

# VQV

## VideoQ Viewer

### Media Files Viewer-Analyzer

*Training Presentation*

*December 2024*



[www.videoq.com/vqv.html](http://www.videoq.com/vqv.html)

[www.videoq.com](http://www.videoq.com)

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of any slide for this global  
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**See separate presentation:  
Appendix A, for advanced users**

Learn more about VQV: <http://www.videoq.com/vqv.html>

# 1. General Features



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## 1.1. General Features

- VQV is an Augmented Intelligence software tool, instantly revealing your video camera, codec, scaler, converter or other video HW and/or SW device/workflow performance
- Unique video data analysis and fidelity verification tool for the file-based environment
- The 4<sup>th</sup> generation smart tool for production and post-production facilities, CDN and IPTV systems, development labs, software developers and high volume manufacturers
- An essential QA/QC tool for broadcast, prosumer and consumer video systems with LAN/WAN connectivity
- VQV displays images and parameters of all compressed video files in a variety of formats, including MOV, MXF, MP4, AVI, TS, M2TS, etc.
- In addition, VQV reads, plays, converts and outputs uncompressed video material data in YUV/RGB/BMP formats, *bit by bit, pixel by pixel, frame by frame*

# 1.2 VQV and VQMP – General Concept



VQV compatible **VQMP** player can be used as a stand-alone QA/QC tool or it can work in close co-operation with VQV.

In the latter case **VQV** is a **master control point**, launching VQMP player (*and sync server running in the background*) as needed.

In any case **video files** can be opened in **VQV** and/or in **VQMP**.

VQMP can open and analyze **audio files**, but VQV can not.

VQMP player has many **useful features**:

- Real time playout via ffmpeg hardware accelerated decoder
- Fast intuitive timeline navigation and speed/scale/zoom/pan controls
- Playlist manager, recent files manager, video and audio tracks selection
- Advanced AV Monitor and Audio Analyzer

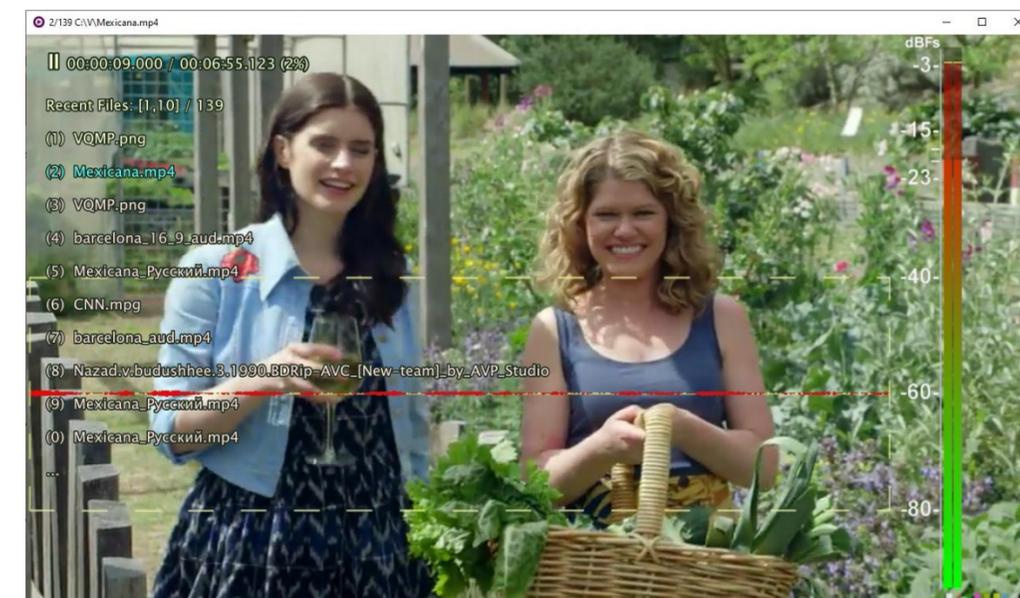
Learn more about VQMP: <http://www.videoq.com/vqmp.html>



SDR sample video – courtesy of Kate McCartney & Kate McLennan, Australia

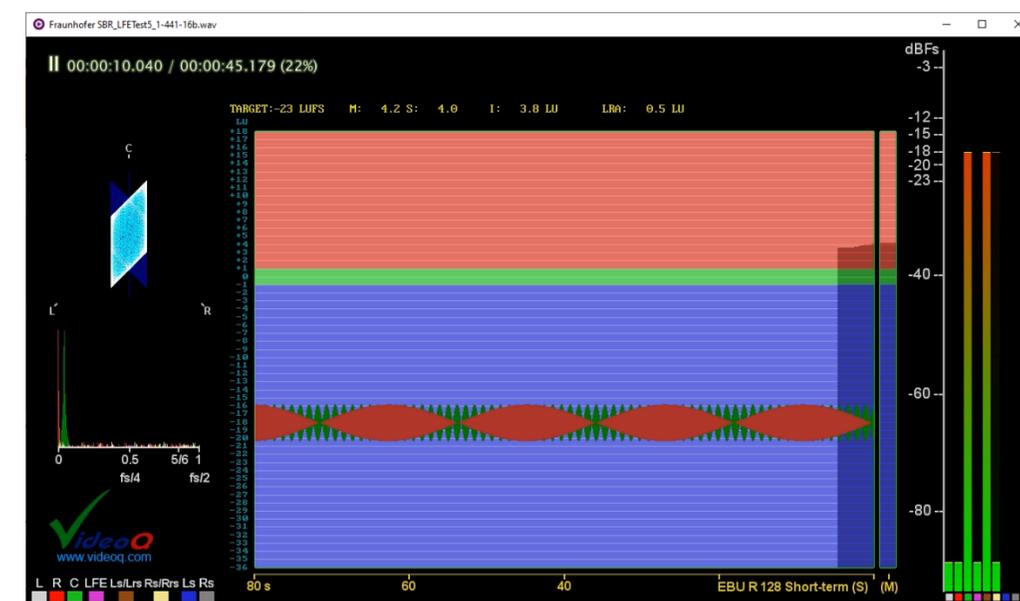
SDR media file opened in VQMP window

Audio Levels Meter and Recent Files overlays

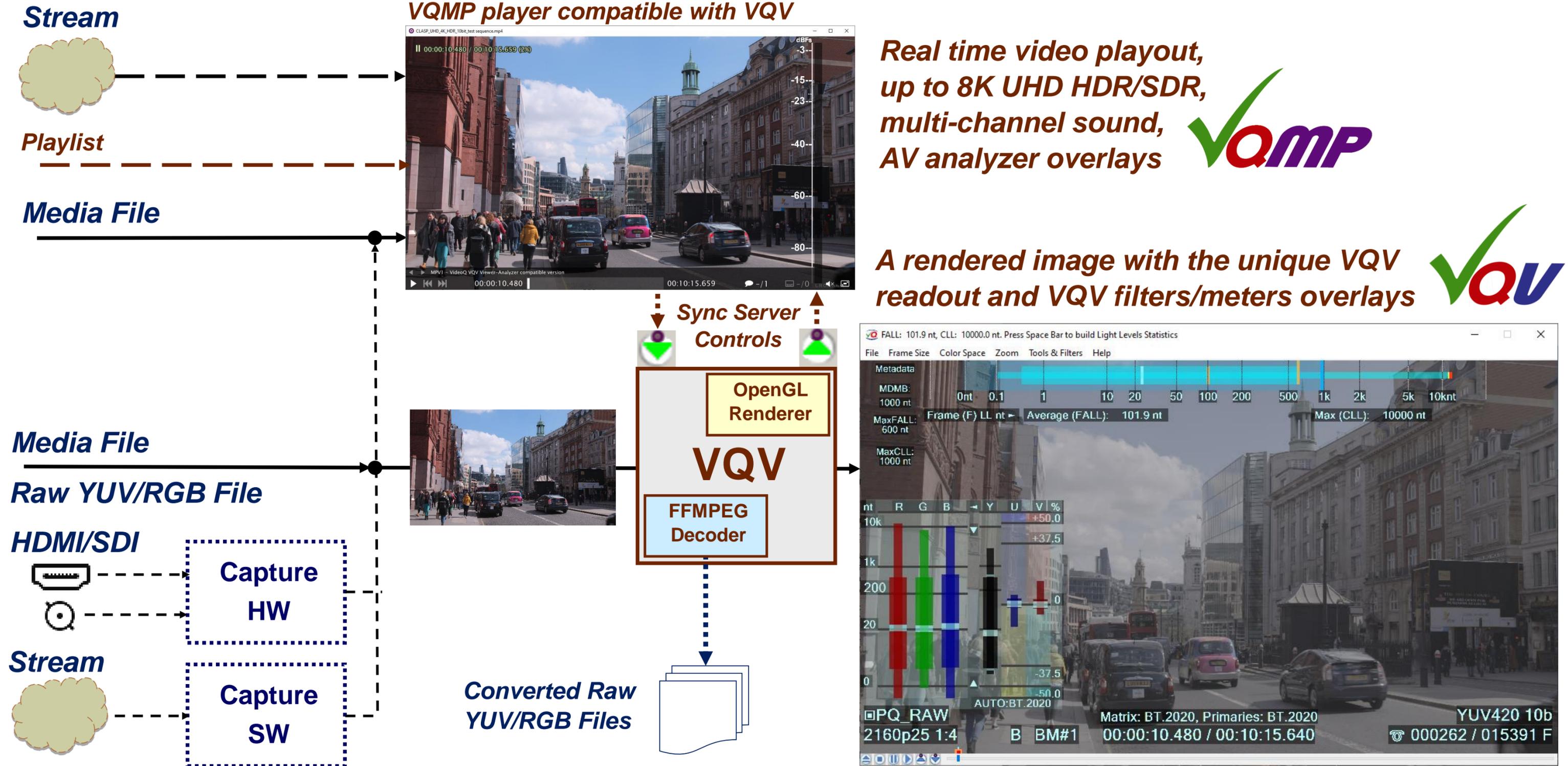


7.1 surround sound audio file opened in VQMP window

Advanced Audio Analyzer overlay



# 1.3 The Top Level Workflow Diagram



UHD HDR10 sample video – courtesy of newsbyte.co.uk

## 1.4 VQV Features 1



- An offline video player with sophisticated viewer-analyzer functionality
- Covers a wide range of frame sizes and formats, up to **8K**, including variety of **HDR** formats (**PQ**, **HLG**, and **LOG**, several user-selectable rendering modes)
- VQV displays frame by frame:
  - XY positions, YUV & RGB Levels and expected (as by selected model) Light Levels of every pixel, line, frame or segment
  - GOP structure, frame type, bitrate statistics for the selected frame or selected timeline segment
  - Light Levels (LL) values in **perceived nits** (*= cd/m<sup>2</sup> only on shades of Gray*) or % of the selected LL range limit
- Uses fast intuitive controls for timeline position, zoom, signal gain, filter mask size and position
- Contains built-in high-gain spatial and temporal high-pass filters *revealing even hardly visible artefacts*
- The user can choose:  
RGB, Y, UV, R, G, B or LL view channel, color space, level scheme and SDR/HDR Rendering Mode
- A right-click submenu allows fast creation of snapshots or thumbnail .BMP images
- VQV also contains a powerful “Export as” file and data format converter
- Provides for quick frames/profiles comparison and benchmarking by running multiple VQV instances

## 1.5 VQV Features 2 (continued)



- For R&D and product verification work, VQV can be launched in a **Windows GUI Mode**
- For semi-automatic QA/QC operation VQV provides multiple GUI instances via **Command Line Mode**
- VQV opens and decodes any wrapped/compressed video file (*all formats supported by ffmpeg*)
- VQV opens static image files in a variety of formats – JPG, PNG, TIF, etc.
- VQV opens single frame file, folder with numbered frame files, or large multi-frame RAW video files
- Video data export processing provide for:
  - Frame cadence change: N:1 decimation, 3:2 repeat, 1:N frame repeat, and/or A-B fragment repeat
  - Color space and pixel format conversion: **SDR** ⇔ **HDR**, **YUV** ⇔ **BMP/RGB**, **UYVY** ⇔ **Planar YUV**
- Resolutions supported:  
from **192x108** to **7680x4320 (8K)**, **8**, **10**, **12** or **16** bits per component
- Repeat full duration (loop) or selected fragment (**A-B loop**) playout
- Shuttle/Jog playout modes, variable forward and backward playout speed (VideoQ 'Videola'):  
*Actual frames-per-second speed depends on CPU/GPU power and video frame size*

# 1.6 VQV Features 3 (continued)



- **SDR / HDR** (Standard Dynamic Range / High Dynamic Range) Modes supported:
  - **SDR** – Conventional YUV/RGB data format, selectable rendering modes
  - **HDR-PQ** (Perceptual Quantizer), selectable rendering modes, including RAW video data image
  - **HDR-HLG** (Hybrid Log Gamma), selectable rendering modes, including RAW video data image
  - **HDR LOG** (Camera LOG and DPX LOG), selectable rendering modes, including RAW video data image
- Auto and manual selection of  $YUV \Leftrightarrow RGB$  and  $XYZ \Rightarrow RGB$  **matrices** and color space **primaries**:
  - **UHD** and **8K** (BT.2020/BT.2100, DCI-P3)
  - **HD** (BT.709, BT.2020, DCI-P3)
  - **SD** (BT.601)
- Switchable  $YUV \Leftrightarrow RGB$  levels mapping:
  - **Full Range (FR)**, e.g. 8 bit **RGB 0-255** format, which **requires down-scaling** to make **YUV 16-235**
  - **Narrow Range (NR)**, e.g. 8 bit **RGB 16-235** format, which **does not requires down-scaling** to make **YUV 16-235**
- Variety of Input and output RAW YUV / RGB formats:
  - Interleaved, 422 UYVY 8bpc and RGB48YUV48 – interleaved 16pcb YUV/RGB
  - Planar 444 RGB and YUV, 422, 411 and 420 YUV, bit depth: 8, 10, 12, 14 or 16bpc

## 1.7 VQMP Media Player Features



- VQV compatible real time media player combining minimalistic GUI (OSC = On-Screen Controller pop-up bar) with intuitive keyboard/mouse/overlay controls
- Powerful ffmpeg-based hardware-accelerated decoder that supports nearly all media formats, up to 8K UHD HDR/SDR
- HDR (PQ and HLG) to SDR conversion for easy HDR preview on SDR screen
- Multi-channel audio rendering engine, up to 7.1 surround sound
- Fast intuitive timeline navigation, including switchable messages and GoTo Manager
- Smart speed/scale/zoom/pan controls with info overlays
- Smart file opening, including configurable use of last-used timeline position and track controls
- Playlist Manager with editing controls
- Recent Files Manager with editing controls
- Smart video, audio and subtitle tracks selection
- Advanced AV Monitor and sophisticated Audio Analyzers

*For more about VQMP see separate presentation*

## 2. VQV GUI: Menus and Controls



[2.1 Menus and Controls](#)

[2.2 File Menu](#)

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# 2.1 Menus and Controls

Top level menus: **File, Frame Size, Color Space, Zoom, Tools & Filters, Help**

### Title Bar Band

shows messages about:

- media file format,
- selected modes of operation,
- current timeline position,
- measured parameters values

**Stop Button** forces **Jog Mode**, current frame number resets to **0**. All filters and overlays reset to **Off**.

### Eject Button

Close (release) media file, 2<sup>nd</sup> click will **re-open** closed file

### Pause Button

**Play Button** toggles Play/Pause.

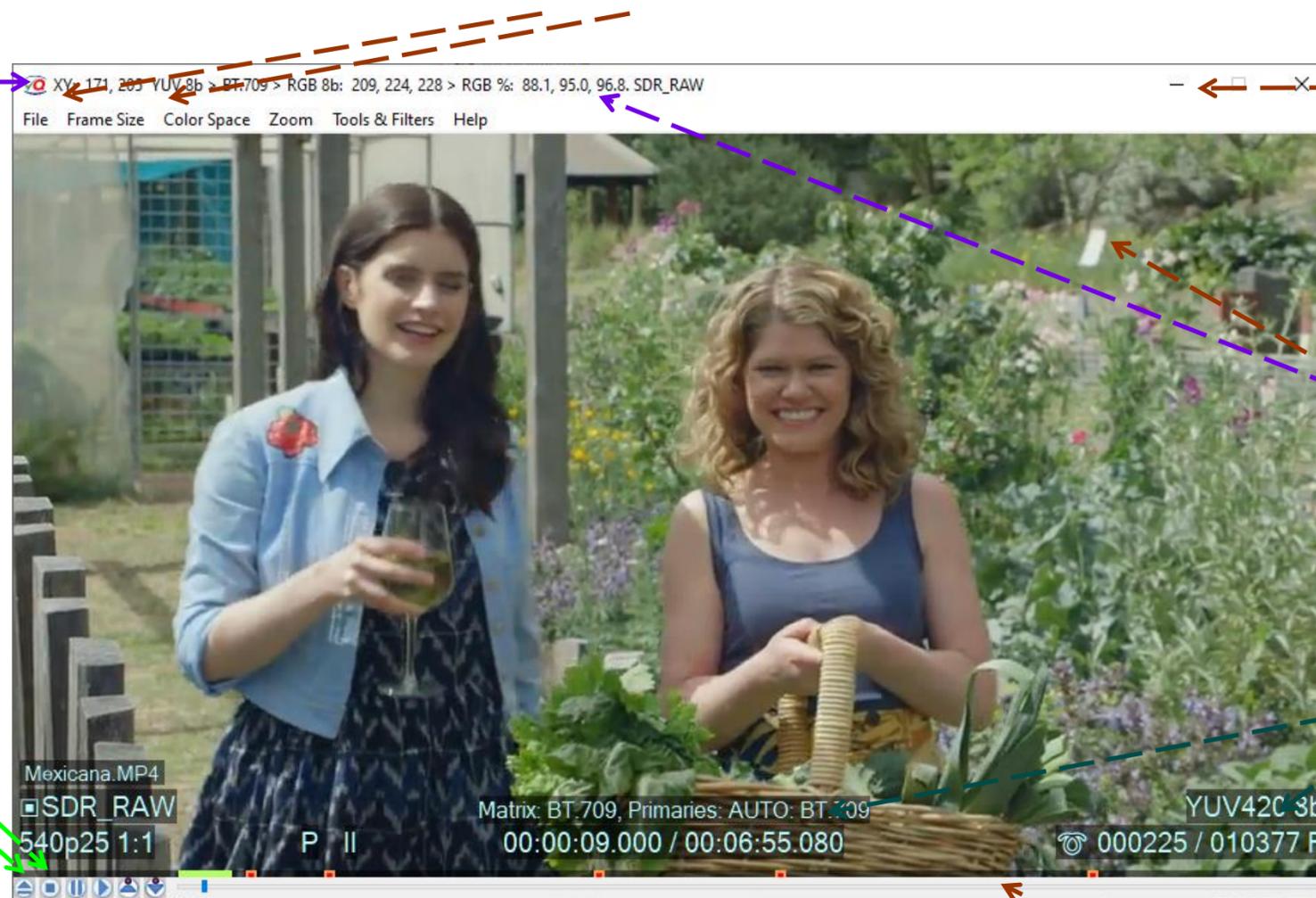
### VQMP Server Control Buttons:

Send/receive **file path** and **timeline position** between **VQV** and **VQMP** windows

### Navigation Slider Band:

When **Mouse Cursor** is in this band the **Title Bar Message** shows media format info, current timeline position and playout speed. Press **S** key to cycle thru the message modes, e.g.:

- VQV 540p59.94 8b "B" 0.010 bpp 0.317 Mbps 235 / 3634 00:00:03.921 / 00:01:00.627
- VQV 540p59.94 8b "B" 662 bytes 235 / 3634 00:00:03:55 / 00:01:00:36



When **Mouse Cursor** is within the **Title Bar**, **Title Bar Message** shows the file name/format:

- VQV VQMA\_1280x720\_8frms\_UYVY\_8b.YUV
- VQV MP4[AVC] 540p25 8b 0.535 Mbps Frame: 9924 / 15142

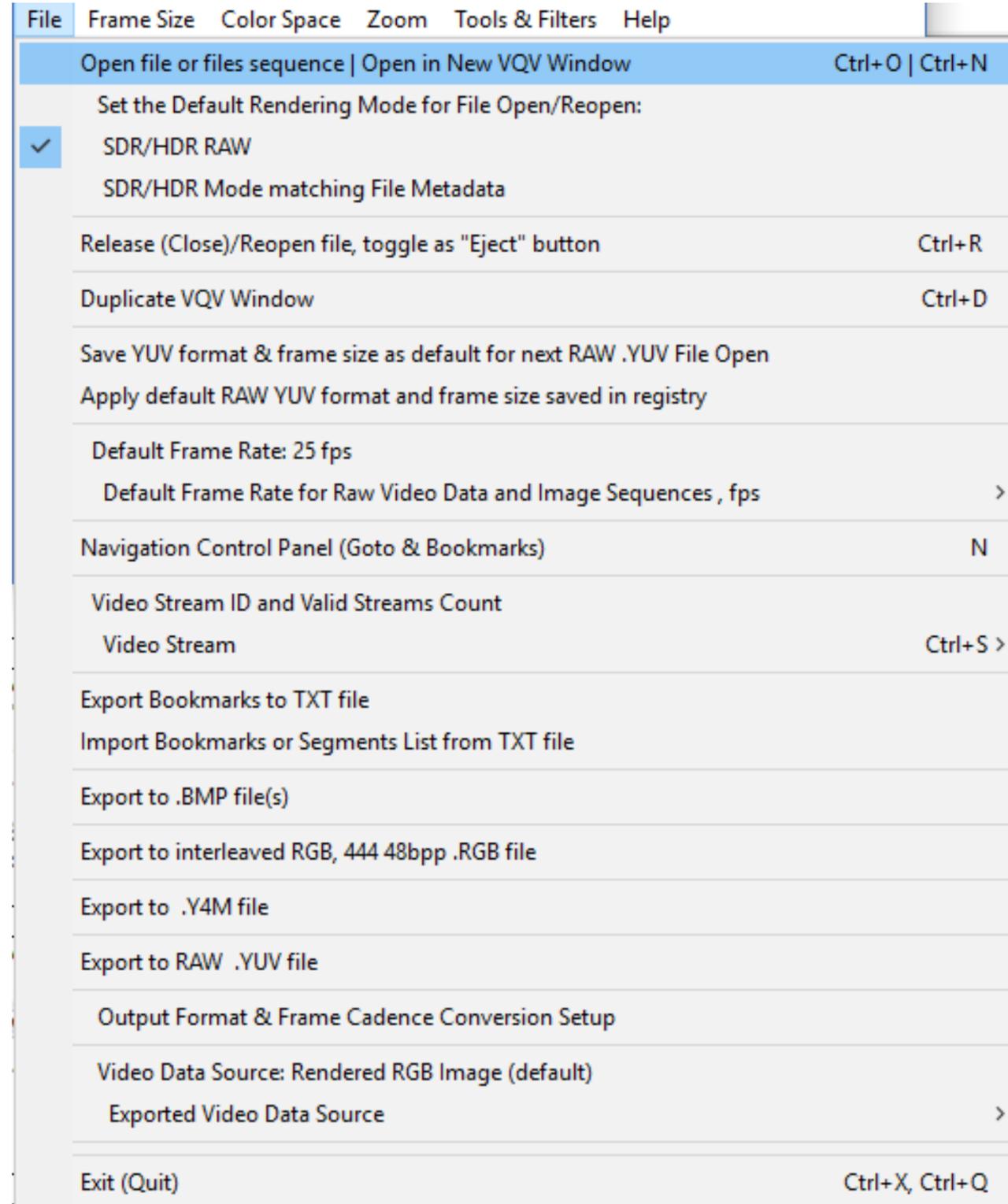
When **Mouse Cursor** is within the **Active Image Area**

**S** key toggles the **Title Bar Message** e.g. between **current pixel** parameters and **current frame** levels statistics

### Text Info Overlay Messages

Press **T** key to toggle it On/Off  
**Ctrl+T** toggles auto-hide mode On/OFF

## 2.2 File Menu



This menu controls the following operations:

- Media File Open /Close / Quit Operations:
  - **Ctrl + O** brings up standard File Open Dialog, **Ctrl + N** does the same, but the selected file opens in new window. **Ctrl + D** duplicates current VQV window. **Ctrl + S** cycles thru video streams (if media file streams count > 1) **Ctrl + X, Ctrl + Q** serve to exit (quit) VQV program
  - Released (closed) file can be reopened, e.g. for iterative video codec settings optimization. **Ctrl + R** shortcut is a toggle control for this process. **Eject Button** also toggles between File Close / File Reopen. Reopen operation restores previous timeline position preserving main controls, but some tools, overlays and controls could be reset to defaults. **Ctrl + Eject** brings up standard File Open Dialog (same as **Ctrl + O**).
  - File open menu options set defaults for: Rendering Mode, RAW YUV pixel format and Frame Rate,
- Files Export / Import:
  - Export / Import **Bookmarks** to / from \*.vqvbm.txt file, or import **Segments List** from \*.vqtsf.txt. *If present, InFilePath.vqtsf.txt file and/or InFilePath.vqvbm.txt file are auto-loaded immediately after opening InFilePath media file.*
  - Export of source or rendered RGB data to BMP / RGB file. Multi-frame content can be saved as a folder with numbered BMP frames or as a single multi-frame RGB file (16b per component, 48b per pixel).
  - Export to Y4M / RAW YUV file with optional conversion of pixel format.

## 2.3 File Menu Options

Save frame size, color space & frame number as defaults for .YUV/.RGB File Open	
Stored parameters application mode: Off	
Select stored parameters application mode	>
Default Frame Rate: 25 fps	
Default Frame Rate for Raw Video Data and Image Sequences, fps	>

<input checked="" type="checkbox"/> Do not apply stored parameters
<input type="checkbox"/> Apply stored parameters once
<input type="checkbox"/> AUTO: Always apply stored parameters

It is possible to save in Windows Registry current (user-selected) pixel format and frame size of RAW file, e.g. UYVY 1920x1080, thus providing for easier opening of similar files. This function has a pop-up configuration sub-menu: OFF, Apply Once, AUTO: Always Apply

Default Frame Rate, fps	>	23.976
Navigation Control Panel (Goto & Bookmarks)	N	24.000
<input checked="" type="checkbox"/> Video Stream ID: 1, 540p25.000		<input checked="" type="checkbox"/> 25.000
Video Stream	Ctrl+S >	29.970
Export Bookmarks to TXT file		30.000
Import Bookmarks from TXT file		50.000
Export to .BMP file(s)		59.940
		60.000

Default Frame Rate can be selected at any time, thus providing for advanced opening of RAW data files or media files with missing, wrong or corrupted Frame Rate metadata.

