

F R E E M A N

AUDIO VISUAL OPERATIONS STANDARD

VIDEO DISPLAY IMAGE OPTIMIZATION

General Principles

- **Every projection or direct-view display must be optimized prior to completion of setup.**
- **Projected images (LCD/DLP projector) must be physically/geometrically aligned prior to optimizing image signal with projector panel.**
 - Use internal test pattern/crosshatch grid when aligning projector geometry.
 - Projected image must completely fill screen.
 - Eliminate keystone distortion by physical means first (moving projector/stand in relation to screen, raising stand legs) before use of digital keystone correction.
- **High-quality/high-bandwidth cables should be used whenever possible to connect image source/output device to display. VGA cables should be used only up to cable runs of 50' or less. RGBHV or other high-bandwidth cable should be used for cable runs in excess of 50'.**
- **Display should always be connected using the best video conduit available for image source/output device (see AV Standard 0012):**
- **If multiple screens displaying the same output/image are viewable, brightness and color of screens must be matched such that each screen looks exactly the same.** Use weakest projector/display as baseline for matching.
- **If displaying a 4:3 aspect ratio image source on a 16:9 display (i.e. PDP/LCD monitor), the 4:3 image should fill the 16:9 screen using the display's "Full" or "Stretch" functions unless the client requests the image appear undistorted (pillarboxed).**

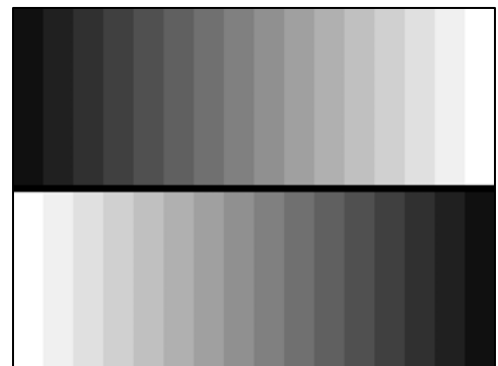
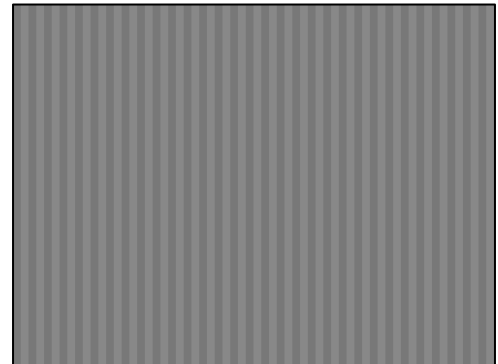
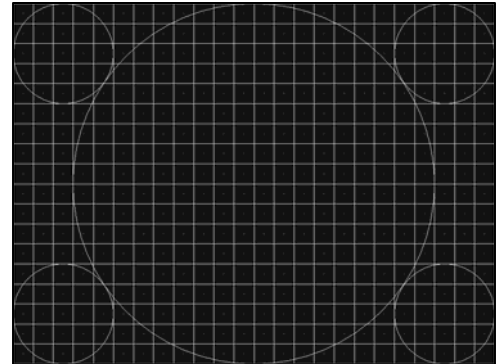
Optimizing Composite Source/CRT Monitor

- **The following procedure is to be followed for each display connected using composite video:**
 - Utilize test tape/DVD with selected test patterns or professional test pattern generator.
 - If alignment controls are available on the display, use **crosshatch with safety circles test pattern** to ensure image is correctly aligned on the screen (see below for instructions).
 - Use **SMPTE color bars test pattern** to set brightness (black level), contrast (picture/white level), chroma (color), and hue (tint/phase):
 1. Turn **chroma** all the way down, displaying black/white/grayscale pattern.
 2. Adjust **brightness** until the third (far right) PLUGE bar is barely visible.
 3. Adjust **contrast** as high as possible until blooming or tearing occurs between higher intensity bars (i.e. between white/yellow bars).
 4. Using blue filter (internal switch or primary-blue (Rosco 80) lighting gel held between eyes and screen), adjust **chroma** until white and blue bars appear equal in intensity.
 5. Using blue filter, adjust **hue** until cyan and magenta bars appear equal in intensity.



Optimizing Component or RGB Source/Digital Display

- **The following procedure is to be followed for each display connected using component video or RGB (computer/data signal):**
 - **If using computer video source, output resolution must match native panel resolution of display device (i.e. XGA / 1024x768).**
 - Utilize test tape/DVD with selected test patterns or test pattern generation hardware/software. If using scaler/switchers (i.e. Folsoms) for master output, use internal switcher test patterns for calibration and optimization.
 - Use **crosshatch (with safety circles, if available) test pattern** to align source video image with the display panel.
 1. Adjust **horizontal/vertical shift** and **size/clock** until outline/raster box appears on outermost pixels (“one pixel off / one pixel on” method).
 2. Circles should appear perfectly round, and squares should appear symmetrical (not rectangular) without distortion.
 - Use **multiburst/fine-line moire vertical test pattern** to align signal fine sync/phase.
 1. Adjust **horizontal size/clock** until burst/moire pattern appears evenly across entire screen (mapped).
 - If wide dark vertical bars appear, image is not correctly aligned horizontally.
 - If more bars are appearing as adjustment is being made, make adjustment in the opposite direction until pattern is even.
 2. Readjust **horizontal shift**, if necessary, to completely fill screen (may require return to crosshatch pattern for proper alignment).
 3. Adjust **fine sync/phase** until all visible horizontal noise is eliminated and burst/moire pattern is as bright as possible.
 - Use **grayscale bars test pattern** to adjust brightness, contrast, and color balance.
 1. Adjust **brightness/black level** as low as possible until the darkest gray bar appears just distinguishable from blackest bar. Use horizontal black line in middle of the pattern as a black reference.
 2. Adjust **contrast/picture** as high as possible until lightest gray bar appears just distinguishable from whitest bar.
 3. Evaluate color of middle gray bars. Adjust **red, green, and blue gain** and/or **color temperature** as appropriate until grays appear as neutral in color as possible.



NOTE: If utilizing digital conduits and output resolution is matched to native panel resolution, alignment occurs automatically in most flat-panel displays and display device alignment, sizing, and phase controls will likely be disabled. Brightness, contrast, and color balancing may still be required. Occasionally, a horizontal shift of 2-6 pixels may still be required to properly align the image in higher-end projectors.