

## **Summary**



### **Vclips VC105B Video Clips for Testing and Optimization of Video Compression**

### **Decoder Series – VC105B, D-Space MP4 ASP Hdr**

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## **General Safety Summary**

Use this product only as specified.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other product manuals for warnings and cautions related to their operation.

## Summary: VC-105-A D-Space-MP4-ASP-Hdr

<b>Decoder Test Set</b>	VC-105-A D-Space-MP4-ASP-Hdr
<b>Purpose</b>	Test MPEG-4 Advanced Simple Profile decoders (at Levels 0, 1, and 2) with all variants of bit fields within the MPEG-4 Visual Object and Video Object Layer headers.
<b>Content</b>	Synthetic sequence with Space shuttle, Earth and Moon. Most clips are 173 frames.
<b>Standard</b>	ISO/IEC 14496-2:2001(E) ISO title: Information technology – Coding of audio-visual objects: Part 2: Visual 2 <sup>nd</sup> Edition 2001-12-01
<b>Number of clips</b>	47 sequences, numbered V10501 to V10547: <ul style="list-style-type: none"> <li>• 176x144 (42 streams)</li> <li>• 352x576 (2 streams)</li> <li>• 88x72 (1 stream)</li> <li>• 88x144 (1 stream)</li> <li>• 176x72 (1 stream)</li> </ul> <p>i.e. total 47 clips plus five YUV source videos</p>
<b>Total disk size</b>	6 Mbytes (compressed video) plus 97 Mbytes (trace files)
<b>Video format</b>	Compressed ".m4v" video files as per MPEG-4 Part 2 Visual standard
<b>How supplied</b>	1 computer CD
<b>Software supplied</b>	YUV sequence viewer ".m4v" to YUV decoder in folder: \Software
<b>Documentation</b>	PDF of this manual in folder: \Documentation

## 1. Introduction

This set of video sequences is designed to test the parts of an MPEG-4 Advanced Simple Profile decoder which decode the headers of the video bitstream, primarily the VisualObjectSequence, VisualObject and VideoObjectLayer structures.

This is done by individually enabling all the different permissible bit-field options within the header structures in the clips specified. Some clips are also provided with multiple combinations and with all permissible bit-fields enabled.

A single video scene is provided: all the variations are done on this single video scene.

## 2. Information supplied

The following pages list:

- the basic details of the video sequence (source data, contents of the scene);
- the settings used for each sequence.

In addition, on the CD there is provided:

- 'Trace' information, showing the location and value of each syntax element in the sequence headers and first five VOPs.
- a spreadsheet listing all the clips and showing which header parameters are enabled and the values used (Microsoft Excel<sup>®</sup> format).
- the original YUV source video used to encode the video sequences.

### 2.1. 'Trace' information provided

The 'Trace' files provide a parsing/decoding of the header and the first few VOPs of each clip, into the bitstream fields as listed in the standard.

Two Trace files are provided for each clip:

- Parse bitstream
- Interpret

Both of these file types have the file extension '.vpt', although they only contain standard ASCII text data and can be viewed with any text viewer.

(These Trace files were generated using the [MTS4EA](#) video compression analysis tool, available from [Tektronix](#).)