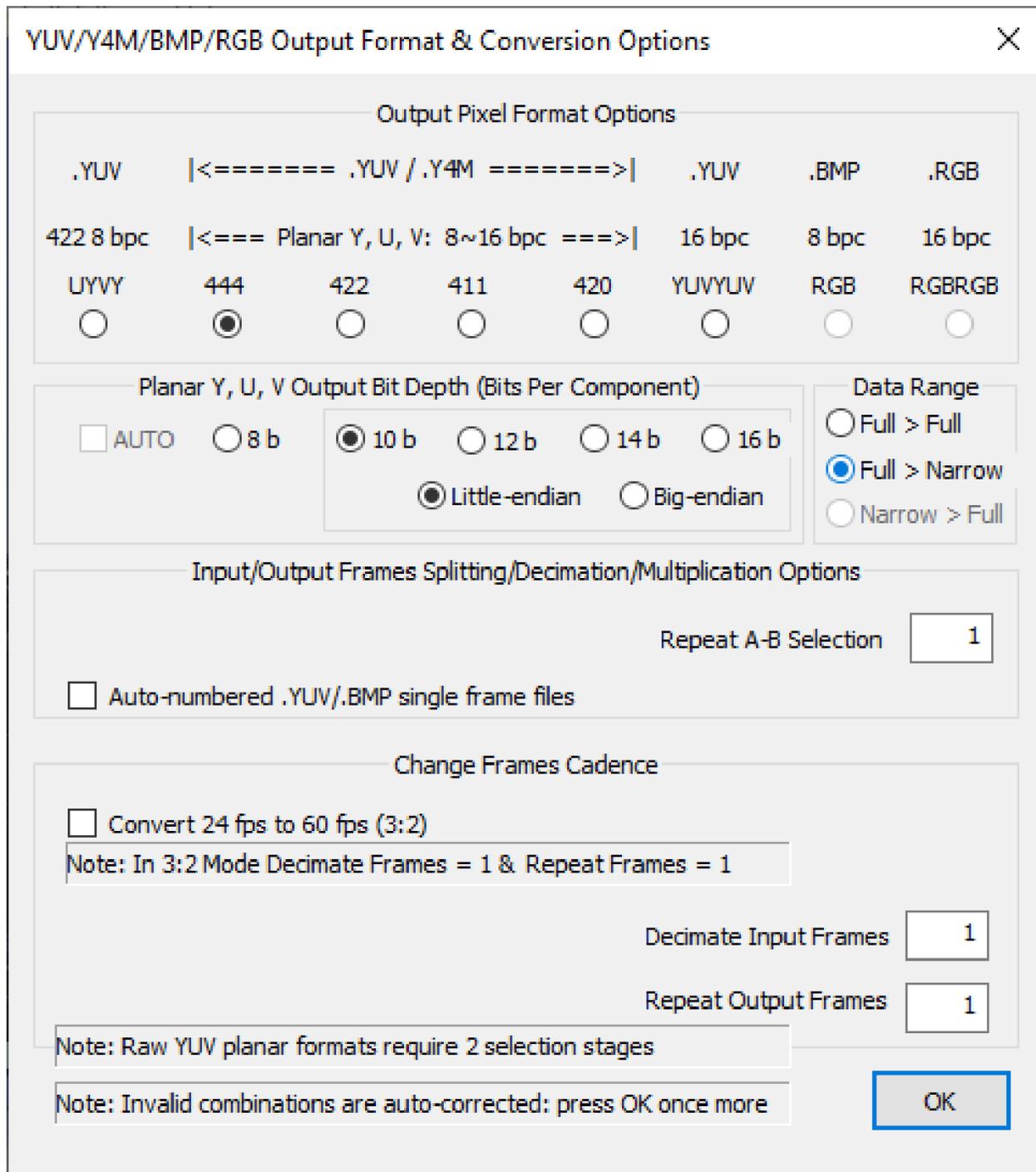
Shortcut **N** brings up Navigation Control Panel pop-up window, *see next slides for more details*

Video Stream: #1 / 2, ID: 65, 1080i29.970	
Video Stream	Ctrl+S >
Export Bookmarks to TXT file	
Import Bookmarks from TXT file	
Export to .BMP file(s)	

<input checked="" type="checkbox"/> Stream #1, ID: 65, 1080i29.970
Stream #2, ID: 81, 480i29.970
Stream #3: N/A
Stream #4: N/A
Stream #5: N/A

If the analyzed file contains several video streams, it is possible to select any one for analysis. Select with mouse click or shortcut; **Ctrl +S**

# 2.4 YUV/RGB Output Format and Conversion Options



This pop-up dialog windows can be launched from File menu. It provides for YUV/RGB formatting and data range conversion options:

- YUV output pixel format selection:
  - UYVY (aka “interleaved 422”), compatible with widespread SDI stream format
  - Widespread planar 444, 422, 411, and 420 YUV formats, 8bpc ... 16bpc, LE or BE
  - VideoQ proprietary 444 interleaved 48b (16b per component) format
- Frame sequence splitting/multiplication options (BMP & YUV):
  - Repeat pre-selected A-B segment of media file several times. It is useful, e.g. for creation of dynamic video by repetition of a single static frame
  - Split selected A-B segment into a set of numbered frames (UYVY format only)
- Frame cadence conversion controls (BMP & YUV):
  - It is possible to simulate 24 fps to 60 fps frame rate conversion (3:2 cadence) by checking the corresponding box. In such case all even-numbered source frames will be repeated 3 times and all odd-numbered frames will be repeated 2 times, thus two input frames will be converted to 5 output frames.
  - Combining “Decimate” and “Repeat” numbers provides for the creation of custom frame cadences, e.g. Decimate = 2 and Repeat = 1 will simulate 50 fps to 25 fps (or 60 fps to 30 fps) frame rate reduction.

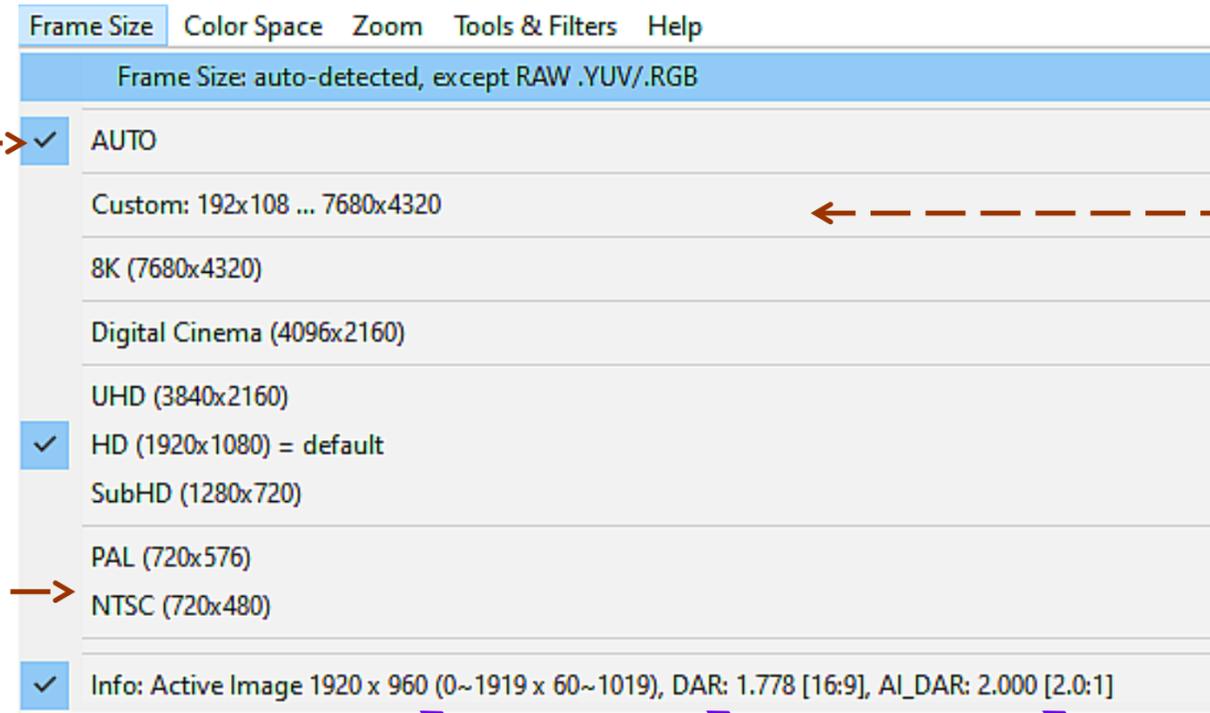
# 2.5 Frame Size Menu

Manual selection of **Frame Size** is required only for **RAW YUV/RGB** input format.

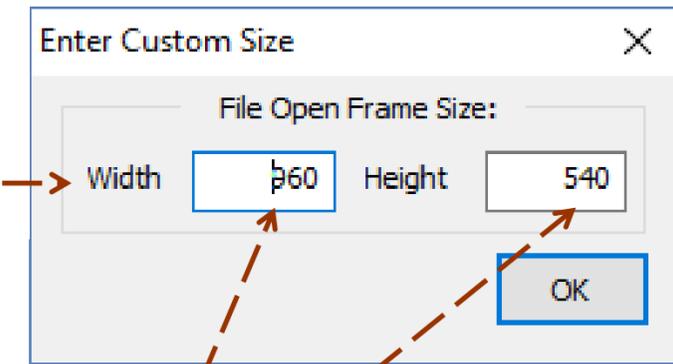
*For all other input formats Frame Size is set **automatically** and the Frame Size menu used only as **info message***

Only for **UYVY** format:  
if the actual Raw YUV frame size is **unknown**, then it makes sense to enable the **AUTO** detection (smart guess) mode

It is recommended to select correct frame size before opening **RAW YUV/RGB** files.



Click on **Custom Size** will bring up the pop-up dialog window



Manual selection of **Custom Frame Size**, the values set are used only for **RAW YUV/RGB** input format.

Info Message showing currently selected **Frame Mode**, **Active Frame Size** & **Display Aspect Ratio** resulting from Black Bands (**Letterbox** / **Pillarbox**) detection and media file metadata (**PAR/DAR**) processing.

The control switching Full Frame Mode / Active Frame Analysis Modes is in Tool & Filters menu: shortcut: **Ctrl + Shift +A**.  
Black Bands Meter: Shortcut: **Ctrl +A**

# 2.6 Color Space Menu

**YUV/RGB Pixel Format:**  
 Except Raw YUV/RGB files  
 the format is set automatically,  
 so these menu lines are used  
 mainly for information

**Color Gamut  
 Conversion Mode  
 On/Off**

Select  
**YUV ⇔ RGB  
 Conversion Type**

For **SDR & HDR** Modes  
 user can choose between  
 “**Narrow**” and “**Full**” Data Range

For some **HDR** Modes  
 the selection is fixed (AUTO),  
 so it can not be changed by user

Color Space | Zoom | Tools & Filters | Help

Pixel Format: auto-detected, except RAW .YUV/.RGB

- UYVY, Interleaved 422, 16 bpp, 8 bpc
- YUV or RGB, Interleaved 444, 48 bpp, 16 bpc
- YUV Planar 444 or RGB/RGBA
- YUV Planar 422 or Packed v210
- YUV Planar 411
- YUV Planar 420
- Selected Bit Depth: 8 bpc
- Bit Depth and Endianness:
  - 8
  - 10le
  - 12le
  - 14le
  - 16le
  - 10be
  - 12be
  - 14be
  - 16be
- YUV <> RGB Color Matrix: BT.709 - Auto-selected by Frame Size & Aspect Ratio: 1920x1080
  - AUTO (default: by file metadata, format, frame size & aspect ratio)
  - BT.2020-NCL (UHD-SDR), BT.2100-NCL (HD-HDR, UHD-HDR)
  - BT.709 (HD-SDR)
  - BT.601 (SD-SDR) - mandatory for some graphic Image formats
- Primaries: AUTO: BT.709
  - Primaries:
    - AUTO
    - BT.2020
    - DCI-P3
    - BT.709 / BT.601 (625)
    - BT.601 (525)
- Color Gamut converted for BT.709~sRGB SDR Screen On / Off
- Selected Rendering Mode: SDR.
  - Extended Media Ambit CVC Mode On / Off (default)
  - SDR (default)
  - HDR-PQ (BT.2100), Select Rendering Mode:
  - HDR-HLG (BT.2100), Select Rendering Mode:
  - LOG, Select Rendering Mode:
- YUV<>RGB Levels Mapping Scheme. Toggle Narrow/Full Range (NR/FR):
  - Narrow YUV Range <> Full RGB Range
  - Narrow YUV Range <> Narrow RGB Range & Full YUV Range <> Full RGB Range

Note: For some modes/formats the Mapping Scheme is fixed

**YUV ⇔ RGB Color Matrix:**  
 Matrix can be set  
 automatically or manually

Select **Dynamic Range Type** used  
 for rendering and measurements:  
**SDR, HDR-PQ, HDR-HLG or LOG**

Select **Bit Depth**  
 and **endianness**  
 Only for **RAW YUV**  
 inputs

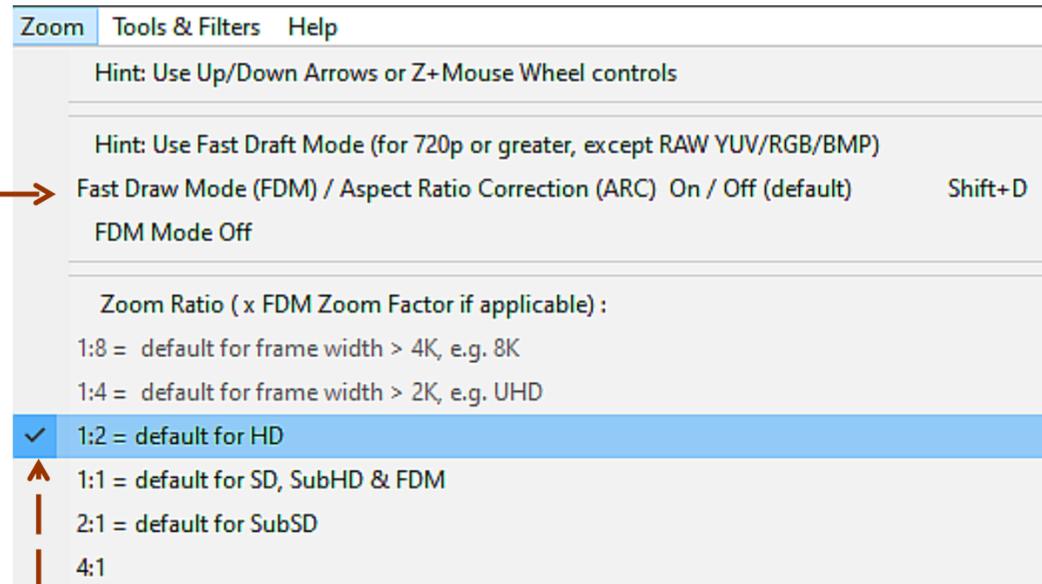
Select **Primaries**

Select a sub-variant of the  
 selected rendering mode:

e.g. for **HDR-PQ**  
 select  
**HDR-PQ RAW**  
 or  
**HDR-PQ > SDR**  
 converted RGB

# 2.7 Zoom and Pan Controls

**Fast Draw Mode** provides for faster analysis and playout due to built-in frame size converter so any input size greater than 1280x720 is converted to 960x540 frame size



Select Rendered Image **Zoom Ratio** Depending on Frame Size some ratios (too small or too big) could be excluded, and the corresponding menu line grayed out, e.g. for 960x540 size 1:4 zoom is not available and for UHD frame size 4:1 zoom ratio is not available.

**Zoom Ratio** can be changed in three ways:

- Click on the desired line in **Zoom menu**
- Press **Up/Down Arrows** (*image centered zoom*)
- Point the cursor to an area of interest, press and hold **Z** key, then rotate **Mouse Wheel** (*cursor centered zoom*)

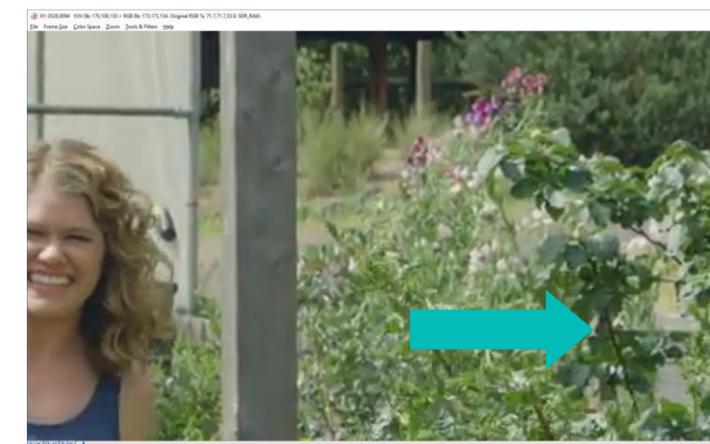
For ratios greater than 1:1, image is magnified **by simple pixel repetition without any smoothing filter**, thus making analyzed **artifacts more visible**

**Zoom Ratio 4:1**



If zoomed image is larger than VQV active window dimensions (which depends on PC monitor resolution), then press and hold **Left Mouse Button** and move the mouse cursor in the desired direction to move the whole image (Pan Control).

**Mouse Pan Control, Zoom Ratio 2:1**



# 2.8 Tools & Filters Menu



✓	Reset All Tools and Filters to Defaults	D	
TOOLS			
Hint: General Shortcuts: K: Color Space Info, S: Messages/Modes, T: Text Info, Ctrl+M: Media Info, Ctrl+P: Print to TXT file			
	HDR & SDR Metadata Validator	Ctrl+Shift+M	
	Active Image (Black Bands Detector), detect once & store	Ctrl+A	
Hint: Black Bands Detector Controls: Shift+A: Show / Hide Markers, Ctrl+Shift+A: toggle ActiveImage / FullFrame Modes			
	'FrameScope' - RGB Range Frame Profile Waveform On / Off. Controls: F: Filtering Mode, S: Readout Mode	W	
	Line Parade Waveforms On / Off. Controls: M: Full Frame / Selected Lines, Ctrl+M: Selection Mask, Y: YUV / RGB, P: Persistence	Ctrl+W	
	Histogram On / Off. Control Shortcuts: Ctrl+H: Modes, Shift+H: RGB / LL, Ctrl+Shift+H: HDR10+ Distribution	H	
	'L-Bar' - Levels Statistics Bargraph On / Off (Press "S" twice to show Levels Statistics Report Overlay)	L	
Graticule Units: LL (Light Levels), nt			
	Waveforms & Histogram Graticule Units Selector (locked for some formats/modes):	U >	<ul style="list-style-type: none"> <li>RGB Levels, %</li> <li>Light Levels (LL), %</li> <li>✓ Light Levels (LL), nt</li> </ul>
	'VV-Bars' - Video Volume Bargraph (RGB & YUV statistics) On / Off. Shift+V : cycle thru RGBYUV6 / RGB3 / RGB1 modes	V	
	VectorScope On / Off. Controls: "S" with cursor in VectorScope area to cycle thru the display modes	Ctrl+V	
	ChromaScope - Color Gamut Meter On / Off. Controls: P: Persistence, A: Auto-Primaries, Shift+P: Primaries, M: Modes	Ctrl+C	
	'C-Bar' - Compressed Video Bitrate Bargraph On / Off (Press "S" twice to show BitRate Statistics Report Overlay)	C	
	Noise & Activity Meter On / Off. Shift+M toggles Mask Mode	Shift+N	
	AV Sync Error Meter (requires MPC Test Pattern YUV+WAV input)	Ctrl+E	
FILTERS:			
✓	All Filters On (default) / Off	Shift+F	
✓	Filters Mask On (default) / Off, MaskSizeControl: M+MouseWheel	Shift+M	
✓	Selected Color Component(s): RGB (default)		
Hint: Display R, G, B, Y, UV, LL (maxRGB) Component Image On / Off:			
	MSBs / LSBs Image Display toggle, only if Bit Depth > 8b	8	
Hint: Change Display Gain (Contrast): Shift + Up/Down Arrows or Shift + Mouse Wheel, Selected Gain: x1			
✓	Reset Display Gain x1 (default)		
XY (spatial) Filter and/or T (temporal) Filter Controls:			
	XY (Intra-Frame) HPF/LPF/Off, default = Off	Shift+X	
	T (Inter-Frame) HPF, On / Off (default)	Shift+T	

### Tools Section:

Controls built-in **meters & analyzers** and the corresponding **overlays** showing the analysis results.  
*See next slides for more details*

### Filters Section:

- **Filter Mask** (adjustable square or full screen)
- **R, G, B, Y, UV, LL** color channels selection
- **MSB/LSB** image selection (if input > 8b)
- **Display Gain** (contrast): x1, x2, x4, x8, x16
- **XY (spatial) Filter:** HPF (details) or LPF (blur)
- **T (temporal) Filter** shows frames differences

*XY Filter can be combined with T Filter, e.g. T HPF cascaded with XY LPF.*

*See next slides for more details.*



# 2.10 Right-click Context Menu

Save & Open BMP Snapshot in MS Paint	
Save & Open BMP Snapshot with TimeStamp in MS Paint	
Save BMP Snapshot	
Save BMP Snapshot with TimeStamp	
Playout Wraparound On / Off (default)	Ctrl+Shift+P
Bookmark current Timeline Position & Copy it to Clipboard	B
Go to the Last Used Bookmark	Ctrl+B
Create the Bookmark from Clipboard data	Ctrl+Shift+B
Clear All Bookmarks	Shift+0
Open Timeline Navigation Control Panel	N
Toggle All Overlays On (default) / Off (Clean View)	O
Toggle Timeline Info Text Overlay On (default) / Off	T
Text Overlay Auto-hide Mode On / Off (default)	Ctrl+T
Mark/Trim AB Loop Start Point: [A>	[
Mark/Trim AB Loop End Point: >B]	]
Clear AB Loop Start & End Points	/

This pop-up window can be invoked by pressing **Mouse Right Button** whilst cursor is in the **Active Image Area**.

The menu contains 4 sections allowing to:

- Save current frame **Snapshot** as **BMP** file and optionally open it with **Microsoft Paint**
- Control **Playout Wraparound Mode** and **Bookmarks** creation and usage
- Control **Timeline & Info Text Overlays**
- Mark **A-B loop** timeline segment boundaries (Start and End points)

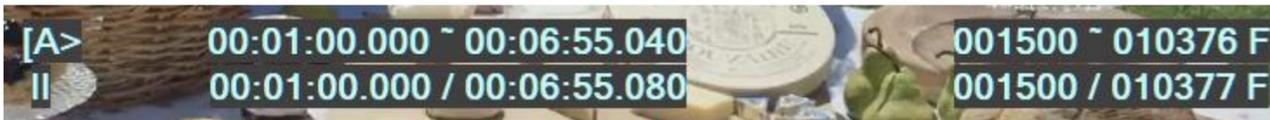
*Snapshot file name is automatically appended by current frame number and frames count, e.g.*

*“TestSDR\_frame\_225\_of\_10377.BMP”.*

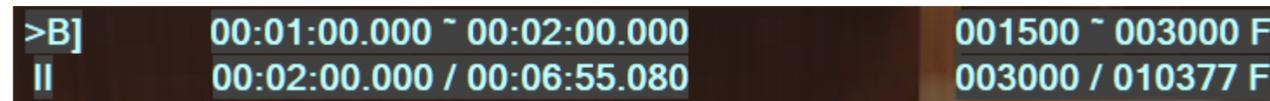
*Snapshot file name can be optionally appended by PC local date and time, e.g.*

*“TestSDR\_frame\_225\_of\_10377\_20170308\_205801.BMP”*

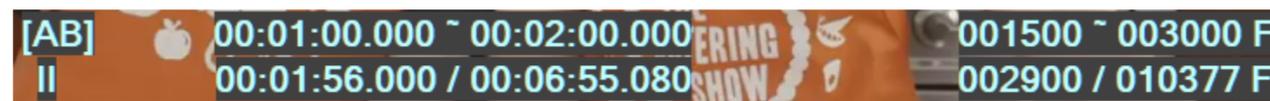
Loop start set: displayed symbol = **[A>**



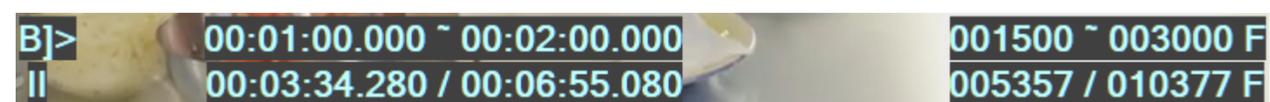
Loop end set: displayed symbol = **>B]**



Time position within the loop limits: displayed symbol = **[AB]**



Time position outside the loop limits: displayed symbol = **B]>**



There are 3 modes of Text Overlay presentation: **On**, **Off**, and **Auto-hide**.

In Auto-hide Mode two lines of Text Overlay are displayed only when mouse cursor is below the active image, i.e. in the timeline slider area.

Default AB Loop limits (frame numbers) are: A (Start) = 0, B (End) = frames\_count - 1

If Start > 0 or End < frames\_count - 1, AB limits are shown in the **top row** of Text Overlay

For example if frames\_count = 100, and user marked only A point = 20, then loop playout will start at frame 20, continue until frame 100 and restart at frame 20 if Wraparound Mode is ON.

