



# VideoQ Calibration Tool

## User Guide

***Full HD Test Patterns on USB Flash Drive***  
for Western Digital  
**WD TV™ HD Media Player**

Version 1.1 July 2009



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

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**VQCT-100**

**Test Patterns Description  
and  
User Guide**

# How It Works

Congratulation!

You already got WD TV Media Player and, of course, you want to watch your HD content in best possible quality.



Now you can easily do it.

Just plug VideoQ VQCT USB flash drive into WD TV player and you have HDMI/SPDIF AV calibration tool equipped with powerful test materials and step-by-step guidance.

You can check and calibrate your home multimedia devices to be sure you are getting the best possible picture and sound quality.

# How To Get Good Picture and Sound

1. We assume that you are already familiar with all manuals, settings, controls and functions available on your AV system (WD TV™ HD Media Player, TV Set, AV Processor, STB, etc). So, be prepared, - each consumer device is slightly different.
2. VQCT Tests are presented in this User Guide in the order optimal for the complete calibration procedure:
  - ∅ Zoom, Position, Scaling, Cropping, Sharpness – use **STV1080** test
  - ∅ Brightness, Contrast, Gamma, RGB Gain & Offset – use **GS1080** test
  - ∅ Color Saturation – use **CB1080** test
  - ∅ Display Gamma check – use **DG1080** test
  - ∅ Audio channels allocation and levels – use **Audio Tests**
3. Use following detailed descriptions and instructions for each test pattern to adjust your devices settings for best picture and sound quality

# Suggestions

1. Keep in mind that on some consumer devices not all adjustments are available, also the functions names may vary among manufactures
2. **Caution:** So called “Factory Defaults” settings are not necessarily the best ones. Most TV settings are made to “shine” in **Demo Room** – which may be far away from viewing conditions in **your living room!**
3. Use VideoQ “Seven Golden Rule” at the end of this Guide – we hope it will help you to do the job right
4. If you want to become **professional** video installer, visit [www.imagingscience.com](http://www.imagingscience.com) for more details

# VQCT-100 - Test Patterns Set

1. **STV1080** – Scaling & Cropping Test, ScalTracker™ series
2. **GS1080** – GrayScale & PLUGEs Test, GradTracker™ series
3. **CB1080** – Color Bars & PLUGEs Test, GradTracker™ series
4. **DG1080** – Display Gamma Test, GradTracker™ series
5. **Audio Tests** – Channel Names & Level Check

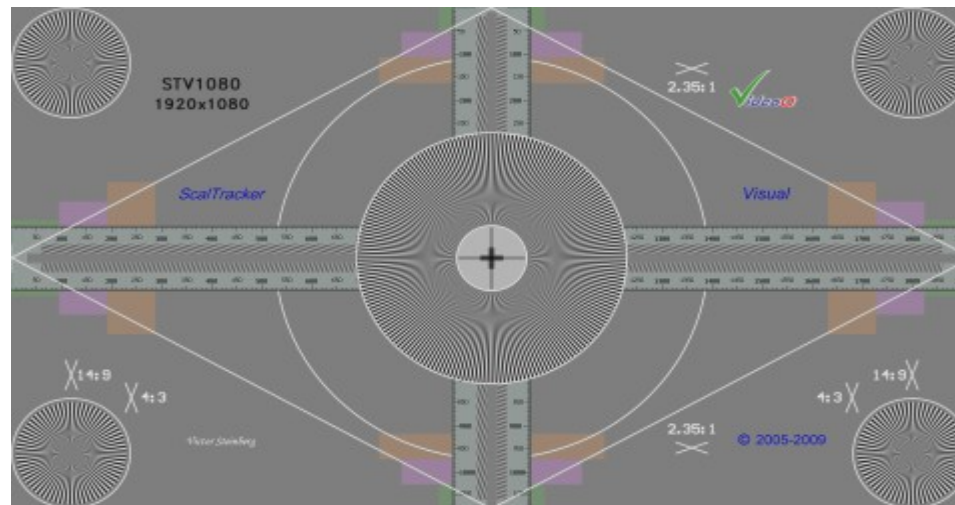
*Full custom test files and application-specific live video clips are available on request*

# 1. STV1080 – Scaling & Cropping Test Pattern

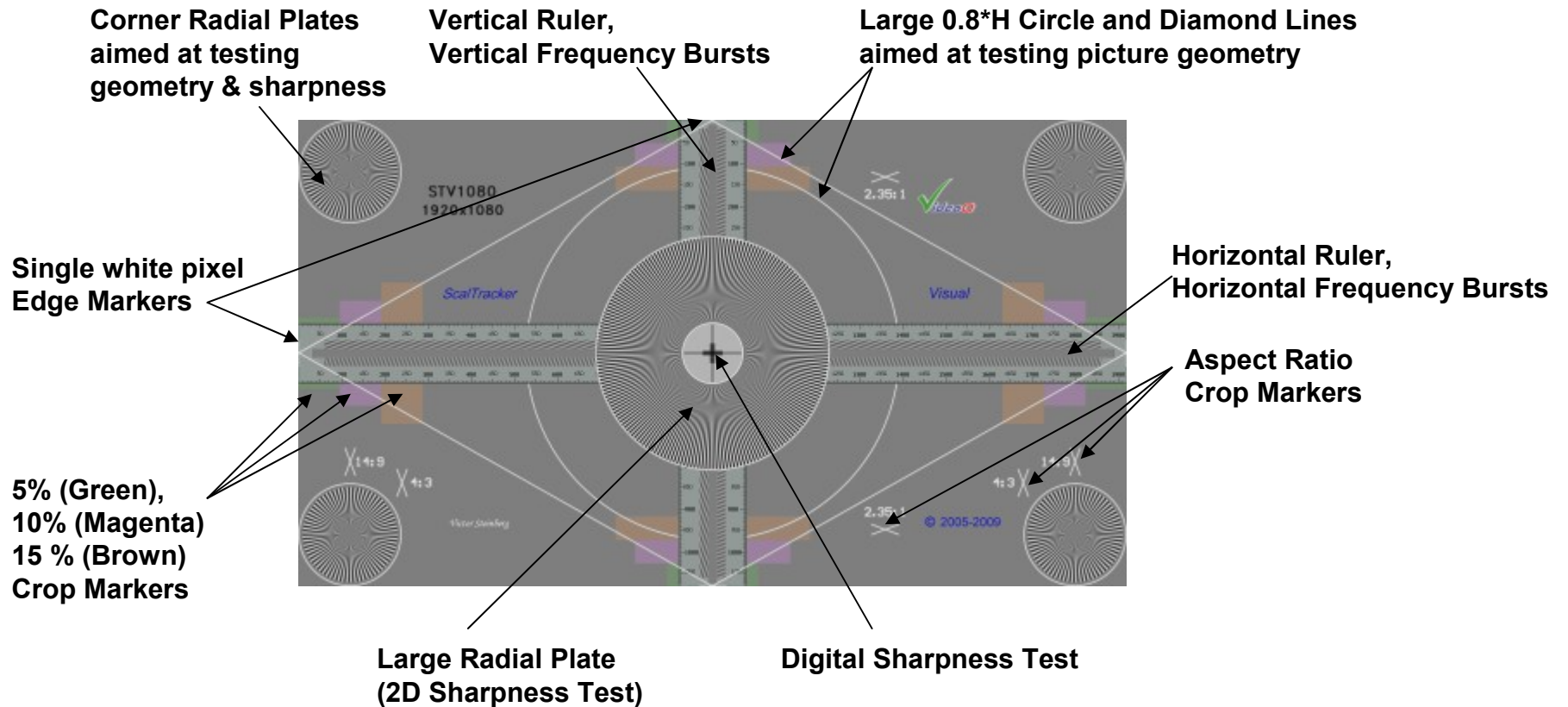
It is highly recommended to apply this test **before** all other tests to be sure that the device under test is in **native resolution full HD mode** (dot-by-dot), i.e. there is no spatial scaling, overscan or zooming