#### 2.1.1 Parse bitstream Trace file

The Parse bitstream Trace file lists all the bits of the bitstream, divided into the individual bitstream fields:

```

0000 0000 0000 0000 0000 0001 1011 0000 (0x00000000,7) : VISUAL_OBJECT_SEQUENCE_START_CODE
0000 0011 ---- ---- ---- ---- ---- (0x00000004,7) : PROFILE_AND_LEVEL_INDICATION
0000 0000 0000 0000 0000 0001 1011 0101 (0x00000005,7) : VISUAL_OBJECT_START_CODE
0---- ---- ---- ---- ---- ---- ---- (0x00000009,7) : IS_VISUAL_OBJECT_IDENTIFIER
0001 ---- ---- ---- ---- ---- ---- ---- (0x00000009,6) : VISUAL_OBJECT_TYPE
0---- ---- ---- ---- ---- ---- ---- (0x00000009,2) : VIDEO_SIGNAL_TYPE
01-- ---- ---- ---- ---- ---- ---- ---- (0x00000009,1) : STUFFING_BITS
0000 0000 0000 0000 0000 0001 0000 0000 (0x0000000A,7) : VIDEO_OBJECT_START_CODE
0000 0000 0000 0000 0000 0001 0010 0000 (0x0000000E,7) : VIDEO_OBJECT_LAYER_START_CODE
0---- ---- ---- ---- ---- ---- ---- (0x00000012,7) : RANDOM_ACCESSIBLE_VOL
0000 0001 ---- ---- ---- ---- ---- ---- (0x00000012,6) : VIDEO_OBJECT_TYPE_INDICATION
0---- ---- ---- ---- ---- ---- ---- (0x00000013,6) : IS_OBJECT_LAYER_IDENTIFIER
0001 ---- ---- ---- ---- ---- ---- ---- (0x00000013,5) : ASPECT_RATIO_INFO
0---- ---- ---- ---- ---- ---- ---- (0x00000013,1) : VOL_CONTROL_PARAMETERS
00-- ---- ---- ---- ---- ---- ---- ---- (0x00000013,0) : VIDEO_OBJECT_LAYER_SHAPE
1---- ---- ---- ---- ---- ---- ---- (0x00000014,6) : MARKER_BIT

```

The above information is split into 3 sections:

- ❑ the section of '0's and '1's on the left gives the bits in the bitstream, in the order they occur;
- ❑ the data in brackets (0x00000004,7) is the hex address byte address in the bitstream and the starting bit position in the bitstream, where 7 is the most-significant bit (occurring first in the byte) and 0 is the least-significant bit (occurring last in the byte);
- ❑ the name given is the standard name for the bitstream field.

Each of the Parse bitstream Trace files has a name of the form:

V105nn\_A\_D-Space\_MP4\_ASP\_Hdr\_xxx\_parse\_bitstream.vpt

(where 'nn' is the last 2 digits of the clip number)

## 2.1.2 Interpret Trace file

The Interpret Trace file reads the values in the bitstream fields and interprets them i.e. explains what the value given means:

```

(0x00000000,7) [VOS] {MP4} visual_object_sequence_start_code = 0xb0 (0xB0)
MPEG-4 Simple/Level 3
(0x00000005,7) [VO ] {MP4} visual_object_start_code = 0x1b5 (0x1B5)
(0x00000009,7) [VO ] {MP4} is_visual_object_identifier = 0
(0x00000009,6) [VO ] {MP4} visual_object_type = 0x1
(0x00000009,2) [VO ] {MP4} video_signal_type = 0
(0x00000009,1) [VOP] {MP4} Stuffing bits = 0x1 (number of bits is 2)
(0x0000000A,7) [VOS] {MP4} video_object_start_code = 0x100 (range: 0x100 - 0x11F)
(0x0000000E,7) [VOL] {MP4} video_object_layer_start_code = 0x120 (range: 0x120 - 0x12F)
(0x00000012,7) [VOL] {MP4} random_accessible_vol = 0
(0x00000012,6) [VOL] {MP4} video_object_type_indication = Simple Object Type
(0x00000013,6) [VO ] {MP4} is_object_layer_identifier = 0: video_object_layer_verid='0001'
(Version 1) assumed
(0x00000013,5) [VOL] {MP4} aspect_ratio_info = '0001' = 1:1 (Square)
[VOL] {MP4} vol_control_parameters are off
(0x00000013,0) [VOL] {MP4} video_object_layer_shape = 0 (Rectangular)
(0x00000014,5) [VOL] {MP4} vop_time_increment_resolution = 0x19 (dec. 25)
[inf] {MP4} number of bits for vop_time_increment = 5
(0x00000016,4) [VOL] {MP4} fixed_vop_rate = 0 : VOP rate can be variable
[VOL] {MP4} video_object_layer_width = 352; video_object_layer_height = 288

```

The above information is split into 3 sections:

- ❑ section on the left in brackets (0x00000004,7) is the hex address byte address in the bitstream and the starting bit position in the bitstream, where 7 is the most-significant bit (occurring first in the byte) and 0 is the least-significant bit (occurring last in the byte);

- ❑ the title (such as [VOL] is the general syntax level of the bitstream element (e.g. VOL = VideoObjectLayer) and {MP4} denotes this applies to MPEG-4 only (as opposed to other standards such as H.263);
- ❑ section on the right gives the interpreted value of the bitstream data, i.e. what the bitstream data means.

