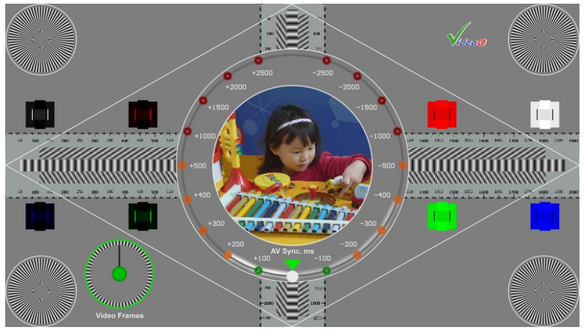

VideoQ Test Patterns Library

Test Patterns Suite

VQMPC

VideoQ Multi-Purpose Charts

Training Presentation

September 2025

VQMPC

videoq.com

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1. General Info

The **most popular** VideoQ test pattern used by the renown industry leaders:

- Major **R&D labs** uses SDR and HDR versions of this test for processing chain **performance validation** and **product verification**

- The **most valuable US media company** uses dynamic VQMPC test for instant **CDN/OTT quality estimation**

- **VQMPC UHD version** was used at **Olympic Games** for international broadcast **system setup** & **configuration spot checks** since 2018

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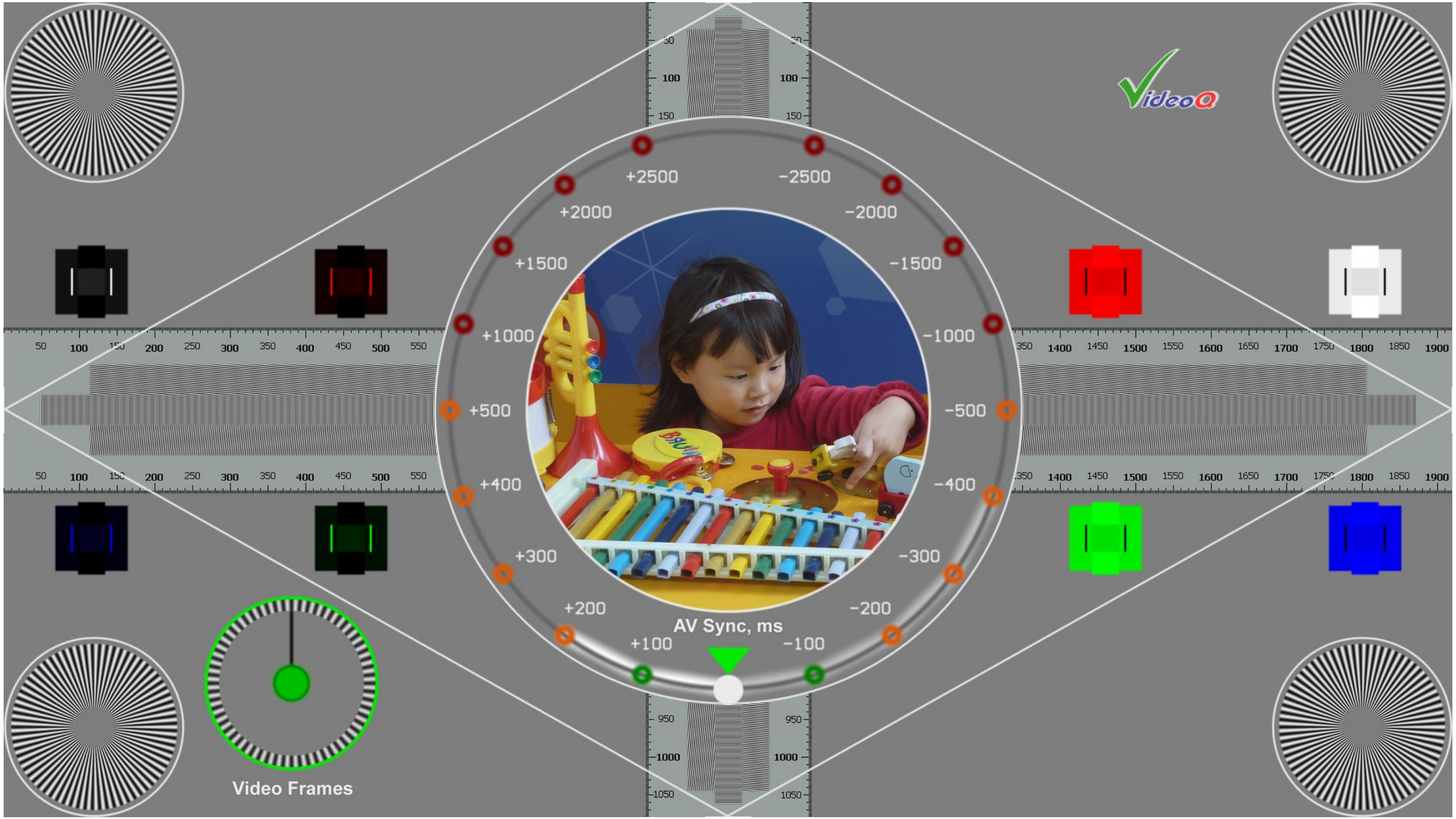
2. VQMPC – Dynamic Test with AV Sync Components



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3. VQMPC Test Composition

Four **Corner Radial Plates**
aimed at testing
Geometry & Sharpness

Vertical Ruler,
Vertical Frequency Bursts

AV Sync Error Circular Graticule
Coarse +/-3000 ms scale: *"red" range*

Fine +/- 500 ms scale:
"green-and-brown" range,

Reserved
for customer logo
and/or
text message

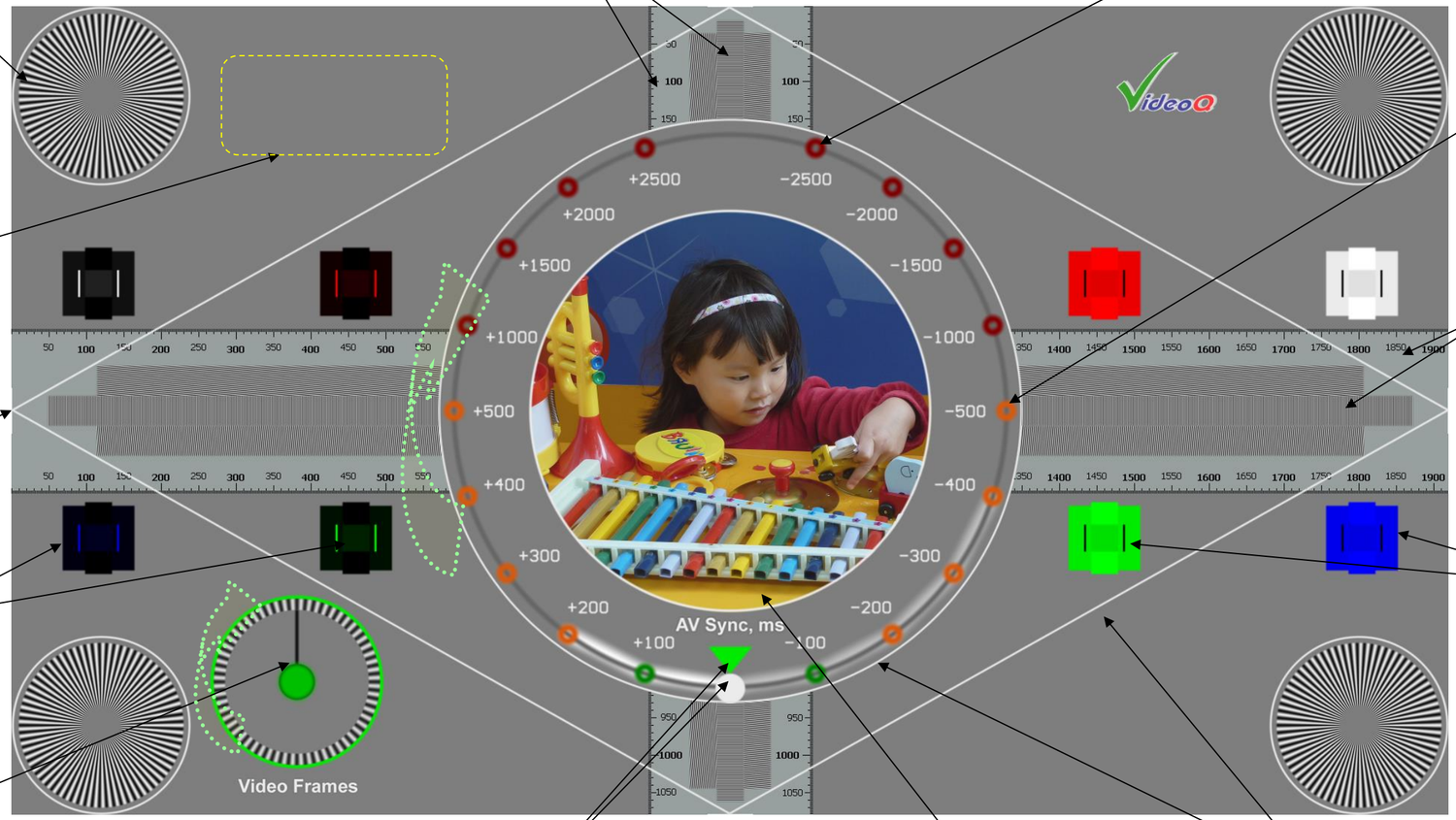
Horizontal Ruler,
Horizontal Frequency Bursts

Four H & V
Edge Markers
line width = 1 pixel

Four Tri-level
PLUGE boxes
aimed at testing
YRGB min levels

Four Tri-level
PLUGE boxes
aimed at testing
YRGB max levels

Frames Counter
Video Continuity Test



AV Sync Test:
Orbiting White Ball (2 speeds).
If "Bop" sound starts with the Ball in the "green" zone
(green marker flashing)
then AVS error is within +/- 100 ms

Central Photo 0.5*H Insert
aimed at checking **Color Rendition**

0.7*H **Circle and Diamond** Lines
aimed at testing picture **Geometry**

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4. Features

Multi-purpose, multi-resolution, multi-format test pattern to check at glance:

- **Geometry**: Aspect Ratio, Overscan and "Ultra-wide Mode" effects of the display
- **Scaling Quality** or proof of no-scaling, especially in case of DHCP/DRM conflict in STB/OTT
- **Colors**: PLUGEs x8 for display setup and Photo Insert for general quality evaluation
- **Dynamic Range Modes**: SDR, HDR-PQ and HDR-HLG versions,
  see separate Presentation for HDR Test Patterns suite
- **2D Frequency Response** and **Sharpness Correction** settings
- **Frames Continuity**, e.g. codec freeze-skip, 3:2 pull-down, frame rate conversion
- **De-interlacing Performance**: artifacts are especially noticeable on moving white circle component
- **AV Sync Errors** (6000/6006ms loop): coarse range +/-3000ms and fine range +/-500ms
- **Option** of **automatic Audio Gain & AV Sync Errors measurement** via VideoQ software tools