## 3. Opening Media File

[3.1 Opening Media File via Windows GUI Dialog](#)

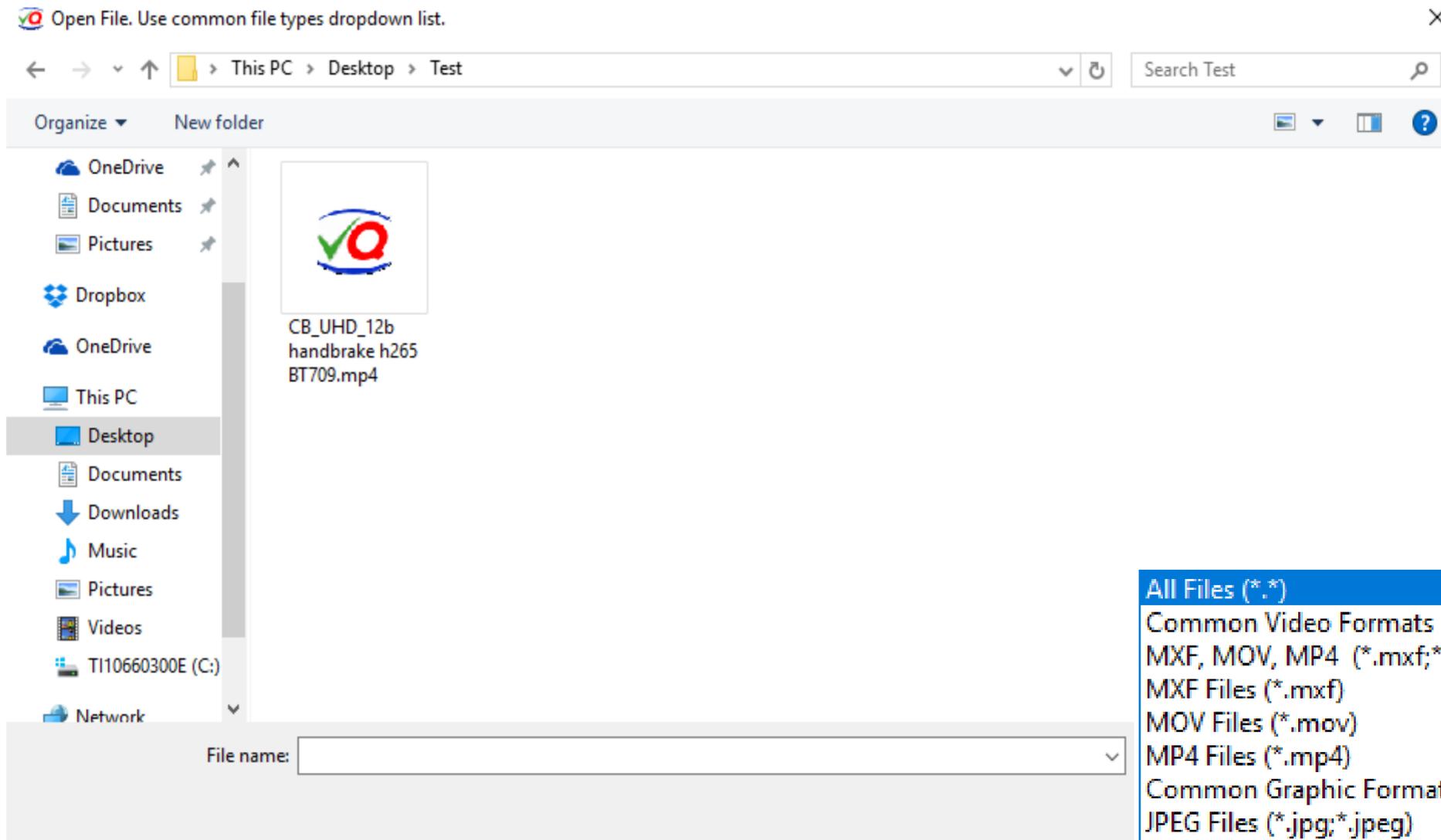
[3.2 Opening Media File via Drag-And-Drop](#)

[3.3 VQV and VQMP Synchronization](#)

[3.4 Opening Media File via CLI 1](#)

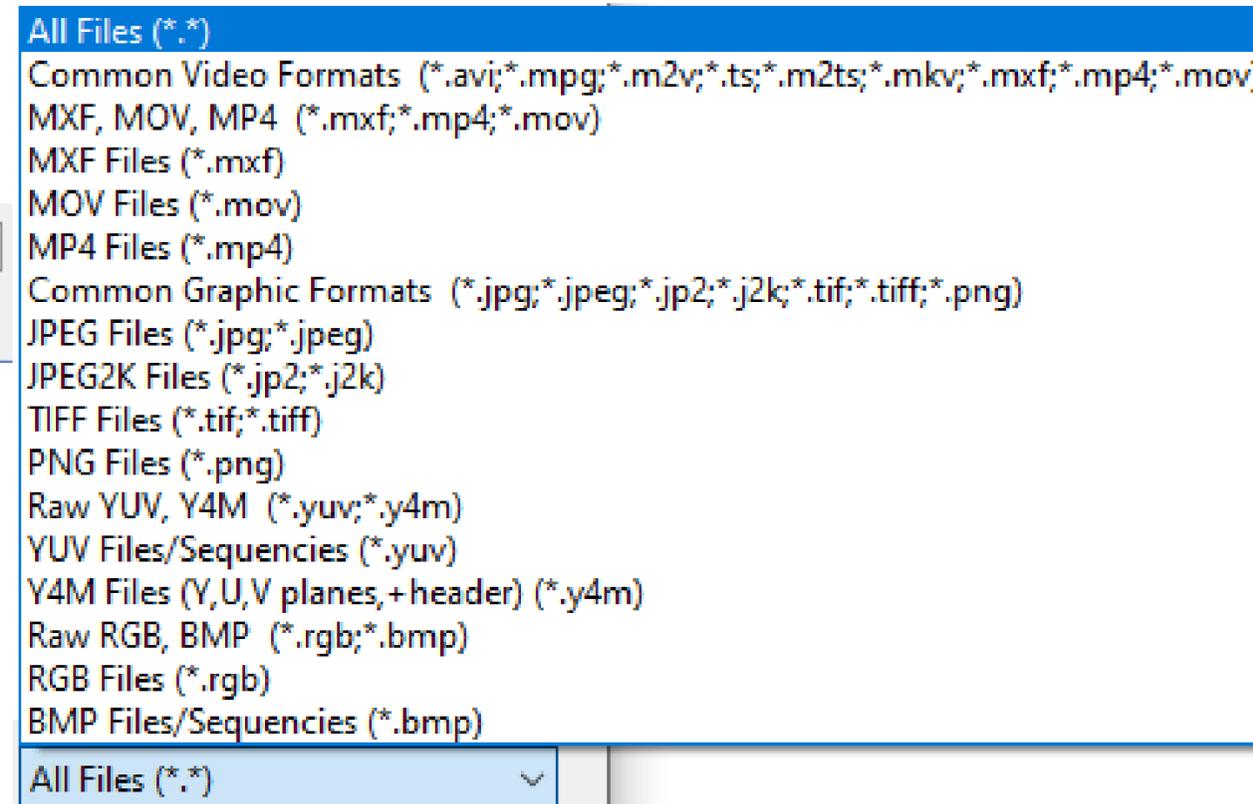
[3.5 Opening Media File via CLI 2 \(continued\)](#)

# 3.1 Opening Media File via Windows GUI Dialog



VQV GUI Menu File/Open (Shortcut Ctrl+O) brings up standard Windows dialog.

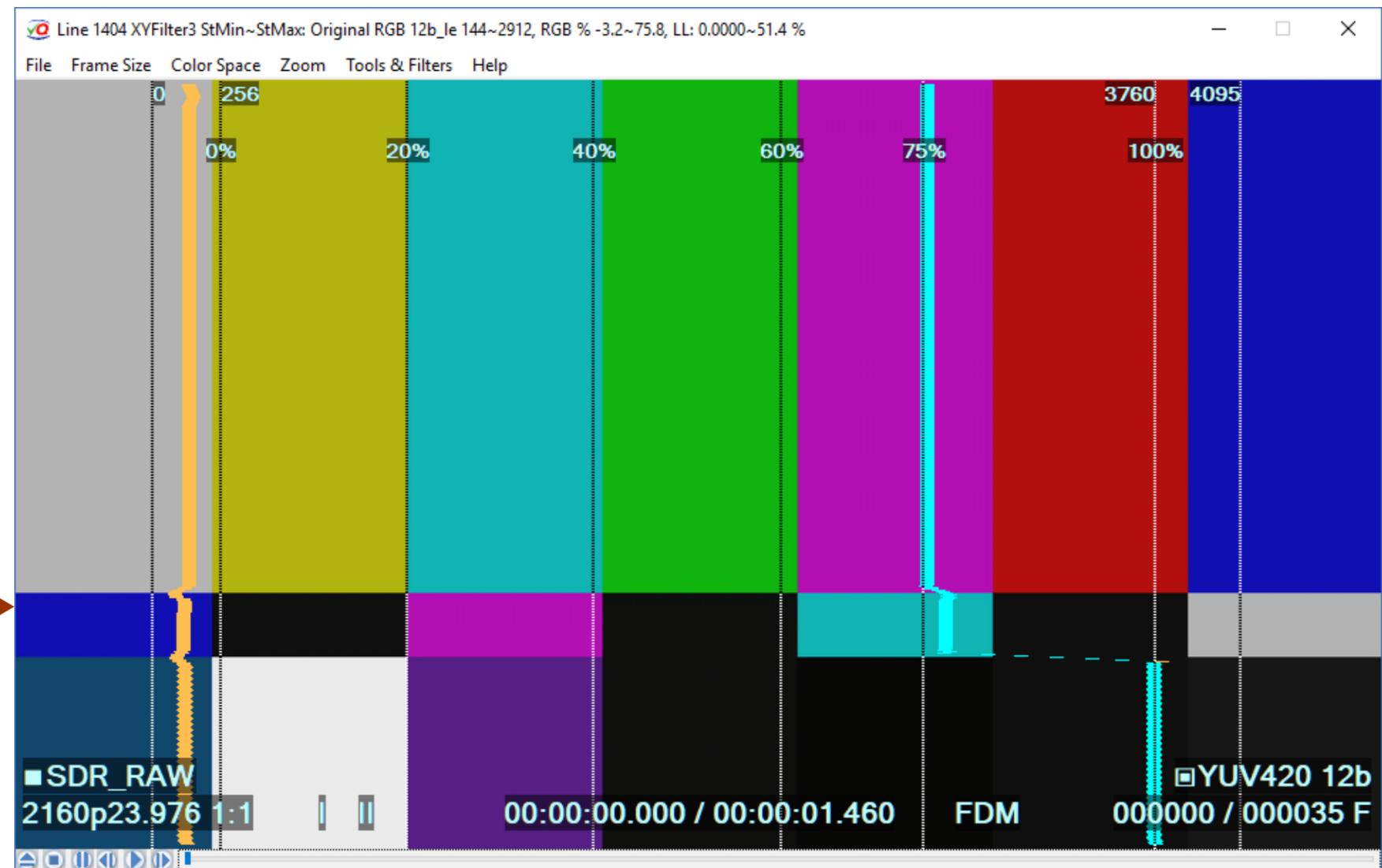
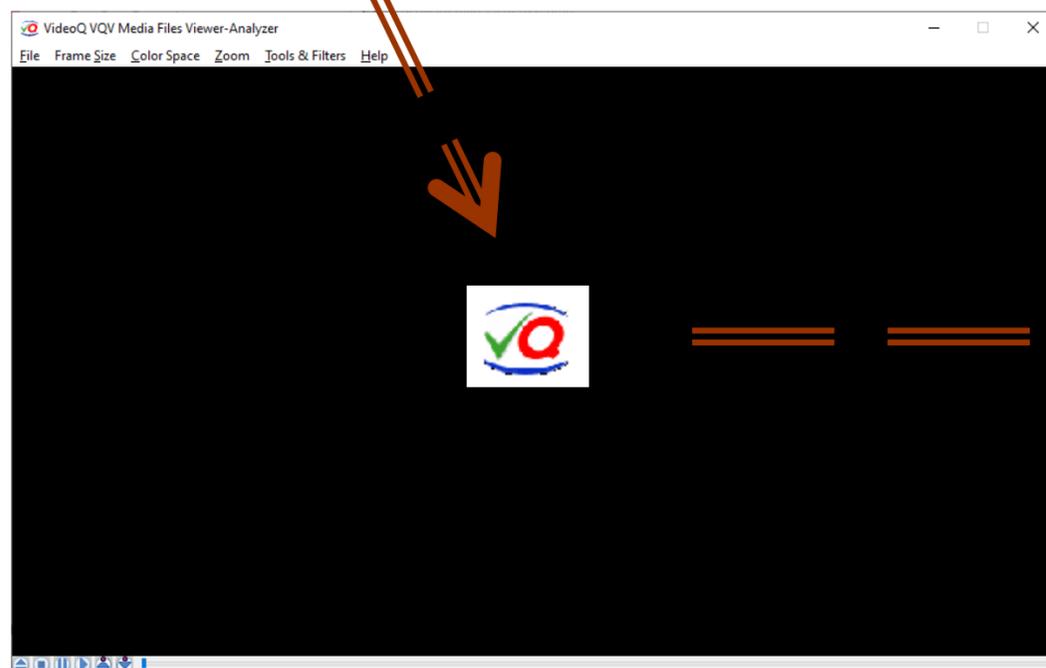
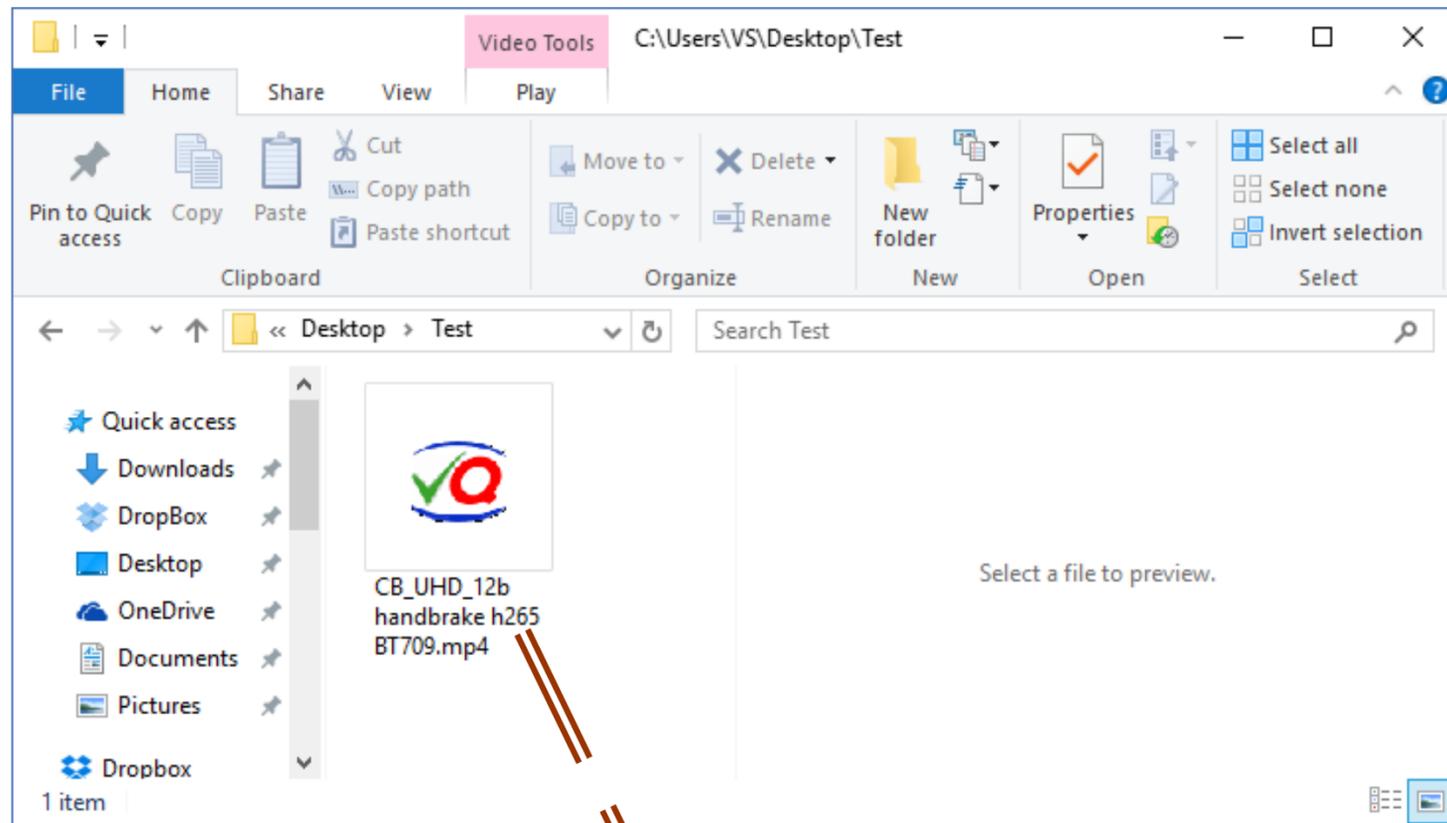
User can use wildcards, type specific file type, e.g. \*.mp4, or select the appropriate line from **drop-down list**.



# 3.2 Opening Media File via Drag-And-Drop



VQV supports Windows standard file extension association procedure, as well as **drag-and-drop** (quick & easy) opening procedure.



# 3.3 VQV and VQMP Synchronization



**VQV** is a **master control point**, launching **VQMP** player (and sync server running in the background) as needed.

Video files can be opened in VQV and/or in VQMP, so there are **several cases**:

- VQV and VQMP render **the same file**, possibly at different timeline positions.
- VQV and VQMP render **two different files**, even of two different types, e.g., video file by VQV, audio file by VQMP

In any case, VQV can exchange with VQMP short command messages containing:

- Full path to media file
- Timeline position in s.ms format

Click on VQV  button or use **Ctrl+ Up Arrow** to send message **from VQV to VQMP**

Click on VQV  button or use **Ctrl+ Down Arrow** to request and receive message **from VQMP to VQV**

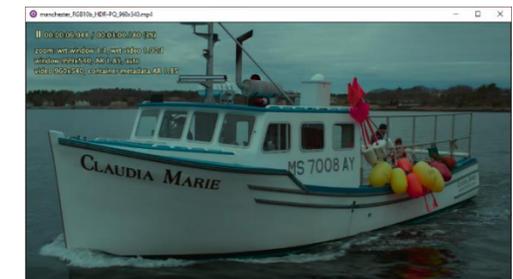
Idle VQV launches idle VQMP (server initialization only)



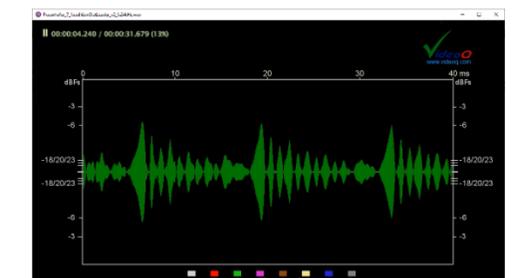
VQV sends to VQMP current SDR file path and timeline position



VQV requests and receives from VQMP HDR file path and timeline position



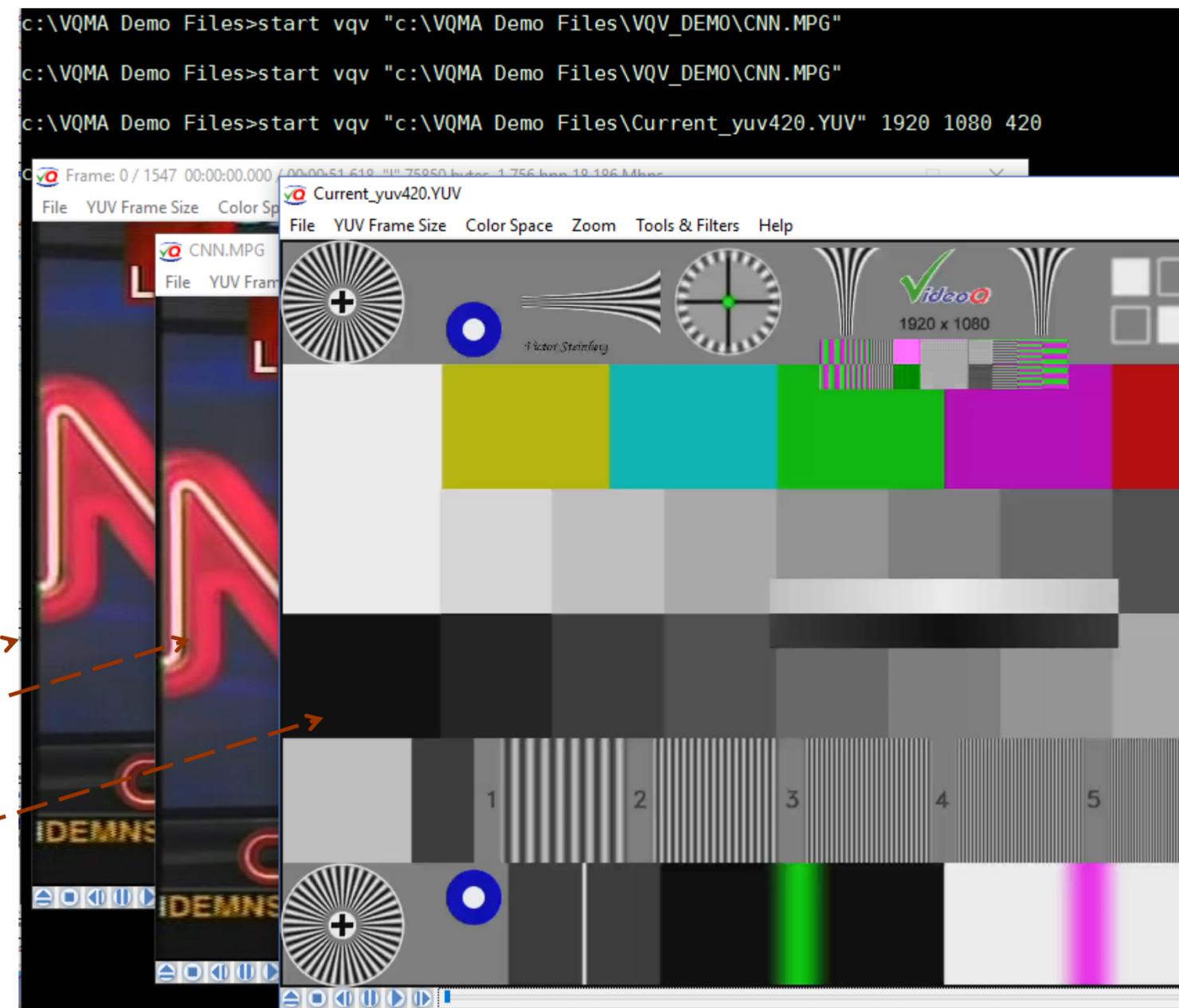
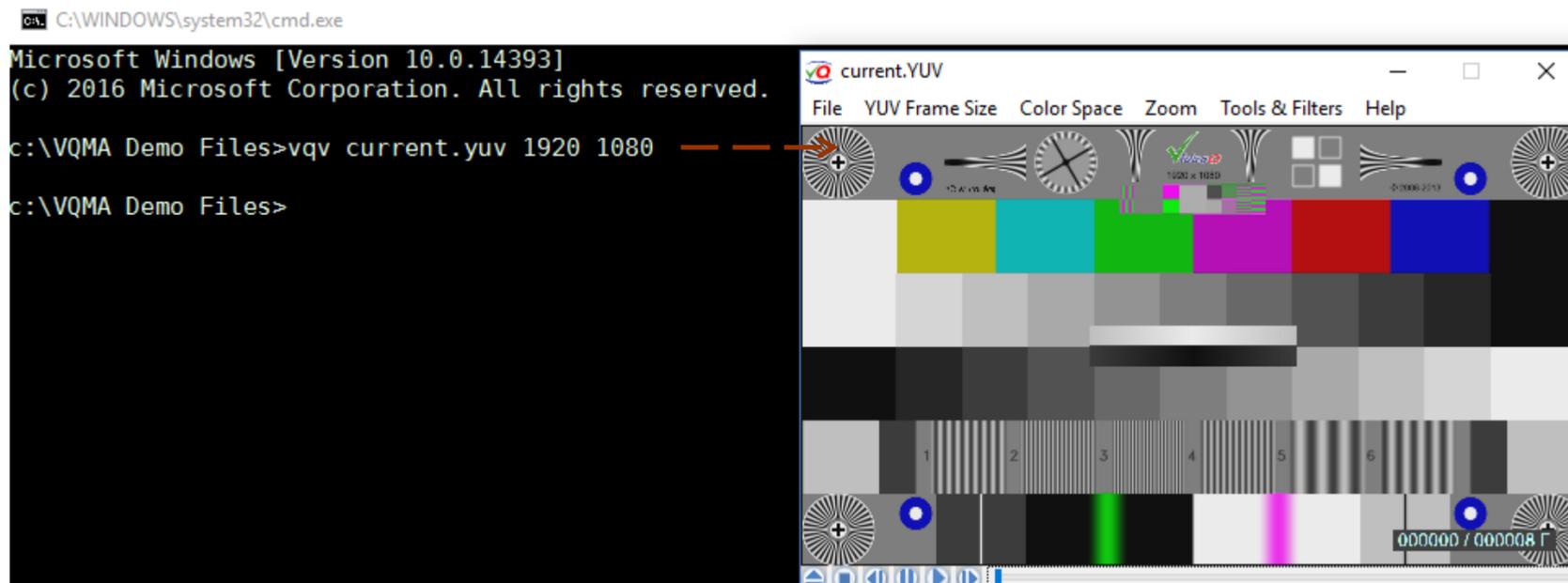
Special case: VQV can not open audio file, but VQMP can



# 3.4 Opening Media File via CLI 1



Simple Example: Single raw UYVY data .YUV file opened via command line interface



Advanced Example: Launch multiple VQV instances, using 'start' prefix:

Open several files or open the same file in several separate windows

**start vqv "c:\VQMA Demo Files\VQV\_DEMO\CNN.MPG"**

**start vqv "c:\VQMA Demo Files\VQV\_DEMO\CNN.MPG"**

**start vqv "c:\VQMA Demo Files\Current\_yuv420.YUV" 1920 1080 420**

*Such batch opening is very useful for benchmarking and iterative tests – because it allows side-by-side comparison of “before and after” variants.*

## 3.5 Opening Media File via CLI 2 (continued)



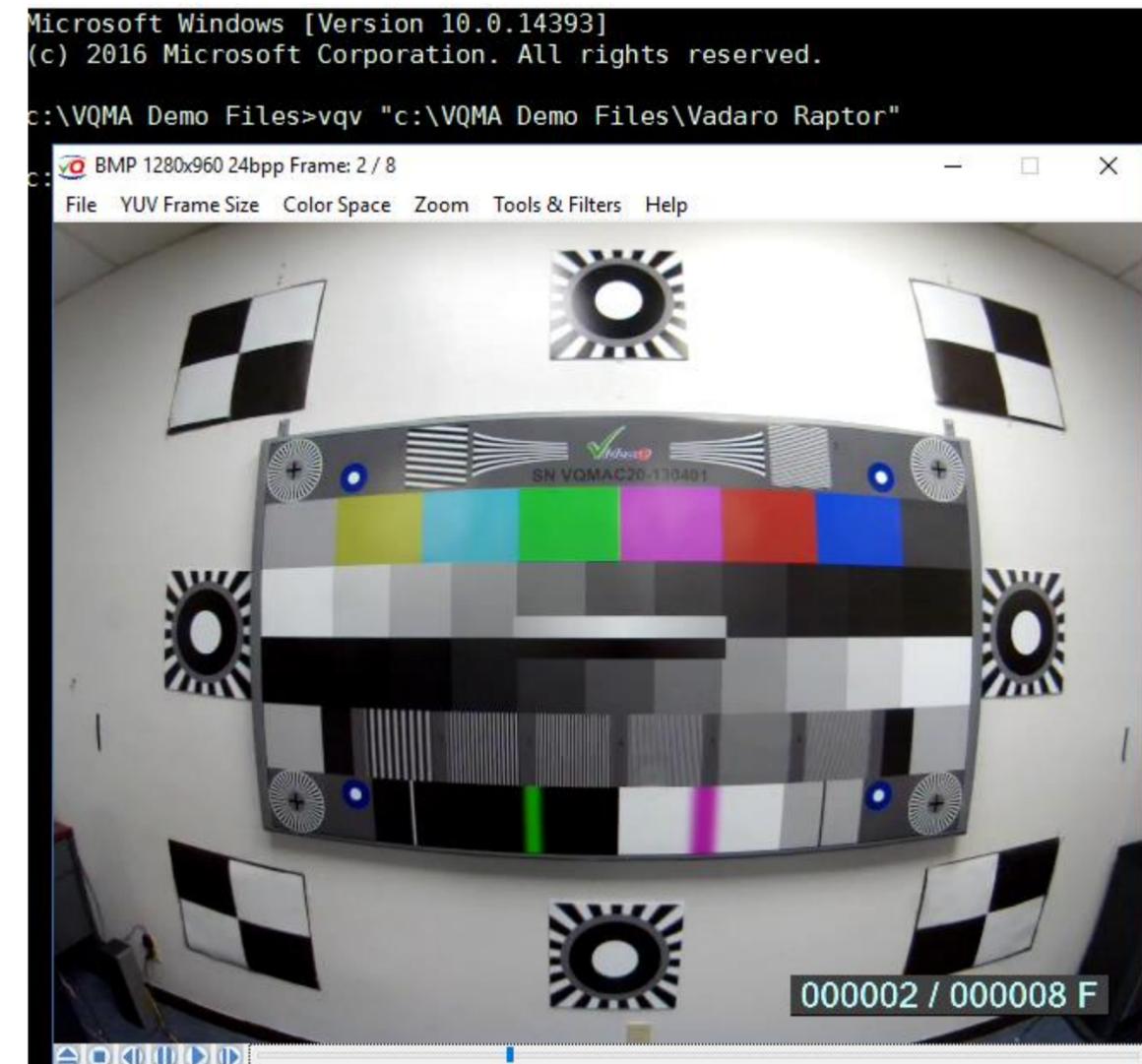
If Input Name is a FOLDER, containing **numbered YUV or BMP files**, then the file with the **lowest number** belonging to the **numbered frame sequence** found **within the folder** will be opened first, and the whole sequence can be played, e.g.