Each of the Interpret Trace files has a name of the form:

V105nn\_A\_D-Space\_MP4\_ASP\_Hdr\_xxx\_interpret.vpt

(where 'nn' is the last 2 digits of the clip number)

## 3. Software supplied

The following software is supplied:

- ❑ ".m4v" to YUV decoder;
- ❑ YUV sequence viewer.

### 3.1. YUV sequence viewer

This program is called: `YUVSequenceViewer.exe`

and is located on disk 1 in the folder: `\Software`

To run it, double-click on it – it does not need to be installed.

Once it has been run once, it associates files with an extension of `.yuv` so that after this double-clicking on a file with this extension will automatically open the YUV file in the sequence viewer.

YUVSequenceViewer tries to work out the size of the video frames from the filename (if it is given in the filename): if there are no clues from the filename then the user must enter the size of the frames.

On the 'Tool' menu there is an option to subtract two YUV sequences, to look for differences between two files. A zero difference results in a constant grey image. To make these differences more visible, select the menu 'View' then 'Options' then enter a number into the 'Subtraction scale' box: the larger the number, the more the differences are multiplied.

### 3.2. ".m4v" to YUV decoder

This program is called: `decoder.exe`

and is located on disk 1 in the folder: `\Software`

It is a command-line only tool (to be called from within a DOS / Command Prompt box).

The syntax for use is:

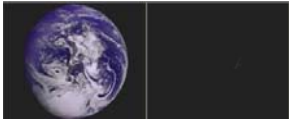
```
decoder <input file> <output file> <width> <height>
```

Where the file names include spaces, the filenames must be included within quotes, e.g.

```
decoder "input 1" "C:\Temp\output 1" 176 144
```

## 4. Basic Clip Set Details

### 4.1. General clip set details

BASIC CLIP SET DETAILS		Begin   End	Title
			<b>Space</b>
1.	Number(s)	V10501 to V10547	
2.	Filename(s)	V10501_A_D-Space_MP4_ASP_Hdr_<name>.m4v to V10547_A_D-Space_MP4_ASP_Hdr_<name>.m4v	
3.	Title	Space	
4.	Description	Synthetic sequence with Space shuttle, Earth and Moon	
5.	Main purposes / tests	Check different options in Header are correctly decoded	
6.	Size(s), horizontal x vertical	42 QCIF sequences (176x144) 2 CIF sequences (352x288) 1 sequence at 88x72 1 sequence at 88x144 1 sequence at 176x72	
7.	Video format	.m4v MPEG-4 Part 2 Visual (source material YUV 4:2:0 Planar, 8 bits per pixel)	
8.	Number of frames	173	
9.	Source frame rate	25 fps	
10.	Clip duration (seconds)	6.92	
11.	File size on disc (MB)	Total for all files: 47MB (.m4v plus YUV files)	
12.	Original video format	CIF-sized RGB	
13.	Keywords	KW-vehicles, KW-cross_movement, KW-dark, KW-text KW-high_contrast, KW-bright_colours, KW-monochromatic_area	

	FEATURES	Qty / amount	Notes
14.	<b>GLOBAL MOTION</b>		
15.	Fast pan	-	
16.	Pan	-	
17.	Tracking pan	-	
18.	Zoom in	-	
19.	Zoom out	-	
20.	Scroll	-	
21.	Rotate	-	
22.	Hand-held camera	-	
23.	<b>OBJECT MOTION</b>		
24.	Movement out of picture	-	

25.	Movement into picture	Some	
26.	Movement across picture	Lots, mainly downwards	
27.	Diagonal movement	-	
28.	Subjects behind foreground objects	-	
29.	Low movement	-	
30.	<b>COLOURS &amp; CONTRAST</b>		
31.	Light picture	Areas	
32.	Dark picture	Areas	
33.	Bright colours	Areas	
34.	Dull colours	-	
35.	Fine detail pattern	Some	
36.	High contrast areas	Several	
37.	Large monochromatic area	Some	Black background
38.	<b>SCENE CONTENT</b>		
39.	Out-of-focus	-	
40.	Fine lines / moiré patterns	-	
41.	Reflections	-	
42.	Scene change	-	
43.	<b>SCENE SUBJECTS</b>		
44.	People	-	
45.	Faces	-	
46.	Vehicles	Space shuttle	
47.	Buildings	-	
48.	Trees	-	
49.	Text	-	
50.	Talking head	-	
51.	Water	-	
52.	Leaves	-	
53.	Sky	-	
54.	Clouds	-	
55.	Round objects	Earth, Moon	
56.	<b>LIGHT CONDITIONS</b>		
57.	Bright sunlight	-	
58.	Shaded areas	-	
59.	Bright daylight	Some	
60.	Dull daylight	-	
61.	Twilight	-	
62.	Night	-	
63.	Backlighting	-	
64.	Substantial brightness change	-	