This test provides for checking and adjusting, if necessary, of:

- H & V Pixel Mapping, including Pixel Phase for analog components connections
- Centering & Cropping (Zoom)
- Linear and Non-Linear Aspect Ratio Conversion
- Picture Sharpness and 2D Frequency Response

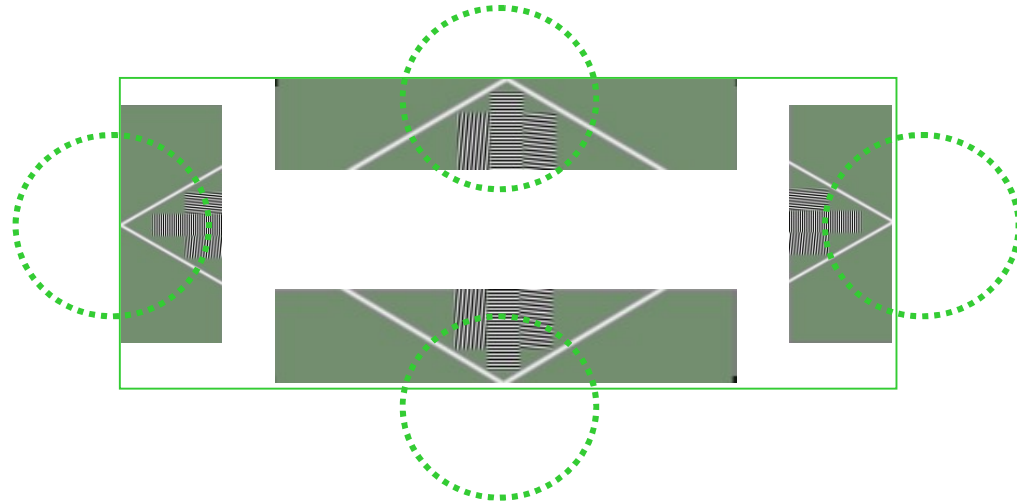


# STV1080 Test Pattern Composition

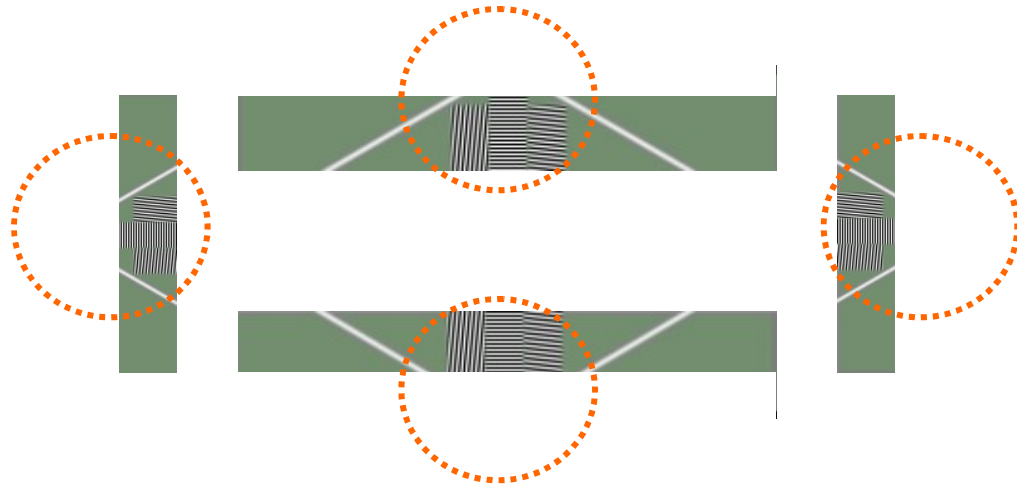


# STV1080: Diamond Pattern Usage

**Example of correct display:**  
All picture edges are not cropped and single pixel white markers are visible

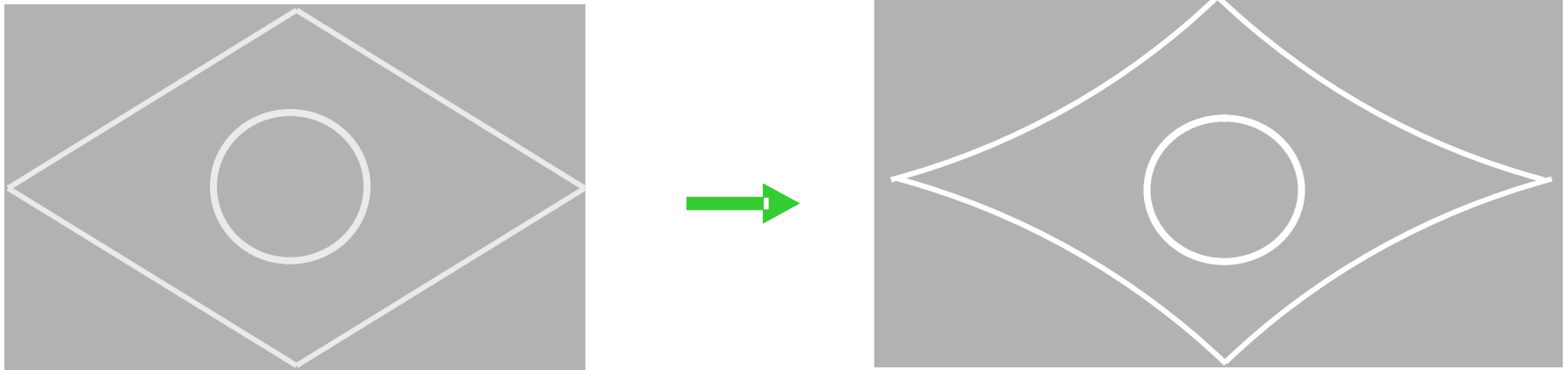


**Example of incorrect display:**  
Picture edges are cropped

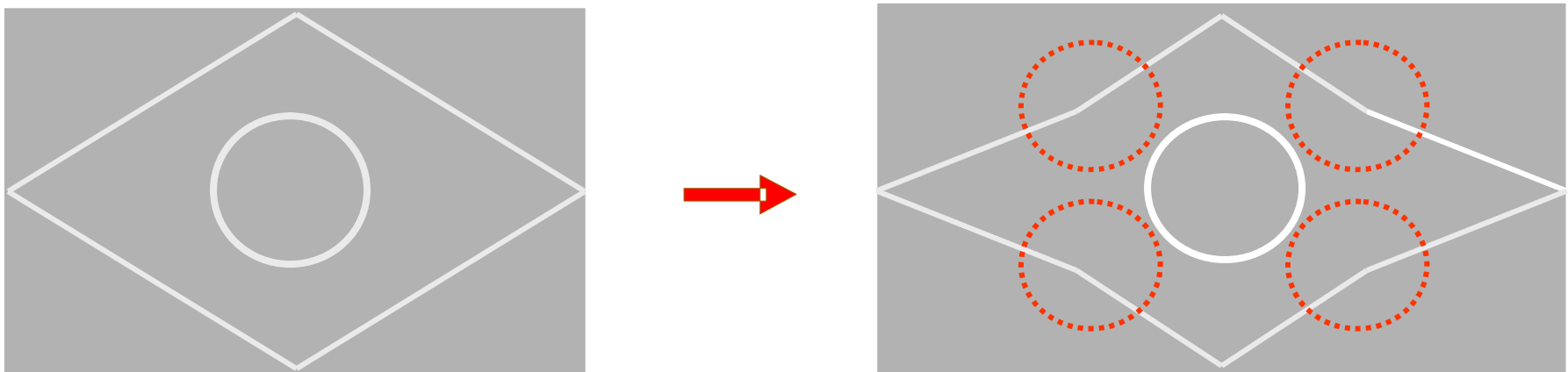


