T2Vid

T2V041 4K

User Manual

Video Clips for

Testing and Optimisation of

Video Compression

TestVid

www.testvid.com

Intentionally blank

This User Manual contains full information on the video files that you/your organisation has licensed for use.

Please ensure to read the next two pages for details of how these video clips may be used, within the terms of the License Agreement

To find particular video clips that contain specific features/subjects that you wish to test for, it is recommended that you use the PDF version of this manual as this allows fast electronic searching for specific clip features using the "CF-words" (see section 5.2 for more information).

T2V041_4K User manual v1.0

TestVid Ltd., 4 Cheyne Road, Bristol BS9 2DH, United Kingdom
www.testvid.com sales@testvid.com Tel.: +44 (0)117 949 6411

TestVid Content License Agreement

This Content License Agreement (this "Agreement") governs the terms by which you ("You" or "Your") obtain the right to use video files, music files, sound effects files, creative art, 3-D animations, computer animations, motion backgrounds, camera acquired video footage, photos, flash files, project files, music files, data files and other material (collectively referred to as " Content") supplied by TestVid Ltd ('TestVid'). This Agreement is in addition to the TestVid Terms and Conditions of Sale ("Terms and Conditions") which are incorporated herein by reference and to which You will be contractually bound upon Your first use of the Content. In the event of any inconsistency between this Agreement and the Terms and Conditions, this Agreement shall govern. Any capitalized term that is not defined in this Agreement shall have the same meaning as set out in the Terms and Conditions.

GENERAL INFORMATION REGARDING THIS AGREEMENT

USE OF ANY OF THE TESTVID CONTENT INDICATES FULL AGREEMENT TO THE TERMS OF THIS AGREEMENT, EITHER FOR YOURSELF OR ON BEHALF OF YOUR COMPANY OR EMPLOYER (WHETHER ACTING AS AN EMPLOYEE, CONTRACTOR, SUB-CONTRACTOR, CONSULTANT OR IN ANY OTHER CAPACITY), AND AGREE TO BE BOUND BY ITS TERMS. IF YOU ARE ACCEPTING ON BEHALF OF YOUR COMPANY OR EMPLOYER, YOU REPRESENT AND WARRANT THAT YOU HAVE FULL LEGAL AUTHORITY TO BIND YOUR COMPANY OR EMPLOYER. IF YOU DO NOT HAVE SUCH AUTHORITY OR YOU DO NOT ACCEPT OR AGREE WITH THESE TERMS, DO NOT USE THE CONTENT.

LICENSE TERMS

Upon Your acceptance of this Agreement and receipt of payment from You by TestVid, TestVid grants to You a perpetual, non-exclusive, non-transferable license to use the Content for the Permitted Uses (as outlined below). The use contemplated by You must be a Permitted Use. If it is not, it is prohibited by this Agreement. All other rights in and to the Content, including, without limitation, all copyright and other intellectual property rights relating to the Content, are retained by TestVid.

Content is Licensed (not sold)

Your use of the Content is under license only. No title or intellectual property rights are granted to You. Ownership of the Content and all copyright and all other rights not expressly granted by this Agreement remains with TestVid.

Permitted Uses for the Content

Subject to the restrictions described under **Content License Restrictions & Prohibited Uses** below the following are "Permitted Uses" of the Content:

1. testing, development, engineering and related activities including product demonstrations and tests;
2. on-line or electronic presentations, catalogues, brochures, advertising and promotions including web pages, podcasts and vidcasts providing that when used for this purpose the version of the Content displayed (a) must be compressed such that any version that appears to be as good quality as the original cannot be obtained, and (b) the TestVid logo remains visible, and (c) there is a clear label denoting the TestVid copyright;
3. any other uses approved in writing, in advance by TestVid.

For clarity, You may not use the Content in products for resale, license or other distribution, unless approved in writing in advance by TestVid.

Content License Restrictions & Prohibited Uses

You may not do anything with the Content that is not expressly permitted in the preceding section or permitted by a separate modified content license which has been explicitly agreed in writing by TestVid. By way of example and not limitation, the following are "Prohibited Uses":

4. sale, resale or distribution of the Content either as a single piece of video, music file, sound effect file, composition, software project file or product or as a part of any background of these;
5. sale, resale or distribution of the Content as a part of another production where the Content, in our sole discretion, comprises 5% or more of the finished product;
6. incorporation of the Content in any product that results in a re-distribution or re-use of the Content or is otherwise made available in such a way one could extract or access or reproduce the Content as a separate file as if it were substantially unmodified;
7. sub-licensing, re-selling, renting, lending, assigning, gifting or otherwise transferring or distributing the Content or the rights granted under this Agreement;
8. removal of any notice of copyright, logo, watermark, trade-mark or other proprietary right from any place where it is on or embedded in the Content;
9. installation and use of the Content at a location/site other than for which the Content was originally licensed or placing a copy of the Content on a network server or web server for use by others at a different location/site;
10. use of the Content in a way which could be considered obscene, pornographic, immoral, infringing, dishonest, fraudulent, defamatory or libellous in nature, or that could be reasonably likely to bring any person or property reflected in the Content into disrepute;
11. use of or display of the Content in an electronic format that enables it to be downloaded or distributed as the original media file or with minor differences (as determined by TestVid) via any computer device (including mobile devices) or shared in any peer-to-peer or similar arrangement;
12. breaking the Content into smaller pieces and selling these pieces as stock or test media

Restriction on Quantity of Copies

Only You or bona-fide colleagues are permitted to use the Content, although You may transfer the Content or files containing the Content or Permitted Derivative Works to Your company's servers, for the purpose of reproduction for Permitted Uses, provided that such parties shall have no further or additional rights to use the Content and cannot access or extract it from any file You supply.

