

# Summary



## **Vclips VC313A Video Clips for Testing and Optimization of Video Compression**

## **Decoder Series – VC313A, D-Traffic AVC Err MP**

Copyright ©Tektronix. All rights reserved. Licensed software products are owned by Tektronix or its suppliers, and are protected by United States copyright laws and international treaty provisions.

Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specifications and price change privileges reserved.

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

## **Contacting Tektronix**

Tektronix, Inc.  
14200 SW Karl Braun Drive  
P.O. Box 500  
Beaverton, OR 97077  
USA

For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit [www.tektronix.com](http://www.tektronix.com) to find contacts in your area.

## 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-313-A D-Traffic-AVC-Err-MP

<b>Decoder Test Set</b>	VC-313-A D-Traffic-AVC-Err-MP
<b>Purpose</b>	Test AVC (H264) Main Profile decoders with many different errors that can occur in SPS, PPS and slice data within an Annex-B bitstream
<b>Content</b>	Single scene - Traffic, cars moving in two directions along a road.
<b>Standard</b>	ISO/IEC 14496-10:2003(E) Information technology - Coding of audio-visual objects - Part 10: Advanced video coding
<b>Number of clips</b>	40 sequences, numbered V31301 to V31340: <ul style="list-style-type: none"> <li>• CIF: 352x288           (38 files)</li> <li>• 912x96               (1 file)</li> <li>• 96x912               (1 file)</li> </ul> plus CIF-size YUV source video (number V31300)
<b>Total disk size</b>	19 Mbytes (for compressed video files)
<b>Video format</b>	Compressed ".264" video files as per H.264 Annex-B file format
<b>How supplied</b>	1 computer DVD
<b>Software supplied</b>	YUV sequence viewer ".264" 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 response of an AVC Main Profile decoder to errors:

- ❑ which commonly occur within a compressed bitstream (based upon [Vqual's](#) experience with customer bitstreams);
- ❑ caused when other individual fields of the parameter sets or slices are set incorrectly.

This is done by:

- ❑ setting individual bitstream fields to non-permissible values (i.e. not permitted in AVC Main Profile at the given Level);
- ❑ setting bitstream fields to a non-permitted combination of values;
- ❑ introducing bit-errors at various points, to check decoder recovery from and resilience to errors.

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 error settings used for each sequence with the error location.

In addition, on the DVD there are provided:

- ❑ 'Trace' information of the relevant part of each clip showing where the error is (see below);
- ❑ 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 bitstream of each clip, into the bitstream fields as listed in the AVC standard.

Two Trace files are provided for each clip:

- ❑ Parse bitstream
- ❑ Interpret

Both of these file types are provided in HTML format.

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

To quickly find the error location in these files, select a link from the comment index at the top of the page

Note that in most of these HTML files, only the first 5 frames are listed, as this is all that is necessary to understand the error.

### 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 ---- ---- ---- ---- ---- ---- (0x00000000,7) : ZERO_BYTE
0000 0000 0000 0000 0000 0001 ---- ---- (0x00000001,7) : START_CODE_PREFIX_ONE_3BYTES
0---- ---- ---- ---- ---- ---- ---- (0x00000004,7) : FORBIDDEN_ZERO_BIT
11-- ---- ---- ---- ---- ---- ---- (0x00000004,6) : NAL_REF_IDC
0011 1---- ---- ---- ---- ---- ---- (0x00000004,4) : NAL_UNIT_TYPE
0100 1101 ---- ---- ---- ---- ---- ---- (0x00000005,7) : PROFILE_IDC
0--- ---- ---- ---- ---- ---- ---- (0x00000006,7) : CONSTRAINT_SET0_FLAG
0--- ---- ---- ---- ---- ---- ---- (0x00000006,6) : CONSTRAINT_SET1_FLAG
0--- ---- ---- ---- ---- ---- ---- (0x00000006,5) : CONSTRAINT_SET2_FLAG
0000 0---- ---- ---- ---- ---- ---- (0x00000006,4) : RESERVED_ZERO_5BITS
0001 0101 ---- ---- ---- ---- ---- ---- (0x00000007,7) : LEVEL_IDC
1--- ---- ---- ---- ---- ---- ---- (0x00000008,7) : SEQ_PARAMETER_SET_ID
0010 1--- ---- ---- ---- ---- ---- (0x00000008,6) : LOG2_MAX_FRAME_NUM_MINUS4
1--- ---- ---- ---- ---- ---- ---- (0x00000008,1) : PIC_ORDER_CNT_TYPE
0010 1---- ---- ---- ---- ---- ---- (0x00000008,0) : LOG2_MAX_PIC_ORDER_CNT_LSB_MINUS4
011- ---- ---- ---- ---- ---- ---- (0x00000009,3) : NUM_REF_FRAMES

```

The above information is split into three 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:

V313nn\_D\_Traffic\_AVC\_MP\_<err\_name>\_parse\_bitstream.html

(where 'nn' is the last 2 digits of the clip number and <err\_name> is the error name as listed in the table below in section **Error! Reference source not found.**)

Within each Trace file, the error is highlighted and a comment has been inserted. To find the error, use the comment index at the top of the trace file.

The Parse bitstream files are located in the folder:        \Documentation\Parse  
on the disk.

## 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) [BSN]      zero_byte = 0x00
(0x00000001,7) [BSN]      start_code_prefix_one_3bytes = 0x000001
(0x00000004,7) [NAL]      forbidden_zero_bit = 0
(0x00000004,6) [NAL]      nal_ref_idc = 3 : Reference slice or SPS or PPS
(0x00000004,4) [NAL]      nal_unit_type = 7 : Sequence Parameter Set (SPS)
(0x00000005,7) [SPS]      profile_idc = 77 : Main profile
(0x00000006,7) [SPS]      constraint_set0_flag = 0 : May or may not obey A.2.1 constraints
(0x00000006,6) [SPS]      constraint_set1_flag = 0 : May or may not obey A.2.2 constraints
(0x00000006,5) [SPS]      constraint_set2_flag = 0 : May or may not obey A.2.3 constraints
(0x00000006,4) [SPS]      reserved_zero_5bits = '00000'
(0x00000007,7) [SPS]      level_idc = 21 : Level 2.1
(0x00000008,7) [SPS]      seq_parameter_set_id = 0 (bitstream values: length=1 bits,
seq_parameter_set_id=0x1)
(0x00000008,6) [SPS]      log2_max_frame_num_minus4 = 4 : MaxFrameNum = 256 (bitstream values:
length=5 bits, log2_max_frame_num_minus4=0x5)
(0x00000008,1) [SPS]      pic_order_cnt_type = 0
(0x00000008,0) [SPS]      log2_max_pic_order_cnt_lsb_minus4 = 4 : MaxPicOrderCntLsb = 256
(bitstream values: length=5 bits, log2_max_pic_order_cnt_lsb_minus4=0x5)
(0x00000009,3) [SPS]      num_ref_frames = 2 (bitstream values: length=3 bits, num_ref_frames=0x3)
```