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5. Applications

Picture quality control and calibration tool for general public, video installers, hardware and software developers, video development labs, production, post-production and content distribution facilities in the fields of:

- Broadcast HD & UDH TV
- Consumer Electronics
- Video Transcoding
- Video Data Compression
- Digital Cinema
- Mobile TV
- IPTV, CDN, Cloud video processing and transcoding

VQMPC test patterns are equally suitable as QA/QC tool for:

- Direct audio-visual quality estimation by eyes and ears
- Semi-automatic and fully automated AV levels and AV sync measurement using VideoQ software tools

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6. Formats

Set of test pattern video and audio files:

- Raw formats: .YUV, planar 4:4:4, 10bit, .WAV: 2.0 LR or 5.1 surround sound, 48kHz, 24bit
- Encoded format: .MP4, 4:2:2 or 4:2:0, 8, 10 or 12bit, fixed GOP size = 1s, medium to high bitrate
- 6 frame sizes, various frame rates and interlace formats:

  720x480p (**SD 4:3**), 23.976, 24.0, 29.97, 30.0, 59.94, and 60.0fps

  720x480i (**SD 4:3**), 29.97fps (i29.97 aka 59.94i)

  720x576p (**SD 4:3**), 25, 50fps

  720x576i (**SD 4:3**), 25 fps (i25 aka 50i)

  1280x720p (**Sub-HD 16:9**), 50, 59.94 and 60.0fps

  1920x1080p (**HD 16:9**), **Special** “consumer camera” YUVJ levels and fps: 47.952, 48.0fps

  1920x1080p (**HD 16:9**), 23.976, 24.0, 25.0, 29.97, 30.0, 50.0, 59.94, and 60.0fps

  1920x1080i (**HD 16:9**), 25.0 fps (i25 aka 50i), 29.97 fps (i29.97 aka 59.94i),

  3840x2160p (**4K UHD** 16:9), 23.976, 24.0, 25.0, 29.97, 30.0, 50.0, 59.94, and 60.0fps

  7680x4320p (**8K UHD** 16:9), 23.976, 24.0, 25.0, 29.97, 30.0, 50.0, 59.94, and 60.0fps

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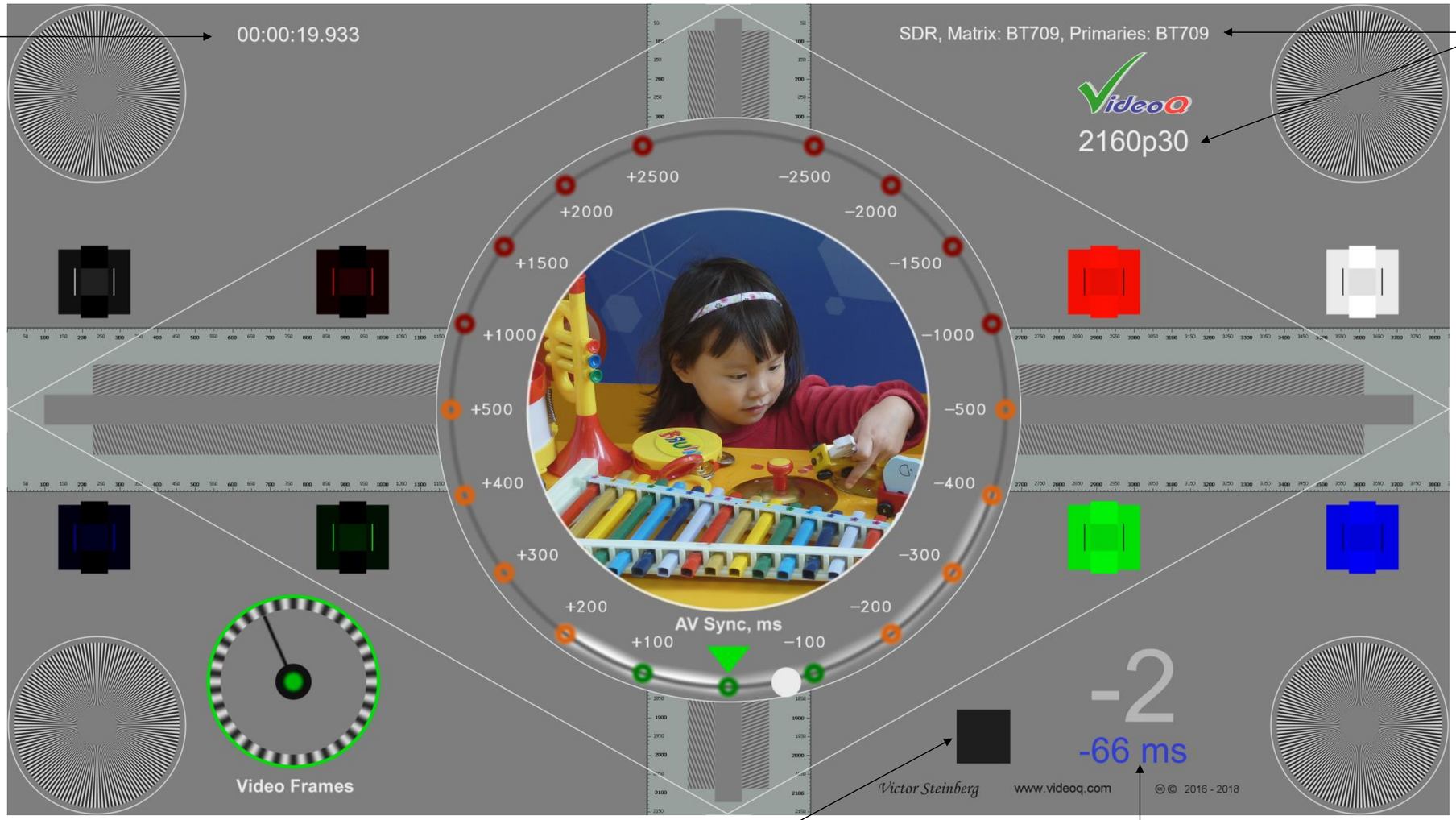
7. Optional Video Format and AV Sync Text Messages



Original Time Code

Original Video Format

Black AV Sync Reference Marker flashing White @0ms for 200ms

Timeline distance wrt AV Sync Reference Position, In video frames & milliseconds

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8. AV Sync Test Audio Component

Loop duration: 6000ms (6006ms for 23.976, 29.97 and 59.94fps)

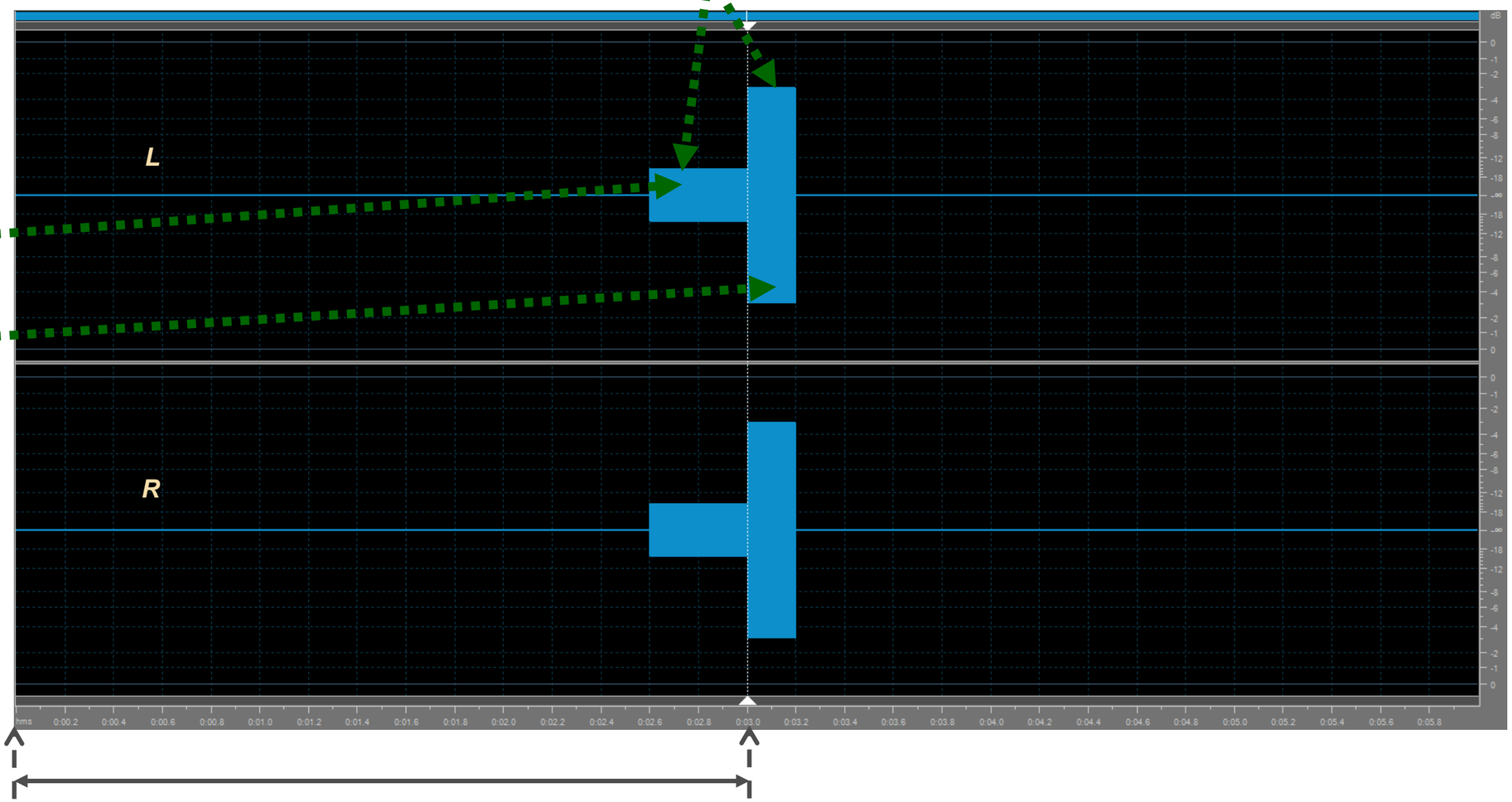
AV Sync Reference: Beep-bop burst

Beep:

-14dBfs, 1250Hz, 400ms

Bop:

-3dBfs, 1000Hz, 200ms



AV Sync Reference Position = 3000ms (3003ms for 23.976, 29.97 and 59.94fps)