# STV1080: Diamond Pattern Usage

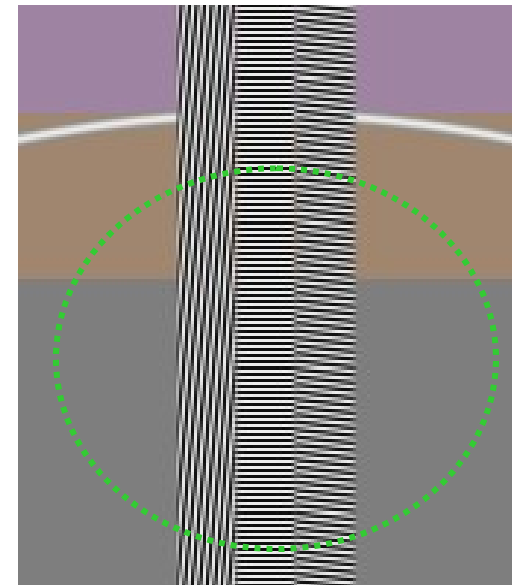
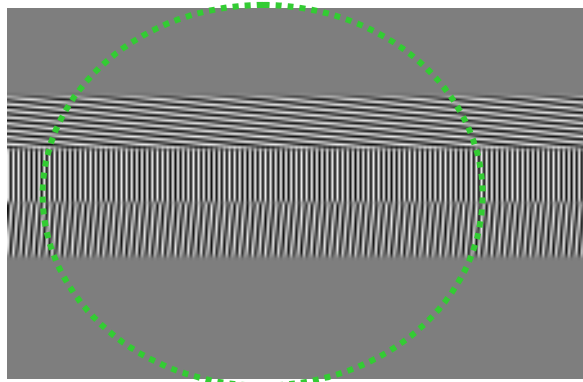
**Optimal non-linear 16:9 to 2.35:1 (Cinemascope) scaling with no sharp boundaries**



**Sub-optimal non-linear 16:9 to 2.35:1 (Cinemascope) scaling with sharp boundaries**

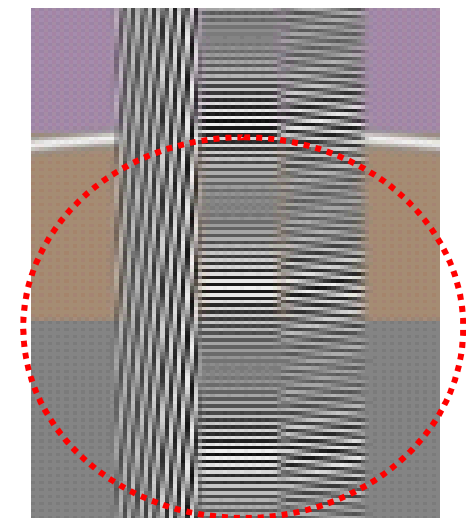
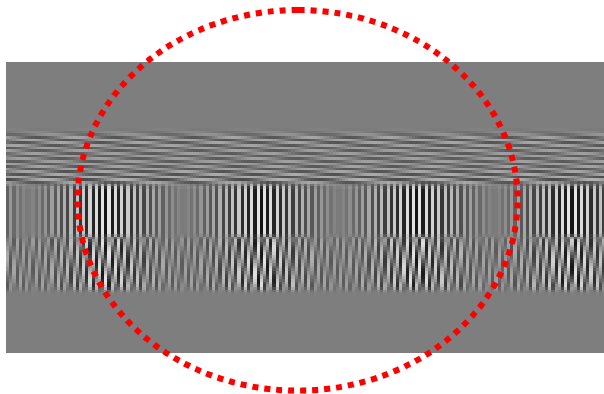


# STV1080: H & V Frequency Bursts Usage



**Example of correct settings** (no scaling):

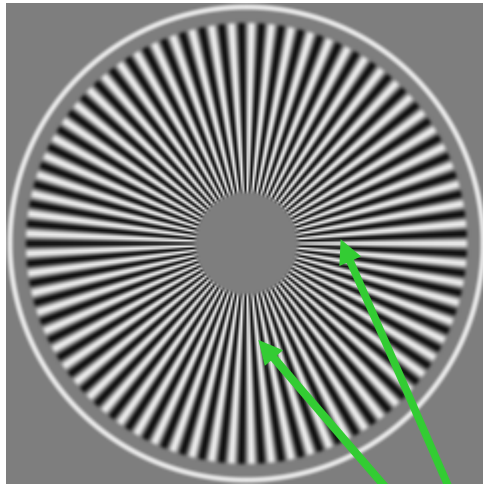
There are no visible beat waves on both horizontal and vertical Tri-band Patterns



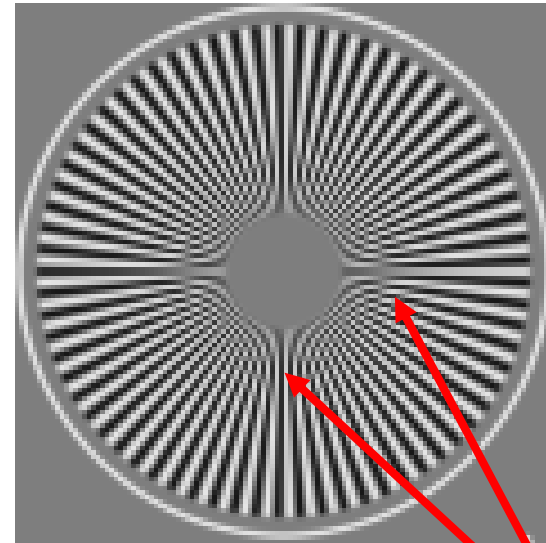
**Example of incorrect settings** (with scaling):