**vqv "c:\VQMA Demo Files\Vadaro Raptor"**

If Input Name designates **any numbered file** within a folder, then the file with the **lowest number** belonging to the **numbered frame sequence** will be found, and the whole sequence can be played, e.g. the command line **vqv "c:\VQMA Demo Files\Vadaro Raptor\RV\_25Apr13\_3.bmp"** produces the same result as the command line above

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

c:\VQMA Demo Files>vqv "c:\VQMA Demo Files\Vadaro Raptor\RV_25Apr13_3.bmp"
```



# 4. Timeline Navigation and Playout



[4.1 Timeline Navigation and Playout Controls](#)

[4.2 Segments Info Overlay Options](#)

[4.3 Seek and Play Controls and Indicators](#)

[4.4 Timeline Navigation Panel](#)

[4.5 Bookmarks Info Report and Bookmarks Controls](#)

[4.6 Text Info Overlay](#)

# 4.1 Timeline Navigation and Playout Controls

## Shuttle Mode – Speed Controls VideoQ Videola™

### Mouse Wheel

or **Right/Left Arrows:**

**Preset speed values:**

- +/- 0, 1, 2, 5, 10 frames,
- 1, 2, 5, 10, 20 s, 1 m (60 s)

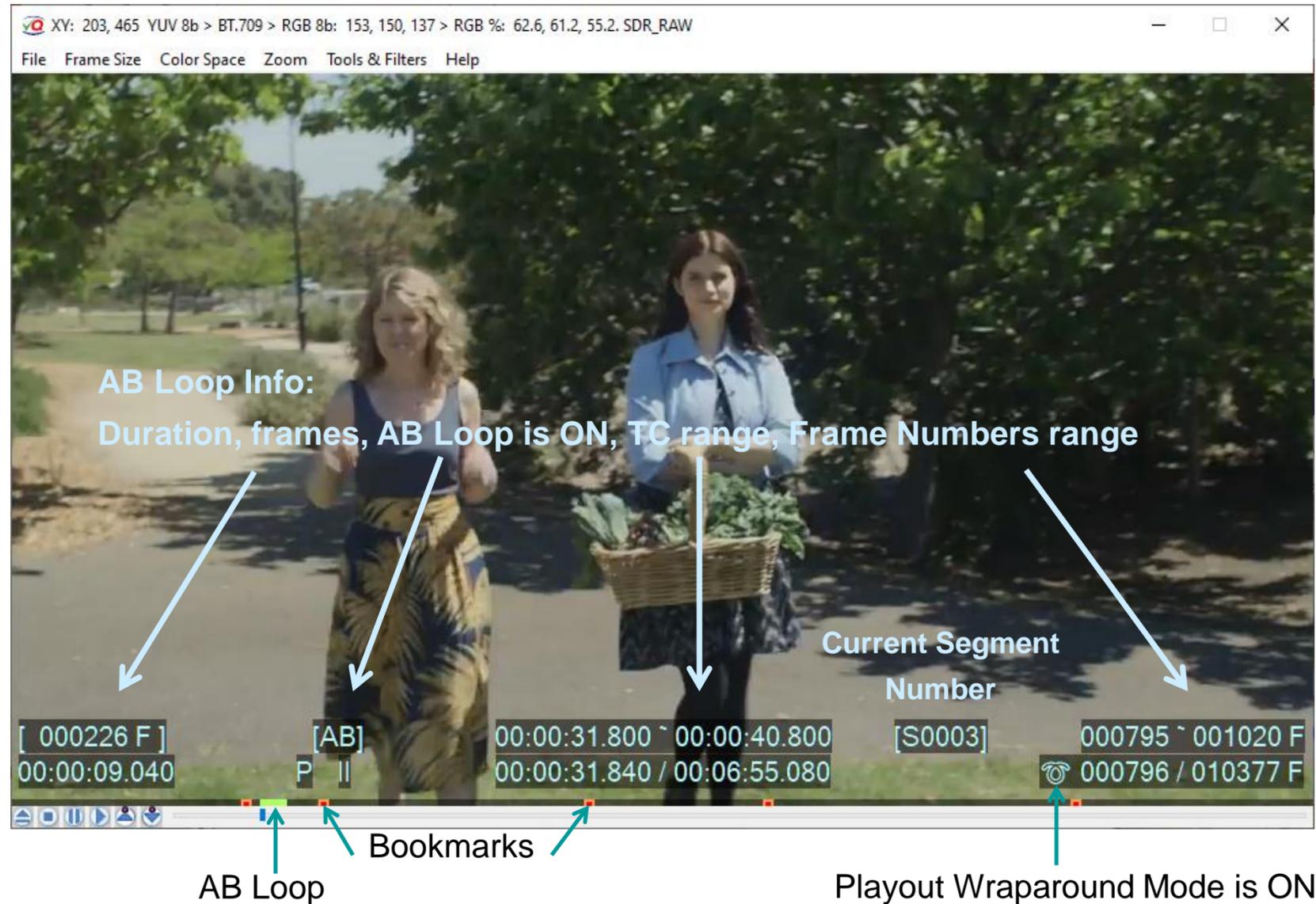
Also available are fractional playout speeds (slow motion):

- +/- 0.1, 0.2 and 0.5
- of the media file frame rate.

### Ctrl + Mouse Left Button

and cursor position within Image Area

On release of Mouse Left Button or Ctrl key playout continues at the last selected speed.



### Play Button, Space Bar

and **Mouse Middle Button** toggle between:

- **Play** (aka Shuttle Mode)
- **Pause** (aka Jog Mode)

**Pause** button always enables **Jog Mode**

### Shift + Mouse Left Button click

within Image Area also toggle between:

- **Play**
- **Pause**

and reset playout speed to +1.0

## Jog Mode – Timeline Position Controls

- **Mouse Wheel** +/- 1 frame
- **Right/Left Arrows** +/- 1 frame
- **Ctrl + Right/Left Arrows** +/- 10 frames
- **PgDn/PgUp** +/- 1 s
- **Shift + PgDn/PgUp** +/- 10 s
- **Ctrl + PgDn/PgUp** +/- 1 m
- **Ctrl + Shift + PgDn/PgUp** +/- 10 m

- **Ctrl + Mouse Left Button** and cursor position within Image Area Seek with variable speed.

On release of Mouse Left Button or Ctrl key playout will **pause** at **last shown frame**

**Ctrl + Shift + P** toggles  

**Playout Wraparound Mode** On/Off.

*In Shuttle Mode every video frame is decoded and displayed only at speed values -1, 0 and +1. Any other speed means decimation, e.g. speed +5.0 means that every 5<sup>th</sup> frame is shown.*

# 4.2 Segments Info Overlay Options

Press **Shift + S**  
to cycle thru 3 Text Info Display Modes:  
**Segments, AB Loop, Regular Video**  
(only if Segment List Data available)

Press **< or >** to browse Bookmarks / Segments by Number  
or

Press **Ctrl + 0**  
to toggle Segments Info Text Overlay:  
On/Off  
(Segments List data are preserved)

**Ctrl + < or >** to browse Bookmarks by Position or Segments +/- 10 (50)

Regular Video Mode with optional Segments Info



Current Segment  
Number & Duration

Current Bookmark  
Number & Position

Other Bookmarks

Segments Info Mode

Duration Frames & TC1000	Segment Number	Segment Start ~ End TC1000	Segments Count	Start ~ End Frames
[ 000524 F ] 00:00:20.960	[S0019] P II	00:02:00.960 ~ 00:02:21.880 00:02:01.000 / 00:06:55.080	66 S	003024 ~ 003547 F 003025 / 010377 F

Current  
Segment

Current Time Position  
TC1000 & Frames

AB Loop Mode with optional Segments Info

Loop Duration Frames & TC1000	Loop Start ~ End TC1000	Loop Start ~ End Frames
[ 000524 F ] 00:00:20.960	[AB] P II	[S0019] 003024 ~ 003547 F 003025 / 010377 F

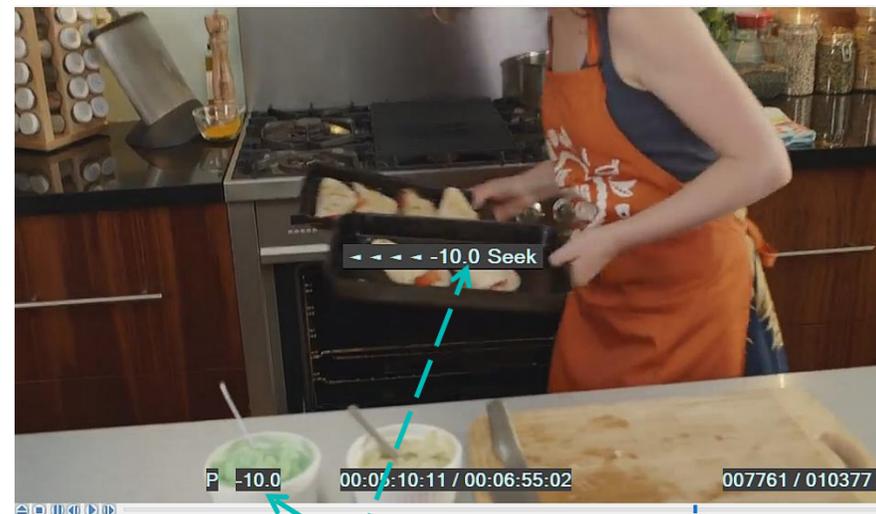
AB Loop Mode Markers

Segment Number  
(if matching AB Loop Start & End Positions)

# 4.3 Seek and Play Controls and Indicators



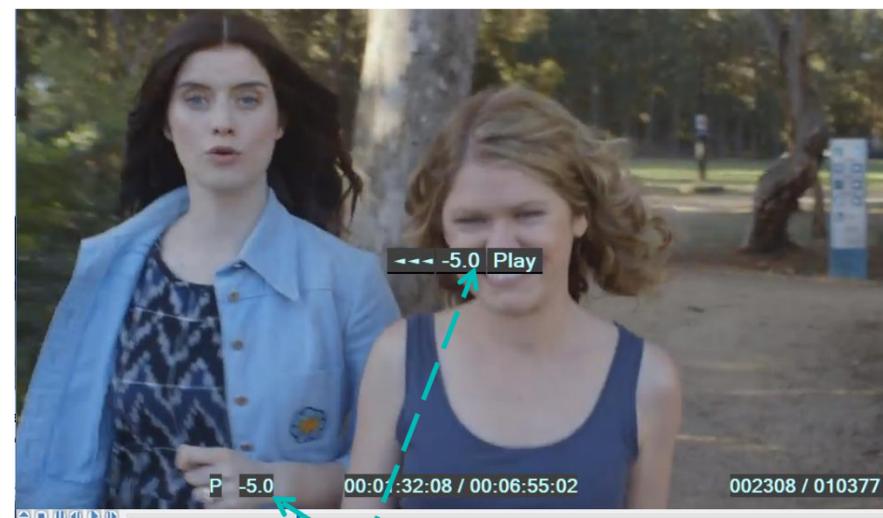
Jog Seek Mode – Position Control: **Mouse Left Button** within Slider Area



Jog Seek Mode – Position Control: **Ctrl + Mouse Left Button** within Image Area, also **Ctrl** and/or **Shift** + **Left/Right Arrows** or **PhDn/PgUp**



Shuttle Mode Speed Control by **Mouse Wheel**, also **Left/Right Arrows**



Shuttle Mode – Speed Control: **Ctrl + Mouse Left Button** within Image Area



# 4.4 Timeline Navigation Panel

## Text Edit Boxes:

Enter / copy / paste *either* **Segment Number**, **Frame Number** or **Time Position**: s[.ms], TC1000 or SMPTE Time Code of the **Target Timeline Position**. All related boxes content will be auto-updated after confirmation.

If confirmed by **Enter** key or **OK** button (1<sup>st</sup> OK to review, 2<sup>nd</sup> OK to confirm), VQV will create new **Bookmark** and go this position.

Press **N**

to invoke

**Navigation Panel**

pop-up window

### Timeline Info Boxes

(not editable)

### Target Segment

(if segments data available)

### Target Time Position

Direct Control Boxes

### 9 Radio Buttons

serve for direct selection of the **Target Time Position**

Frame Number -1 means disabled (vacant) Bookmark

At the dialog start the selected Radio Button designates the **Last Used Bookmark**

Review all Frame Numbers and Time Code strings, then **confirm** them by 2<sup>nd</sup> **OK** click

It is possible to edit more than one **Bookmark Box**

Note that Frame Numbers and Time Code strings should be **confirmed** by 2<sup>nd</sup> **OK** click.

Entering Frame Number -1 disables (vacates) the edited bookmark.

### Bookmarks / Segments Shortcuts:

(active only when Navigation Panel closed)

To **record** bookmark on pause or during playback press **B** or **Shift + Digit Key** from **1** to **9**.

To **go to** the recorded bookmark press **Ctrl + Digit Key** from **1** to **9** at any time.

It is possible to **clear** all bookmarks on pause or during playback by pressing **Shift + 0**

To go to the **Next** or **Previous Bookmark Number** or **Segment Number** press **<** or **>** key

To go to the **Next** or **Previous Bookmark Position** press **Ctrl + <** or **>**.

**Ctrl + B:** go to the **Last Used Bookmark**.

**Ctrl + 0** toggles Segments Info On/Off

# 4.5 Bookmarks Info Report and Bookmarks Controls



## Use **File>Export Bookmarks** Menu

to save **InFilePath.vqvbm.txt** and open in minimized Notepad window.

Report file name is fixed and it is co-sited with the analyzed media file.

VQV v 2.2.1. Copyright (c) 2012-2018 VideoQ, Inc.

Bookmarks Info Report created: 2018-11-25T22:06:53

Media File: "C:\VQV\_Test\\_HDR\_Test\_Sample\_1knt\_10b.mp4"

Frames Count: 0015000, Duration: 00:10:00.000, Frame Rate: 25

#, FrameNo, TC1000, SMPTE\_TC

1, 0000000, 00:00:00.000, 00:00:00:00

2, 0009000, 00:06:00.000, 00:06:00:00

3, 0003000, 00:02:00.000, 00:02:00:00

4, 0006000, 00:04:00.000, 00:04:00:00

5, null, null, null

6, null, null, null

7, null, null, null

8, null, null, null

9, null, null, null

== DO NOT EDIT ABOVE THIS LINE ==

== ADD YOUR NOTES BELOW =====

It is possible to rename the saved bookmarks file as needed.

It is also possible to add explanatory notes **after** the bookmarks data.

For QA/QC purposes it is helpful to add comments about the bookmarked timeline positions, e.g. "Frame 9000 Frame Average Light Level is beyond the specified limit".

Added comments are ignored in case of opening of the modified bookmarks file via **File>Import Bookmarks** menu.