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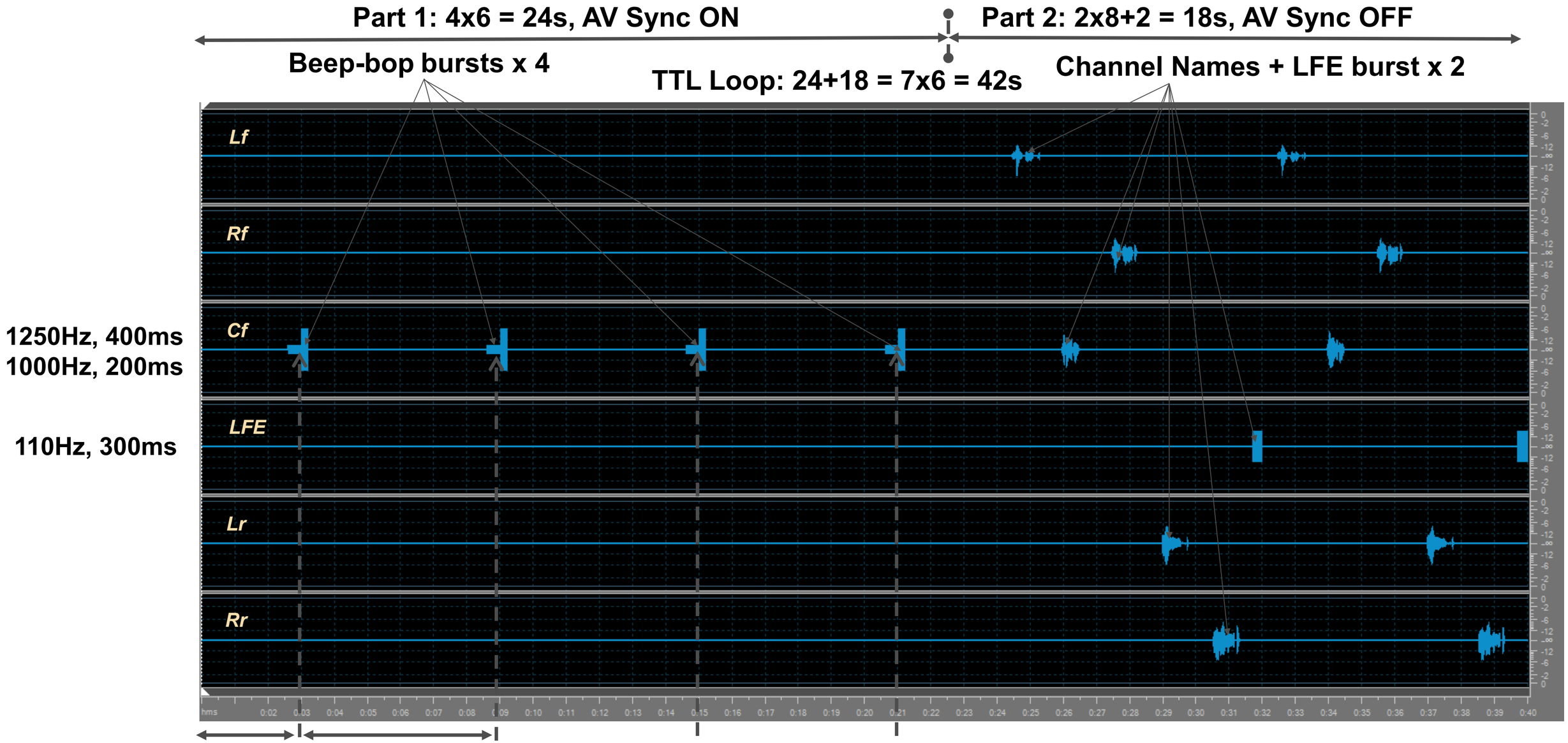
9. Audio Component – Surround Sound 5.1 Variant



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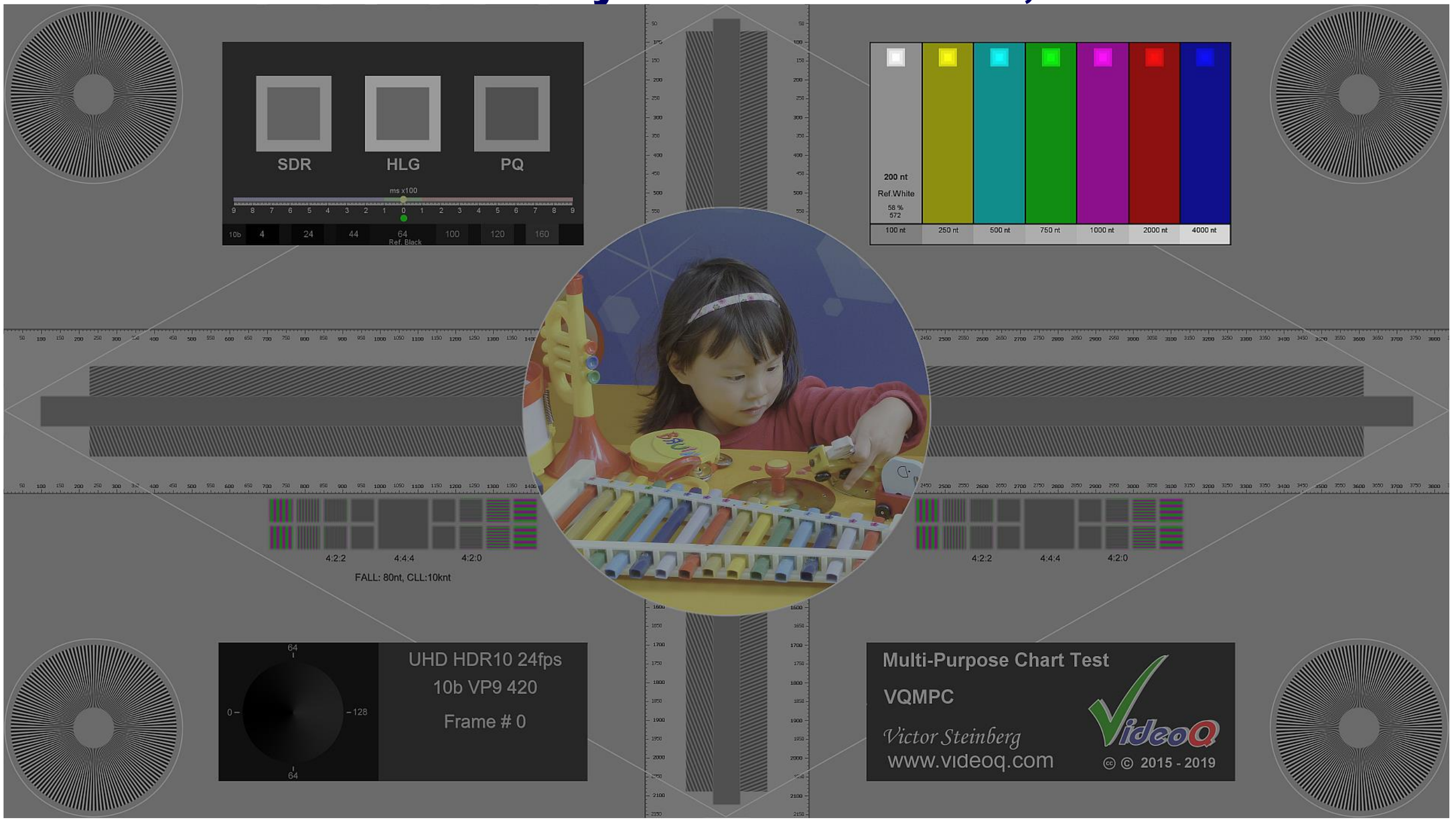
10. VQMPC-PQ – Dynamic HDR Test, PQ version



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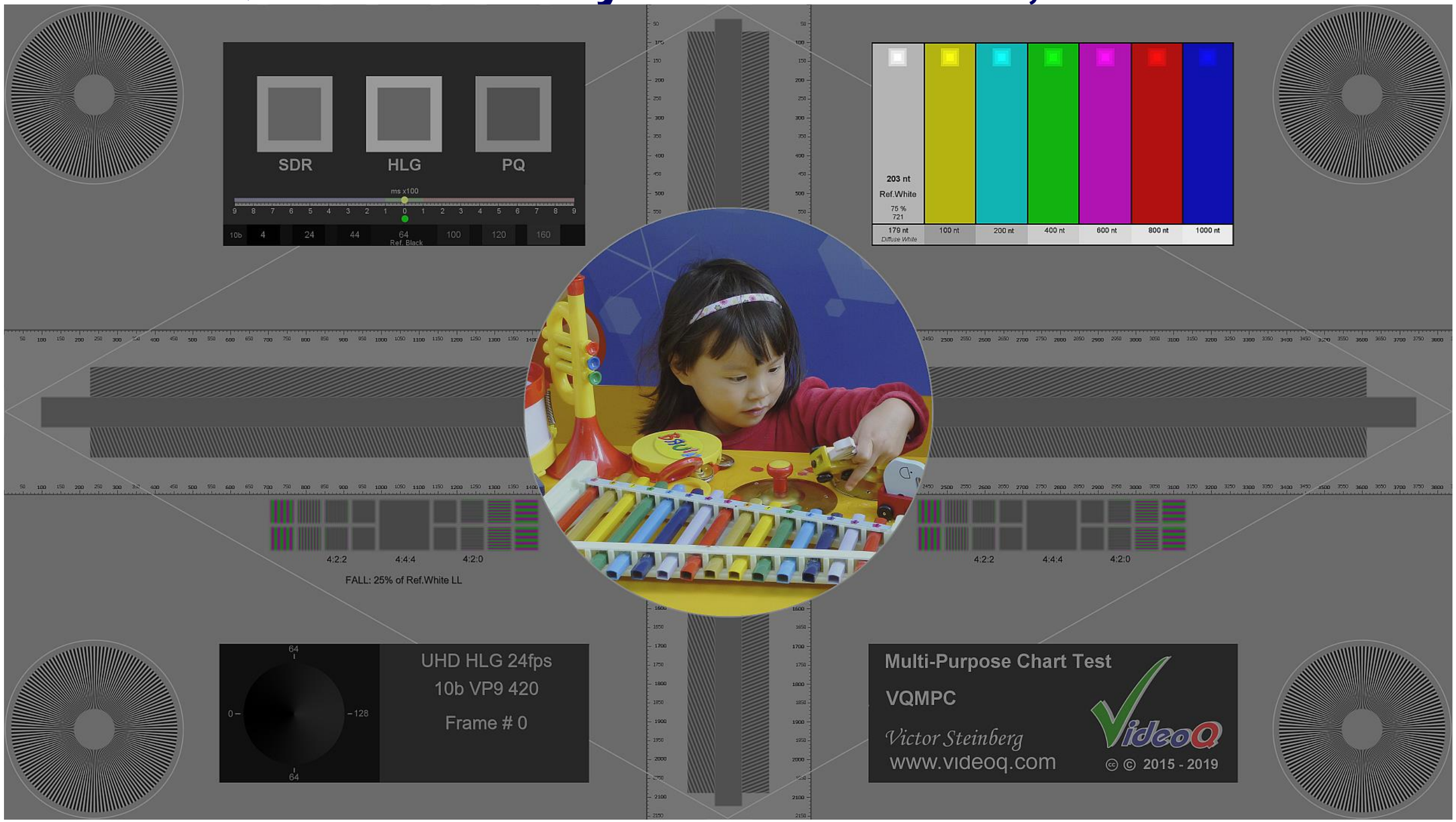
11. VQMPC-HLG – Dynamic HDR Test, HLG version