As long as it is a Permitted Use, You may reproduce the Content or any parts thereof in original or derivative forms (e.g. compressed) a maximum of 25 times on one particular 'site' (i.e. one geographical location, as determined at the discretion of TestVid).

If You require the Content to be copied or stored more than 25 times in original or derivative form, or require the Content or any parts thereof on a different site then You must purchase additional licenses for the Content. The count of number of copies covers all versions whether stored or used on personal computers, workstations, servers, web-servers, mainframes, laptops, PDAs, mobile phones and other mobile devices, games consoles and any other type of computer. For the avoidance of doubt, if the Content is stored at a remote site this Content may only be downloaded and used at the single site for which the license was purchased.

In addition to these 25 copies You may make one (1) copy of the Content solely for back-up purposes, and You must reproduce all

proprietary notices on this single back-up copy.

Term of Agreement

This Agreement is effective until it is terminated. If You terminate this Agreement You must destroy or delete the Content and any Permitted Derivative Works, along with any copies or archives of it or accompanying materials (if applicable), and cease using the Content for any purpose. This Agreement and all of Your rights under it terminate automatically without notice if at any time You breach any of its terms. You must, if requested, confirm to TestVid in writing that You have complied with these requirements and provide any proof thereof requested by TestVid.

Amendment

This Agreement can be amended by TestVid at any time by posting an amended Agreement on TestVid's website. Your only recourse, if You are not agreeable to the amended Agreement is to terminate this Agreement and cease use of the Content. Otherwise, You will be bound by the terms of the amended Agreement.

Replacement of the Content

TestVid may revoke the license granted by this Agreement and replace the Content with a substantially similar alternative for any reason. TestVid may inform You of replacement of the Content by sending notice of same, along with the replacement Content to the address or contact information provided to TestVid by You or such other address as You may advise TestVid in writing to use. In the event of a replacement, the license for the replaced Content immediately terminates and this Agreement (or the then-current version of this Agreement) automatically applies to the replacement Content. You agree not to use the replaced Content, or any Permitted Derivative Works, for future products and to take all reasonable steps to discontinue use of the replaced Content, or any Permitted Derivative Works, in products that already exist.

Limitation of Warranties and Liability

While TestVid carefully all of the Content to ensure the highest quality, THE CONTENT IS PROVIDED "AS IS" WITHOUT REPRESENTATION, WARRANTY OR CONDITION OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED REPRESENTATIONS, WARRANTIES OR CONDITIONS OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE. WE DO NOT REPRESENT OR WARRANT THAT THE CONTENT WILL MEET YOUR REQUIREMENTS OR THAT IT WILL BE ERROR FREE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE CONTENT IS WITH YOU. SHOULD THE CONTENT PROVE DEFECTIVE, YOU ASSUME THE ENTIRE RISK AND COST OF ALL NECESSARY CORRECTIONS.

Our entire liability and Your exclusive remedy, with respect to any claims arising out of Your use of the Content, or out of Your actions in downloading the Content, shall be as follows: TESTVID'S MAXIMUM AGGREGATE LIABILITY UNDER THIS AGREEMENT OR IN RESPECT OF THE USE OR EXPLOITATION OF ANY OR ALL OF THE CONTENT IN ANY MANNER SHALL BE LIMITED TO THE FEES COLLECTED BY TESTVID FOR YOUR USE OF THE CONTENT THAT IS THE SUBJECT MATTER OF THE CLAIM OR $1,000 UNITED STATES DOLLARS, WHICHEVER IS GREATER. IN NO EVENT SHALL TESTVID OR ANY OF ITS DIRECTORS, OFFICERS, EMPLOYEES, SHAREHOLDERS, PARTNERS, AGENTS OR LICENSEES BE LIABLE FOR ANY INCIDENTAL, INDIRECT, PUNITIVE, EXEMPLARY, OR CONSEQUENTIAL DAMAGES WHATSOEVER (INCLUDING DAMAGES FOR LOSS OF PROFITS, INTERRUPTION, LOSS OF BUSINESS INFORMATION, OR ANY OTHER PECUNIARY LOSS) IN CONNECTION WITH ANY CLAIM, LOSS, DAMAGE, ACTION, SUIT OR OTHER PROCEEDING ARISING UNDER OR OUT OF THIS AGREEMENT, INCLUDING WITHOUT LIMITATION THE USE OF, RELIANCE UPON, ACCESS TO, OR EXPLOITATION OF THE CONTENT OR ANY PART THEREOF, OR ANY RIGHTS GRANTED TO YOU HEREUNDER, EVEN IF TESTVID HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, WHETHER THE ACTION IS BASED ON AGREEMENT, TORT (INCLUDING NEGLIGENCE), INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OR OTHERWISE. IF YOUR JURISDICTION DOES NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES OR FOR THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, THE LIABILITY OF TESTVID OR ANY OF ITS DIRECTORS, OFFICERS, EMPLOYEES, SHAREHOLDERS, PARTNERS OR AGENTS SHALL BE LIMITED TO THE GREATEST EXTENT PERMITTED BY LAW.

