Test Pattern Maker User's Guide

SyntheticAperture

This manual reflects version 1.0 of Test Pattern Maker

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Why Test Patterns?

Test patterns serve many purposes in video production. While the test of "good video" might seem to be whether or not it looks good on the screen or not, there is more to it than that: equally important is whether it looks (and sounds) good on other people's screens and whether it can accurately be recorded and played back on tape. To ensure that we all see more-or-less the same picture and hear the same sounds, standards have been developed that we all must adhere to. Test patterns allow you to be sure your video productions, and the equipment you use to produce them, meet those standards.

You can easily spend tens of thousands of dollars on video test equipment to ensure standards compliance, but the most important parameters can be evaluated with just some test patterns and software.

Why Test Pattern Maker?

There are a lot of files floating around that contain both test images and sounds. Unfortunately, many of these are either designed for other video systems, of dubious quality, or simply incorrect. For example, Adobe Premiere ships with a file called "SMPTE Bars" that contain color bars at 100% amplitude, although the SMPTE spec clearly specifies 75% amplitude. Since a common use of color bars is to place them at the head of a tape so that whoever receives it knows what levels you used, using inaccurate bars is far worse than using no bars at all.

Because different NLE systems use different pixel aspect ratios, different frame sizes, and different digital values for black and white, coming up with a one-test-fits-all file is impossible.

Test Pattern Maker was developed to allow the quick and easy generation of common video test patterns to fit a variety of NLE systems.

Because you specify the frame size, pixel aspect ratio, and black and white levels, you know that the image you generate is correct for your system.

When creating audio test tones, Test Pattern Maker allows you to specify the frequency, duration, sample rate, and level of the tone. Using test tones that have been resampled to other rates or have unknown levels is, once again, worse than no tone at all.

Minimum System Requirements

In order to install and use Video Finesse, you will need:

- Power Macintosh computer.
- At least 16MB of memory. 32MB is recommended.
- MacOS 8.0 or later.
- QuickTime 3.0 or later.

License

Creating a Video Test Pattern

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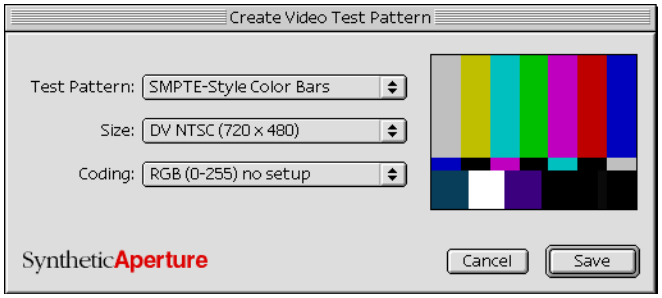
To create a video test pattern, start Test Pattern Maker and choose Create Video Test... from the File menu.



In the dialog, choose the test pattern, size, and coding you want, then click Save.

Within the Save dialog, choose the file format you wish to save the test pattern in and, if necessary, click Options to choose the file format options you want. Click Save to create the test pattern image file. You're done, and can create another test pattern or quit Test Pattern Maker.

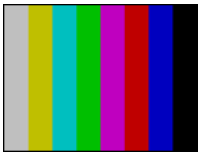
Test Pattern

Test Pattern Maker can generate eight different test patterns:

- EIA Color Bars
- EBU Color Bars
- SMPTE-style Color Bars
- 5-step Luma Staircase
- 10-step Luma Staircase
- Luma Ramp
- Convergence
- Overscan

Choose the test pattern you want from the drop down menu.

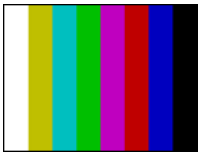
EIA Color Bars



Standardized by the Electronic Industries Association (EIA), EIA color bars consist of 8 full-field bars including black, white, and the six primary colors. All bars (except black) are at 75% amplitude, 100% saturation.

EIA color bars are typically used with NTSC video.

EBU Color Bars



EBU color bars were standardized by the European Broadcast Union (EBU), and are the same as the EIA bars, except the white bar is at 100% amplitude.

EBU color bars are typically used with PAL video.

SMPTE-Style Color Bars

The SMPTE-style bars are similar to the standard set by the Society of Motion Picture and Television Engineers (SMPTE), but, because the bars are stored in an RGB file, some portions of the standard bars (which are Y, R-Y, B-Y encoded) cannot be represented.

The SMPTE-style bars are split-field bars, in that the test pattern is split vertically into three distinct sections. The upper two-thirds of the field contains 7 color bars with white and the six primary colors at 75% amplitude and 100% saturation.

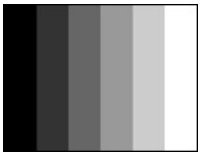
The narrow center section consists of the same pattern, but in reverse order and with all green removed. If the test pattern is viewed with only the blue CRT gun enabled, or through an appropriate blue filter, the narrow center region will appear to be the same brightness as the bar immediately above it when the monitor is properly adjusted.

The lower left portion of the pattern consists of three bars of a -I, pure white, and +Q signals. Because -I and +Q cannot be represented in RGB, these bars are not accurate. However, IQ color encoding has fallen out of use and these bars are therefore not of much use anyway. The 100% white bar, however, is accurate.

The lower right portion of the pattern consists of three black bars. The centermost of these black bars if further divided into three bars that make up the PLUGE (Picture Line Up Generating Equipment) test sig-

nal which conists of a central black bar with a bar slightly below black to the left and a bar slightly above black on the right. On a properly adjusted monitor, the left bar will disappear and the right bar will just barely be visible. Because you can choose some codings that do not allow values below black, the left blacker-than-black signal may not be present in the bars created by Test Pattern Maker.