Use **B** shortcut to bookmark **current Timeline Position** and copy the TC1000 time code string of this position to Windows Clipboard.

Use **Ctrl + B** to go to the **Last Used Bookmark** timeline position.

**Ctrl + Shift + B** shortcut can be used to create bookmark from Clipboard data, e.g. for fast bookmark transfer from any document or from one VQV instance to another VQV instance.

The supported data string format options are:

- Frame Number, e.g. "018002"
- TC1000 Time Code, e.g. "00:06:00.040"
- SMPTE Time Code, e.g. "00:06:00:02"

# 4.6 Text Info Overlay

If mouse **cursor** is in the **slider area**, then speed, frame number and time code are shown in the **Title Bar** thus duplicating the **Text Info Overlay** shown at the bottom of Active Image

**Current playout speed**  
i.e. Shuttle Mode timeline steps in frames, seconds, or minutes.

Pause symbol = Jog Mode

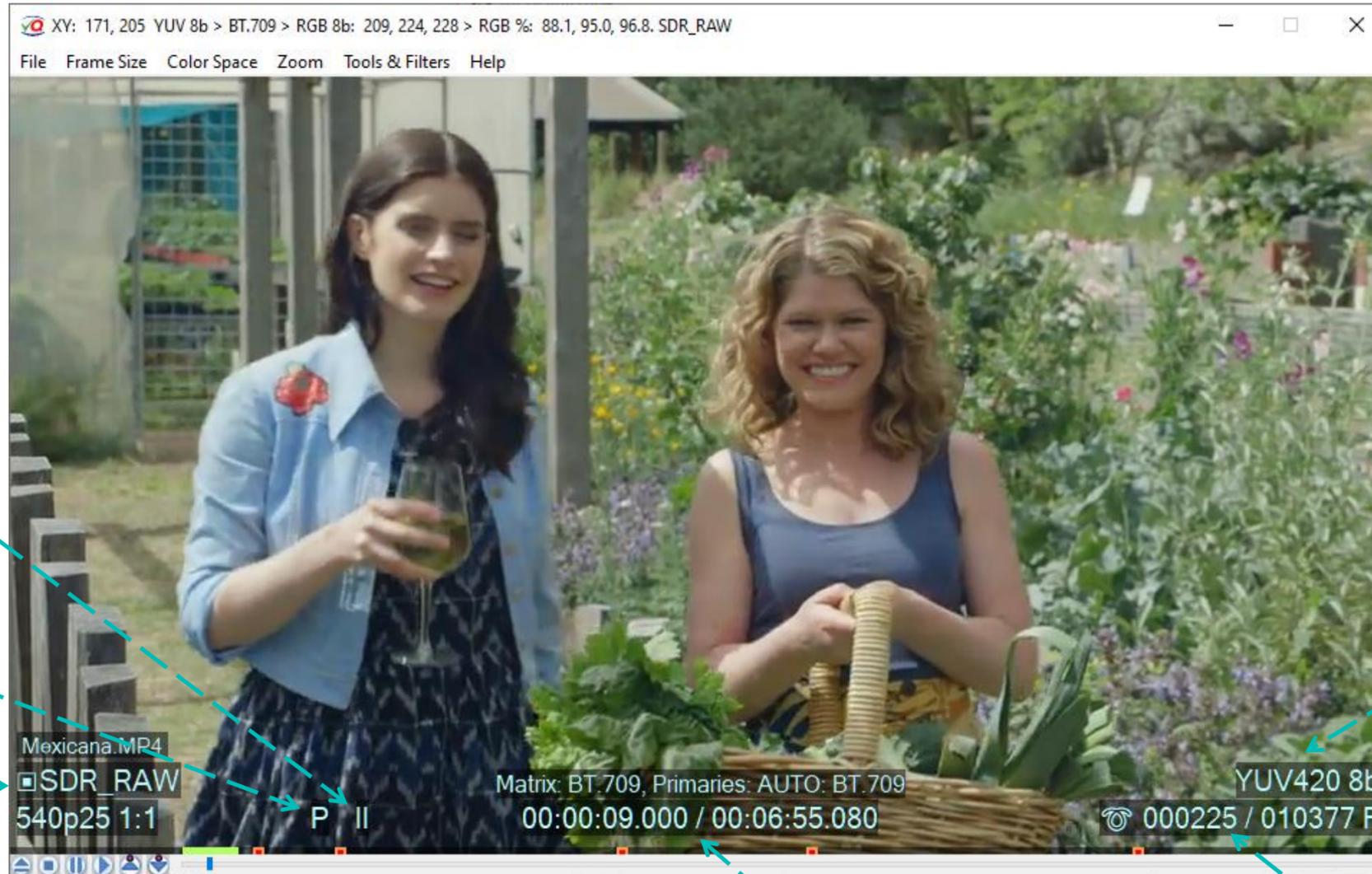
**Current Frame Type**  
(only for compressed video), e.g. 'I', 'P', 'B'

**DR Mode & Scanning Standard**  
- Selected Dynamic Range Mode  
- Frame Height, Interlace, Rate, and Zoom (hidden on playout)



YUV ⇔ RGB Narrow Range (NR) Symbol

YUV ⇔ RGB Full Range (FR) Symbol



Press **T** key to toggle Text Info overlays On/Off,  
**Ctrl + T** toggles Text Overlay Auto-hide Mode

**Video Format Info**  
(hidden on playout)

**Timeline Position Info:**  
CurrentTimeCode / DurationTimeCode

**Timeline Position Info:-**  
CurrentFrameNo / TotalFramesCount

# 5. Tools and Meters

[5.1 Tools and Meters Categories](#)

[5.2 Tools and Meters Overview](#)

[5.3 Active Image Frame Size Meter](#)

[5.4 Video Volume Bars – VV-Bars Overlay](#)

[5.5 VV-Bars Variants](#)

[5.6 Smart VectorScope](#)

[5.7 VectorScope Modes](#)

[5.8 Smart ChromaScope](#)

[5.9 FrameScope Waveform Tool](#)

[5.10 Line Parade Waveform Monitor Tool](#)

[5.11 Frame Histogram Tool](#)

[5.12 L-Bar – Video Frame Levels Statistics](#)

[5.13 L-Bar and Video Fragment Statistics](#)

[5.14 C-Bar – Compressed Video Bitrate Analyzer](#)

[5.15 C-Bar Bitrate Markers](#)

[5.16 Noise and Inter-frame Activity Meter](#)

## 5.1 Tools and Meters Categories



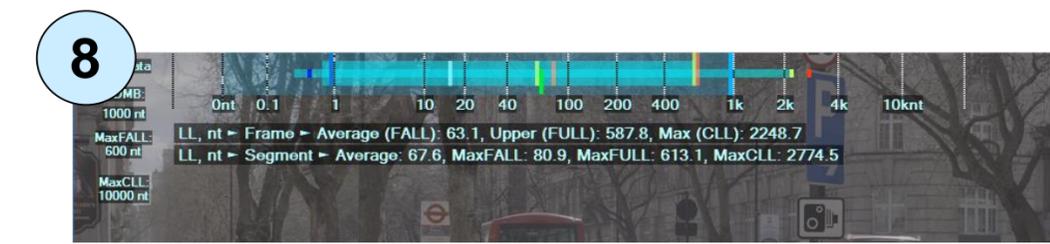
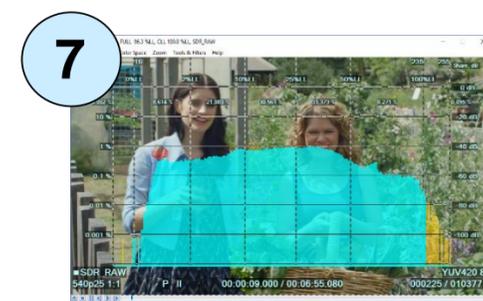
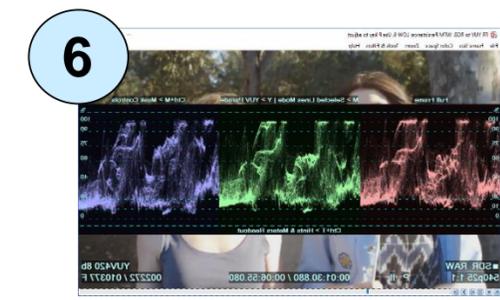
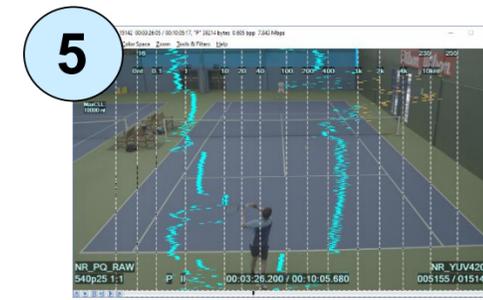
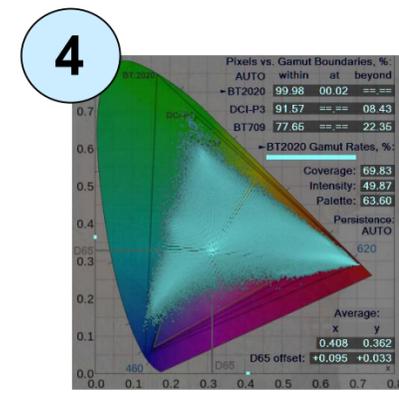
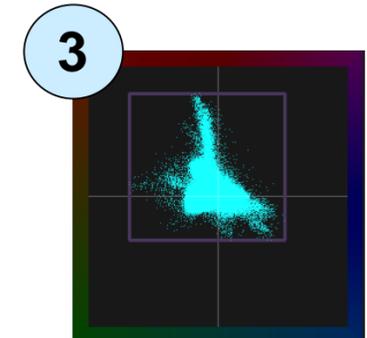
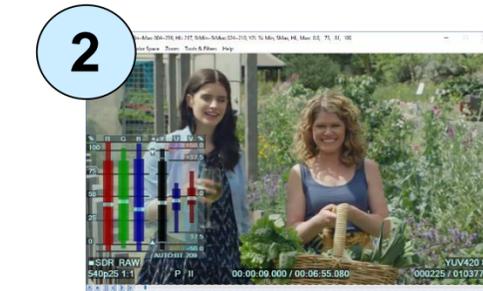
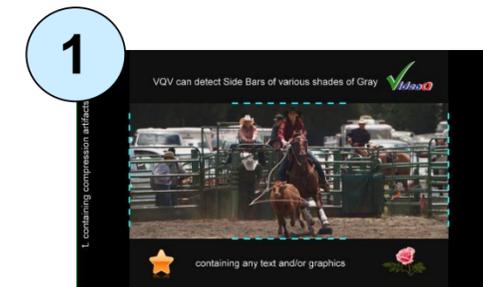
- VQV analyzers and meters can be sorted out into 3 categories:
  1. **YUV & RGB Levels Analyzers**, providing for several secondary analyzers, such as **Frame Lines RGB Range Profile**, **Video Volume Meter**, **VectorScope**, **ChromaScope**, etc.
  2. Intra-frame Activity and Inter-frame **Activity Analyzers**, also providing for **Noise Level Meter**
  3. **Bitrate, Packet Size and GOP Structure Statistics Analyzers**
- For all 3 categories the analysis results are presented in two formats:
  1. **Graphical overlays** – Bargraphs, Waveforms and Vector Display formats
  2. **Numerical readouts**, shown as Title Bar Message and/or Text Overlay
- Some analyzers, filters and overlays can be combined, some others are mutually exclusive

# 5.2 Tools and Meters Overview



See next slides for detailed description of:

1. **Active Image Size Meter**
2. Video Volume Meter – **VV-Bars™**
3. **VectorScope**
4. **ChromaScope**
5. RGB Frame Profile Monitor – **FrameScope™**
6. RGB/YUV Line Parade **Waveform Monitor**
7. RGB/Light Levels **Histograms**
8. RGB/Light Levels Analyzer – **L-Bar™**
9. Bitrate Analyzer – **C-Bar™**
10. **Noise Meter**



# 5.3 Active Image Frame Size Meter

Press **Ctrl + A**  
to detect  
**Active Image Size**

*Also used as Statistics Analysis Area  
Full Frame / Active Image switch*

Press **Shift + A**  
to show/hide  
Active Image Size  
**Markers**

**Ctrl + Shift + A**  
Analyzed Area toggle:  
Active Image / Full Frame

*Active Image Size Meter  
results are not affected*

VQV can detect Side Bars of various shades of Gray

↑ containing compression artifacts ↓

★ containing any text and/or graphics

**Current Frame Brief Info**

Frame Size 1280x720, Active Image 960x407 (160~1119x160~566)  
SDR, RGB Volume 92 %, UV Volume 16 %  
Full YUV Range

8 bit values:	Y	U	V	R	G	B
Min - All pixels:	0	62	69	0	0	0
Min - 99% pixels:	0	101	116	0	0	0
Average:	16	128	128	45	43	39
Max - 99% pixels:	235	135	156	235	235	233
Max - All pixels:	250	174	246	255	254	254

% of the range:	Y	U	V	R	G	B
Min - All pixels:	0.0	-25.3	-22.6	0.0	0.0	0.0
Min - 99% pixels:	0.0	-10.4	-4.6	0.0	0.0	0.0
Average:	6.3	0.0	0.0	17.6	16.9	15.3
Max - 99% pixels:	92.2	2.7	10.7	92.2	92.2	91.4
Max - All pixels:	98.0	17.6	45.2	100.0	99.6	99.6

Light Levels, % LL:

Min - All pixels:	0.00
Min - 99% pixels:	0.00
Average (FALL):	7.68
Max - 99% pixels:	100.00
All pixels Max (CLL):	100.00

Save full info to machine-readable "VQV\_FrameInfoReport.TXT" ?

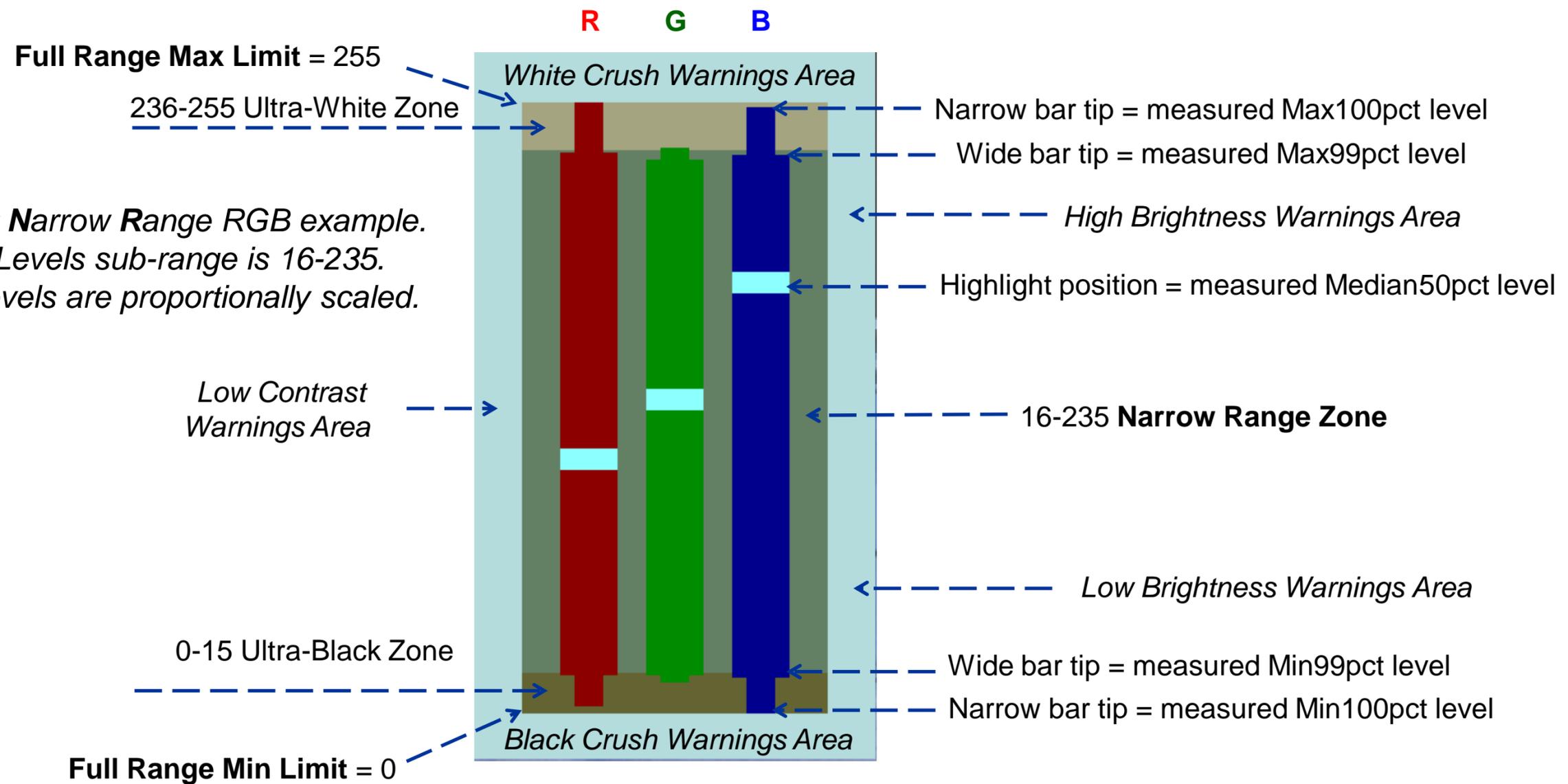
Yes No

**Active Image Size Detection** affects the results of **all other Meters** because the black bands (Letterbox, Pillarbox, PostStamp) may significantly affect image levels and activities statistics.

# 5.4 Video Volume Bars – VV-Bars Overlay

Press **V**  
to toggle On/Off  
**VV Bars Overlay**

*This slide shows typical 8 bit **Narrow Range** RGB example.  
For 8 bit NR encoding Valid Levels sub-range is 16-235.  
For Bit Depth > 8 bit these levels are proportionally scaled.*



Each **Wide Bar** represents the color component range for **reliable 98%** of current frame pixels, ignoring specular highlights, whilst corresponding **Narrow Bar** shows **extreme** values for **all (100%)** pixels - they are nearly random and may vary a lot.

This explains the drastic difference in the dynamic behavior of two bars on live video playback:

Wide Bar size and position typically do not change significantly from frame to frame, but Narrow Bar tips are moving very fast.

# 5.5 VV-Bars Variants

Press **V**  
to enable **VV-Bars**

Press **S**  
and put **Mouse Cursor** in the **VV-Bars** area.  
VQV Title Bar shows VV-Bars statistics numerical values

Press **Shift + V**  
to cycle thru 3 Display Modes:  
**YUVRGB** (6 Bars), **RGB** (3 Bars), **RGB Range** (1 Bar)



Selected YUV ⇔ RGB Conversion Parameters:  
YUV RAW (Narrow Range within Full Range), Matrix BT.709

Selected YUV ⇔ RGB Conversion Parameters:  
YUV Narrow Range ⇒ RGB Full Range, Matrix BT.709

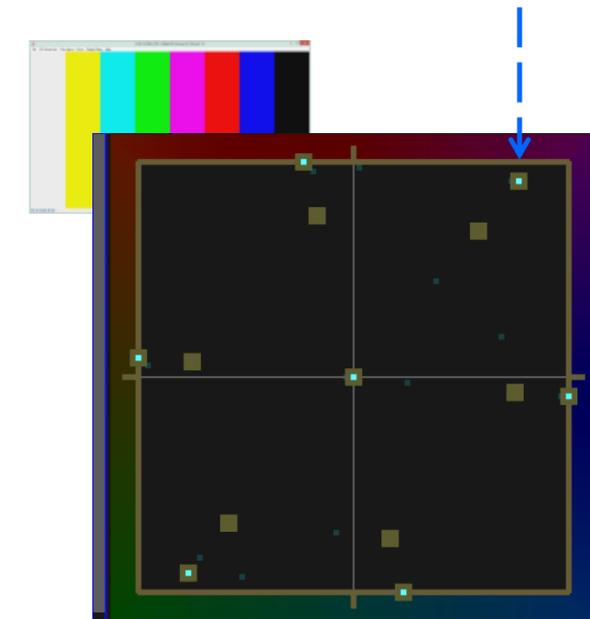
*SDR sample video – courtesy of Kate McCartney & Kate McLennan, Australia*

# 5.6 Smart VectorScope

Press **Ctrl + V**  
to toggle On/Off  
**VectorScope Overlay**



*If Test Pattern input detected,  
the rectangle limits are auto-adjusted  
to **measured** UV levels.*  
**Target boxes** (dark yellow)  
designate 75% & 100% Color Bars

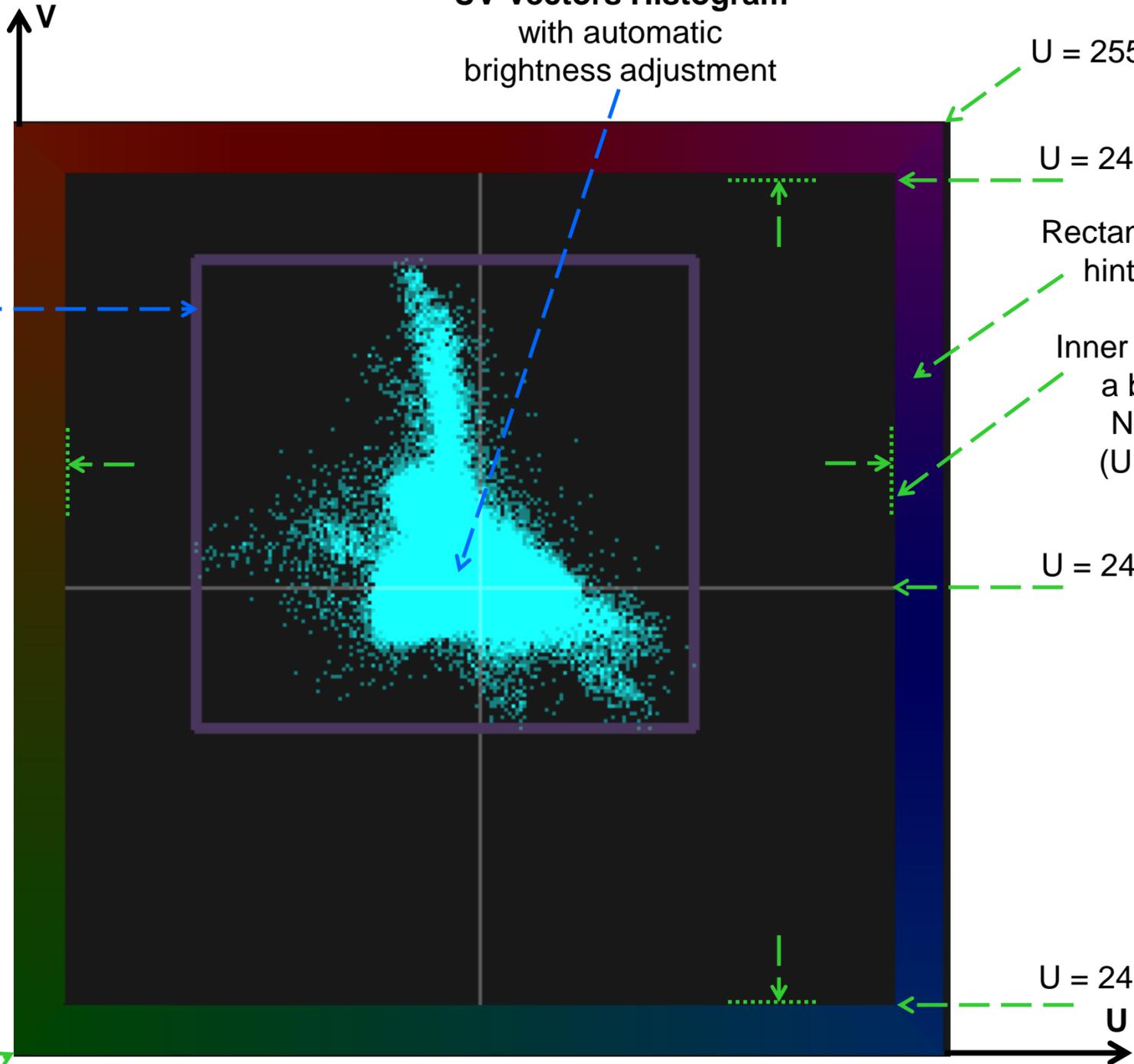


**Peak Levels Marker**  
Rectangle limited by:  
U & V  
Min & Max values

**4 Display Modes**  
Press **S** whilst  
**Mouse Cursor**  
is in **VectorScope** area  
to change  
display modes

U = 0, V = 0