Indemnity

You agree to indemnify, defend and hold TestVid and its affiliates, and their respective directors, officers, employees, shareholders and agents (collectively, the "TestVid Parties") harmless from and against any and all claims, liability, losses, costs and expenses (including reasonable legal fees) incurred by any TestVid Party as a result of (i) any breach by You of this Agreement; (ii) any claim threatened or asserted against any TestVid Party that alleges that You have breached this Agreement or infringed any copyrights, trade secrets, trademarks, right of privacy, right of publicity or other intellectual or other property rights of any third party. TestVid reserves the right, at Your expense, to assume the exclusive defence and control of any matter otherwise subject to indemnification by You, and You agree to cooperate with TestVid's defence of such claim.

General Provisions

You acknowledge and agree that this Agreement will be governed under the laws of the United Kingdom (without reference to conflicts of laws principles). You hereby irrevocably submit to the jurisdiction of the Courts of the United Kingdom. If TestVid is obligated to go to court or arbitration to enforce any of its rights, or to collect any fees, You agree to reimburse TestVid for its legal fees, costs and disbursements if TestVid is successful. You consent to service of any required notice or process upon You by registered mail or overnight courier with proof of delivery notice, addressed to the address or contact information provided by You at the time You first purchase usage rights to the Content. You agree to waive any right You may have to trial by jury. TestVid's failure to insist upon or enforce strict performance of any provision of this Agreement shall not constitute a waiver. This Agreement is not assignable by You without TestVid's prior written consent (such consent not to be unreasonably withheld). TestVid may assign this Agreement without Your consent to any other party so long as such party agrees to be bound by its terms. This Agreement may be amended by TestVid at any time by posting an amended Agreement on the TestVid website. Continued use of the Content or failure to terminate this Agreement after posting of such amendment will be deemed to be acceptance of the amendment.

YOU ACKNOWLEDGE THAT YOU HAVE READ THIS AGREEMENT AND HAVE HAD OPPORTUNITY TO SEEK INDEPENDENT LEGAL ADVICE PRIOR TO AGREEING TO IT. IN CONSIDERATION OF TESTVID AGREEING TO PROVIDE THE CONTENT, YOU AGREE TO BE BOUND BY THE TERMS AND CONDITIONS OF THIS AGREEMENT. YOU FURTHER AGREE THAT IT (AND ANY SUBSEQUENT MODIFICATION OF IT) AND THE TERMS AND CONDITIONS POSTED ON THE WEBSITE ARE THE COMPLETE AGREEMENT BETWEEN YOU AND TESTVID, AND THAT SAME SUPERSEDES ANY PRIOR AGREEMENT.

Contents

1. Overview of T2V041 4K

2-D / 3-D	2D
Compressed/ Uncompressed	Uncompressed
Description of video	Scenes from USA West (San Francisco and Las Vegas), Europe (UK) and Asia (S. Korea, Japan, China)
Purpose	Test an encoder to deal with 'difficult' video, with all aspects of global/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
Number of clips	Total 20 scenes, all at 4K resolution (4096x2304 **), progressive: 1) 7 at 59.94 fps 2) 6 at 50.0 fps 3) 7 at 23.976 fps
Length of video	Total of approx. 12 minutes
Total size on disk	Approx. 985 GBytes

Video format(s)

File Nos.	Resolution **	Frame rate
T2V040nn	4096x2304	59.94
T2V041nn	4096x2304	50.0
T2V042nn	4096x2304	23.976

(where 'nn' are the numbers of the individual streams)

All are progressive, YUV planar, 4:2:2 chroma, 12 bits per sample

***** NOTE: a utility program is provided to generate many different formats of '4K video' from the video supplied, including:***

- ***resolutions of 4096x2160, 3840x2160, 3840x2304***
- ***bit-depths of 16, 14, 12, 10 and 8-bits per sample***
- ***chroma of 4:4:4, 4:2:2 and 4:2:0***
- ***progressive / interlaced***
- ***frame rates as above or half (29.97, 25.0 fps)***
- ***YUV, RGB/BGR output format***
- ***BMP files (one file per frame)***

See section 4.3.2 for full list of formats supported.

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, 12-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. T2V041 4K Clip set description

3.1 Set content types

This set of video clips provides a basis set of video clips at different frame rates, that allows '4K video' to be generated in most of the various sizes of '4K' with different bit-depths, chroma sampling and progressive/interlaced using the provided utility software.