The above information is split into three 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 [SPS]) is the general syntax level of the bitstream element (e.g. SPS = SequenceParameterSet);
- ❑ 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:

V313nn\_D\_Traffic\_AVC\_MP\_<err\_name>\_interpret.vpt

(where 'nn' is the last 2 digits of the clip number and <err\_name> is the error name as listed in the table below in section **Error! Reference source not found.**)

Within each Trace file, the error is highlighted and a comment has been inserted. To find the error, use the comment index at the top of the trace file.

The Interpret files are located in the folder:     \Documentation\Interpret  
on the disk.

### 3. Software supplied

The following software is supplied:

- ❑ ".264" 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. ".264" to YUV decoder

This program is called: `decode264.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:

```
decode264 <input file> <output file>
```

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

```
decode264 "input 1" "C:\Temp\output 1"
```

#### 4. Clip Set Details

CLIP SET DETAILS		Begin   End	Title
			<b>Traffic</b>
1.	Number(s)	V31301 to V31340	
2.	Filename(s)	V31301_D_Traffic_AVC_MP_*.264 to V31340_D_Traffic_AVC_MP_*.264	
3.	Title	Traffic	
4.	Description	Single scene - Traffic, cars moving in two directions along a road.	
5.	Main purposes/tests	Check decoder response to different errors in the SPS, PPS and Slice NAL units	
6.	Size(s), horizontal x vertical	<ul style="list-style-type: none"> <li>• CIF: 352x288 (38 files)</li> <li>• 912x96 (1 file)</li> <li>• 96x912 (1 file)</li> </ul>	
7.	Video format	H264 ISO/IEC 14496-10 (source material YUV 4:2:0 Planar, 8 bits per pixel)	
8.	Number of frames	Source is 500 frames, encoded clips are 499 frames.	
9.	Source frame rate	25 fps	
10.	Clip duration (seconds)	6	
11.	File size on disc (MB)	19.2MB (.264 files) 1174 MB (Trace files)	
12.	Original video format	DV, interlaced	
13.	Keywords	KW-vehicles, KW-movement_in, KW-movement_out, KW-movement_across, KW-high_contrast, KW-bright_colours, KW-leaves, 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	Lots, some fast	
25.	Movement into picture	Lots, some fast	
26.	Movement across picture	Lots, some fast	
27.	Diagonal movement	-	
28.	Subjects behind foreground objects	Some	
29.	Low movement	-	
30.	<b>COLOURS &amp; CONTRAST</b>		
31.	Light picture	Areas	
32.	Dark picture	Areas	
33.	Bright colours	Areas	
34.	Dull colours	Areas	
35.	Fine detail pattern	Some	
36.	High contrast areas	Several	
37.	Large monochromatic area	Some	
38.	<b>SCENE CONTENT</b>		
39.	Out-of-focus	-	
40.	Fine lines/moiré patterns	Some	
41.	Reflections	Some	
42.	Scene change	-	
43.	<b>SCENE SUBJECTS</b>		
44.	People	-	
45.	Faces	-	
46.	Vehicles	Lots	
47.	Buildings	-	
48.	Trees	Some	Background
49.	Text	-	
50.	Talking head	-	
51.	Water	-	
52.	Leaves	Some	Background
53.	Sky	-	
54.	Clouds	-	
55.	Round objects	-	

## Vclips

---

56.	<b>LIGHT CONDITIONS</b>		
57.	Bright sunlight	Some	
58.	Shaded areas	Some	
59.	Bright daylight	Some	
60.	Dull daylight	-	
61.	Twilight	-	
62.	Night	-	
63.	Backlighting	-	
64.	Substantial brightness change	-	