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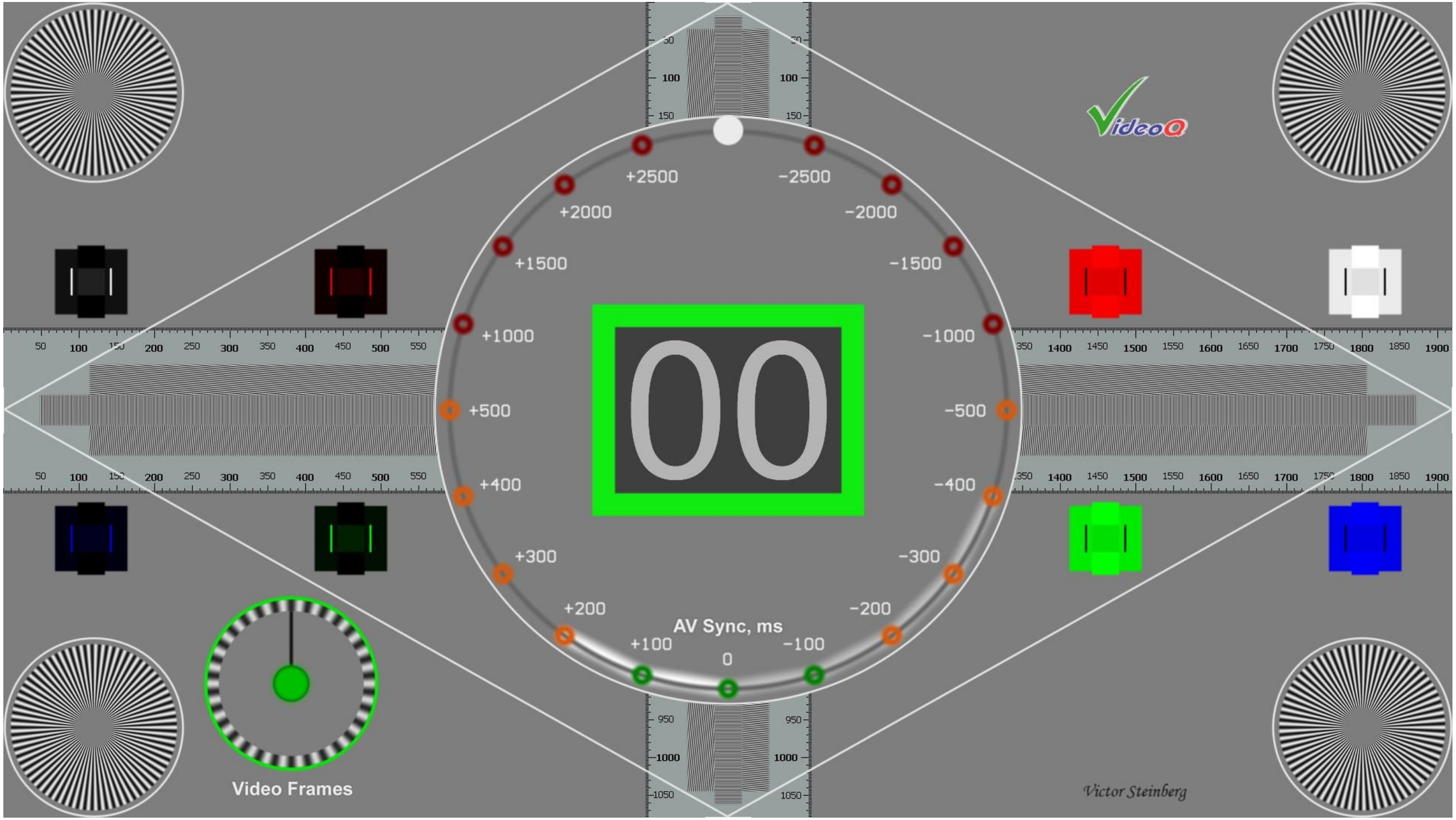
12. VQMPC-C – Variant with Frames Counter Component



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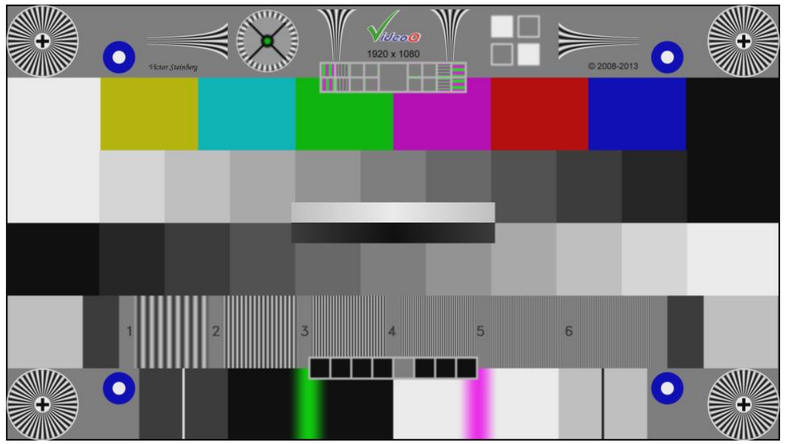
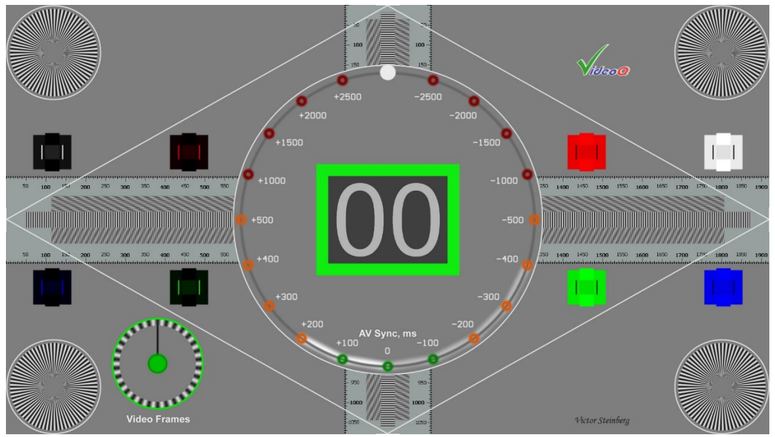
13. VQMPC-E Variant

Enhanced 8s long dynamic test, more suitable for repetitive lab testing, especially if transcoding is involved. Test patterns sequence consists of three segments:

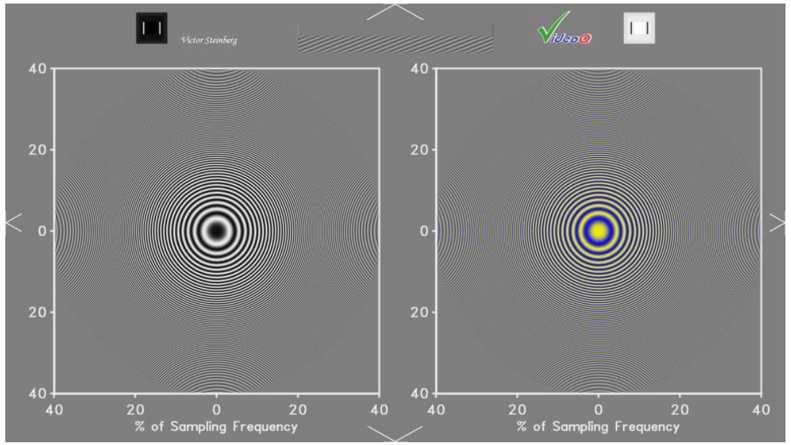
- 1s long **VQMA4** matrix test at the beginning, for ***fully automated video image quality analysis,*** VideoQ **VQMA** Software Analyzer recommended,
- then 6s long regular **VQMPC-C** test, for ***audio-visual estimation***,
- then 1s long **FZP** (Large Flashing Zone Plates) test, revealing ***scaling & compression artifacts***, VideoQ **VQV** Software Viewer/Analyzer recommended.



0s ...1s: VQMA4



1s … 7s: VQMPC-C



7s … 8s: FZP

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14. Order Options

Choice of:

- Standard 6s long **VQMPC (**aka VQMPC-P, with photo insert)
- Standard 6s long **VQMPC-C** (C = frame counter, replacing the photo insert)
- Enhanced 8s long **VQMPC-E**
  with VQMA matrix test pattern during the first second and flashing Zone Plates during the last second

Available on request:

- Alternative video formats (e.g. raw planar .YUV, .Y4M with header, wrapped .AVI or .MP4), alternative frame sizes and/or frame rates
- Insertion of customer logo and/or special text messages
- Central photo insert is customizable, i.e. it can be replaced by:
  - Alternative static picture (customer choice)
  - Radial plate test component
  - Large frame counter digital display