Scaling causes beat waves on both horizontal and vertical Tri-band Patterns

# STV1080: Radial Plates Usage

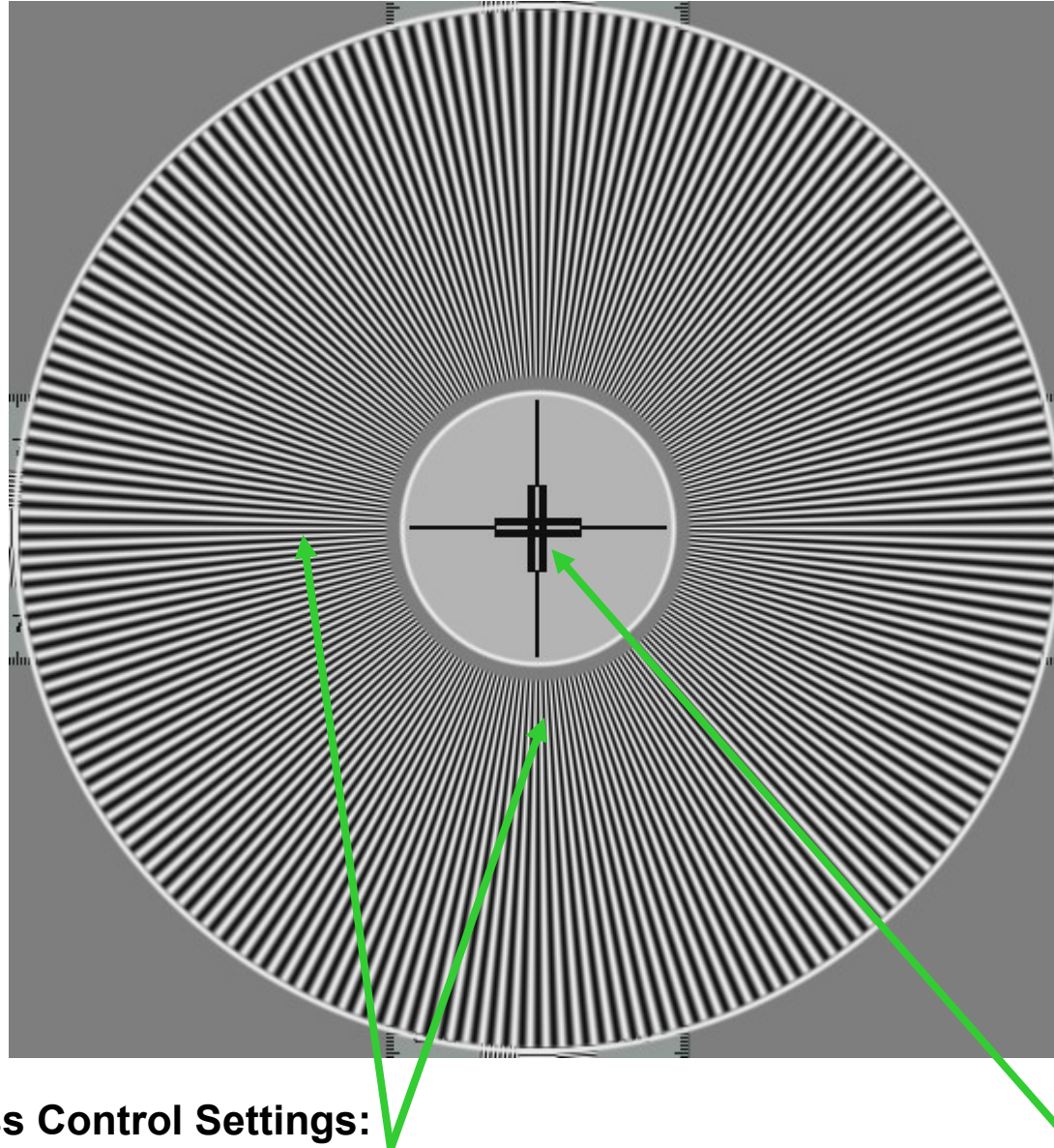


**Original Size – dot-by-dot:**  
Full contrast of fine details in all directions



**Scaled (Zoomed and/or Cropped) Picture:**  
Loss and/or distortion of fine details

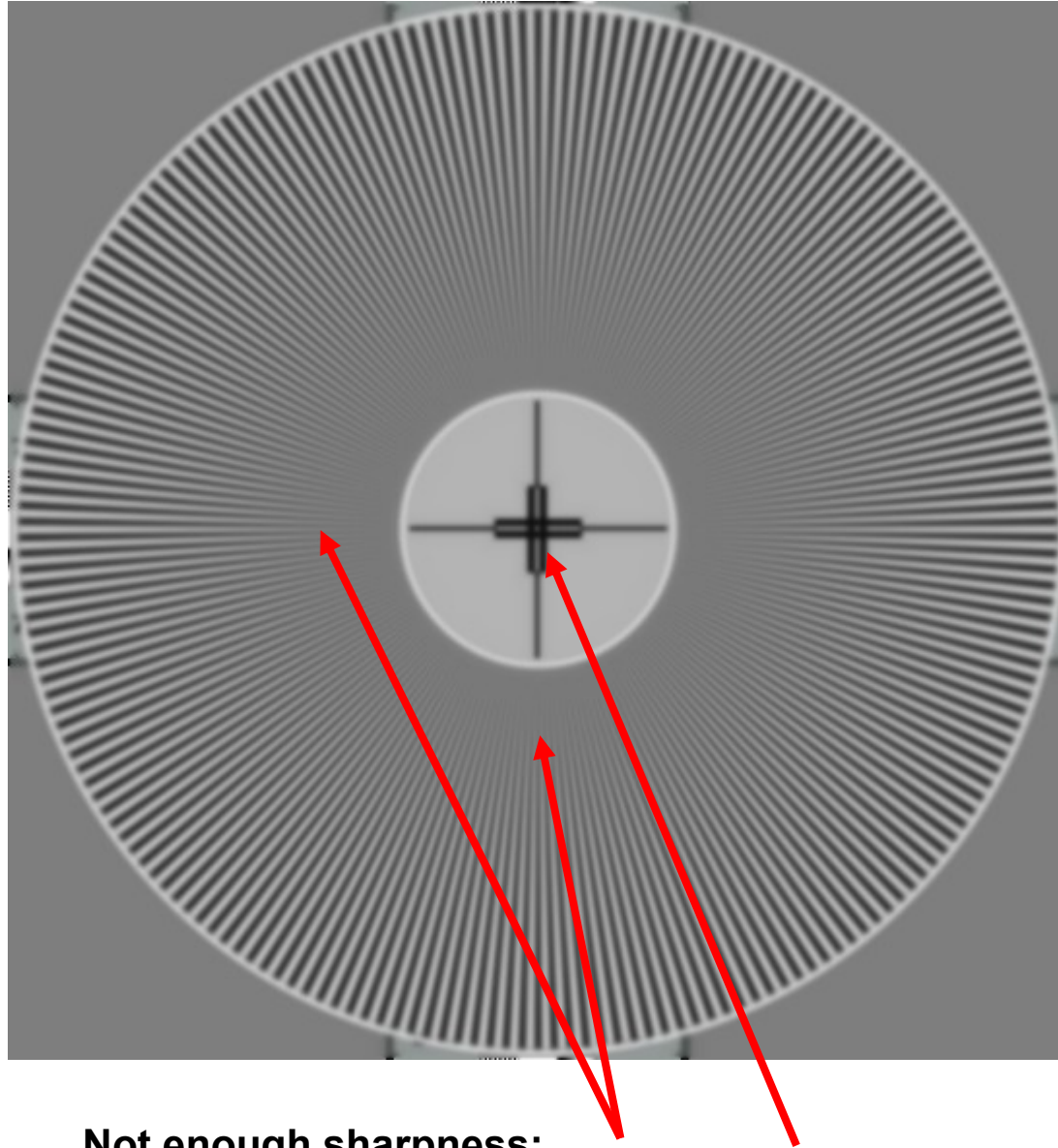
# STV1080: Sharpness Test Usage



## **Optimal Sharpness Control Settings:**

Full contrast of fine details in all directions, perfect digital sharpness, no blur, no ghost images

