

## **Summary**



### **Vclips VC103B Video Clips for Testing and Optimization of Video Compression**

**Decoder Series – VC103B, D-Space MP4 SP V**

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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-103-A D-Space-MP4-SP-V

<b>Decoder Test Set</b>	VC-103-A D-Space-MP4-SP-V
<b>Purpose</b>	Test MPEG-4 Simple Profile decoders with all variants of bit fields within the MPEG-4 visual stream VOP
<b>Content</b>	Single scene – Space moving into, out of and across picture 500 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>	45 sequences, numbered V10301 to V10345: <ul style="list-style-type: none"> <li>• 176x144            38</li> <li>• 352x288           4</li> <li>• 96x64               1</li> <li>• 128x64             1</li> <li>• 128x120           1</li> </ul> <p>i.e. total 45 clips plus YUV source video (number V10300)</p>
<b>Total disk size</b>	7 Mbytes (compressed video files only)
<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                    on disk 1
<b>Documentation</b>	PDF of this manual in folder:     \Documentation                on disk 1

## 1. Introduction

This set of video sequences is designed to test the parts of an MPEG-4 Advanced Simple Profile decoder which decode the VOP part of the video bitstream, i.e. the VideoObjectPlane.

For the purposes of these tests the VOP is defined as comprising those sections of the standard which are referred to by the VideoObjectPlane() pseudo-function in section 6.2.5 of the MPEG-4 standard.

This is done by individually enabling all the different permissible bit-field options within the VOP 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 for some of the VOPs of each clip (the 'Trace' information is ~1Mbyte per VOP, so not all VOPs are detailed, but a relevant number are chosen - see below);
- where relevant, the 'Trace' information for the 'Header' of the sequence (the Header comprises all syntactic elements higher than the VOP);
- a spreadsheet which lists all the clips and shows which VOP fields (and Header fields) 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 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:

V103nn\_D-Space\_MP4\_SP\_VOP\_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:

V103nn\_D-Space\_MP4\_SP\_VOP\_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 Details

### 4.1. General clip set details

BASIC CLIP SET DETAILS		Begin   End	Title
			<b>Space</b>
1.	Number(s)	V10301 to V10345	
2.	Filename(s)	V10301_D-Space_MP4_SP_Err_*.m4v to V10345_D-Space_MP4_SP_Err_*.m4v	
3.	Title	Space	
4.	Description	Synthetic sequence with Space shuttle, Earth and Moon	
5.	Main purposes / tests	Check decoder response to different errors in the Header and VOP	
6.	Size(s), horizontal x vertical	38 QCIF sequences (176x144), 4 CIF sequences (352x288) and 3 sequences smaller than QCIF	
7.	Video format	.m4v MPEG-4 Part 2 Visual (source material YUV 4:2:0 Planar, 8 bits per pixel)	
8.	Number of frames	175	
9.	Source frame rate	25 fps	
10.	Clip duration (seconds)	14, including a 6-second pause after frame 30	
11.	File size on disc (MB)	Total for all files: 12MB	
12.	Original video format	720x576 DV, interlaced	

13.	Keywords	KW-vehicles, KW-cross_movement, KW-dark, KW-text KW-high_contrast, KW-bright_colours, KW-monochromatic_area
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	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 upwards	
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

Clip Name	Description
V10301	Simple Profile/Level 1 stream
V10302	Bitstream with vop_fcode_forward = 2
V10303	Bitstream with vop_fcode_forward = 4
V10304	Bitstream with vop_fcode_forward = 7
V10305	Bitstream with vop_fcode_forward = 2 and resync_markers.
V10306	Bitstream with vop_fcode_forward = 7 and resync_markers.
V10307	Bitstream with vop_rounding_type set to 1.
V10308	Bitstream with intra_dc_vlc_thr set to 1.
V10309	Bitstream with intra_dc_vlc_thr set to 4.
V10310	Bitstream with intra_dc_vlc_thr set to 7.
V10311	Bitstream with explicit vop_quant settings: 4, 8 for I-, and P-VOPs respectively.
V10312	Bitstream with explicit vop_quant settings: 8, 24 for I-, and P-VOPs respectively.
V10313	Bitstream with explicit vop_quant settings: 24, 8 for I-, and P-VOPs respectively.
V10314	Bitstream using the resynchronisation error resilience tool.
V10315	Bitstream using the resynchronisation error resilience tool, but with resync_marker_disable = 1.
V10316	Bitstream using the data partitioning error resilience tool.
V10317	Bitstream using a combination of the data partitioning and RVLC error resilience tools.
V10318	Bitstream using the resynchronisation error resilience tool with video packet length of 512 bits.
V10319	Bitstream using the resynchronisation error resilience tool with video packet length of 1024 bits.
V10320	Bitstream with no 4MV mode macroblocks.
V10321	Bitstream encoded with I-VOPs only.
V10322	Bitstream encoded with group-of-pictures (GOP) pattern containing an I-VOP followed by 14 P-VOPs.
V10323	Bitstream encoded with group-of-pictures (GOP) pattern containing an I-VOP followed by 4 P-VOPs.
V10324	Bitstream with no skipped macroblocks.
V10325	Bitstream with vop_time_increment_resolution set to 1.
V10326	Bitstream with vop_time_increment_resolution set to 65535.
V10327	Bitstream with fixed VOP rate specified.
V10328	Bitstream with fixed VOP rate specified.
V10329	Bitstream with fixed VOP rate specified and using maximum vop_time_increment_resolution.
V10330	Bitstream with many parameter variations (see table in section 5 for full details).
V10331	Simple Profile/Level 0 stream
V10332	SP@L0 bitstream with no AC prediction

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Clip Name	Description
V10333	SP@L0 bitstream at 1 fps.
V10334	SP@L0 bitstream at 5 fps
V10335	SP@L0 bitstream at 10 fps
V10336	SP@L0 bitstream at 96 x 64 image size
V10337	SP@L0 bitstream at 128 x 64 image size
V10338	SP bitstream at 128 x 120 image size
V10339	SP@L0 bitstream encoded with I-VOPs only.
V10340	Bitstream with many parameter variations (see table in section 5 for full details).
V10341	Simple Profile/Level 2 stream
V10342	SP@L2 bitstream at QCIF image size
V10343	SP@L2 bitstream using the resynchronisation error resilience tool with video packet length of 4096 bits.
V10344	Bitstream with many parameter variations (see table in section 5 for full details).
V10345	Bitstream with many parameter variations (see table in section 5 for full details).