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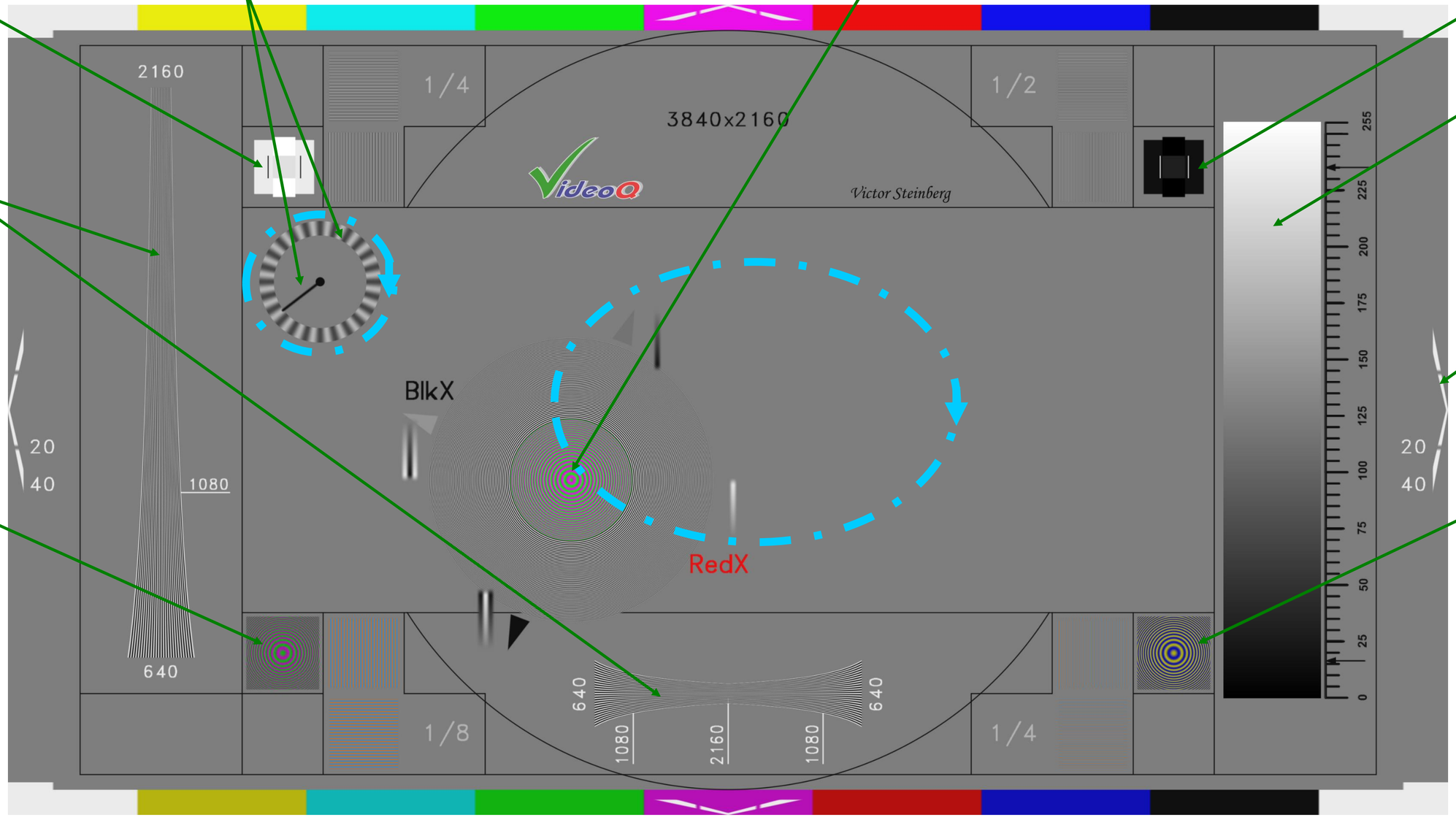
15. VQMPC-ZTUHD – Moving Zone Plate Sprite Test



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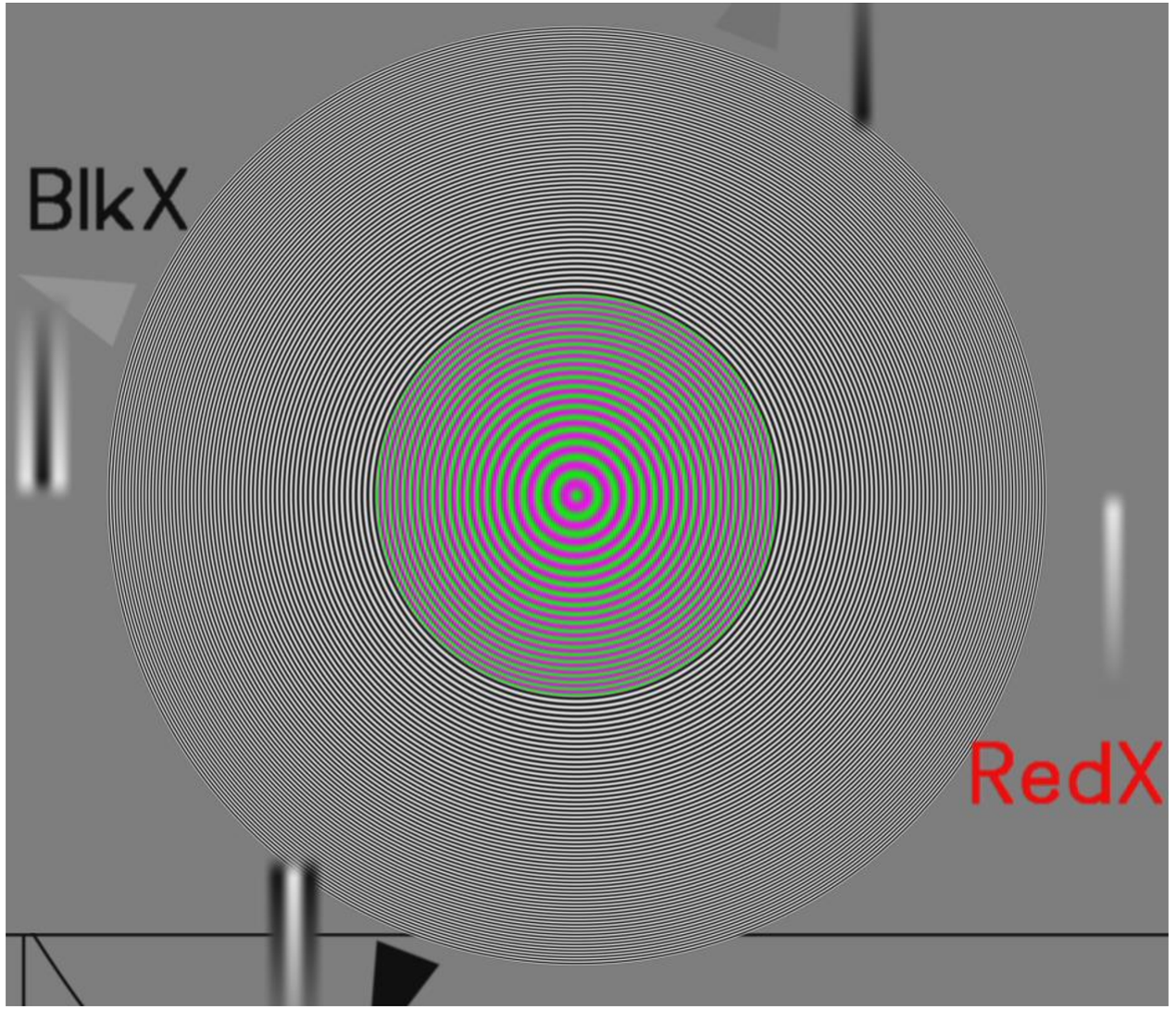
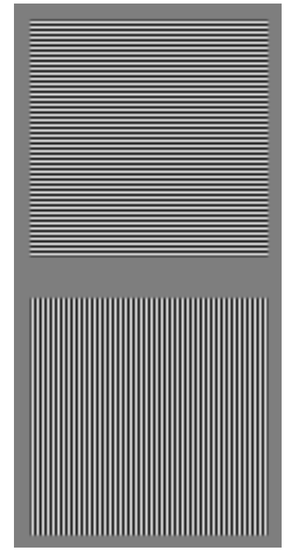
16. VQMPC-ZTUHD Zoomed-in Areas

V Wedge Top

Moving Sprite: Y & UV Zone Plates

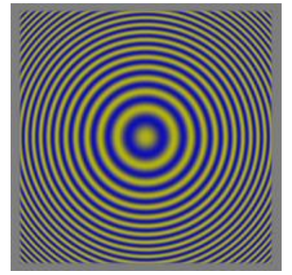


Fs/4 Bursts



H Wedge Left End

Blue-Yellow Zone Plate



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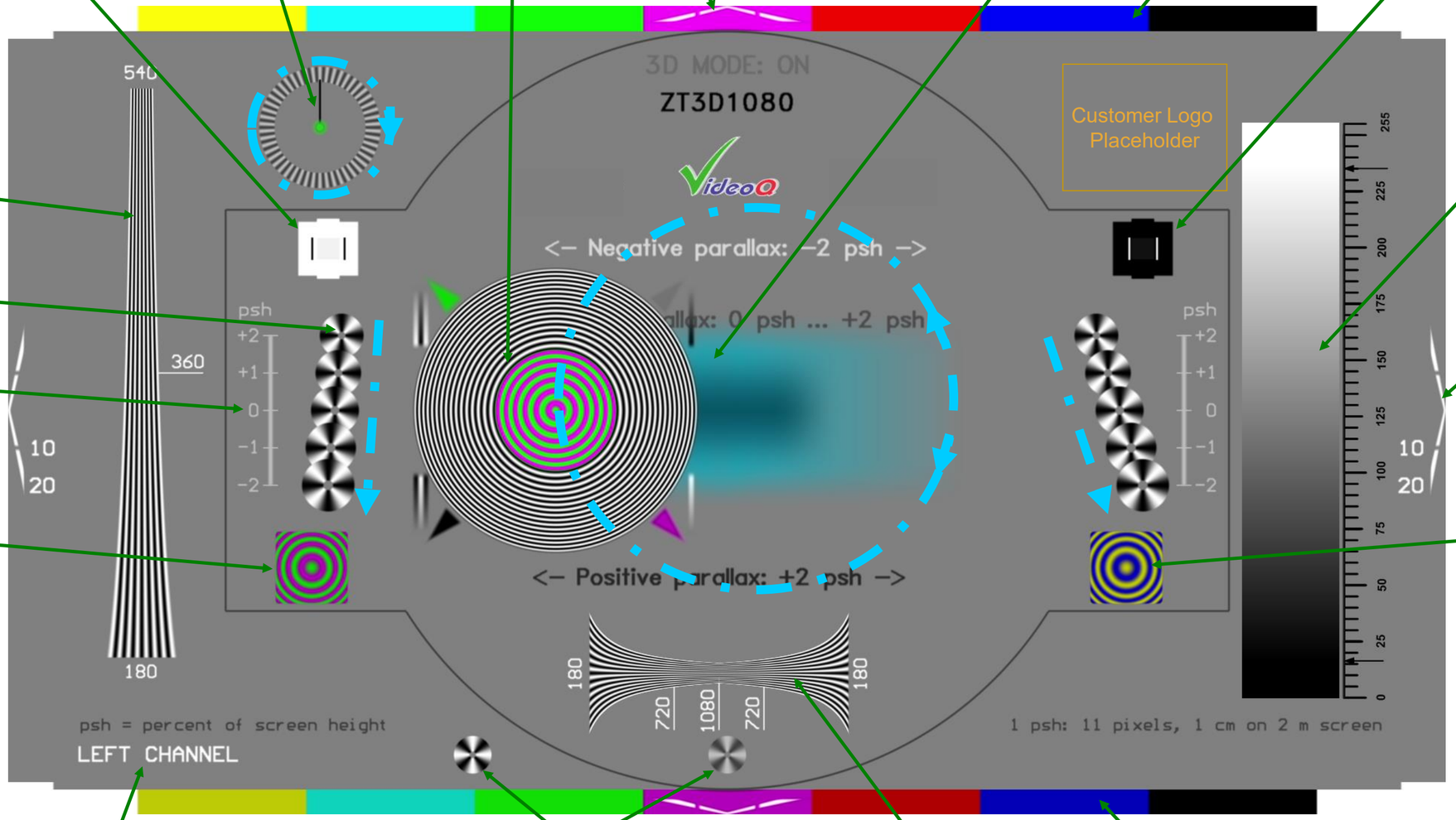
17. VQMPC-ZT3D – Dynamic 3D Zone Plate Test