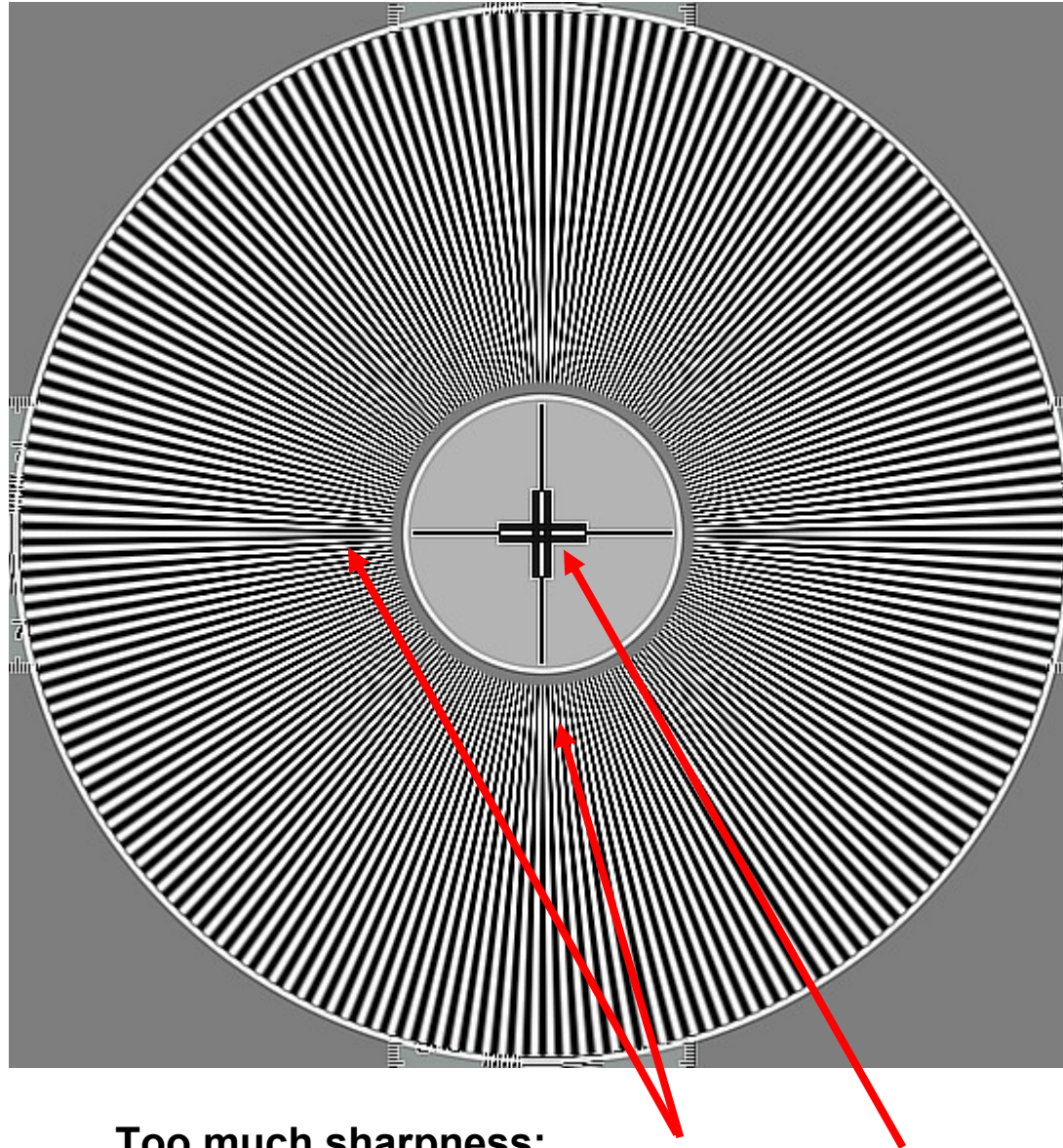
# STV1080: Sharpness Test Usage



**Not enough sharpness:**

1. Fine details contrast reduced,
2. Central cross blurred

# STV1080: Sharpness Test Usage



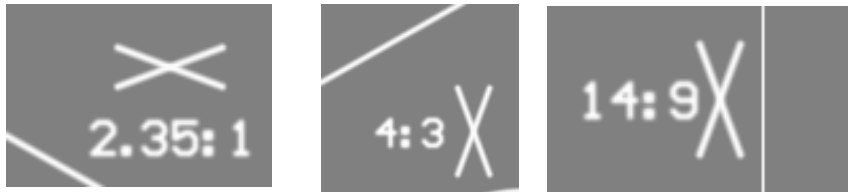
**Too much sharpness:**

1. Fine details distorted (over-enhanced),
2. Visible ghost images next to central cross

# STV1080: Frame Crop (Aspect Ratio) Markers

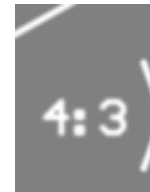
2.35:1 height crop, 4:3 or 14:9 width crop

## Crop Markers



## Examples of 4:3 Crop:

Correct 4:3 Crop



Wrong 4:3 Crop



STV1080 pattern is designed for measurement in 16:9 frame format, as well as in 4:3, 14:9 and 2.35:1 frame formats. Cross-shaped Frame Format Markers indicates precise area for each corresponding Aspect Ratio.

## These are the most popular scale and crop modes:

- | *4:3 crop is used to display 16:9 content on legacy standard definition TV sets,*
- | *14:9 is a compromise (non-letterboxed) mode used in simulcast broadcasting to present 16:9 content on 4:3 and 16:9 screens,*
- | *2.35:1 is used to show letterboxed “cinemascope” movies on 16:9 screens.*

## 2. GS1080 – Gray Scale & PLUGEs Test Pattern

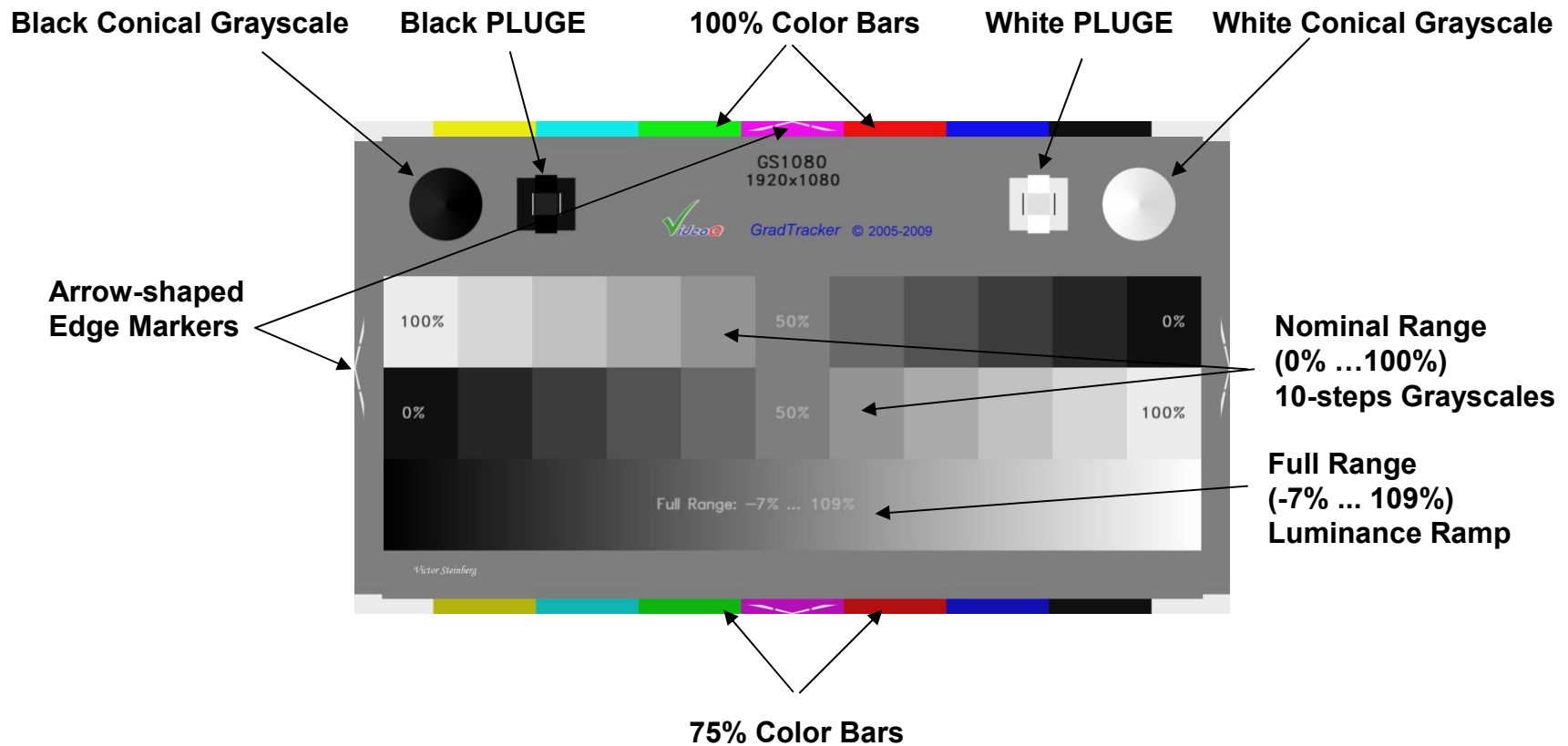
It is recommended to use this test *before* CB1080 test to be sure that the device under test has proper *brightness, contrast, and gamma* settings. GS1080 Test Pattern can also be used for RGB balance check and adjustment.