This set comprises 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

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. These features are deliberately used as they often cause the most difficulty to video encoders and represent the worst case that the encoder should encounter in 'normal / real' use.

The total time of the pairs of video clips is over 12 minutes.

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.

3.1.2 T2vid logo

The *T2vid* logo has been designed to have as little impact as possible on encoders.

The logo is 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.

3.2 Individual clips provided

20 YUV clips are provided as below.

All the clips are:

- 4096x2304 resolution
- 4:2:2 chroma
- 12-bits per sample (two bytes, most significant 12 bits used)
- progressive
- 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
- Y planes are unsigned nominally 256-3760 but may go into the range 0-4095
- U and V planes are centred at 2048 and are nominally 256-3840 but may go into the range 0-4095

4Kp60:

- 59.94 frames per second

4Kp24:

- 23.976 frames per second

4Kp50:

- 50.00 frames per second

All of the clips were filmed at the respective frame rates (i.e. 59.94 / 23.976 / 50.0 fps), although the YUV may be re-played / encoded at any speed (such as 60 / 25 / 50 fps).

3.3 Generation of 4K video, 4:4:4 and bit depths greater than 12

The 59.94fps and 23.976fps video was originally filmed at 3840x2160 resolution, 4:2:2 at 12-bits per Y, U and V sample. To reduce in-field storage requirements, this was down-sampled to 2048x1152 resolution using custom hardware, retaining 4:2:2 at 12-bits per sample. Tests had shown that doing so did not significantly affect visual quality when up-sampled back to 3840x2160 or 4096x2304 resolution as the scaling algorithm itself is virtually artefact-free, although camera artefacts such as ringing, edge emphasis and graininess that are in the original video will remain.

The 50fps video (all the clips in Asia) were filmed at 1920x1080 resolution, 4:2:2 at 10-bits per Y, U and V sample. These were upscaled to 4K using a TestVid custom algorithm. Although preferable to be filmed at full 4K resolution, tests had shown that the visual differences and artefacts were minor from filming at lower resolution; in addition, as the weather while filming was extremely hot and humid in Asia, all the clips have significant heat haze or shimmer (so that the lower resolution filming made little practical difference).

In order to generate 4:4:4 video from the 4:2:2 video, the yuv4Kconv supplied utility software up-samples by two horizontally the U and V planes using a custom scaling & curve smoothing algorithm (which is virtually artefact-free, but due to the up-scaling any visual artefacts may become more visible).

Bit depths of 14- and 16-bits per sample are generated by left shifting the 12-bits of the supplied and filling the lower 2 or 4 bits with zeros.

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.

The information below relates only to the format of the video as supplied: many other formats can be generated by the yuv4Kconv software utility provided (see section 4.3.2 for more information).

3.4.1 4Kp (4096x2304 progressive 4:2:2 12-bit): same at all frame rates

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

One sample of Y, U or V:

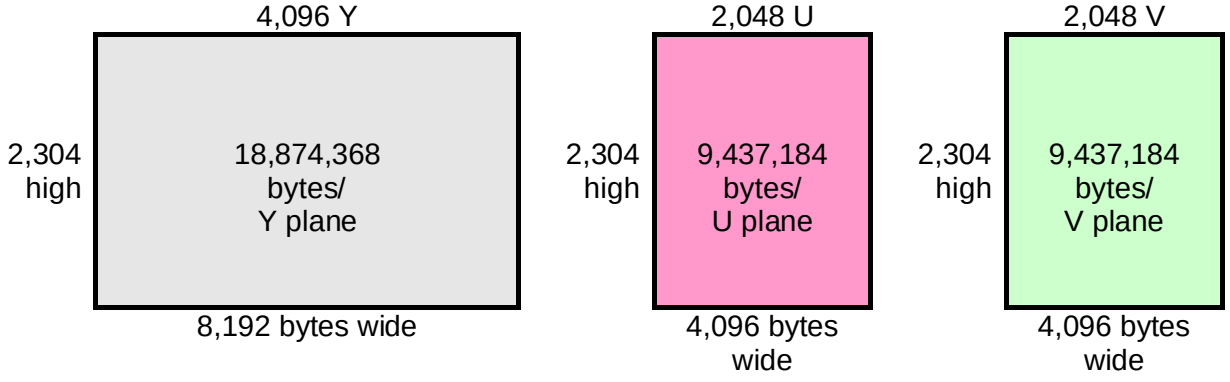
Memory address	Byte	0								1							
	Bit	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Video data	Byte	Least significant								Most significant							
	Bit	0	1	2	3	4	5	6	7	8	9	10	11	x	x	x	x

where 'x' = set to 0

Start of each line of Y, U or V

Memory address	Byte	0	1	2	3	4	5	6	7
Video data (12 bits)	Bit	0 x		1 x		2 x		3 x	

One frame of Y, U and V comprises: plane of Y followed by plane of U followed by plane of V:



Valid video data ranges:

- Y: 256 - 3,760 [16-235 << 4]
- U and V: 256 - 3,840 [16-240 << 4]

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 video (computer and software requirements).

