one of these is stated for every clip
CF3D-effect_change	The depth of the 3D effect changes during the clip
CF3D-peak_negative CF3D-peak_positive	Transitory peak negative or positive disparity which exceeds the Sky specification (see section 3.2.16)
CF3D-perception_hard	3D is hard to perceive either due to scene contents (differences left to right) or lighting differences (e.g. flare from sunlight in one side only) or random nature of scene contents

CF3D-viewer_discomfort	Clips where it is considered that viewer discomfort might be caused, e.g. due to differences left to right, or excessive disparity that continues too long, or window violation(s)
CF3D-window_violation	Where a significant object appears in one side and not the other for a sufficiently long time as to be noticeable
CF3D-diff_colour	Where there is a colour difference between left and right
CF3D-diff_elements	Where there are some elements within the scene which are different between left and right, e.g. due to reflections
CF3D-diff_geometry	Where the geometry is different left to right e.g. due to differential zoom; optical effects
CF3D-diff_not_ genlocked	The cameras have not been 'genlocked' and there may be some very minor artefacts as a result (see section 3.2.13)
CF3D-Sky_spec_yes CF3D-Sky_spec_no	Whether or not the clip meets the Sky specification (see section 3.2.16) either for average or transitory negative and positive disparity One of these is stated for every clip
CF3D-zoom	Zooming in or out
CF3D-rotation	Effect on 3D of rotation
CF3D-fast_movement	Effect on 3D of fast movement
CF3D-contrast	High or low contrast in both views or contrast differences between left and right could affect 3D
CF3D-grain	Graininess of sequence could affect 3D

General:

CF-bright_sunlight	CF-bright_daylight	CF-sunrise_sunset
CF-dull_daylight	CF-brightness_change	CF-shaded
CF-indoors_bright	CF-indoors_dark	CF-night
CF-twilight	CF-light_picture	CF-dark_picture
CF-high_contrast	CF-black_background	CF-dark_areas
CF-low_contrast	CF-white_background	CF-monochromatic
CF-people	CF-vehicles	CF-water
CF-buildings	CF-faces	CF-text
CF-trees	CF-leaves_grass	CF-crowd
CF-sky	CF-clouds	CF-complex_scene
CF-patterns	CF-reflections	CF-round_objects
CF-round	CF-animals	
CF-lines	CF-moire	CF-moving_text
CF-fine_details	CF-highlights	CF-light_sky
CF-graininess	CF-out_of_focus	CF-depth_of_field

CF-bright_colours	CF-dull_colours	CF-large_monochromatic
CF-movement_in	CF-movement_out	CF-movement_up/down
CF-movement_across	CF-random_movement	CF-diagonal_movement
CF-coordinated_movement	CF-from_above	CF-hand_held
CF-low_subject_movement	CF-rapid_movement	CF-rapid_changes
CF-slow_motion	CF-speeded_up	
CF-fast_track_pan	CF-panning	CF-scroll
CF-tracking	CF-tracking_following	CF-jerky
CF-transition	CF-transitions	CF-fade
CF-zoom_in	CF-zoom_out	CF-rapid_zoom
CF-angled	CF-subjects_behind_foreground	CF-banding
CF-sound_vehicles	CF-sound_talking	CF-sound_water
CF-sound_other	CF-wind	CF-music

6. Detailed information on individual clips

The following pages provide detailed information on the clips in this set.

6.1 Detailed description of each clip

This section contains detailed descriptions of each video clip, and the associated audio.

70 features are listed for each clip: the purpose of providing these descriptions is to make it easier to select specific clips for specific features.

Therefore even if a characteristic does occur in a particular clip, this is not necessarily listed where it is not a prominent feature and/or where it is believed that the clip would not be selected for this particular feature.

Clearly to some extent these descriptions and selections are subjective, and the user is likely to come to their own conclusions as to which are most relevant to their particular codec / situation: the descriptions provided are intended to be an appropriate starting point.

T3D023001_Monorail

GN.01	Filename(s)	T3D023001_Monorail_1920x1080p30_8b_P420_l/r.yuv
GN.02	Horizontal x vertical size	1920x1080
GN.03	Progressive / Interlaced	Progressive
GN.04	Video format	YUV planar 4:2:0
GN.05	Bits per sample	8 (for each of Y, U, V)
GN.06	Video description	White monorail trains coming and going
GN.07	Principal purposes	Straightforward codec efficiency test in reasonably complex scene
GN.08	3D notes	Optical lens geometry not perfect left-right, but does not adversely affect 3D
GN.09	Duration (mins:secs:frames)	00:25:05
GN.10	Number of frames	755
GN.11	File size on disk (MB), combined L+R	4,700
GN.12	3D CF-words	CF3D-effect_mild, CF3D-Sky_spec_yes
GN.13	CF-words	CF-bright_colours, CF-bright_sunlight, CF-buildings, CF-complex_scene, CF-fade, CF-fine_details, CF-large_monochromatic, CF-light_sky, CF-light_picture, CF-lines, CF-moire, CF-movement_across, CF-movement_in, CF-movement_out, CF-patterns, CF-rapid_changes, CF-scene_change, CF-sky, CF-transition, CF-vehicles
GN.14	Associated audio types	MPEG1 Layer II 48kHz 16bit stereo 384kbps Constant Bit Rate : 16bit uncompressed 48kHz stereo WAV
GN.15	Associated audio filenames	T3a023x001_Monorail_act_MP1LII.mpa : T3a023y001_Monorail_act_unc.wav
GN.16	Associated audio description	Actual audio recorded with video
GN.17	Audio duration	Same as video (video played at 59.94fps)