This test provides for checking and adjusting, if necessary, of the following controls:

1. Brightness (Black Level)
2. Contrast (with or without additional Backlight Control)
3. Individual R, G, and B Gains
4. Overall Gamma and individual R, G, and B Gammas



# GS1080 Test Pattern Composition



# GS1080: Black PLUGE Usage for Brightness Setting

## *Fine Tuning*

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



**Brightness is too low**

## *Coarse Tuning*

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

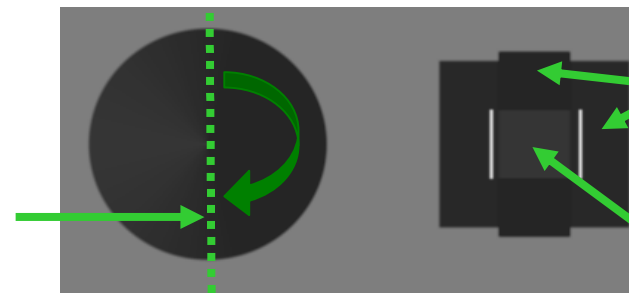
Clipped sector (with no shades of gray) is much less than 180 degrees



**Brightness is too high**

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

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



**Brightness is correct**

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

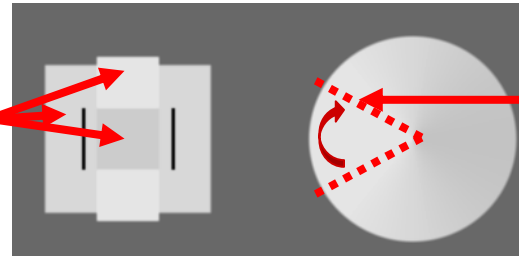
Central small square is clearly visible

# GS1080: White PLUGE Usage for Contrast Setting

## Coarse Tuning

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

Contrast is too low



## Fine Tuning

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

Contrast is too high

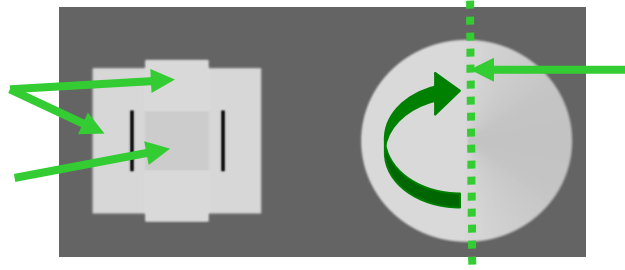
Both central super-white vertical band and central small square are almost the same brightness as big white square



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

# GS1080: Grayscale Usage for Testing Gamma

## Gamma is correct:

- all steps are visible and about equal
- central steps are not too dark or too light



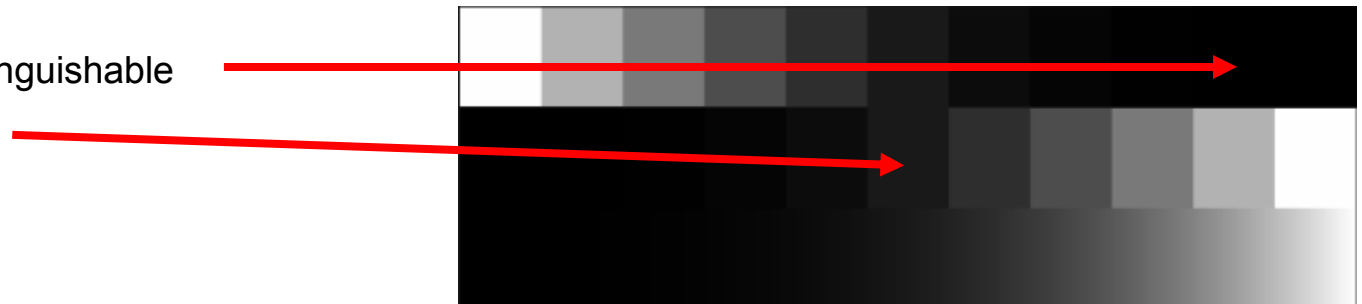
## Gamma is too high:

- light gradations are not distinguishable
- dark gradations and central steps are too light



## Gamma is too low:

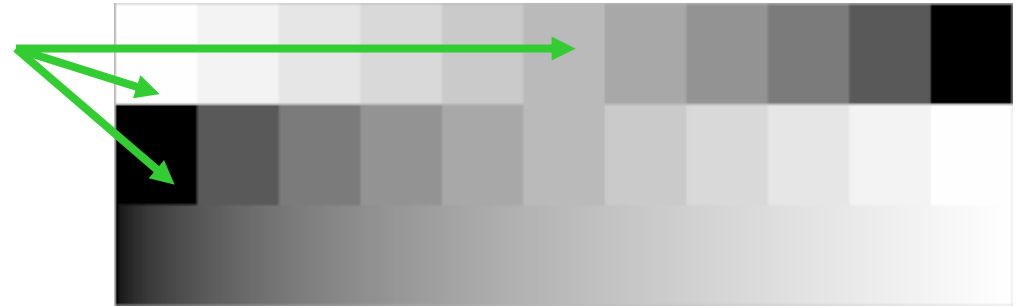
- dark gradations are not distinguishable
- central steps are too dark



# GS1080: Grayscale Usage for RGB Balance

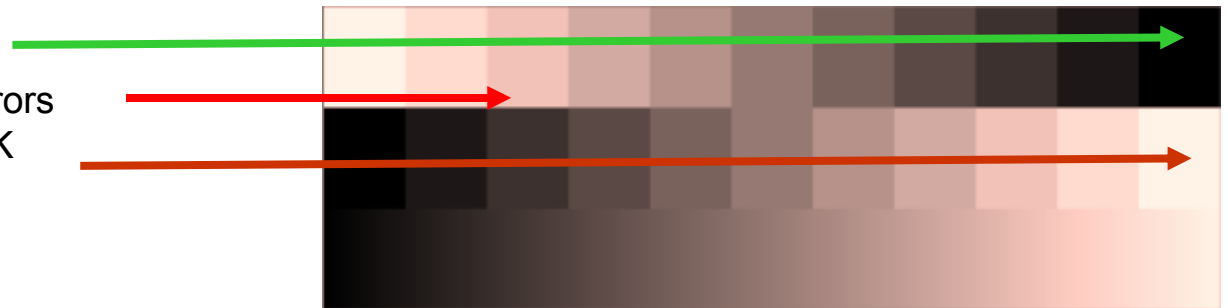
## Correct RGB balance:

- all gradations have same tint (no color)



## R, G, B Gain errors:

- dark gradations are OK (no color)
- light gradations have visible color errors
- the lightest gradations *may* seem OK because of white level clipping



## R, G, B Gamma errors:

- both dark and light gradations are OK
- medium gradations (central steps) are wrong (colored)