Tri-band White PLUGE @ -2psh

Timing Indicator
Frames Count Clock

Moving Sprite
Y & UV Zone Plates

V Crop Markers

Variable Depth "Water pool"

100% Color Bars

Tri-band Black PLUGE @ -2psh

H resolution Wedge
tvl @ 0psh

Moving
Depth Position
Indicators

Depth Scale
in psh

Green-Magenta
Zone Plate
@ +2psh

0-255
Grayscale

H Crop
Markers

Blue-Yellow
Zone Plate
@ + 2 psh

Channel ID text

Flashing Channel ID Indicators

V resolution Wedge
tvl @+2 psh

75% Color Bars

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18. VQMPC-ZT3D Test Pattern Features

Multi-purpose Dynamic Test Pattern consisting of:

1. Mid-gray background with explanatory texts and markers
2. Traditional (2D) geometry, levels and resolution test pattern components
3. Special 3D components aimed at visualization and calibration of positive and negative parallaxes,
   *parallax values expressed in **psh** = percents of picture height*
4. Moving Zone Plate Sprite changing parallax on-the-fly, goes in front and behind the background plane
5. Two sets of Depth Position Markers: -2, -1, 0, +1, +2psh
6. Channel ID Indicators (alternating polarities radial plates) aimed at LR crosstalk testing and LR frames continuity checks
7. Rotating clock indicates current frame count from test clip start, also flashes green twice per second

VQZT3D test pattern data are available in various multi-frame formats:
- Dual: L & R separate files
- Side-by-side: L & R combined, single file, half horizontal resolution, double width, full horizontal resolution
- Top-bottom: L & R combined, single file, half vertical resolution, double height, full vertical resolution

There are three variants for three different frame rates: 24, 50 and 60 fps, *other frame rates are available on request; zone plate sprite motion speed and general layout may slightly vary*

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19. 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

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A1. Appendix: VQMPC Advanced Analysis Examples

This section provides more details about VQMPC test sessions scenarios, VideoQ software tools usage examples and test patterns features.

The screenshots and measurement results shown in this section are taken from VideoQ **VQMP** – Media Files Player-Analyzer:

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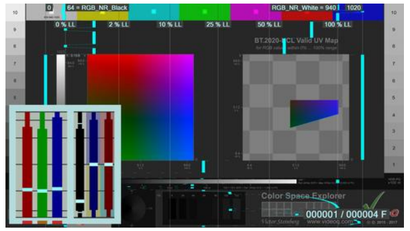
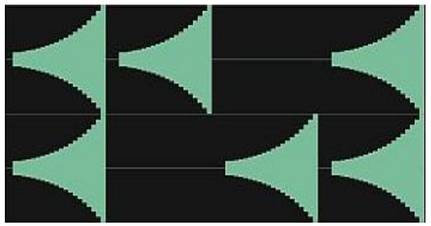
A2. VideoQ Approach to Test Patterns Usage

VideoQ approach combines “classic”, “digital” and “cloud” methodologies, sharing same test patterns and covering all 3 levels of video quality control:

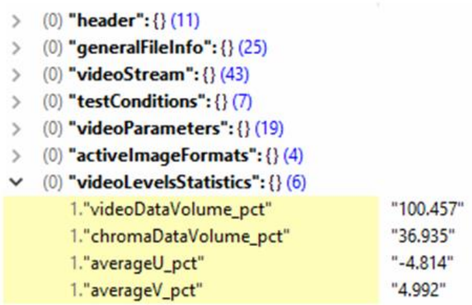
Instant visual-aural quality estimation

Objective measurements of video and audio parameters





Fully automated Quality Control



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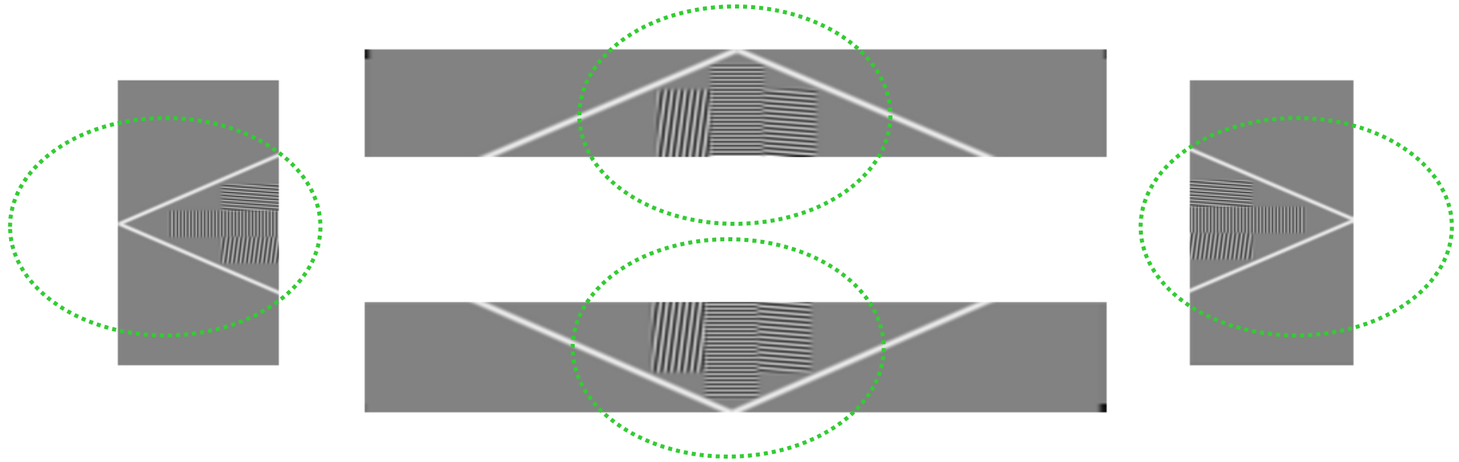
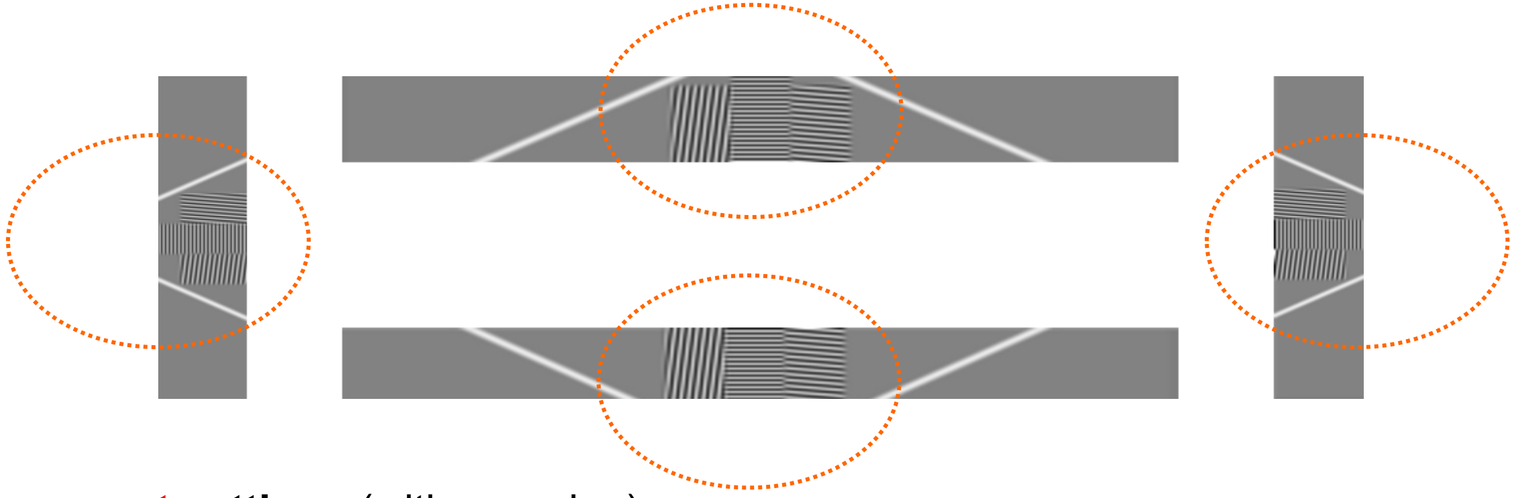
A3. Diamond Pattern and Crop Markers Usage



Example of correct settings (no cropping):
All picture edges are not cropped and single pixel white markers are visible



Example of incorrect settings (with cropping):
Picture edges are cropped

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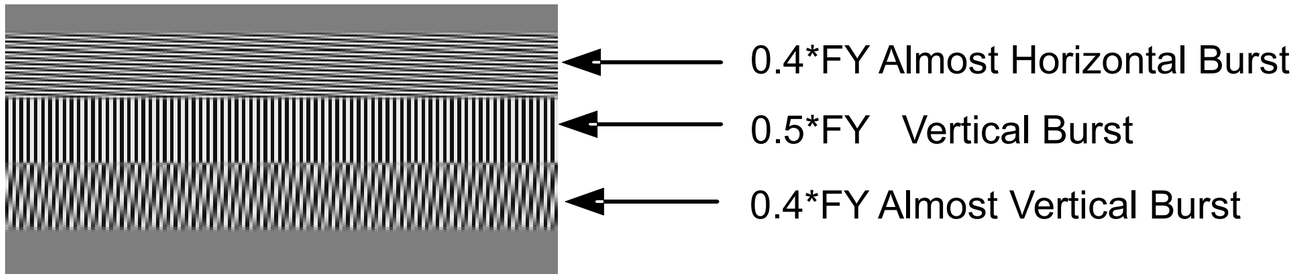
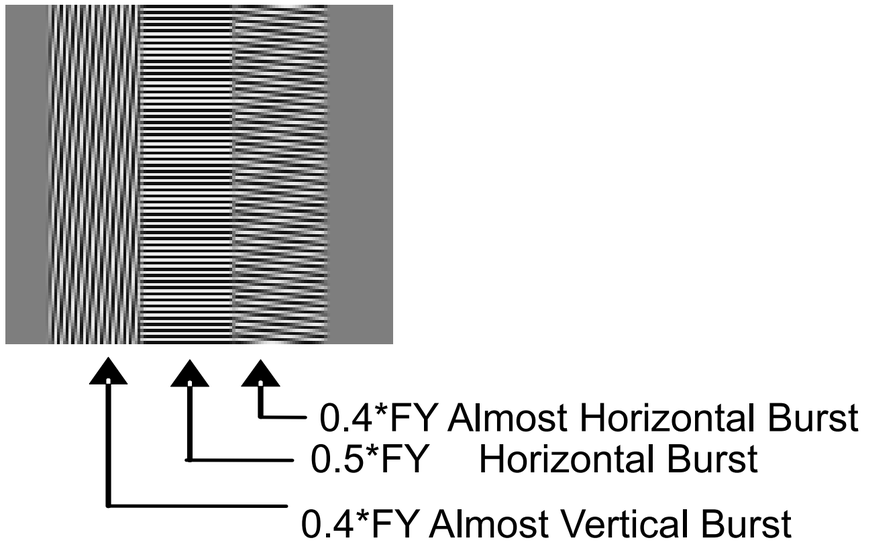
A4. Tri-band Combination Burst Patterns





There are two groups of bursts with frequencies proportional to luma pixels rate FY:
full length horizontal bursts band and **full height vertical** bursts band.
Maximum luminance frequency burst of exactly **0.5 FY** is in the middle of each band.
Two slightly oblique bands of 0.4 FY surrounds the middle burst.