4.1.1 Computer requirements of viewing the 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:

- **4Kp59.94** 2,262 MBytes/sec
- **4Kp23.976** 905 MBytes/sec
- **4Kp50** 1,885 MBytes/sec

These data rates are much higher than achievable even with 'usual' high performance PCs: the result of trying to play the video on such a standard high performance PC is that it will play slowly (appear to be slow motion video).

To achieve the above data rates will likely require arrays of 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 YUV viewers/players

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.

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.

4.1.3 Programs that do not display/import YUV files directly

A number of common programs - such as Final Cut Pro, Adobe Premiere Pro, Sony Vegas and others may not import YUV uncompressed files directly: the YUV files may need to be wrapped e.g. in an AVI or converted to another format

- wrap the YUV within an AVI file
- use an AVS file to reference the YUV
- convert the YUV into a different format acceptable to the chosen program
- 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.

4.1.4 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 4096x2304 -i <infile.yuv> -vcodec copy <outfile.avi>
```

where

- `-r 60` sets the frame rate to 60 frames/sec
- `-r 4096x2304` 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

4.1.5 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:\T2V041_4K\Video_1080p60_12b_422_YUV\T2V041001_Silver_dome_4096x2304p60_12b_P422_l.yuv", pixel_type="P422", width=4096, height=2304)
```

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.

4.1.6 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.

Alternatively, using the provided utility program `yuv4Kconv` the YUV video supplied can be converted to RGB or BMP files [one frame per file] which can be imported into or used by many editors and players.

See section 4.3 for details on the `yuv4Kconv` program.

4.1.7 YUV output on SDI

The same method can be used for stereoscopic video as for 2D video: see section 4.2.

4.2 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.

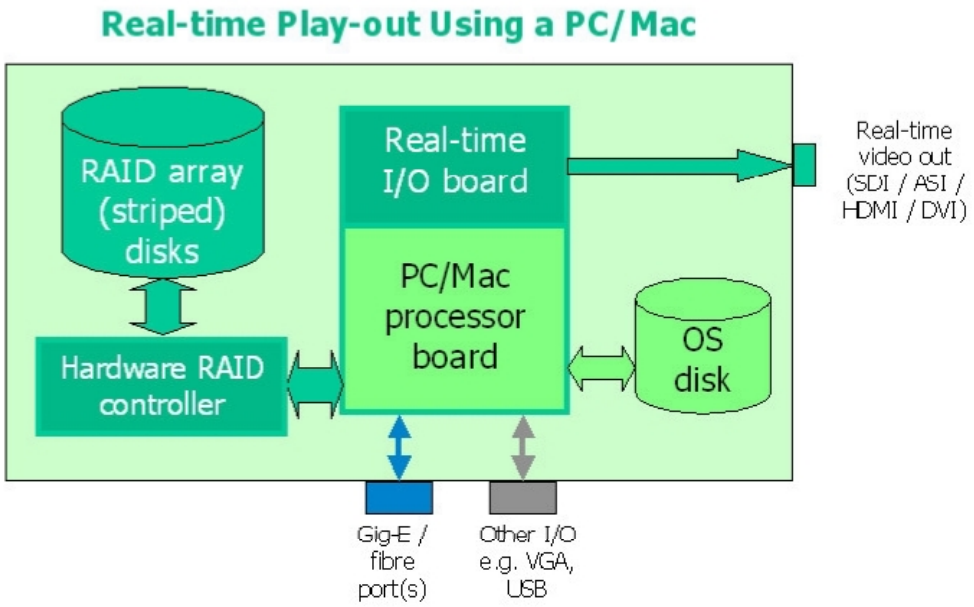
Essentially, the issue is to get the uncompressed ***Tvids*** YUV files from disk onto an SDI / ASI / DVI / HDMI interface via a specialised I/O board.

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"

4.3 Software tools provided

The following software is provided:

Software tool	Purpose
yuv4Kconv	The 4K video is supplied 4096x2304 resolution, 4:2:2, 12-bits per sample. This utility program will convert the 4K video supplied in many ways e.g. to 3840x2160 resolution, 10-bits per sample, 4:2:0 (see below for full list of conversions).

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.

4.3.1 License agreement relating to the software tools provided

This license agreement below applies to all software listed in this section 4.3.

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

4.3.2 yuv4Kconv [convert YUV to RGB, BMP]

This is a command line program for reducing the size of any of the provided video by removing lines from the top and/or columns from the right of each video frame.

The 4K video is supplied 4096x2304 resolution, 4:2:2, 12-bits per sample.