**UV Vectors Histogram**  
with automatic  
brightness adjustment



U = 255, V = 255

U = 240, V = 240

Rectangular **Palette** is a visual  
hint for UV vectors hues.

Inner Palette edge serves as  
a boundary marker for  
Nominal Range Area  
(U & V from 16 to 240)

U = 240, V = 128

U = 240, V = 16

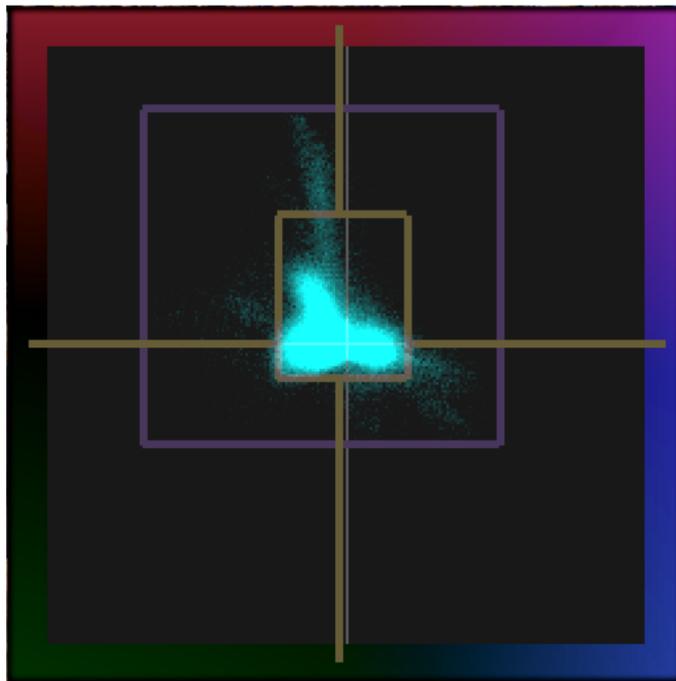
# 5.7 VectorScope Modes



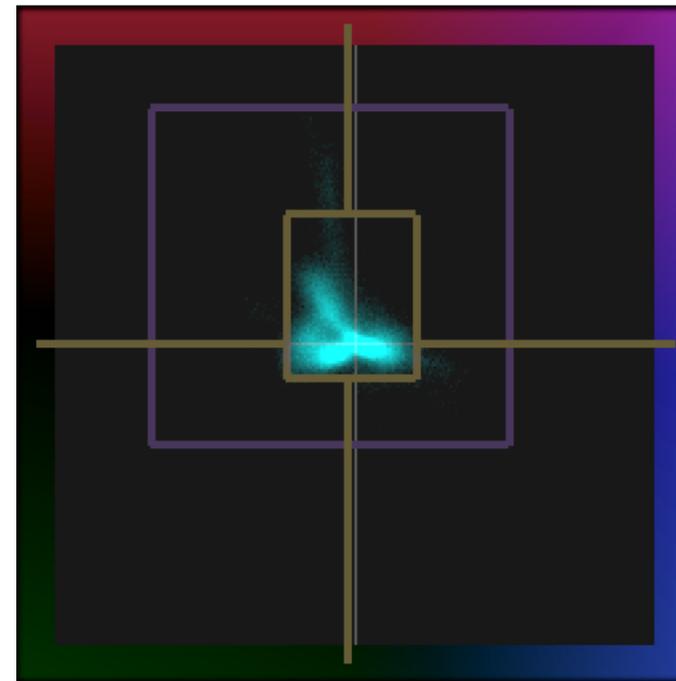
**4 Display Modes:** Press **S** whilst **Mouse Cursor** is in the VectorScope area to change the display mode

**Target Boxes** are enabled automatically by VQV Color Bars Detector

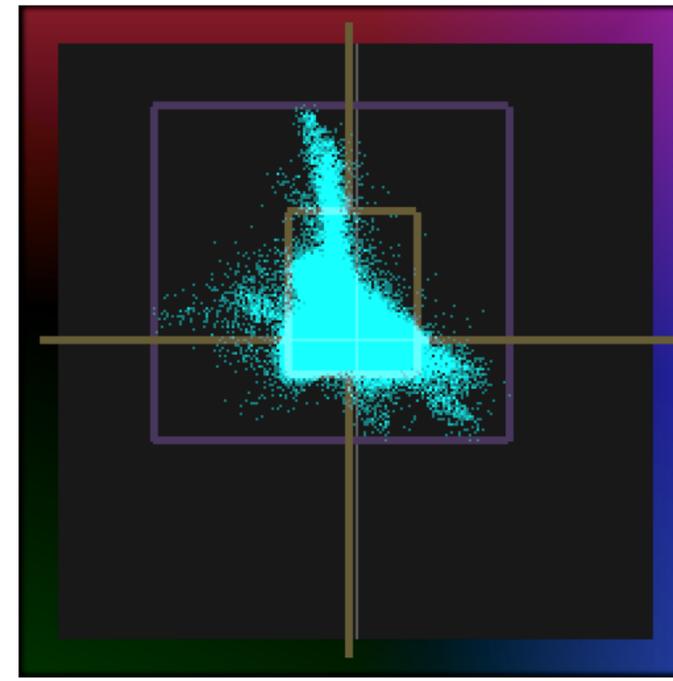
Mode 1: (default) - **AUTO**



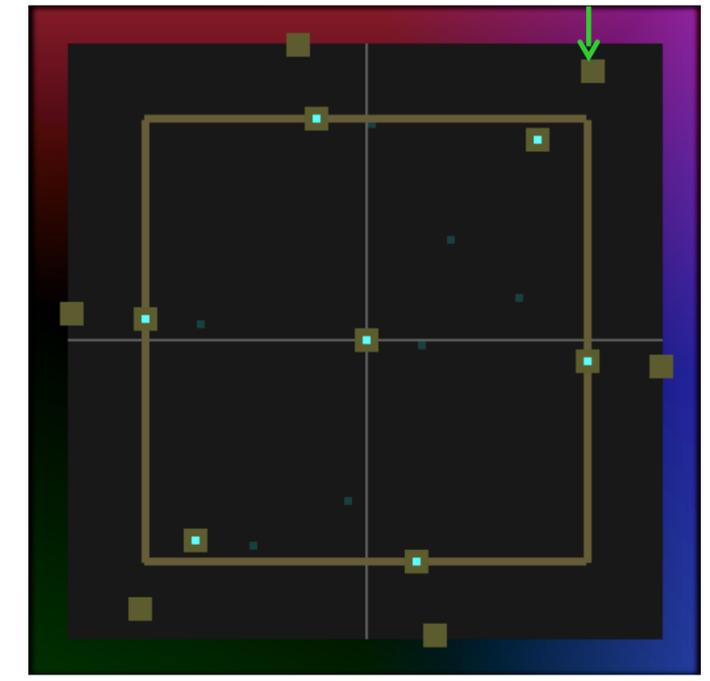
Mode 2: **Fixed Gain x1**



Mode 3: **Fixed Gain x8**



Mode 4: **Color Bars**



Suitable for **majority of use cases**.

Waveform brightness (Gain) is auto-adjusted to fit measured Chroma Volume limits.

Due to the built-in **Color Bars Detector** Mode 1 automatically switches to Mode 4 if Color Bars or similar test patterns are presented, so there is no need to switch modes manually.

x1 Gain provides for better visibility of **dominant colors distribution** (2D contour shape).

However, in this Mode low probability colors (e.g. colors of small size objects) are hardly noticeable.

x8 Gain provides for better visibility of **low probability colors** (e.g. colors of small size objects).

Mode 4 enables **Color Bars Target Boxes** (dark yellow squares) for: SD (BT.601), HD (BT.709), UHD (BT.2100), 75% **and** 100% Color Bars

Also Gain value is adjusted and spot size increased providing for better visibility of actual Color Bars UV values and reduced visibility of spurious low probability colors, such as transitions and overshoots.

*Medians and 100% peaks display disabled.*

# 5.8 Smart ChromaScope

Press **Ctrl + C**  
to toggle On/Off  
**ChromaScope Overlay**

The background is the low contrast semi-transparent image of the **Chromaticity Diagram** showing all colors within the **spectral locus**

Cyan colored overlay represents **Video Image Chromaticity Histogram** (depending on the Color Space selection)

File **Metadata Info** relevant for ChromaScope: **Color Matrix, Primaries** and **Transfer** function

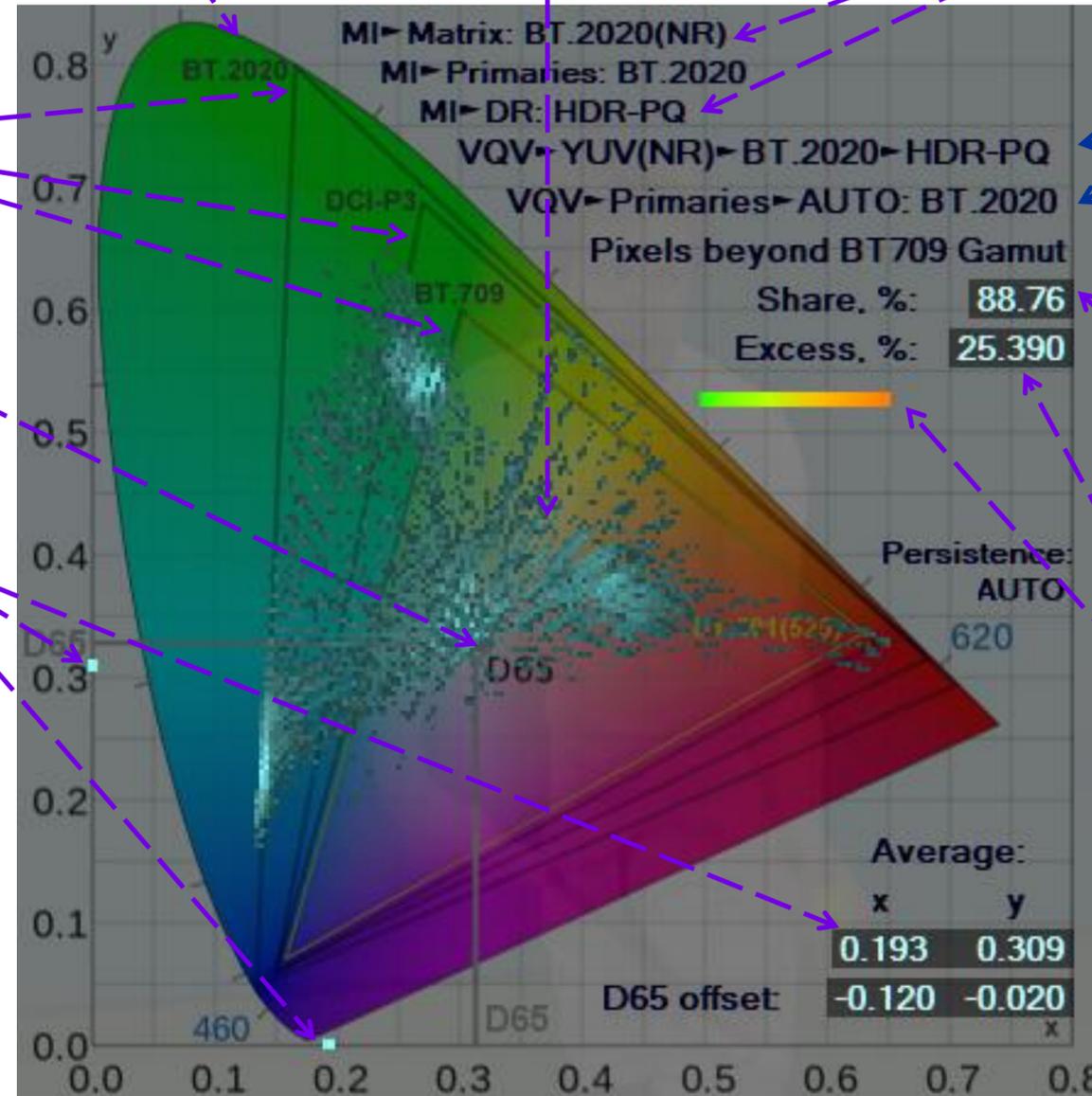
**BT.2020, DCI-P3, BT.709** and **BT.601 Primaries Gamut Boundaries** (color triangles)

Select **Color Space** via main 'Color Space' menu and 'ChromaScope Primaries' submenu. White point is not switchable, always **D65**

ChromaScope calculates and displays the **x** and **y** values of **Average Chromaticity** point and the offset of this point vs. the **D65 Reference White** point.

**D65 Offset Markers** on x and y axes are helpful for at-glance detection of the significant color shifts.

*Typical color balanced video images have Average Chromaticity close to the D65 point, though for the example shown the dominance of green and blue colors is clearly visible.*



User-selectable **VQV Color Processor** parameters, such as **Color Matrix, Primaries** and **Transfer** function, may or may not match the analyzed media file metadata.

If the selected Color Space is **BT.2020** or **DCI-P3** ChromaScope calculates and displays the **Share** of pixels having chromaticity beyond the limits of **BT.709** triangle, i.e. the percentage of colors **illegal** for the ubiquitous HD color space.

The integrated **Excess** value helps to estimate the relevance of such "difficult" pixels. For fast estimation the Excess value is also displayed as color-coded **Bargraph** growing from Green to Red (logarithmic scale).

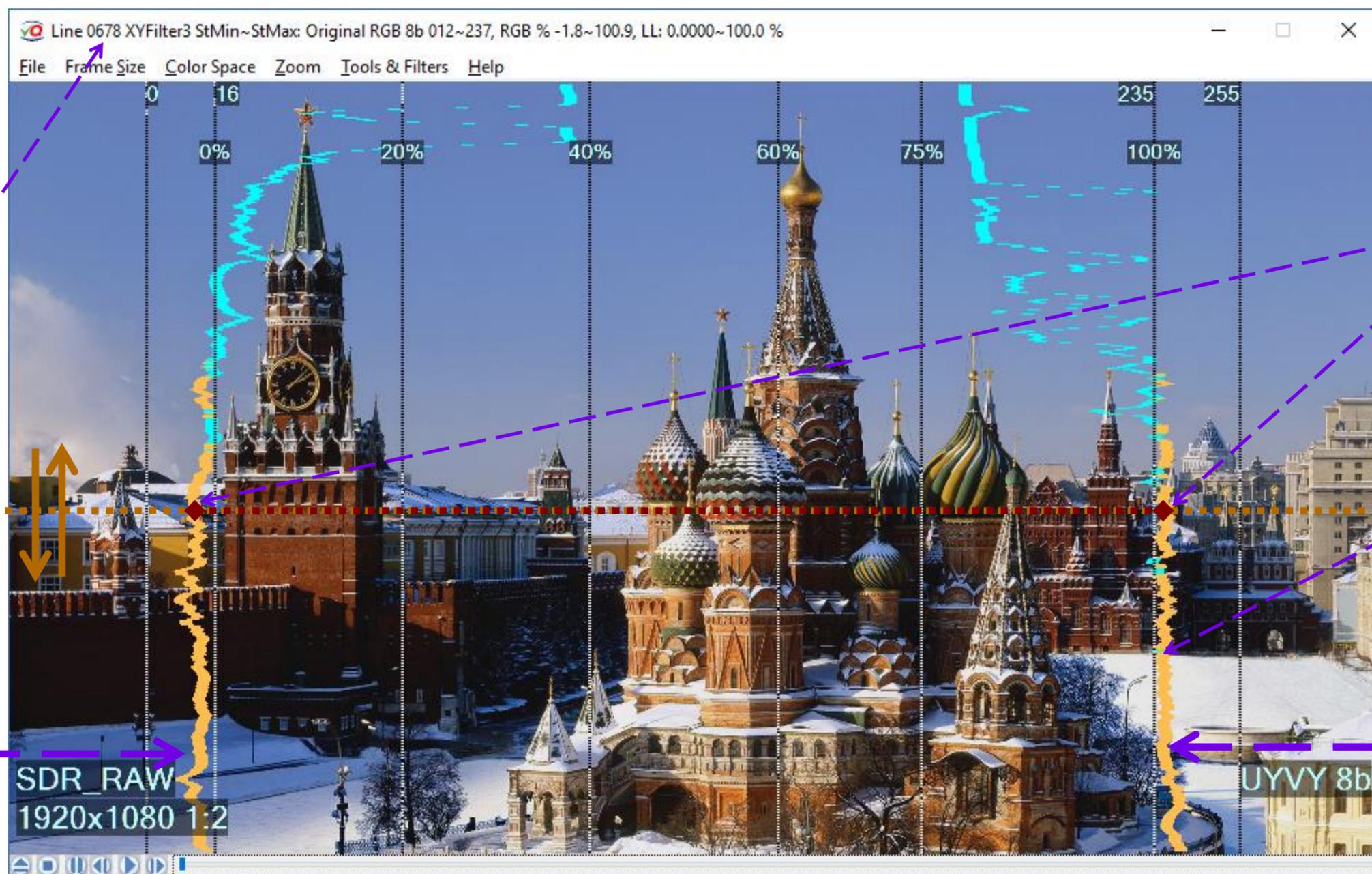
# 5.9 FrameScope Waveform Tool



Press **W** key to toggle On the **FrameScope™** Overlay. (Frame Profile Waveform)

**Line Number** and the corresponding **Title Bar Numerical Readout** values are defined by the **Mouse Cursor** vertical position

**RGB / LL Line Statistics Min value** updated line-by-line



**Frame Profile Waveform** shows the **Current Line RGB / LL Range** from  $Min(R,G,B)$  to  $Max(R,G,B)$

**RGB / LL Min & Max value beyond the valid range** (from 0 % to 100 %) are shown in **Yellow**

**RGB / LL Line Statistics Max value** updated line-by-line

The **Graticule** vertical lines positions can be switched from **RGB Levels** in **percents** of the Reference White to **Light Levels** in **nits** or **percents** – Shortcut: **U**.

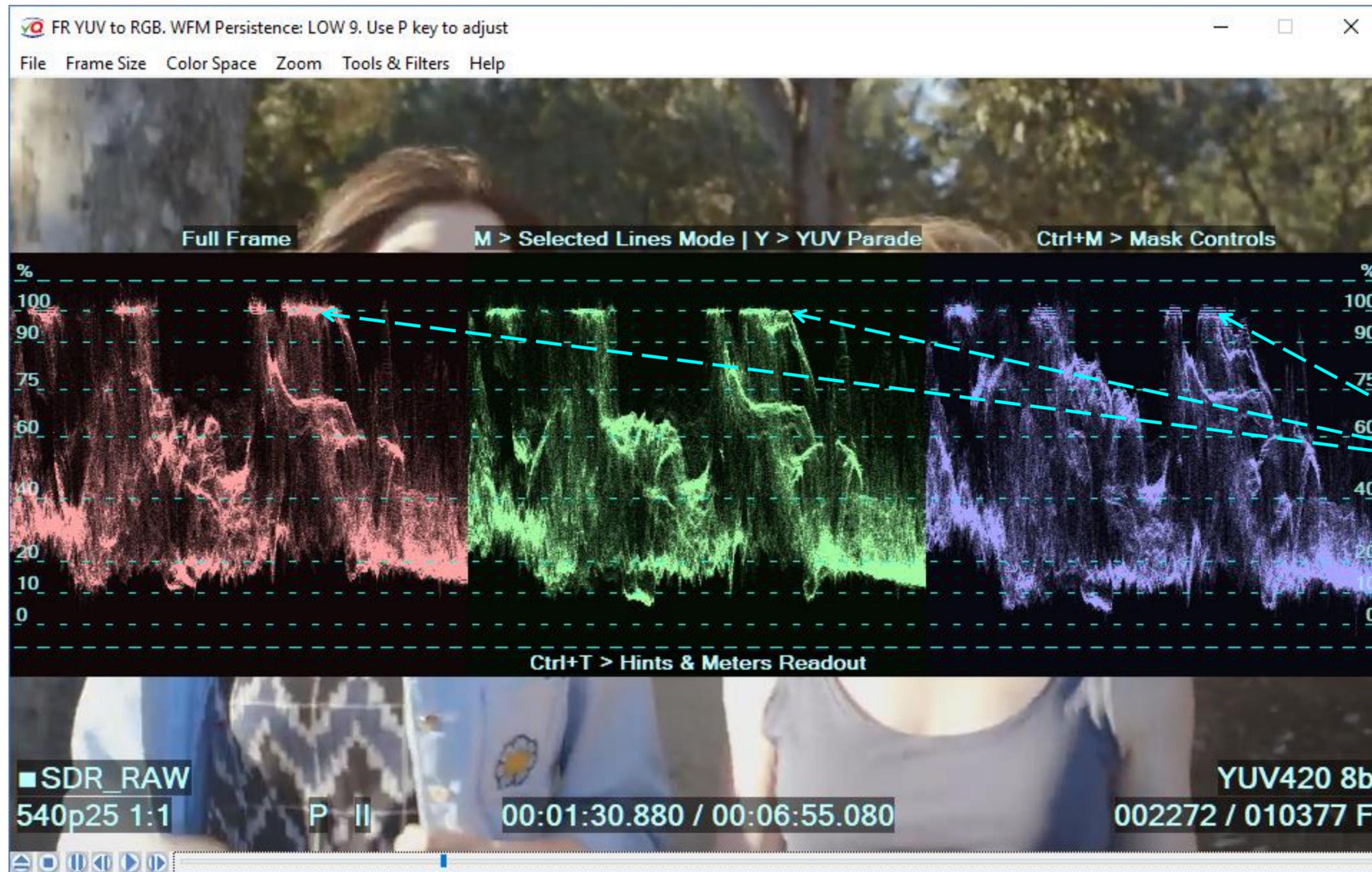
In **SDR** mode the graticule units are percents of RGB or LL range. In **HDR RAW** modes the graticule vertical dotted lines represents BT.2100 light levels.

In down- and cross- conversion modes 100% line may represent the selected **TDMB** (**T**arget **D**evice **M**ax **B**rightness) value.

# 5.10 Line Parade Waveform Monitor Tool



Press **Ctrl + W**  
to toggle On the  
**Line Parade Waveform**



**RGB Line Parade Waveform Mode** provides for easy **correlation** of the object **horizontal position** and the corresponding video **signal levels**

Note the **high density** of **Red & Green Waveforms** near the **100% (Ref.White)** marker of the Graticule (*not so strong for **Blue***).

It means massive clipping of white and yellow tones

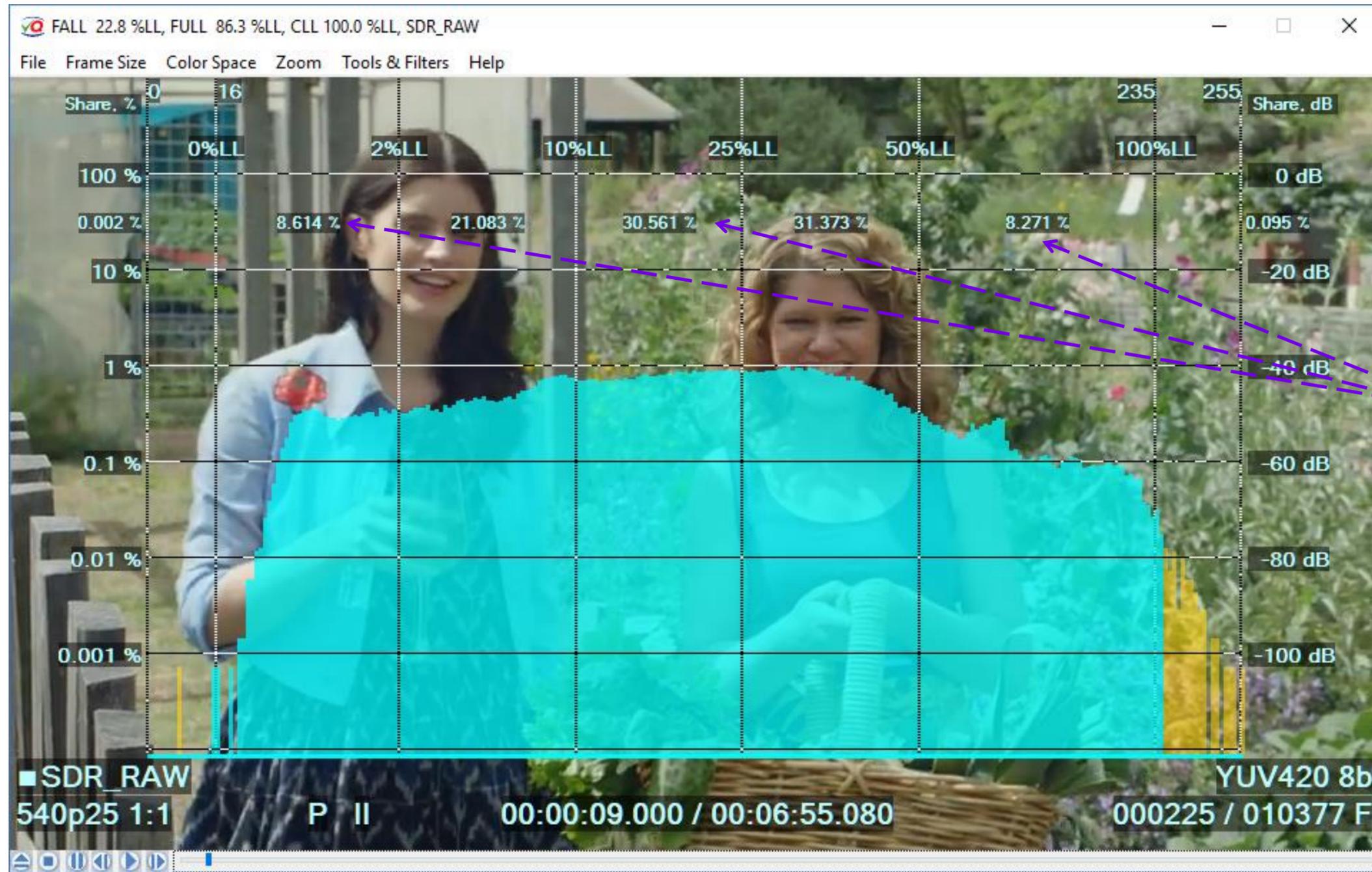
# 5.11 Frame Histogram Tool

Press **H**  
to toggle On the  
**Frame Histogram  
Overlay**

*Digits keys are shortcuts  
to some common  
Dynamic Range Modes:*

- 0 – SDR = default mode
- 1 – HDR-PQ RAW
- 2 – HDR-PQ>SDR
- 3 – HDR-HLG RAW
- 4 – HDR-HLG>SDR
- 5 – LOG-RAW
- 6 – LOG>HLG
- 7 – LOG>SDR
- 8 – MSB/LSB Images
- 9 – YUV range toggle

E.g. press **0**  
to enable the default  
**SDR RAW Mode**



Press **Ctrl + H**  
to toggle On the  
**Alternative  
Sub-ranges Histogram**

All sub-ranges are  
more or less  
**evenly populated.**

It means  
**good SDR image**

Press **U**  
to toggle the  
**RGB / Light Levels  
Units & Graticules**

The default **Histogram Overlay Mode** is the **Light Levels Histogram** shown above

# 5.12 L-Bar – Video Frame Levels Statistics

Press **L** to toggle On the **L-Bar**.

Press **Play Button** or **Space Bar** to start collecting **Segment Statistics Data**.

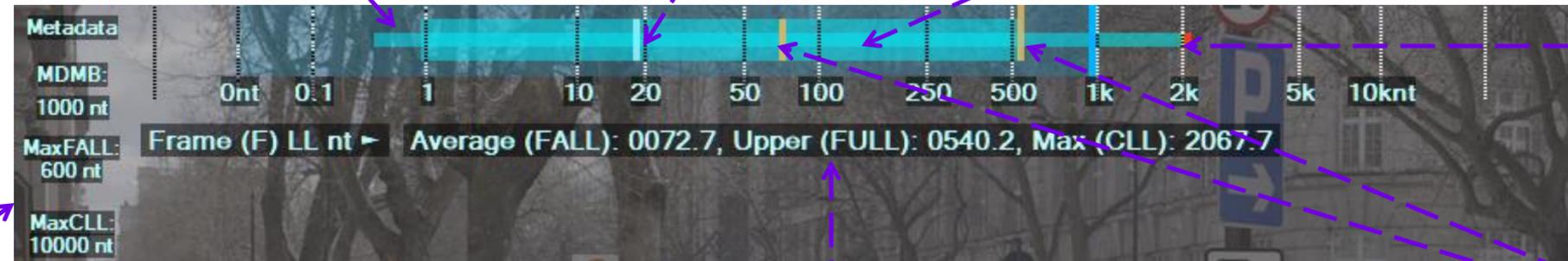
At the end of wanted fragment press **S**.

Statistic Report will be printed as text overlay. To save it to text file press **Ctrl + P**

**Narrow Bar**  
shows 100% of pixels  
(full frame RGB range)  
Min & Max limits,

**Cyan Highlight**  
shows Median Level  
(50% of frame pixels)

**Wide Bar**  
shows 99% of pixels  
(most relevant RGB range)  
Min & Max limits,



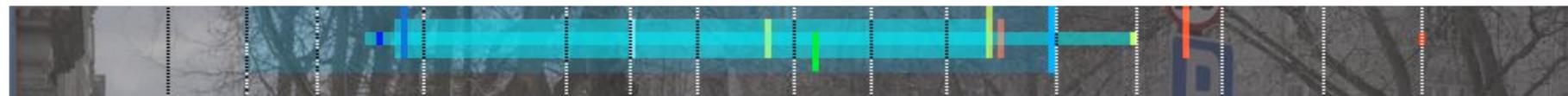
**Yellow Marker:**  
**Frame Max Light Level (CLL)**  
of the current frame  
updated frame-by-frame

**Yellow Markers:**  
**Frame Average Light Level (FALL)**  
&  
**Frame Upper Light Level (FULL)**  
of the current frame  
updated frame-by-frame

Light Levels Metadata  
**Numerical Readout**  
(if available)

Current Frame  
Statistically Relevant Light Levels  
**Numerical Readout**

Press **T** to toggle ON/OFF text labels and numerical readout messages:

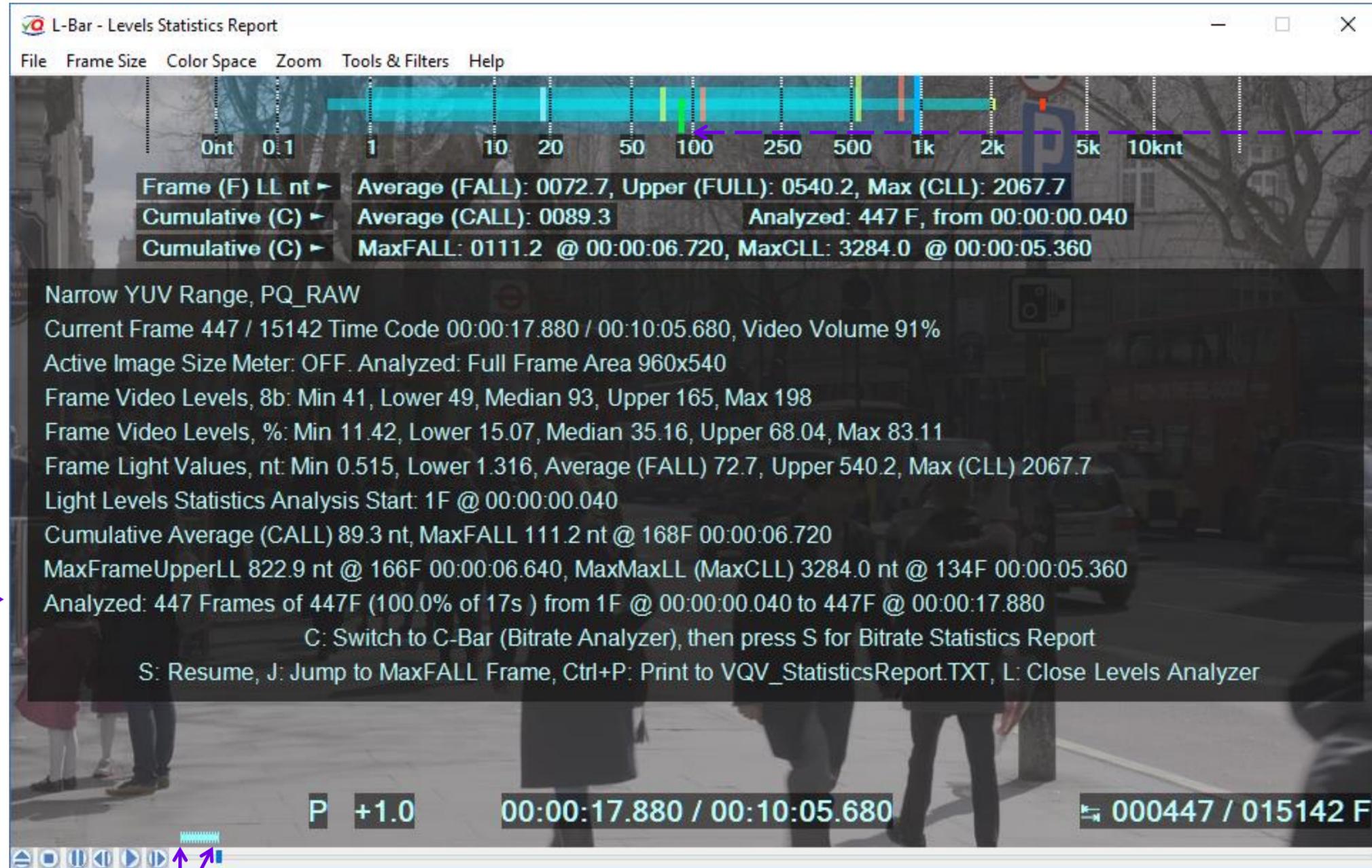