Two **central 0.5 FY sub-bands** are especially sensitive to any errors in **pixel clock**, **mapping** or **scaling**.
Four other sub-bands allow differentiation between horizontal and vertical distortions thru the whole picture area – from left picture edge to the right picture edge and from top to bottom.

Within the burst group **vertical** and **almost vertical** lines test **horizontal frequencies**,
whilst **horizontal** and **almost horizontal** lines test **vertical frequencies**.

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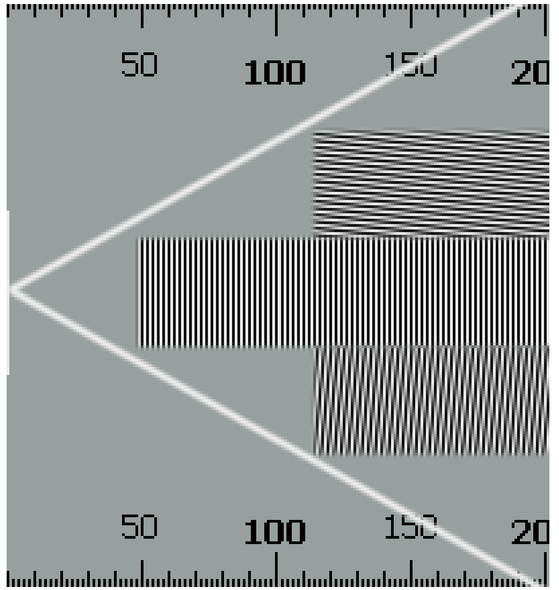
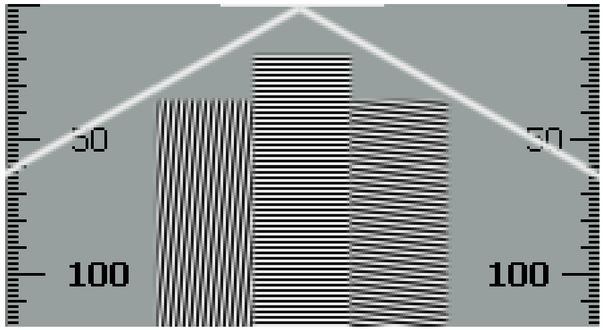
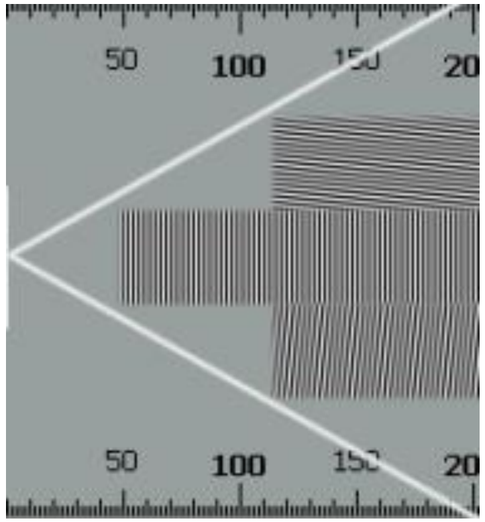
A5. Tri-band Combination Burst Pattern Usage

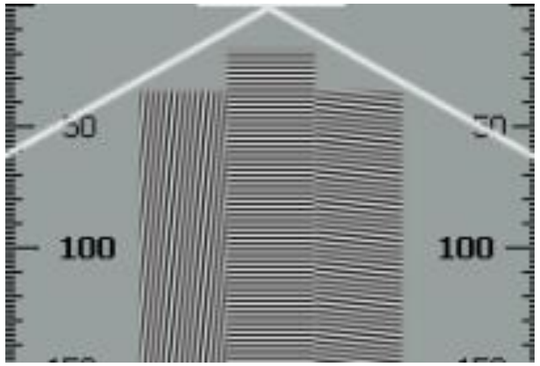
Example of correct settings (no scaling):
There are no visible beat waves on both horizontal and vertical Tri-band Patterns





Example of scaling artifacts:
Scaling causes beat waves on both horizontal and vertical Tri-band Patterns





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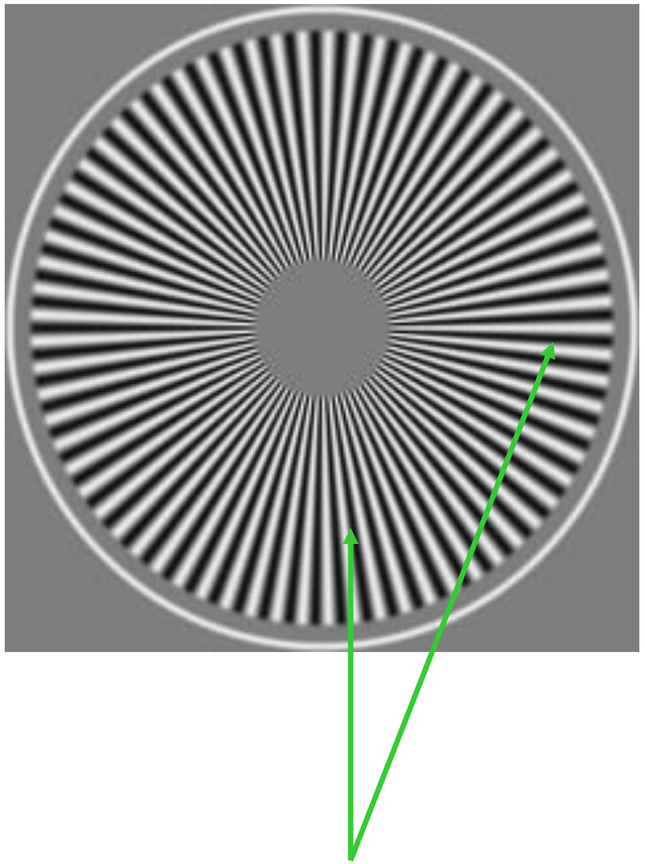
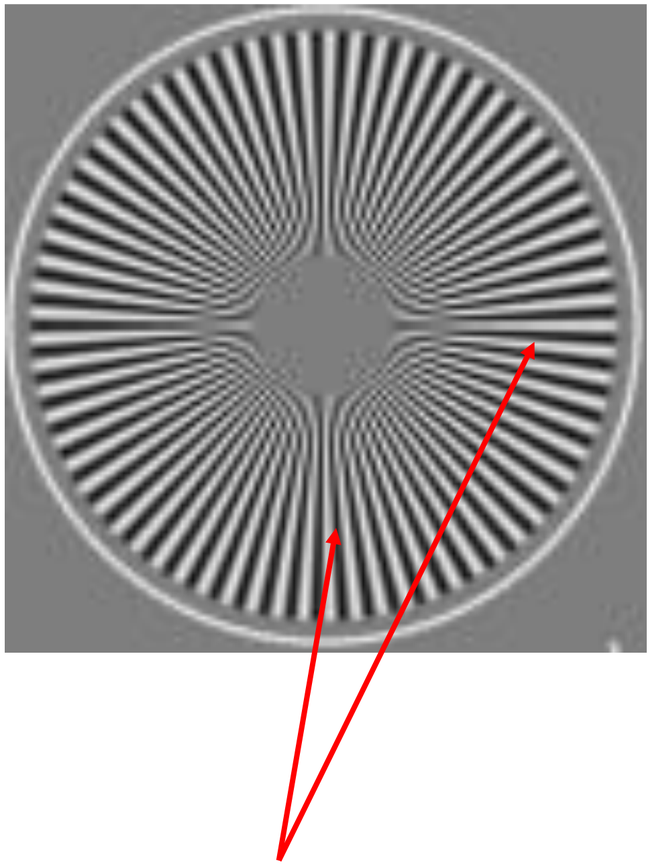
A6. Radial Plates Usage



Original Size – dot-by-dot:
Full contrast of **fine details** in all directions



Scaled (Up or Down) Picture:
Loss and/or distortion of **fine details**

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A7. Black PLUGE & SPLUGE Usage

Fine Tuning (SPLUGE)
optional component

Clipped sector (with no shades of gray) is much more than 180 degrees

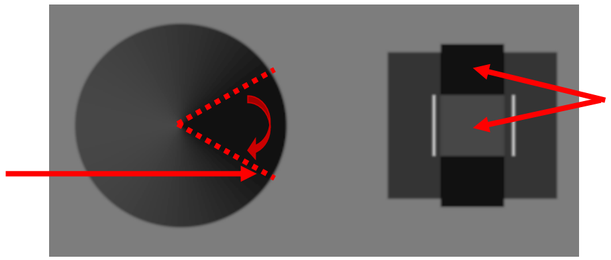
Brightness (Y Offset) is **too low**

Coarse Tuning (PLUGE)

Both central super-black vertical band and central small square are almost the same brightness as big black square

Brightness is **too high**

Clipped sector (with no shades of gray) is much less than 180 degrees



Both central super-black vertical band and central small square are clearly visible

Brightness is **correct**

Conical grayscale is clipped exactly half-circle (180 degrees), no shades of gray on the right half

The super-black vertical band is almost the same brightness as big black square

Central small square is clearly visible

Note that some versions do not contain fine tuning SPLUGE components

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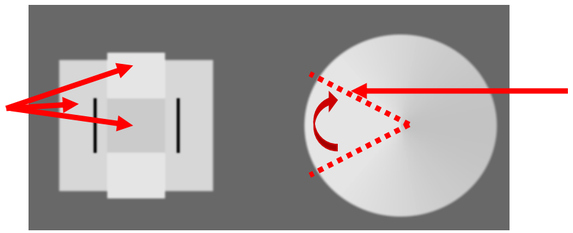
A8. White PLUGE & SPLUGE Usage

Coarse Tuning (PLUGE)

Fine Tuning (SPLUGE)
optional component

Contrast (Gain) is **too low**

Both central super-white vertical band and central small square are clearly visible



Clipped sector (with no shades of gray) is much less than 180 degrees

Contrast is **too high**

Both central super-white vertical band and central small square are almost the same brightness as big white square

Clipped sector (with no shades of gray) is much more than 180 degrees

Contrast is **correct**

The super-white vertical band is almost the same brightness as big white square.
Central small square is clearly visible

Conical grayscale is clipped exactly half-circle (180 degrees), no shades of gray on the left half