This utility program will convert the 4K video supplied in any of the following ways:

- reduce horizontal resolution to 3840 pixels
- reduce vertical resolution to 2160 lies
- change chroma from 4:2:2 to 4:4:4 or 4:2:0
- change bit depth to 16-bits, 14-bits, 10-bits or 8-bits per sample
- half frame rate for progressive output (e.g. 50p to 25p)
- convert to RGB (or BGR colour order), right way up or upside down (i.e. where first byte in file is from bottom left pixel in image, not top left)
- change format from planar to interleaved (i.e. where all the data for each pixel is grouped together)
- convert to interlaced (e.g. 4K interlaced at 29.97 fps)

In order to generate 4:4:4 video from the 4:2:2 video, the `yuv4Kconv` supplied utility software up-samples by two horizontally the U and V planes using a custom scaling & curve smoothing algorithm (which is virtually artefact-free, but due to the up-scaling any visual artefacts may become more visible).

Bit depths of 14- and 16-bits per sample are generated by left shifting the 12-bits of the supplied and filling the lower 2 or 4 bits with zeros.

Usage:

```
yuv4Kconv <inputfile> <outfile> <xsize> <ysize> <f> <o> <p> <chr> <bps> <nnn>
```

where:

- `<inputfile>` is the input filename (the `.yuv` extension is assumed). This is assumed to be 4096x2304 resolution, 4:2:2 chroma, 12-bits per sample

- <outfile> is the name of the output file (it will be given an extension of .yuv)
- <xsize> = horizontal resolution of the output file: set to 4096 or 3840
- <ysize> = vertical resolution of frame of the output file: set to 2304 or 2160
- <f> = field format & frame rate output, i.e. p = progressive [no change in frame rate] or i = interlaced output file [half frame rate] or h = progressive [half frame rate]
- <o> = output format YUV or RGB:
  y = YUV;
  rr = RGB right way up;
  ru = RGB upside down (first byte is from bottom left pixel of frame);
  br = BGR right way up;
  bu = BGR upside down (first byte is from bottom left pixel of frame);
- <p> = packing of pixel data: n = planar; l = interleaved
- <chr> = chroma format of YUV output file, 4 = 4:4:4, 2 = 4:2:2, 0 = 4:2:0. RGB/BGR output can only be 4:4:4 so this value is ignored for RGB/BGR output but **must still be present**
- <bps> = bits per sample of output file, set to 16 / 14 / 12 / 10 / 8 [bits per sample]
- <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

As examples:

```
yuv4Kconv infile outfile 3840 2160 p y n 0 8 0
```

will produce an outfile.yuv file, 3840x2160 resolution, progressive, YUV, planar 4:2:0 chroma, 8-bits per sample, all frames

```
yuv4Kconv infile outfile 4096 2304 h rr l 4 16 500
```

will produce an outfile.yuv file, 4096x2304 resolution, progressive at half frame rate [e.g. going 59.94 to 29.97 fps], RGB right way up, interleaved, 4:4:4 chroma [can only be 4:4:4 if RGB output], 16-bits per sample, only first 500 frames

The full list of supported formats that can be output are:

Common to all formats:

Output resolution: [others possible, down to 1920x1080, but not tested]

- 4096x2304
- 4096x2160
- 3840x2304
- 3840x2160

Progressive/ Interlaced	FPS	Chroma	Bits/ sample	Packing
YUV				*No header in the file: 1st byte is top left of screen*
Progressive	59.94 50.0 29.97 25.0 23.976	4:4:4 or 4:2:2 or 4:2:0	16 or 14 or 12 or 10 or 8	Planar [YYY…UUU… VVV…] or Interleaved [Y0UY1VY2UY3V…]
Interlaced	29.97 25.0	- as above -	- as above -	- as above -
RGB or BGR				Right-way up [first byte is top-left pixel] or upside down [first byte is bottom-left pixel]
Progressive	59.94 50.0 29.97 25.0 23.976	4:4:4	16 or 14 or 12 or 10 or 8	Planar [RRR…GGG… BBB…] or Planar [BBB…GGG… RRR…] or Interleaved [RGBRGBRGB…] or Interleaved [BGRBGRBGR…]
BMP				
Progressive	as above	4:4:4	8	one file per frame containing RGB or BGR, planar or interleaved as above

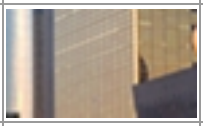
Note: bit depths 16, 14, 12, 10 use two bytes per sample with unused upper bits set to 0; bit depth of 8 uses one byte per sample

5. List of clips

5.1 Clips summary

- Total time of sequences: (all sequences added together) **approx. 12 mins**

Clip number(s)	Title	Main purposes	Duration (mins:secs: frames)	Begin	End
4Kp60 sequences	***Numbers T2V041 0nn***				
T2V041001	Silver_dome	General codec test with complex scene and 'difficult' subjects incl. water, reflections with static background	00:26:00		
T2V041002	Monorail	Straightforward codec efficiency test in reasonably complex scene	00:25:08		
T2V041003	Night_travelator	Codec stress test with lots of moiré fringing and irregular movement	00:25:00		
T2V041004	Pool_shark	'Codec nightmare', where motion vector tracking is extremely difficult	00:25:00		
T2V041005	Ice_cream_van	Global motion with translation and rotation	00:25:00		
T2V041006	Venetian_crossing	Complex scene as people walk towards camera	00:26:01		
T2V041007	Fountain	Codec stress test with many similar reflective/transparent small areas	00:25:00		
4Kp24 sequences	***Numbers T2V041 1nn***				
T2V041111	Footbridge	Codec test when the moving subjects (the people) are substantially obscured, some of the time behind fine lines	01:01:18		
T2V041112	Shopping_mall	Codec test with slow pan/scroll left/right in a highly contrasting scene with strong patterns	00:36:16		
T2V041113	Ferry_arrives	Slow tracking of subject in largely static (complex) background but with water and obscuration	00:50:09		