Clip features		Details
3D DATA		
3DN.01	Ave. Negative disparity	0.0%
3DN.02	Ave. Positive disparity	0.3%
3DN.03	Ave. within Sky spec (-1% / +2%)	Yes
3DN.04	Peak Negative disparity	-0.2%
3DN.05	Peak Positive disparity	0.6%
3DN.06	Peak within Sky spec (-2.5% / +4%)	Yes
3DN.07	Interocular (mm)	40-65
3DN.08	Colour corrected	Yes
3DN.09	Geometric correction	None
3DN.10	Floating window used	No
3D EVALUATION		
3EV.01	3D effect	Mild
3EV.02	Change in 3D effect	-
3EV.03	Peak negative or positive disparity	-
3EV.04	3D perception hard	-
3EV.05	3D viewer discomfort	-
3EV.06	3D window violation	-
3EV.07	3D diff. Left to Right	-

3EV.08	Comply with Sky spec	Yes
3EV.09	3D possibly affected by	-

LIGHT CONDITIONS

LC.01	Bright sunlight	All
LC.02	Bright daylight	-
LC.03	Dull daylight	-
LC.04	Shaded areas	-
LC.05	Indoors bright	-
LC.06	Indoors dark	-
LC.07	Twilight	-
LC.08	Sunrise/sunset	-
LC.09	Night	-
LC.10	Backlighting	-
LC.11	Large brightness change	-

SCENE SUBJECTS

SS.01	People	Deep
SS.02	Faces	-
SS.03	Vehicles	Some
SS.04	Buildings	-
SS.05	Trees	One
SS.06	Text	One
SS.07	Talking head	-
SS.08	Water	Some slow
SS.09	Leaves/grass	-
SS.10	Sky	Monochromatic blue
SS.11	Clouds	-
SS.12	Patterns	-
SS.13	Round/curved objects	-

SCENE PROPERTIES

SP.01	Depth of field	Deep
SP.02	Out-of-focus	-
SP.03	Fine lines/moiré patterns	Some
SP.04	Reflections	-
SP.05	Scene change	One
SP.06	Fades	One
SP.07	Transitions	-
SP.08	Slow/fast motion	Some slow

COLOURS & CONTRAST

CC.01	Light picture	All
CC.02	Dark picture	-
CC.03	Bright colours	Most
CC.04	Dull colours	-
CC.05	Fine detail/moiré patterns	Areas
CC.06	High contrast areas	-
CC.07	Large monochromatic areas	One (sky)
CC.08	Graininess	-
CC.09	Black background	-
CC.10	White background	-

GLOBAL MOTION

GM.01	Fast track/pan	-
GM.02	Tracking in/out	-
GM.03	Tracking	-
GM.04	Panning	-
GM.05	Tracking (following)	-
GM.06	Fast scroll	-
GM.07	Scroll	-
GM.08	Angled	-
GM.09	Zoom in	-
GM.10	Zoom out	-
GM.11	Hand-held camera	-

SUBJECT MOTION

SM.01	Movement out of picture	Some, slow
SM.02	Movement into picture	Some, slow
SM.03	Movement across picture	Some, slow
SM.04	Movement up/down	-
SM.05	Diagonal movement	-
SM.06	Subjects behind foreground objects	-
SM.07	Low movement	-

SOUND CONTENT

SC.01	Talking	-
SC.02	Movement	-
SC.03	Vehicles	-
SC.04	Wind	-

SC.05	Music	-
SC.06	Background	Traffic
SC.07	Other	-

SOUND CHARACTERISTICS

SH.01	Mono/ stereo	Stereo
SH.02	Average volume	Quiet
SH.03	Level changes	-
SH.04	Clear/ distorted	Clear