Note that some versions do not contain fine tuning SPLUGE components

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A9. Frame Counter Features

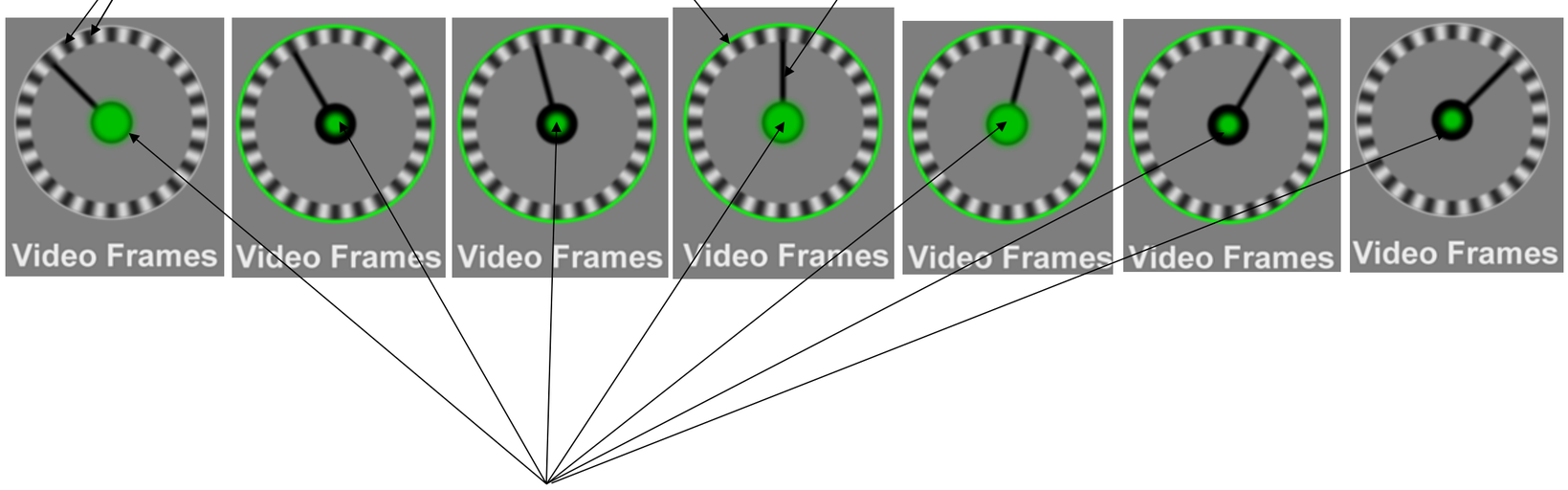
Green Circle flashes for ~ +/- 100ms with 1s periodicity:

@ 0ms, 1000ms, 2000ms, etc.

One Division = 1 Video Frame

Clock Handle in upward position:

@ 0ms, 1000ms, 2000ms, etc.



Green “LED” flashes for 2 frames every 4 frames (2/4 periodic pattern)

revealing any **video frames cadence discontinuities**, 3:2 pull-down and other frame rate conversion cases

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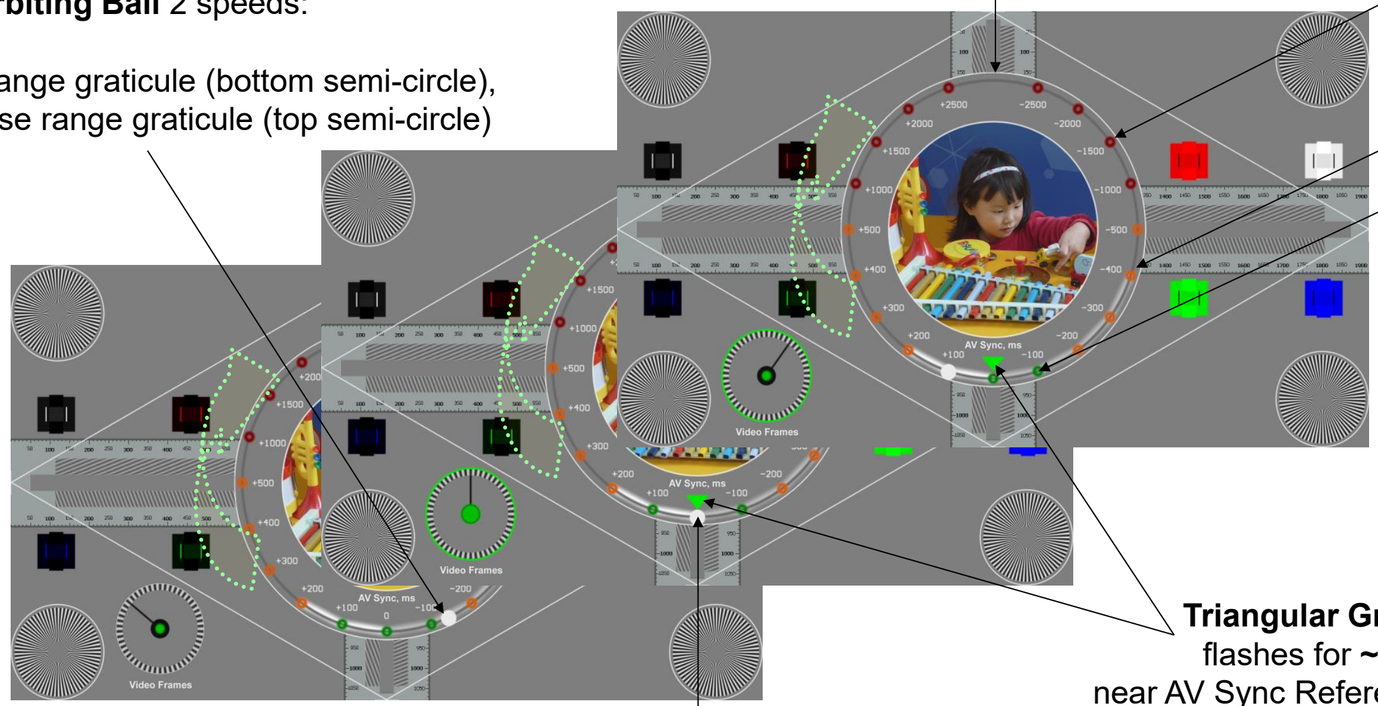
A10. AV Sync Test Features 1

AV Sync Error Subjective Estimation



Wrap-around limit of measurable errors:
+/- 3000ms

“Red” zone:
Error range from 500ms to 3000ms

“Brown” zone:
Error is beyond +/- 100ms “Green” range

“Green” zone:
Error is within +/- 100ms range

Orbiting Ball 2 speeds:

Fast – on fine range graticule (bottom semi-circle),
Slow – on coarse range graticule (top semi-circle)

Triangular Green Marker
flashes for **~ +/- 100ms**
near AV Sync Reference Time Position

Time

Orbiting Ball at AV Sync Reference Time Position (Error = 0)

User can estimate the **AV Sync Error** value by the **ball position** at the moment of “**bop**” sounds **start**.

Green triangular marker flashes for about +/- 100ms wrt AV Sync Reference, thus indicating the boundaries of acceptable errors (“green” range).

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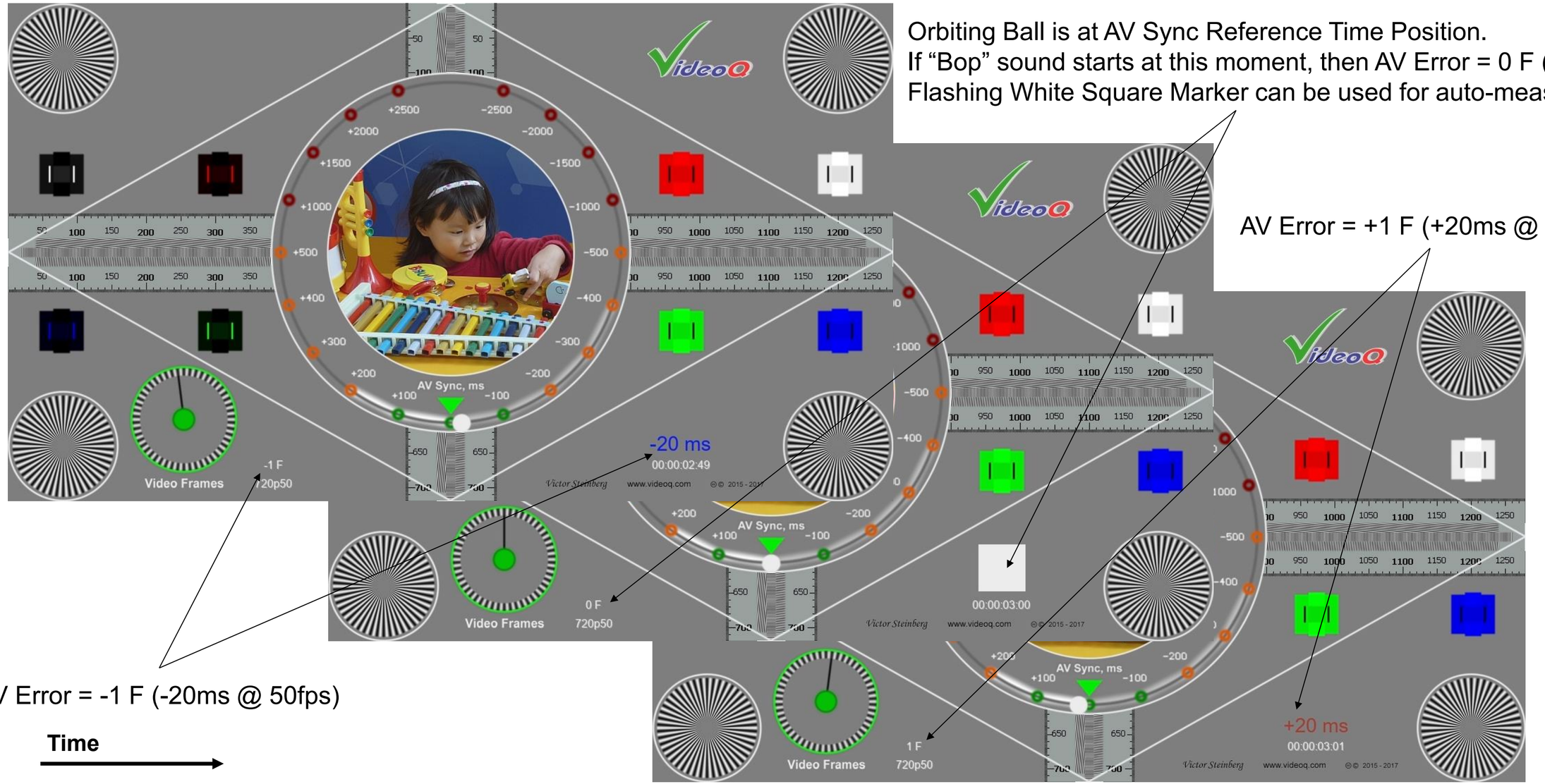
A11. AV Sync Test Features 2

Numerical Readout and Automated Measurement



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