T2V041114	Cabot_Tower	Test with random movement (including rotation), irregular foreground (grass) man-made structure and largely monochrome blue sky	00:57:20		
T2V041115	PedXing	Motion vector test, tracking people in a detailed scene	00:32:00		
T2V041116	Waterfall	Largely static shot but sunlit waterfall makes motion vector tracking impossible on water	00:18:12		
T2V041117	The_Matthew	Codec test with smooth scrolling and panning in complex scene	00:27:19		
4Kp50 sequences		***Numbers T2V041 2nn***			
T2V041221	Asakusa_man	Continuous random movement of background / subject tracking with foreground obscuration, and no global movement	00:24:16		
T2V041222	Nippon_Express	Smooth panning motion left-wards, tracking a subject with continually varying obscuration and heat-haze causing continual minor movements of parts of the picture	00:44:00		
T2V041223	Changing_the_guard	Codec efficiency test with scenes with limited movement, plus global translation, plus low brightness transition	00:27:22		
T2V041224	Golden_statue	Smooth panning motion right-wards with a few irregular global movements	00:26:11		
T2V041225	Beijing_traffic	Codec efficiency test where scene changes from one where there is no global motion & limited subject motion, to one where there is a global pan and zoom, plus continual subject movement	00:30:40		
T2V041226	Fast_walk	Codec stress and efficiency test of grainy night scene with strong video effects applied	00:20:10		

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-…'.

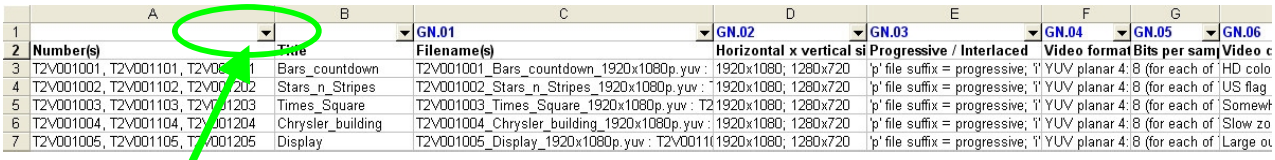
5.2.2 Excel file sorting for specific clip features

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:

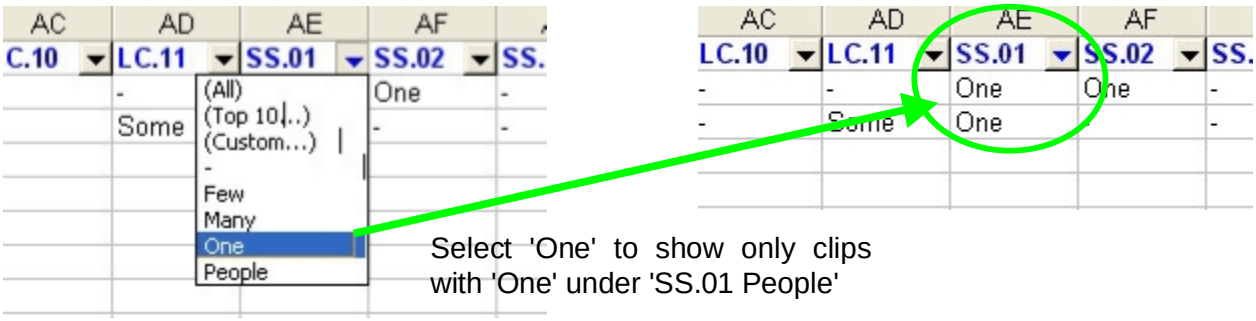
- the first tab has the clip set title: this has all the items listed in the manual for the clip
- the second tab "Clip features" just lists the individual clips, with the list of their clip features and individual columns for each individual clip feature.

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, T2V 1204	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, T2V 1205	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')