## 4.2. Summary of clips

V10501	Advanced Simple Profile/Level 1 stream.
V10502	Bitstream with <code>is_visual_object_identifier</code> set to 1, high priority.
V10503	Bitstream with <code>is_visual_object_identifier</code> set to 7, low priority.
V10504	Bitstream with <code>video_signal_type</code> information.
V10505	Bitstream with <code>video_signal_type</code> and colour description information, low values.
V10506	Bitstream with <code>video_signal_type</code> and colour description information, high values.
V10507	Bitstream with <code>video_object_start_code</code> set to 0x1f.
V10508	Bitstream with <code>video_object_layer_start_code</code> set to 0x2f.
V10509	Bitstream of I-VOPs, <code>random_accessible_vol</code> set to 1.
V10510	Bitstream with <code>is_object_layer_identifier</code> set to 0.
V10511	Bitstream with <code>is_object_layer_identifier</code> set to 1, low priority.
V10512	Bitstream with 40:33 pixel aspect ratio.
V10513	Bitstream using extended pixel aspect ratio of 1:2.
V10514	Bitstream using extended pixel aspect ratio of 254:255.
V10515	Bitstream with <code>low_delay</code> set to 1.
V10516	Bitstream using <code>vbv_parameters</code> syntax elements, lower settings.
V10517	Bitstream using <code>vbv_parameters</code> syntax elements, default settings.
V10518	Bitstream using <code>vop_time_increment_resolution</code> equal to 1.
V10519	Bitstream using fixed VOP rate of 25fps.
V10520	Bitstream using fixed VOP rate, testing high value of <code>fixed_vop_time_increment</code> .
V10521	Bitstream with GMC enabled, 0 warping points and 1/2 pel accuracy.
V10522	Bitstream with GMC enabled, 1 warping point and 1/2 pel accuracy.
V10523	Bitstream with GMC enabled, 2 warping points and 1/4 pel accuracy.
V10524	Bitstream with GMC enabled, 3 warping points and 1/8 pel accuracy.
V10525	Bitstream with GMC enabled, 4 warping points and 1/16 pel accuracy.
V10526	Bitstream using the MPEG quantisation method, default matrix.
V10527	Bitstream using the MPEG quantisation method and short matrices.
V10528	Bitstream using the MPEG quantisation method and full matrices.
V10529	Bitstream quarter-sample precision for motion compensation.

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V10530	Bitstream using complexity estimation header elements, but all estimation flags set to 0.
V10531	Bitstream using complexity estimation header elements, all method 0 estimates enabled.
V10532	Bitstream using complexity estimation header elements, all method 1 estimates enabled.
V10533	Bitstream with resync markers enabled.
V10534	Bitstream using data partitioning and resync markers.
V10535	Bitstream using data partitioning, RVLC and resync markers.
V10536	Stream with Group_of_VOP headers every 20 VOPs. Time code elements at 0.
V10537	Stream with a Group_of_VOP header before each VOP. Time code elements at maximum values.
V10538	Stream with user data in VisualObjectSequence().
V10539	Stream with user data in VisualObject().
V10540	Stream with user data in Group_of_VideoObjectPlane().
V10541	Bitstream with many parameter variations (see table in section 5 for full details).
V10542	ASP @ L0 stream, using GMC and quarter-sample.
V10543	ASP @ L0 16th-CIF sized stream (88x72).
V10544	ASP @ L0 eighth-CIF sized stream (176x72).
V10545	ASP @ L0 eighth-CIF sized stream (88x144).
V10546	ASP @ L2 CIF-sized stream.
V10547	ASP @ L2 CIF-sized stream with many parameter variations (see table in section 5 for full details).