# 5.13 L-Bar and Video Fragment Statistics

At the end of wanted fragment press **S**.

Statistic Report will be printed as text overlay.

To save it to text file press **Ctrl + P**



**Green Marker:**  
Segment Average LL

**Red Markers**  
max values of the corresponding **Yellow** markers within the segment

**On-screen Report:** - - ->

**RGB & Light Levels  
Current Frame Statistics  
&  
Fragment Statistics**  
up to the current frame

**Analysis Progress Bar:** ✓  
From the selected start frame to the current frame

**C-Bar** Bitrate Analyzer is running in the background when **L-Bar** is enabled. Press **C** to switch between L-Bar and C-Bar Modes.

# 5.14 C-Bar – Compressed Video Bitrate Analyzer

Press **C** to enable the Bitrate Analyzer tool

**Logarithmic Bitrate Graticule** covers very wide range: from **0.01 Mbps** to **1,000 Mbps**

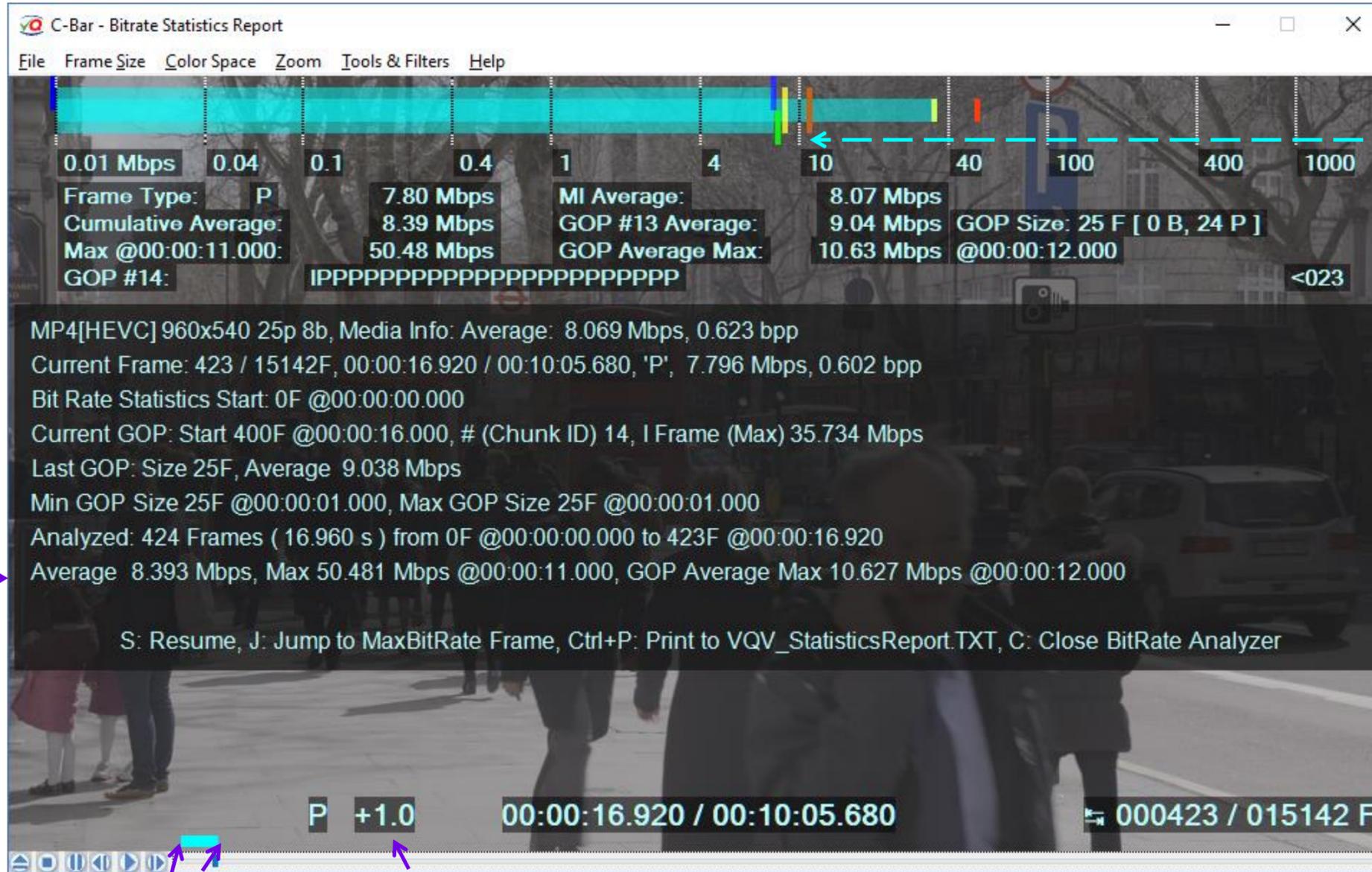
**Press Play Button** to collect and display **Bitrate Statistics Data**

At the wanted fragment end press **S**

Statistic Report will be printed as text overlay;

to save it press **Ctrl + P**

**On-screen Report: Codec Info & Compressed Data Statistics** up to the current frame



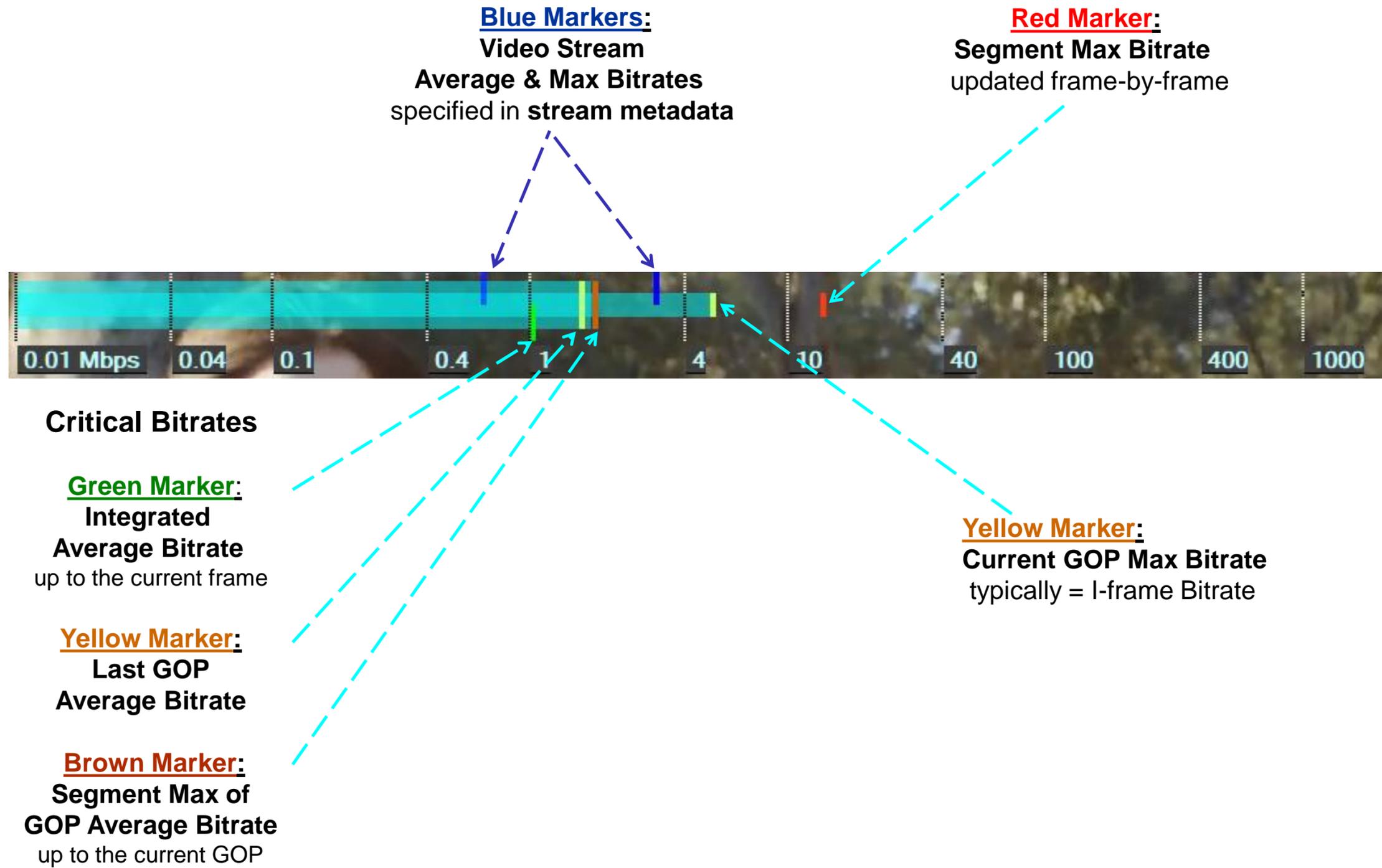
**C-Bar Overlay**  
Narrow Bar: 'I' Frame Bitrate,  
Wide Bar: 'P'/'B' Frame Bitrate

**C-Bar** Bitrate Analyzer is running in the background when **L-Bar** is enabled.  
In such case press **C** to switch between L-Bar and C-Bar Modes, otherwise pressing **C** will switch **C-Bar** Off.

**Statistics Progress Bar:** From the start frame to the current frame

*Note that **full** Bitrate Statistics Report is available only if VQV plays at the nominal **+1** speed, otherwise only current frame brief report is available.*

# 5.15 C-Bar Bitrate Markers

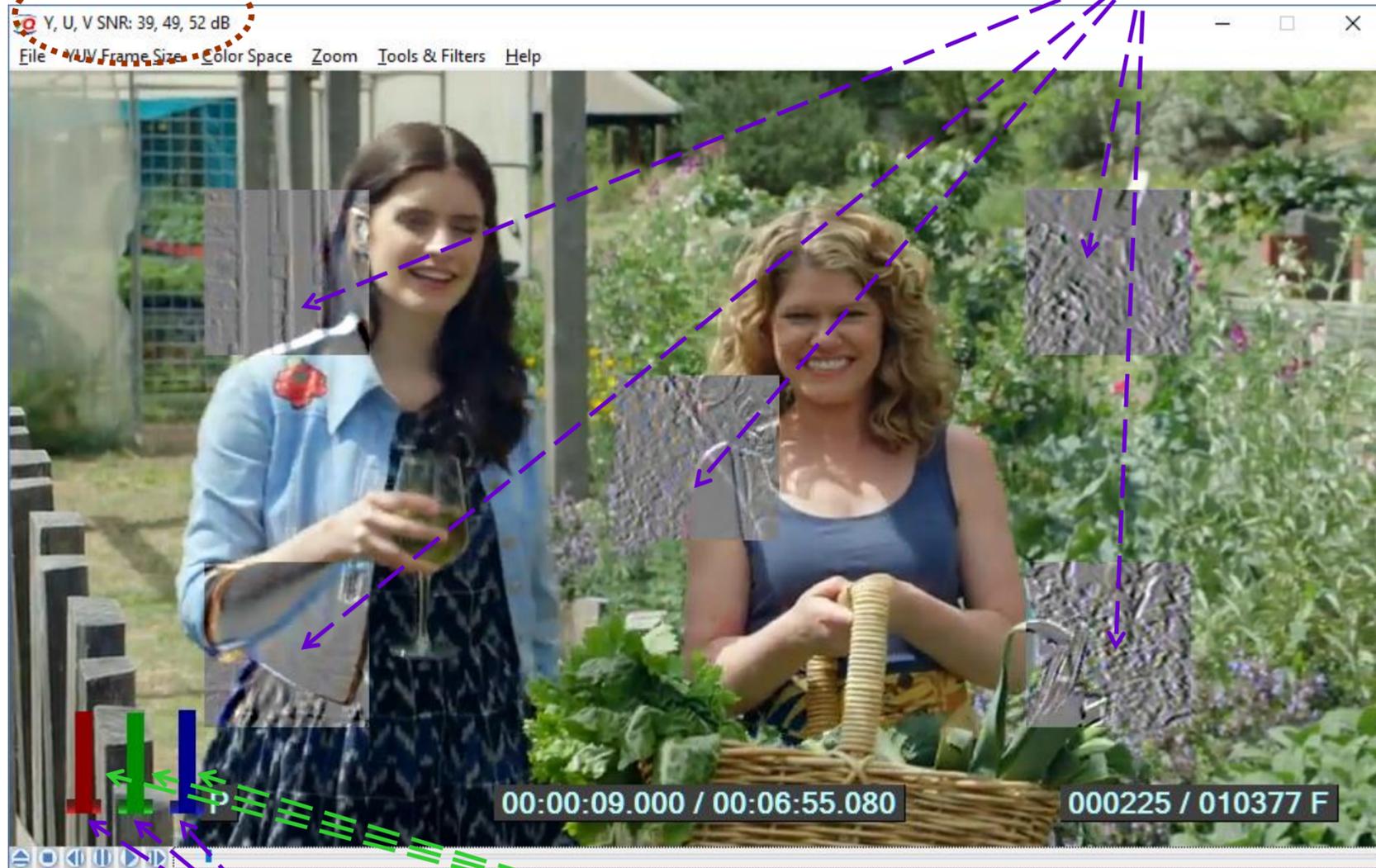


# 5.16 Noise and Inter-frame Activity Meter

Press **Shift + N**  
to toggle On the  
**Noise Meter**

Y SNR = 39 dB,  
U SNR = 49 dB,  
V SNR = 52 dB

5 SNR Meter Zones



Noise Distribution  
BarGraph Display

Inter-Frame Activity  
BarGraph Display

*Relatively poor Y SNR value is probably caused by strong Intra-frame and Inter-frame Activities creating problems for the camera noise reducer*

# 6. Displayed Image Filters



[6.1 Displayed Image Filters Overview](#)

[6.2 Gain Filter](#)

[6.3 Color Components Filters](#)

[6.4 MSB/LSB Filter](#)

[6.5 De-interlaced Display Filter](#)

[6.6 Spatial and Temporal Filters](#)

[6.7 Compression Artifacts Filter](#)

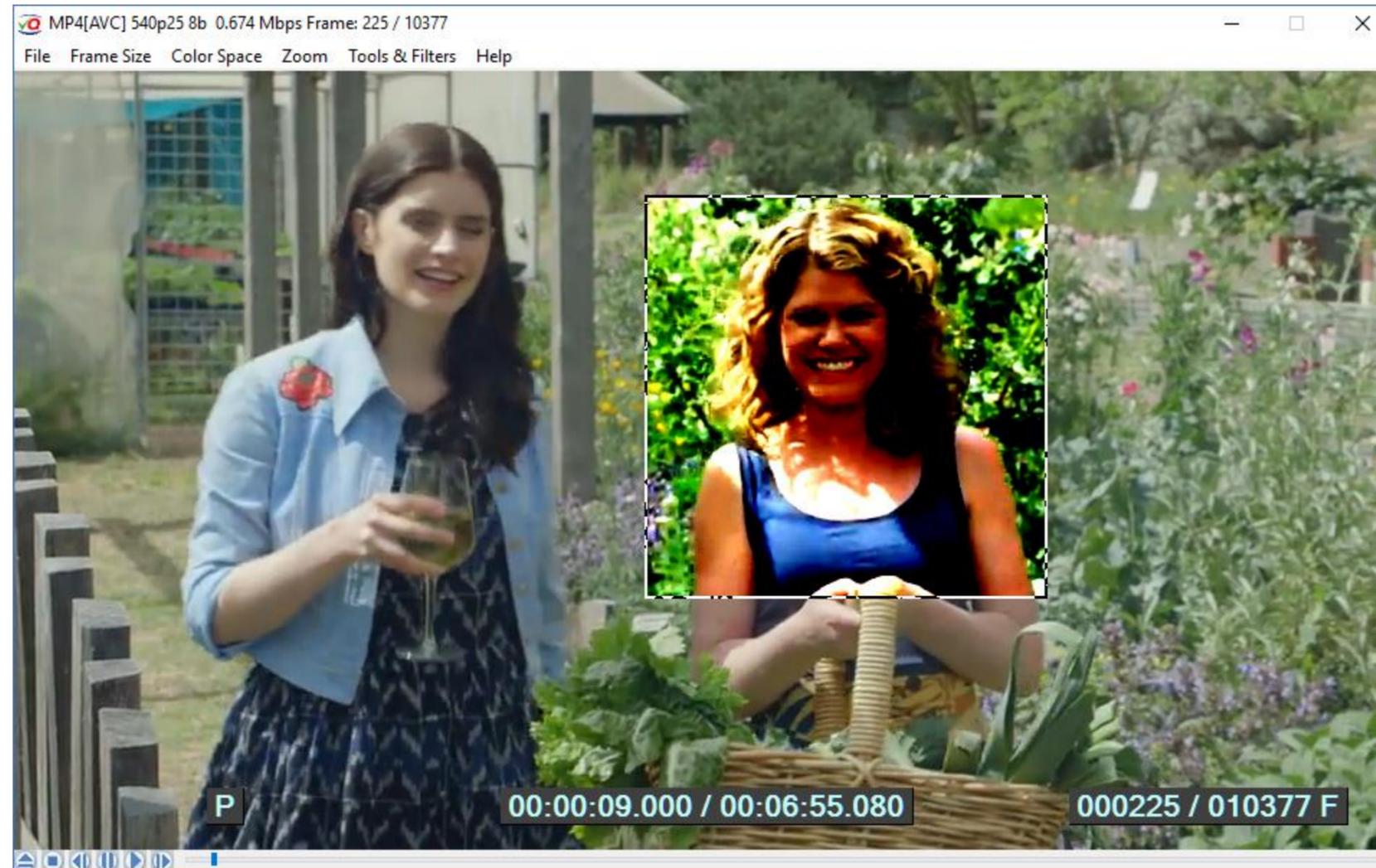
# 6.1 Displayed Image Filters Overview



- VQV displayed image filters can be sorted out into 4 categories:
  - **Color Components Filters:** RGB, R, G, B, Y, UV or LL images with out of range highlighter and heat map options.
  - **Digital Levels Filters:** Gain, Brightness offset, MSB/LSB selector
  - **Spatial Filter:** HPF (High Pass Filter) or LPF (Low Pass Filter) providing for intra-frame activity assessment
  - **Temporal Filter:** HPF (High Pass Filter) providing for inter-frame activity and frames repetition cadence assessment
  - Filters can be applied to:
    - Screen area limited by square mask with adjustable size and position
    - Full screen area
- **Shift + M** toggles between Mask / Full Screen modes, the default mode depends on the selected filter(s).
  - To adjust Mask Size: put mouse cursor inside the mask area, press **M** key and use **Mouse Wheel**, then click inside the mask to finish
  - To change Mask Position: put cursor in the mask area, hold **Mouse Left Button** and move the mask
- **D** key and **ESC** key **reset** all filter controls to the **default** (Off) state.  
**Stop Button** does the same, but also resets the Timeline Position to media file start.
- **Shift + F** toggles On/Off all filters, **preserving** all filter controls and settings
- **I** key cycles thru 3 de-interlaced display modes:
  - Interleaved Fields,
  - Top-Bottom Fields
  - Fields Difference
- Display filters can be combined, but filters concatenation order is fixed and can not be changed
- See next slides for detailed description and examples.

## 6.2 Gain Filter

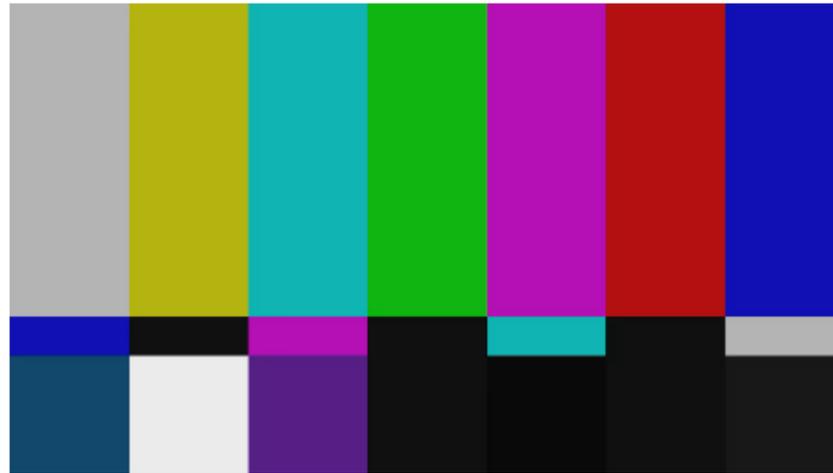
**Shift + Mouse Wheel** (and **Shift + Up/Down Arrows**) controls displayed image Gain (contrast): x1, x2, x4, x16.  
Example below: Gain = **x4** within the Mask area.



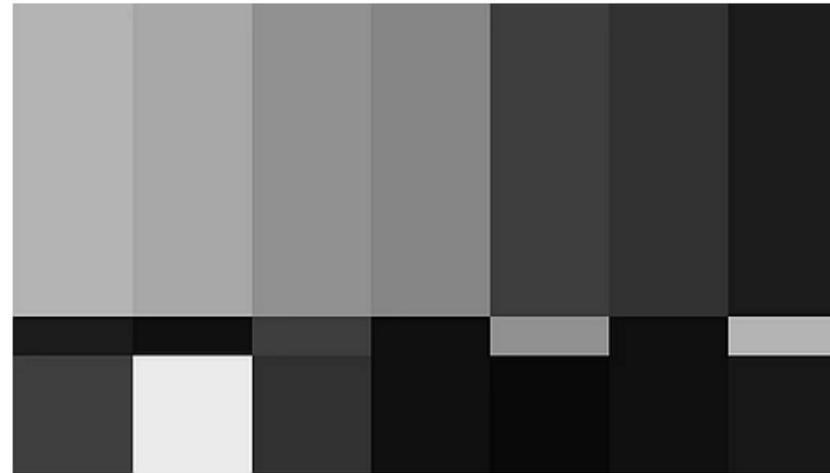
*If necessary, use **Ctrl + Shift + Mouse Wheel** to adjust the Slicing Level (brightness offset)*

# 6.3 Color Components Filters

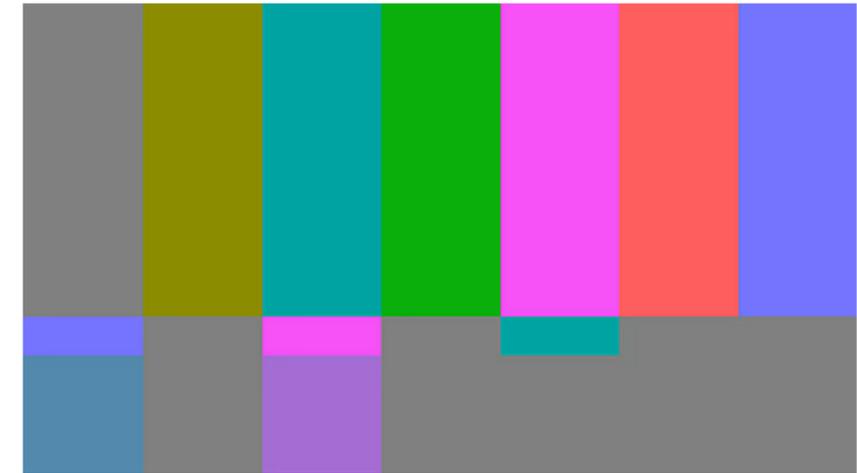
**ESC** or **D**: Default RGB Image



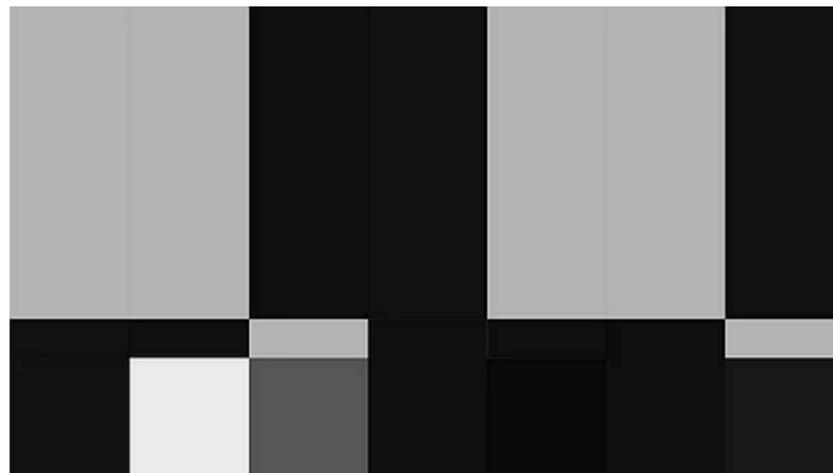
**Shift + Y**: Luminance



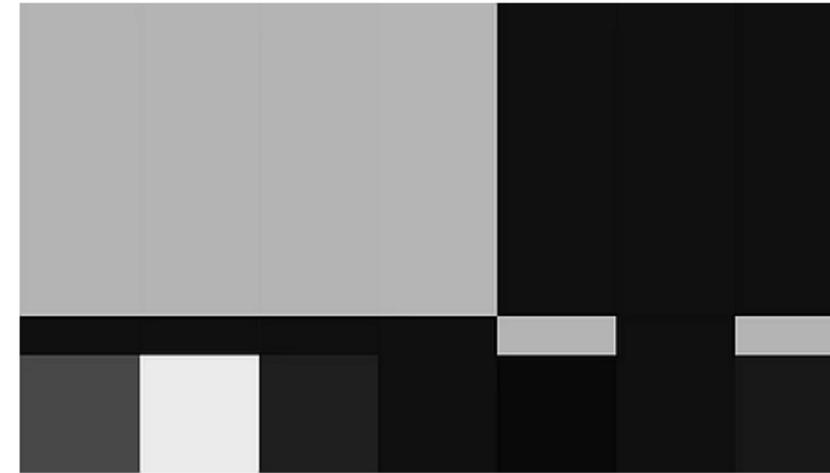
**Shift + U**: Chrominance (UV)



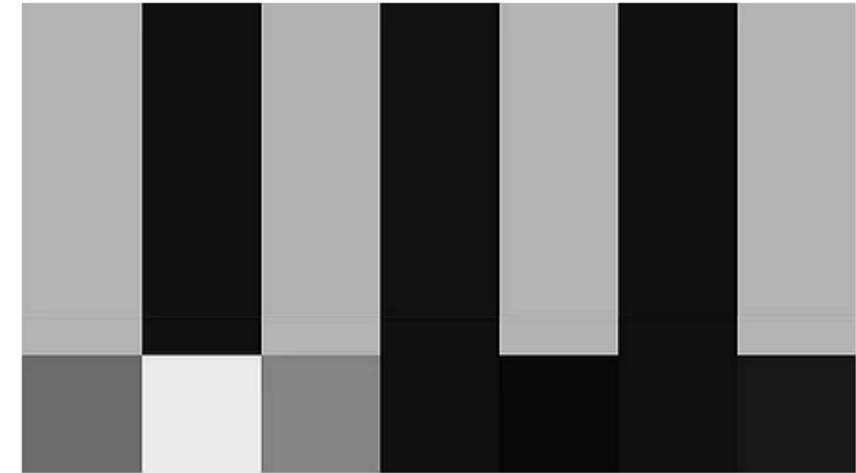
**Shift + R**: Red Component



**Shift + G**: Green Component



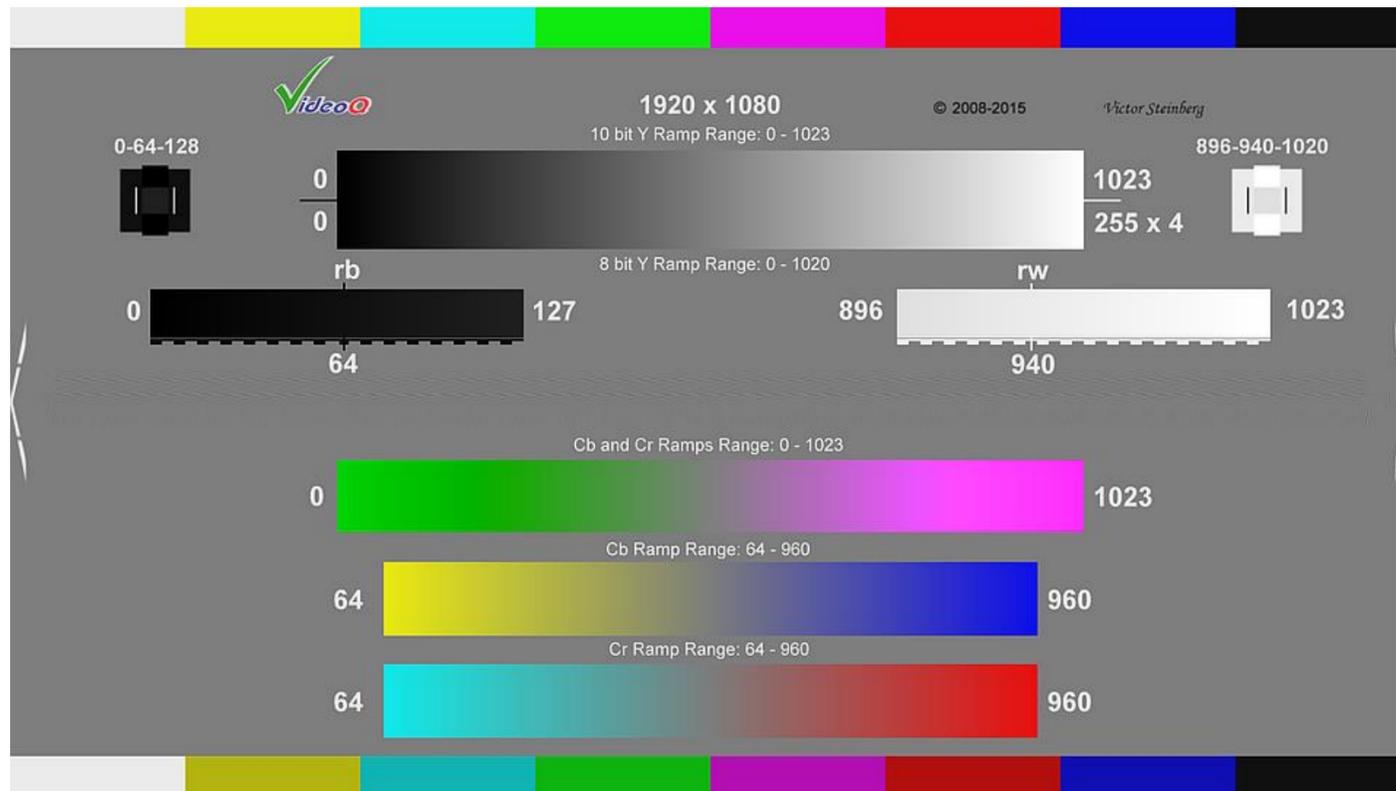
**Shift + B**: Blue Component



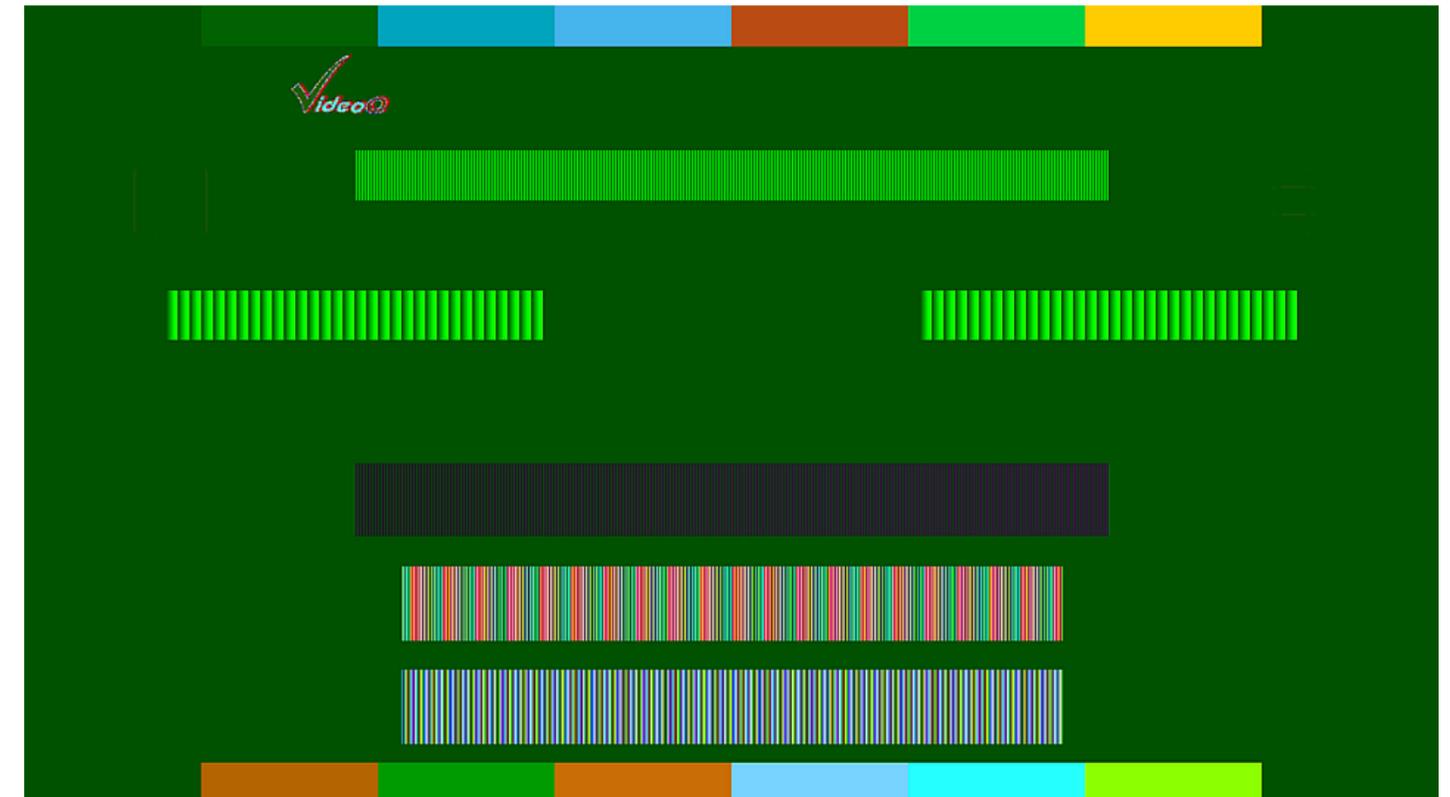
# 6.4 MSB/LSB Filter

Press **8** to toggle between MSB and LSB images (*only if the input bit depth is greater than 8 bit*)

**MSB:** 8b RGB image derived from 16b RAW YUV media file



**LSB:** 8b RGB image derived from 16b RAW YUV media file



Both MSB and LSB images are equally suitable for VQV filters/meters. For example it s possible to select color components, display video data values of any pixel, apply spatial HPF, etc

# 6.5 De-interlaced Display Filter

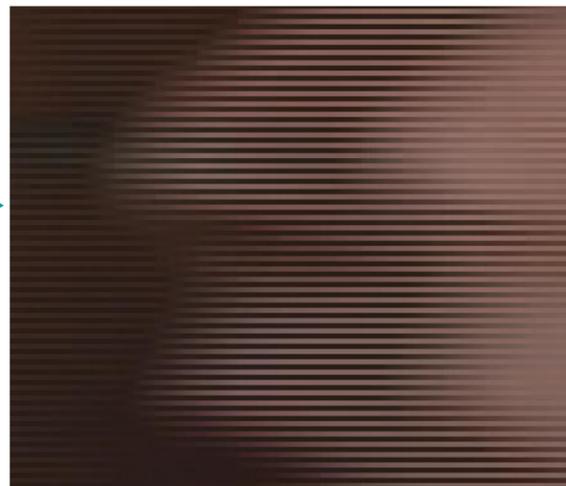


Press **I** to cycle thru 3 de-interlaced display modes: Interleaved Fields (default), Top-Bottom Fields, Fields Difference

Interleaved Fields



Zoom 4:1 (fragment)



Top-Bottom Fields



Fields Difference



Brief Media Info

Container:  
MXF, 18.176992 MB, 00:00:05.040  
Streams: Video 1

Video:  
126F, 00:00:05.040, BFF, 25.000i, 720x576  
yuv411p, YUV, 4:1:1, 8 bit  
24.442 Mbps, DV [0D01030102024102-0401020202020200]

Save full info to machine-readable "VQV\_MediaInfoReport.TXT" ?

Brief Media Info

Container:  
MPEG Video, 64.318682 MB, 00:01:40.440  
Streams: Video 1

Video:  
2511F, 00:01:40.440, TFF, 25.000i, 720x576  
yuv420p, YUV, BT.601, BT.470 System B, BT.470 System G, 4:2:0, 8 bit  
5.123 Mbps, MPEG Video, Main@Main, GopSize 12

Save full info to machine-readable "VQV\_MediaInfoReport.TXT" ?



This example shows that despite **the same 25i** declared format, only the content in the 1st row is **truly interlaced**,  
The 2<sup>nd</sup> row images are in fact **25psf** (Progressively Scanned Fields), i.e. 25p original was converted to 25i – probably, for distribution purposes.

# 6.6 Spatial and Temporal Filters



Intra-Frame Activity  
Readout in dB

Intra-Frame Activity  
Image

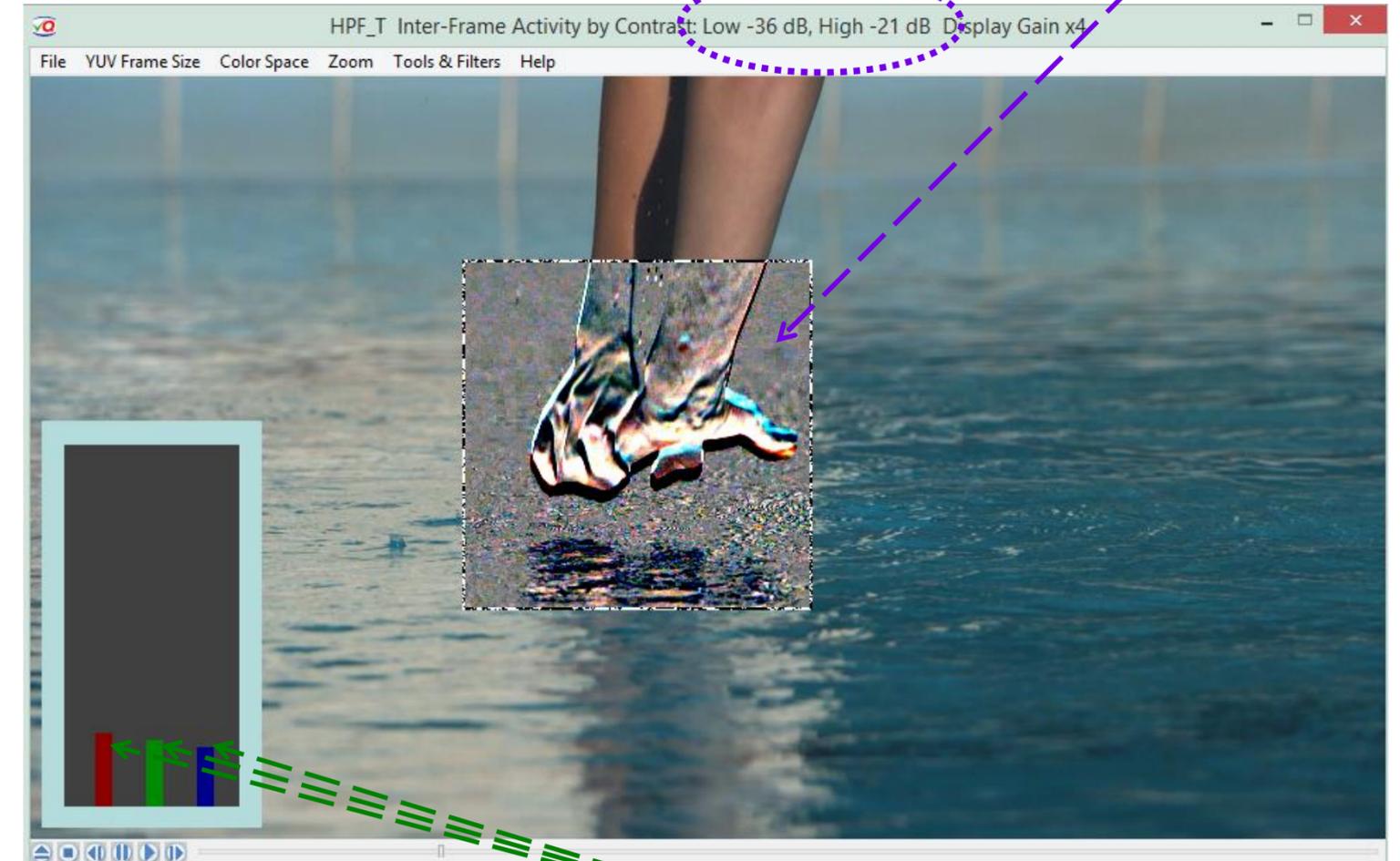


Intra-Frame Activity  
BarGraph Display



Inter-Frame Activity  
Readout in dB

Inter-Frame Activity  
Image



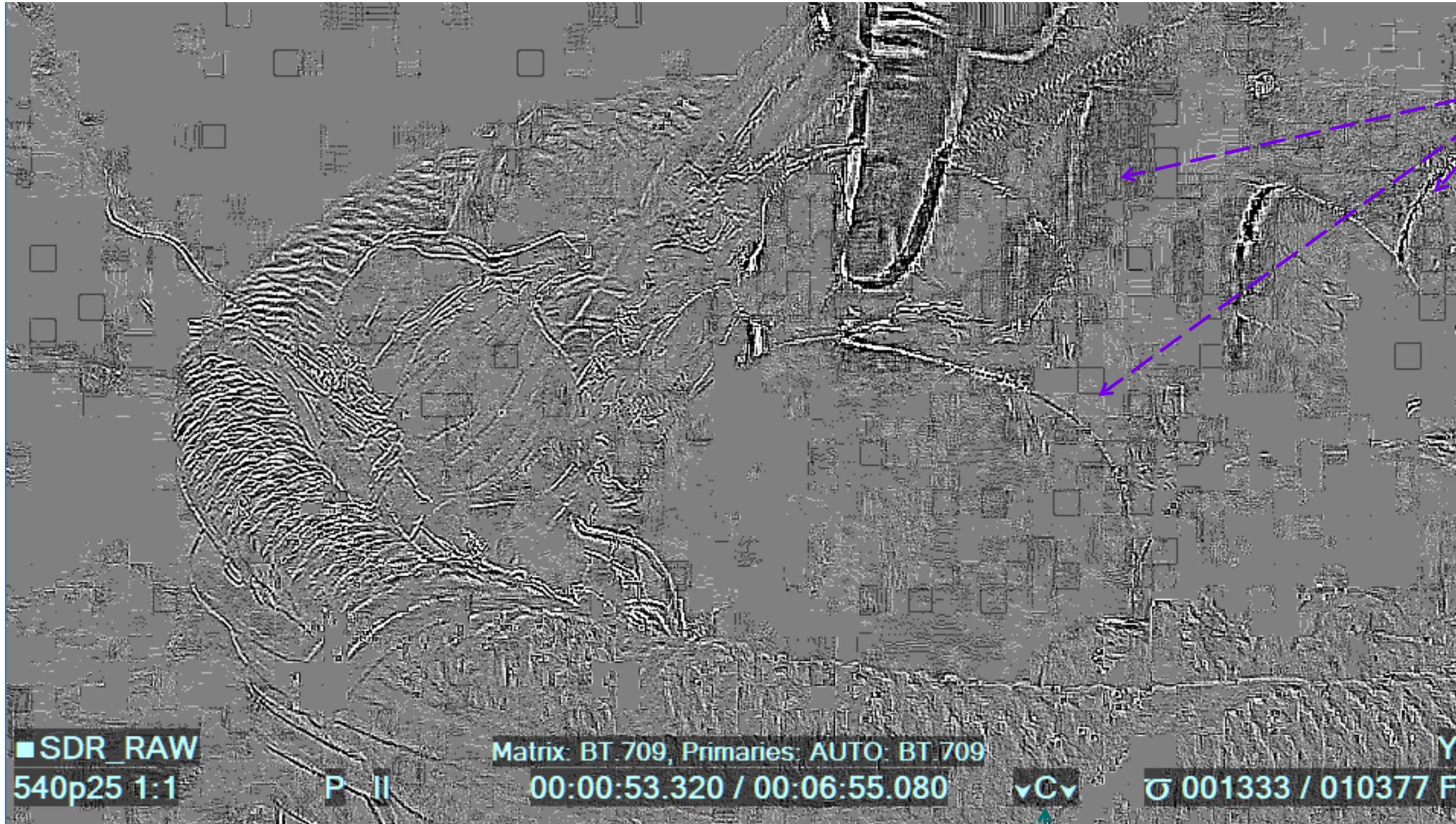
Inter-Frame Activity  
BarGraph Display

Press **Shift + X**, and/or **Shift + T** to control spatial and temporal filtering

# 6.7 Compression Artifacts Filter

Press **Shift + C** to toggle this filter On/Off

Compression artifacts are clearly visible