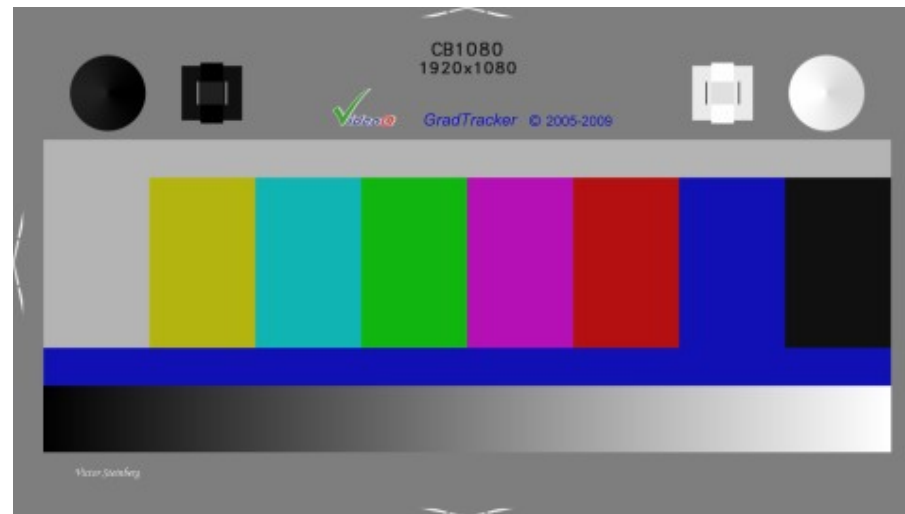


### 3. CB1080 – Color Bars & PLUGEs Test Pattern

It is recommended to apply this test *after* GS1080 test to be sure that the device under test works with *correct brightness & contrast* settings. *RGB gain and gamma balance* should also be checked in advance with GS1080 test

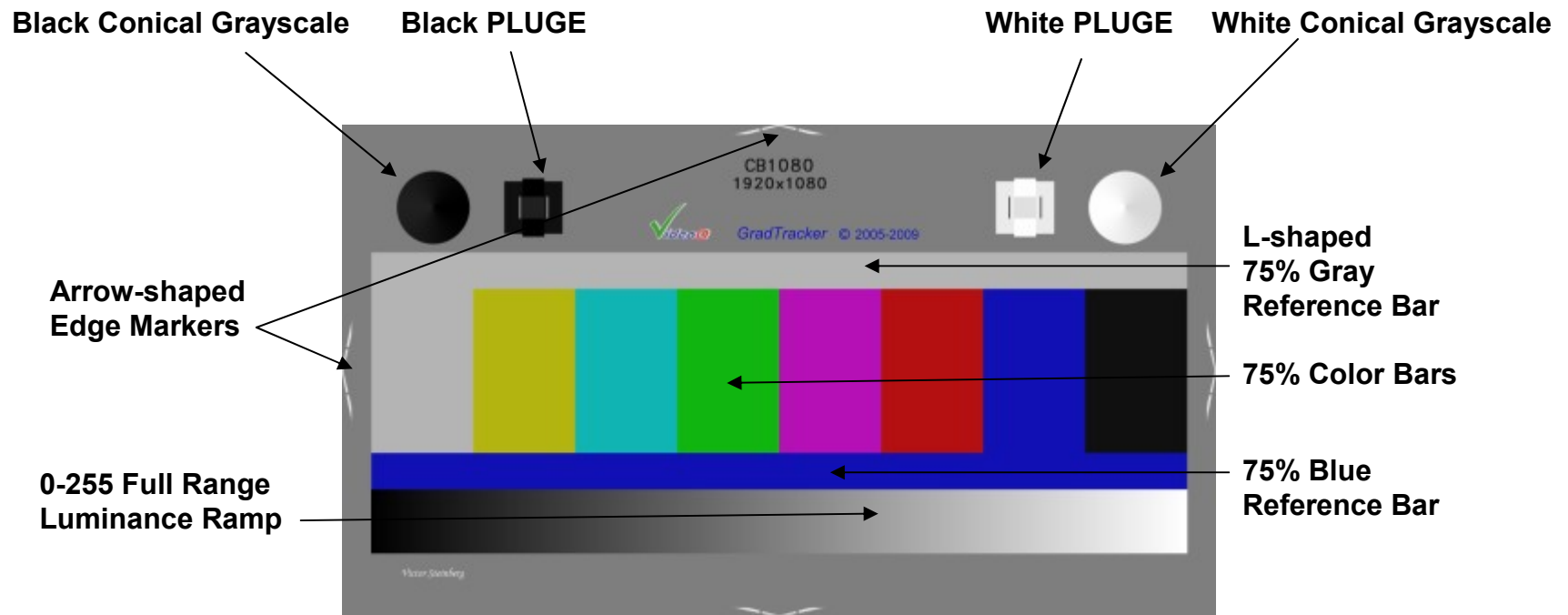
CB1080 test provides for checking and adjusting, if necessary, of:

- Color (Saturation) Control
- Color Matrix Mode Check: HD (709) vs. SD (601)



*Though this test can be used in normal display operation mode without any extra tools, the more accurate results can be achieved in special “Blue Only” mode, available for some TVs, or by looking thru special blue filter.*

# CB1080 Test Pattern Composition



# CB1080: Usage for Saturation Control Setting

**Correct saturation:**

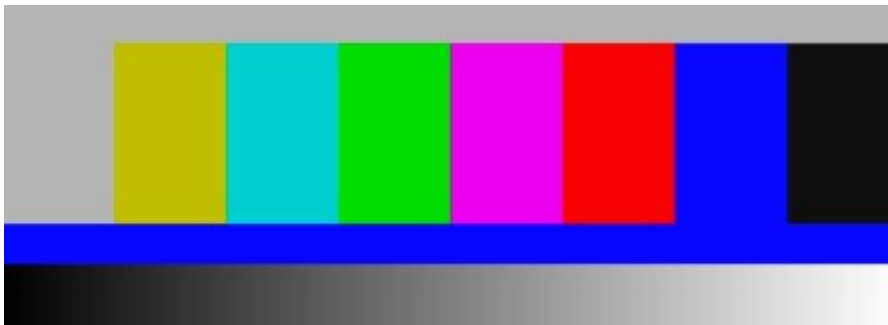


**As seen thru blue filter:**



**Oversaturated picture:**

- blue bars on the right and below appears much brighter than reference 75% gray bars