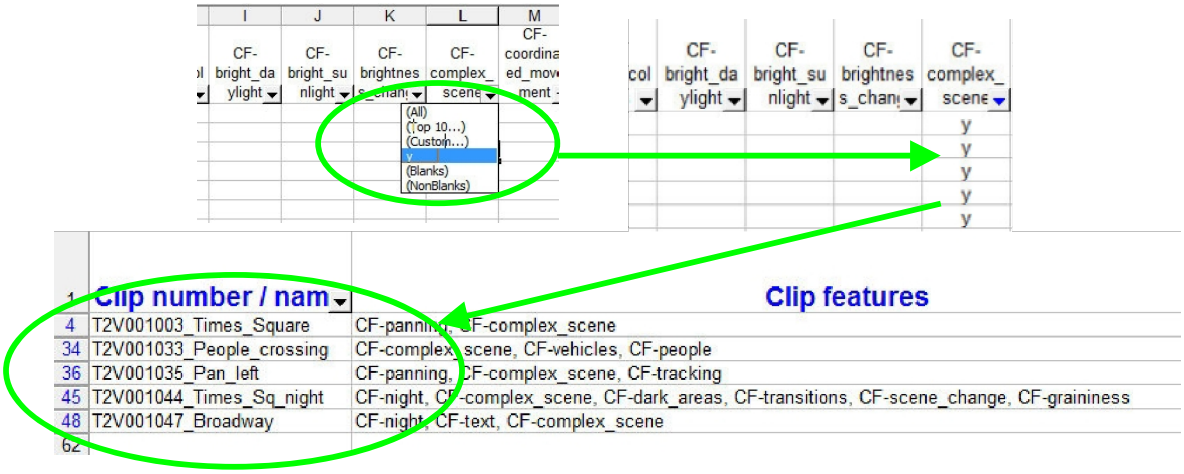
Select 'One' to show only clips with 'One' under 'SS.01 People'

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 **Error! Reference source not found.** 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 **Error! Reference source not found.**)
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 **Error! Reference source not found.**)
CF3D-Sky_spec_yes CF3D-Sky_spec_no	Whether or not the clip meets the Sky specification (see section **Error! Reference source not found.**) 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.

T2V041 001_Silver_dome (p60)

GN.01	Filename(s)	T2V041001_Silver_dome_4096x2304p60_12b_P422.yuv
GN.02	Horizontal x vertical size	4096x2304
GN.03	Progressive / Interlaced	Progressive
GN.04	Video format	YUV planar 4:2:2
GN.05	Bits per sample	12 (for each of Y, U, V)
GN.06	Video description	Silver dome in background, with metal waterfall and people walking to and fro
GN.07	Principal purposes	General codec test with complex scene and 'difficult' subjects incl. water, reflections with static background
GN.08	Duration (mins:secs:frames)	00:26:00
GN.09	Number of frames	1,560
GN.10	File size on disk (MB)	58,888
GN.11	CF-words	CF-buildings, CF-reflections, CF-people, CF-bright_sunlight, CF-movement_out, CF-music, CF-movement_in, CF-sound_water
GN.12	Associated audio types	MPEG1 Layer II 48kHz 16bit stereo 384kbps Constant Bit Rate : 16bit uncompressed 48kHz stereo WAV
GN.13	Associated audio filenames	T2a041x001_Silver_dome_act_MP1LII.mpa : T2a041y001_Silver_dome_act_unc.wav
GN.14	Associated audio description	Actual audio recorded with video
GN.15	Audio duration	Same as video (video played at 59.94fps)

	Clip features	Details
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	Many
SS.02	Faces	Many
SS.03	Vehicles	-
SS.04	Buildings	Several
SS.05	Trees	-
SS.06	Text	-
SS.07	Talking head	-
SS.08	Water	Some
SS.09	Leaves/grass	-
SS.10	Sky	Blue w clouds
SS.11	Clouds	Few
SS.12	Patterns	Many
SS.13	Round/curved objects	One
SCENE PROPERTIES		
SP.01	Depth of field	Deep
SP.02	Out-of-focus	-
SP.03	Fine lines/moiré patterns	-
SP.04	Reflections	Lots

SP.05	Scene change	One
SP.06	Fades	One
SP.07	Transitions	One
SP.08	Slow/fast motion	-

COLOURS & CONTRAST

CC.01	Light picture	-
CC.02	Dark picture	-
CC.03	Bright colours	Some
CC.04	Dull colours	-
CC.05	Fine detail/moiré patterns	-
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	-
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	Lots, slow
SM.02	Movement into picture	Lots, 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	Some
SC.02	Movement	-
SC.03	Vehicles	-
SC.04	Wind	-
SC.05	Music	-
SC.06	Background	People
SC.07	Other	Water

SOUND CHARACTERISTICS

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

T2V041 002_Monorail (p60)

GN.01	Filename(s)	T2V041002_Monorail_4096x2304p60_12b_P422.yuv
GN.02	Horizontal x vertical size	4096x2304
GN.03	Progressive / Interlaced	Progressive
GN.04	Video format	YUV planar 4:2:2
GN.05	Bits per sample	12 (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	Duration (mins:secs:frames)	00:25:08
GN.09	Number of frames	1,508
GN.10	File size on disk (MB)	56,925
GN.11	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.12	Associated audio types	MPEG1 Layer II 48kHz 16bit stereo 384kbps Constant Bit Rate : 16bit uncompressed 48kHz stereo WAV
GN.13	Associated audio filenames	T2a041x002_Monorail_act_MP1LII.mpa : T2a041y002_Monorail_act_unc.wav
GN.14	Associated audio description	Actual audio recorded with video
GN.15	Audio duration	Same as video (video played at 59.94fps)

	Clip features	Details
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