T3D023002_Night_travelator

GN.01	Filename(s)	T3D023002_Night_travelator_1920x1080p30_8b_P420_l/r.yuv
GN.02	Horizontal x vertical size(s)	1920x1080
GN.03	Progressive / Interlaced	Progressive
GN.04	Video format	YUV planar 4:2:0
GN.05	Bits per sample	8 (for each of Y, U, V)
GN.06	Video description	Night time riding a travelator
GN.07	Principal purposes	Codec stress test with lots of moire fringing and irregular movment, with strong 3D depth and 2D depth cues
GN.08	3D notes	Excellent 3D effect throughout and especially at the end
GN.09	Duration (mins:secs:frames)	01:21:16
GN.10	Number of frames	2446
GN.11	File size on disk (MB), combined L+R	15,220
GN.12	3D CF-words	CF3D-effect_medium, CF3D-effect_strong, CF3D-peak_negative, CF3D-peak_positive, CF3D-Sky_spec_no
GN.13	CF words	CF-black_background, CF-bright_colours, CF-complex_scene, CF-coordinated_movement, CF-dark_areas, CF-faces, CF-fine_details, CF-hand_held, CF-high_contrast, CF-indoors_bright, CF-lines, CF-movement_in, CF-night, CF-patterns, CF-people, CF-round, CF-sound_talking, CF-sound_vehicles, CF-sound_water, CF-tracking
GN.14	Associated audio types	MPEG1 Layer II 48kHz 16bit stereo 384kbps Constant Bit Rate : 16bit uncompressed 48kHz stereo WAV
GN.15	Associated audio filenames	T3a023x002_Night_travelator_act_MP1LII.mpa : T3a023y002_Night_travelator_act_unc.wav
GN.16	Associated audio description	Actual audio recorded with video
GN.17	Audio duration	Same as video (video played at 59.94fps)

Clip features		Details
3D DATA		
3DN.01	Ave. Negative disparity	-1.3%
3DN.02	Ave. Positive disparity	0.2%
3DN.03	Ave. within Sky spec (-1% / +2%)	No
3DN.04	Peak Negative disparity	-2.9%
3DN.05	Peak Positive disparity	0.4%
3DN.06	Peak within Sky spec (-2.5% / +4%)	No
3DN.07	Interocular (mm)	65
3DN.08	Colour corrected	Yes
3DN.09	Geometric correction	None
3DN.10	Floating window used	No
3D EVALUATION		
3EV.01	3D effect	Medium, Strong
3EV.02	Change in 3D effect	-
3EV.03	Peak negative or positive disparity	Peak negative & peak positive
3EV.04	3D perception hard	-

3EV.05	3D viewer discomfort	-
3EV.06	3D window violation	-
3EV.07	3D diff. Left to Right	-
3EV.08	Comply with Sky spec	No
3EV.09	3D possibly affected by	-

LIGHT CONDITIONS

LC.01	Bright sunlight	-
LC.02	Bright daylight	-
LC.03	Dull daylight	-
LC.04	Shaded areas	Some
LC.05	Indoors bright	Some
LC.06	Indoors dark	-
LC.07	Twilight	Some
LC.08	Sunrise/sunset	-
LC.09	Night	Some
LC.10	Backlighting	-
LC.11	Large brightness change	-

SCENE SUBJECTS

SS.01	People	Several
SS.02	Faces	Several
SS.03	Vehicles	-
SS.04	Buildings	-
SS.05	Trees	-
SS.06	Text	-
SS.07	Talking head	-
SS.08	Water	-
SS.09	Leaves/grass	-
SS.10	Sky	-
SS.11	Clouds	-
SS.12	Patterns	-
SS.13	Round/curved objects	-

SCENE PROPERTIES

SP.01	Depth of field	Deep
SP.02	Out-of-focus	-
SP.03	Fine lines / moiré patterns	Lots
SP.04	Reflections	-
SP.05	Scene change	-
SP.06	Fades	-
SP.07	Transitions	-
SP.08	Slow/fast motion	Continuous slow

COLOURS & CONTRAST

CC.01	Light picture	Most
CC.02	Dark picture	Areas
CC.03	Bright colours	Areas
CC.04	Dull colours	-
CC.05	Fine detail/moiré patterns	Lots
CC.06	High contrast areas	Lots
CC.07	Large monochromatic areas	-
CC.08	Graininess	-
CC.09	Black background	-
CC.10	White background	-

GLOBAL MOTION

GM.01	Fast track/pan	-
GM.02	Tracking in/out	Slow in
GM.03	Tracking	-
GM.04	Panning	-
GM.05	Tracking (following)	-
GM.06	Fast scroll	-
GM.07	Scroll	-
GM.08	Angled	-
GM.09	Zoom in	-
GM.10	Zoom out	-
GM.11	Hand-held camera	Smooth

SUBJECT MOTION

SM.01	Movement out of picture	Some, slow
SM.02	Movement into picture	Lots, slow
SM.03	Movement across picture	-
SM.04	Movement up/down	-
SM.05	Diagonal movement	-
SM.06	Subjects behind foreground objects	-
SM.07	Low movement	-

SOUND CONTENT

SC.01	Talking	Some

SC.02	Movement	-
SC.03	Vehicles	-
SC.04	Wind	-
SC.05	Music	-
SC.06	Background	Water
SC.07	Other	Squeaking

SOUND CHARACTERISTICS

SH.01	Mono/ stereo	Stereo
SH.02	Average volume	Quiet
SH.03	Level changes	-
SH.04	Clear/ distorted	Distorted