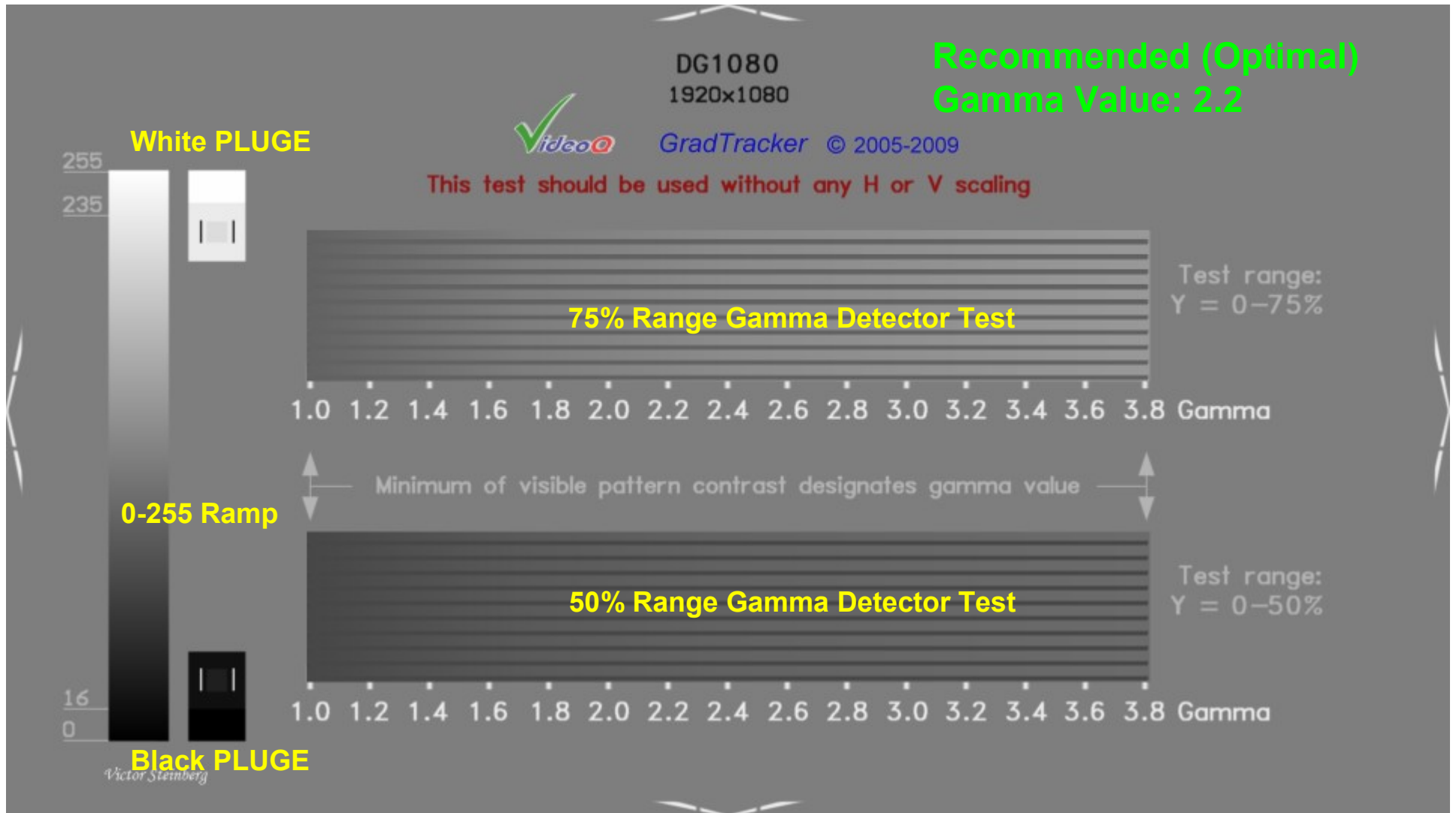


**Undersaturated picture:**

- blue bars on the right and below appears darker than reference 75% gray bars



# 4. DG1080 – Display Gamma Test



• Two multi-strip textured bands allow visual assessment of picture display gamma.

*These bands test gamma values for two corresponding critical sub-ranges of screen brightness: 0%-75% and 0%-50%*

• Black and white PLUGE components and luminance ramp facilitate proper display set-up prior to actual gamma assessment.

# 5. Audio Tests

5.1. **AUD1 Combination Test:** MP3, L+R Stereo

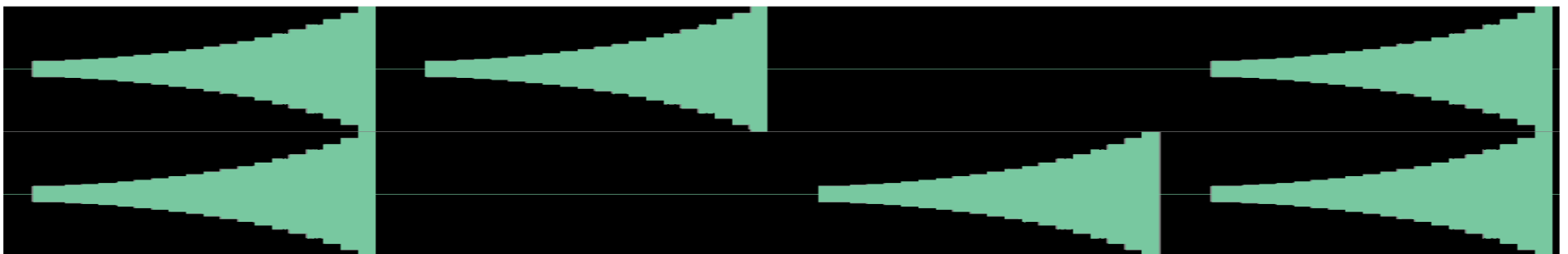
5.2. **AUD2 Combination Test:** MP3, L+R Stereo

5.3. **Surround Sound 5.1 Channel Names:** AC3, 6 channels

**AUD1:** LR Stereo Test for Level Calibration, Frequency Response Test, Pulse Response Test, Dolby Low Level Noise & Distortion Check



**AUD2:** LR Stereo Test for Level Calibration, Channel Swap Check, Channel Polarity Check, Overload and Dynamic Range Test, including L-R difference channel



# Seven Golden Rules To Get Good Pictures

1. **No excessive contrast!**

Proper black & white levels brightness adjustment is paramount.  
Try to reduce ambient light on the screen – don't boost brightness/contrast.

2. **No excessive color saturation!**

Proper color gain control is a must for good colors on screen.  
Excessive color gain brings more noise and distortions.

3. **No scaling!**

The only good scaling/zooming mode is 1:1 (dot-by-dot).

4. **No excessive sharpness!**

Excessive sharpness typically brings noise, ringing and ghost images. Use very carefully, only when needed, e.g. to watch old movies.

5. **No noise reduction without need!**

Excessive noise reduction typically brings motion blur and cartoon-like images.  
Use very carefully, only when needed, e.g. to watch old VHS tapes.

6. **No format change!**

Any format conversion is detrimental to picture quality. DVRs/PVRs often transcode streams and scale pictures up and down without telling you – be careful.

7. **No analog connections!**

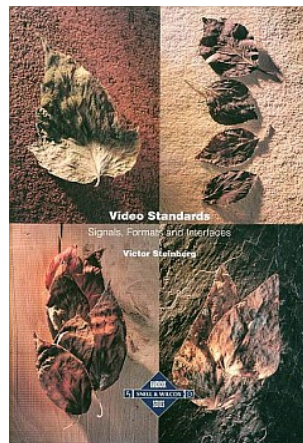
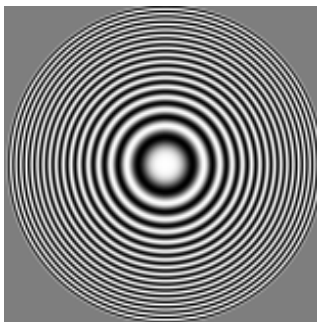
Stay digital wherever possible. HDMI is much better than analog component.  
Going from digital source to digital display via analog connector is not a good idea.

# VideoQ, Inc.

VideoQ is a California-based company, focused on video test & measurement and video enhancement technologies, products and services.

More than 50 man-years of award-winning experience in the field of Broadcast, Consumer Electronics, Transcoding and Video Data Compression.

Experts in Video Calibration, Critical Picture Quality Technologies for Broadcast, Consumer Electronics, Transcoding, Video Data Compression, SDTV, HDTV, Digital Cinema, Mobile TV, IPTV.



# Other Related VideoQ Products

∅ **VQL – Comprehensive Library of Test Patterns**

∅ **VQS-200 – HDMI/SPDIF Test Generator & Reference Source**

∅ **VQMA – Software Video Analyzer**

∅ **VQTS-1000 – Video Generator-Analyzer**

*For more information visit [www.videoq.com](http://www.videoq.com)*