Press **Shift + F** to disable the filter and see normal picture:



Filter is ON

# 7. Full List of VQV Shortcuts 1 (p 1/3)



**'Videola'** – Jog & Shuttle Timeline Navigation Tool: **Ctrl + Mouse Left Button + Cursor Horizontal Position** within Image Area  
 Cursor position controls the speed selection; preset timeline step values: **+/- 0, 1, 2, 5, 10 F, 1, 2, 5, 10, 20 s, 1 m (60 s)**  
 In Jog Mode (i.e. starting from pause) – **Seek with variable speed**. On release of Mouse Left Button or Ctrl key – pause at last shown frame;  
 In Shuttle Mode (during playout) – **Play with variable speed**. On release of Mouse Left Button or Ctrl key – continue playout at last selected speed.  
 Select fractional playout speeds (slow motion) with **Mouse Wheel or Left/Right Arrows: +/- 0.1, 0.2 and 0.5** of media file frame rate

Key	Result	Shift + Key	Ctrl + Key	Ctrl + Shift + Key
<b>Mouse Wheel</b>	Jog Mode: <b>+/- 1 frame</b> , Shuttle Mode: <b>Speed</b> up/down,	Display <b>Gain</b> : up/down		Display Gain Filter Brightness <b>Offset</b> : up/down
<b>Mouse Move</b>	In Active Image: <b>Pixel Value</b> readout, In Mask Area: <b>Masked Filter</b> readout			
<b>Mouse Middle Button</b>	<b>Jog/Shuttle</b> toggle			
<b>Mouse Left Button + Mouse Move</b>	In Active Image: <b>Image Position</b> In Mask Area: <b>Mask Position</b>	Click in the image area: <b>Start/Stop playout</b> , speed: <b>+1F</b>	Hold and move the slider: <b>Timeline Scroll</b>	Click in the image area: <b>Continue playout</b> , reset speed: <b>+1F</b>
<b>M + Mouse Wheel</b>	<b>Mask Size</b> up/down			
<b>Z + Mouse Wheel</b>	<b>Zoom</b> up/down ( <i>cursor centered</i> )			
<b>Mouse Right Button</b>	In Active Image: <b>Context Menu</b>			
<b>Up/Down Arrows</b>	<b>Zoom</b> up/down ( <i>image centered</i> )	Display <b>Gain</b> : up/down	<b>VQV</b> to/from <b>VQMP</b> message	Display Gain <b>Slicing Level</b> up/down
<b>Right/Left Arrows</b>	Jog Mode: <b>+/- 1 frame</b> , Shuttle Mode: <b>Speed control</b>	Jog Mode: <b>+/- 10 frames</b>	In Jog Mode: <b>Seek, variable speed</b>	
<b>PageDown/PageUp</b>	Jog Mode: <b>+/- 1 s</b>	Jog Mode: <b>+/- 10 s</b>	Jog Mode: <b>+/- 1 m</b>	Jog Mode: <b>+/- 10 m</b>
<b>0</b>	<b>SDR RAW</b>	<b>Clear all Bookmarks</b>	<b>Segments Info</b> On/Off	
<b>1</b>	<b>HDR-PQ RAW</b>	<b>Record Bookmark #1</b>	<b>Go to Bookmark #1</b>	
<b>2</b>	<b>HDR-PQ ⇒ SDR, Max 1000 nt</b>	<b>Record Bookmark #2</b>	<b>Go to Bookmark #2</b>	
<b>3</b>	<b>HDR-HLG RAW</b>	<b>Record Bookmark #3</b>	<b>Go to Bookmark #3</b>	
<b>4</b>	<b>HDR-HLG ⇒ SDR, Max 100% LL</b>	<b>Record Bookmark #4</b>	<b>Go to Bookmark #4</b>	

# 7. Full List of VQV Shortcuts 2 (p 2/3)



Key	Result	Shift + Key	Ctrl + Key	Ctrl + Shift + Key
<b>5</b>	HDR-LOG RAW	Record Bookmark #5	Go to Bookmark #5	
<b>6</b>	HDR-LOG ⇒ HLG Compatible SDR	Record Bookmark #6	Go to Bookmark #6	
<b>7</b>	HDR-LOG ⇒ SDR	Record Bookmark #7	Go to Bookmark #7	
<b>8</b>	MSB / LSB Image toggle (if media file > 8 bit)	Record Bookmark #8	Go to Bookmark #8	
<b>9</b>	Full / Narrow YUV Range toggle (RGB <> YUV conversion mode)	Record Bookmark #9	Go to Bookmark #9	
<b>Space Bar</b>	Jog / Shuttle toggle (same as Play Button)	Jog / Shuttle toggle speed reset to default +1F		
<b>A</b>	Auto-select Primaries for: - Color Gamut Converter - ChromaScope	Active Image Size Markers Show / Hide toggle	Active Image Size Meter (Black Bars Detector): Detect once & store results; also enables Active Image Area Analysis Mode	Analyzed Area toggle: <b>Active Image / Full Frame</b>  Applies to most meters; Active Image Size Meter results are not affected
<b>B</b>	Bookmark current Timeline Position and copy it to Clipboard	B component Image (Blue)	Go to the last used Bookmark	Create the Bookmark from Clipboard data
<b>C</b>	C-Bar (Compression Analyzer) toggle On/Off	ChromaScope Primaries	ChromaScope On/Off	
<b>D</b>	All Filters Off, same result as ESC key: <i>settings reset to defaults</i>	- Fast Draw Mode (FDM) - Aspect Ratio Correction (ARC)	Duplicate currently opened file in new VQV window	
<b>E</b>	Enhanced Rendering Mode On/Off, Color Vector Correlation™ (CVC) processing		AV Sync Error Meter (on MPC Test Pattern)	
<b>F</b>	Frame Profile Waveform Filtering Modes,	All Filters On/Off (settings preserved)	Frame Info Report pop-up, or Line Range Selection Mask	
<b>G</b>	Gamut Conversion On/Off	G component Image (Green)		
<b>H</b>	Histogram Overlay toggle On/Off	RGB / Light Levels Histogram toggle	Histogram Mode toggle	HDR10+ Analyzer On/Off, also enables L-Bar

# 7. Full List of VQV Shortcuts 3 (p 3/3)



Key	Result	Shift + Key	Ctrl + Key	Ctrl + Shift + Key
I	Cycle thru 3 <b>Deinterlacing Modes</b>			
L	<b>L-Bar</b> toggle On/Off	<b>Light Levels</b> (MaxRGB) Image, <b>S</b> : Highlighter / Heat-Map	<b>Transfer Function</b> Plot: On/Off	
M	WFM <b>Mask</b> toggle: Full Frame/Line Select, <b>Mask Size</b> control, ChromaScope <b>Modes</b>	Filters <b>Mask</b> On/Off	<b>Media Info</b> Report pop-up or WFM <b>Mask</b> Controls	
N	<b>Navigation</b> Control Panel pop-up (Go to Timeline Position & Bookmarks)	<b>Noise</b> Meter toggle On/Off	File Open in <b>New</b> Window	
O			File <b>Open</b> Dialog	
P	ChromaScope & WFM <b>Persistence</b>	Select <b>Primaries</b> for: - Color Gamut Converter - ChromaScope	<b>Print</b> analysis data to: <i>VQV.Log, VQV_Statistics.TXT, etc.</i>	
Q			<b>Quit</b> (Exit) VQV	
R		<b>R</b> component Image ( <b>Red</b> )	<b>Release / Reopen</b> media file <i>same as 'Eject' button</i>	
S	<b>Switch / Start / Select</b> Text Messages / Display Modes		Select <b>Video Stream #</b> <i>if the number of video streams &gt; 1</i>	
T	<b>Text Overlay Messages</b> On/Off	<b>T-Filter</b> (Temporal High Pass)	<b>Text Overlay Auto-hide</b> On/Off	
U	Histogram, WFM, FrameScope and ChromaScope <b>Units</b> selection	<b>UV</b> components Image	Graticule Grid <b>Units</b> toggle: <b>RGB %</b> vs. <b>Light Level %</b> or <b>nits</b>	
V	<b>VV-Bars</b> toggle On/Off	Cycle thru 3 <b>VV Bars Modes</b>	<b>VectorScope</b> toggle On/Off	
W	<b>FrameScope</b> On/Off		<b>Waveform Monitor</b> On/Off	
X		<b>XY-Filter</b> (Spatial HPF/LPF)	<b>Exit</b> (Quit) VQV	
Y	Waveform Monitor: <b>RGB/YUV</b> toggle	<b>Y</b> components Image		
Z	<b>Zoom</b> with <b>Mouse Wheel</b> – see above			

# 8. About VideoQ



## Customers & Partners



## Company History



- Founded in 2005
- Formed by an Engineering Awards winning team sharing between them decades of global video technology.
- VideoQ is a renown player in calibration and benchmarking of Video Processors, Transcoders and Displays, providing tools and technologies instantly revealing artifacts, problems and deficiencies, thus raising the bar in productivity and video quality experience.
- VideoQ products and services cover all aspects of video processing and quality assurance - from visual picture quality estimation and quality control to fully automated processing, utilizing advanced VideoQ algorithms and robotic video quality analyzers, including latest UHD and HDR developments.

## Operations

- Headquarters in CA, USA
- Software developers in Silicon Valley and worldwide
- Distributors and partners in several countries
- Sales & support offices in USA, UK