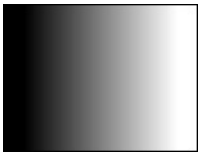
Luma Steps



Test Pattern Maker creates two different Luma Step patterns: one with five steps and one with ten. View the Luma Step test patterns on a video monitor and you should see smooth, evenly spaced steps of gray, with no trace of color. View them on a waveform monitor and you should see an even staircase pattern.

If the steps are not evenly spaced, it indicates a linearity problem somewhere in the signal path.

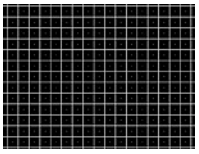
Luma Ramp



View the Luma Ramp test patterns on a video monitor and you should see a smooth progression from black to white, with no trace of color. View it on a waveform monitor and you should see a straight line.

If the line is not straight, it indicates a linearity problem somewhere in the signal path.

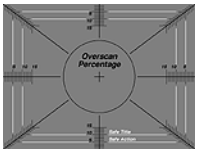
Convergence



The Convergence test pattern consists of a series of horizontal and vertical white lines and small dots. When displayed on a television or video monitor, these lines and dots should appear white, no matter what part of the screen you examine.

If the screen you are looking at has convergence errors (misconvergence) you'll see color fringing in some parts of the image. Some small amount of misconvergence is to be expected in the corners, but serious color fringing may mean that your monitor needs repair or adjustment.

Overscan



All television sets are designed to overscan the incoming video signal; that is, they display the video image larger than the visible area of the picture tube, resulting in part of the image being hidden behind the television's bezel at the top, bottom and both sides.

This is by intentional design so that visual artifacts that may occur at the beginning and end of each scan line, and at the top and bottom of

each field are hidden. While less common with modern televisions, these are the times when the electron beam is slowing and reversing its scanning pattern and is when artifacts are most likely to occur.

The amount of overscan varies from one television to another, and may even be influenced by controls accessible to the viewer. Because you can never be sure exactly how much of the picture may be lost to overscanning, it's necessary to keep important action and titles away from the edges.

To measure the amount of overscan on a given television, use the Overscan test pattern. By displaying this pattern you can see the amount of image hidden on each side of the display. Don't be surprised if it is not the same on each side.

This pattern is particularly useful when played back in the camera viewfinder as it allows you to judge just how much of the actual image area is displayed in the viewfinder. Many viewfinders have significant overscan—sometimes even more than most televisions—which can result in microphone booms and other objects being invisible in the viewfinder, but appearing when the tape is played back on a video monitor. Also, few camera viewfinders center the image accurately and the Overscan test pattern will help you determine the true center.

Size

Choose the frame size appropriate for your editing system from the drop down list:

- DV NTSC (720 x 480)
- DV PAL (720 x 540)
- Rec. 601 NTSC (720 x 486)
- Rec. 601 PAL (720 x 576)
- Square Pixel NTSC (640 x 480)
- Square Pixel PAL (768 x 576)

The Rec. 601 sizes are also called “CCIR” in some editing systems.

Coding

Choose the digital coding appropriate for your editing system from the drop down list:

- RGB (0-255) no setup
- RGB (0-255) w/ setup
- Rec. 601 (16-235) no setup
- Rec. 601 (16-235) w/ setup

Not all editing systems use the same digitial coding for video signals. Some systems use a range of 0-255 to encode black to white, while others use 16-235. Some editing systems refer to the 0-255 range as RGB, and the 16-235 range as "CCIR" coding. You need to choose the proper coding range to match your video editing system or the test pattern will not be correct.

Most M-JPEG systems use 0-255. While the DV standard itself uses 16-235 internally, some DV codecs translate this to 0-255 while others leave it as 16-235. The best way to determine the proper coding is to ask the manufacturer of your editing system and codec. If you are unable to obtain the information that way, you can digitize some black footage (shot with the lens cap on and the gain turned down) and bring a frame into Photoshop. Use the eyedropper tool to examine the digital values of the black pixels. If the value is 0,0,0, then chances are your system uses 0-255 coding. If the value is 16,16,16, then chances are it uses 16-235 coding.

You also need to determine if your system is using the NTSC 7.5 IRE setup or not. Some systems use setup, but subtract it out and add it back in when going to and from tape, while others do no adjustment at all. Again, refer to your systems manual or contact the manufacturer for the correct settings.

Most digital video formats, such as DV, do not include setup, even in NTSC models.

Save

The Save dialog allows you to specify what file format you want to save the test pattern in. You can choose any of the still-image formats supported by QuickTime, including PICT, JPEG, TIFF, and BMP. Depending on the format you choose, you may also be presented with an Options button which allows you to select format-specific settings, such as compression level for JPEG files.

In formats that allow for compression, choose no compression or the least amount of compression to avoid artifacts that can distort the test pattern.

Creating an Audio Test Tone

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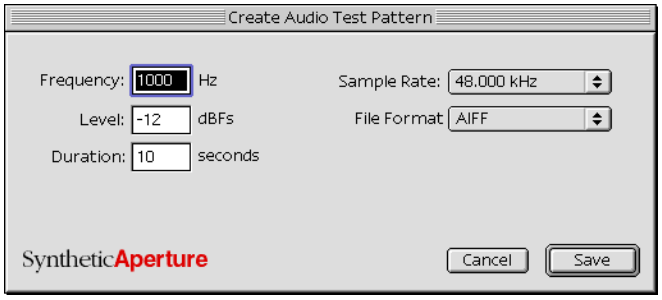
To create an audio signal, start Test Pattern Maker and choose Create Audio Test... from the File menu.



In the dialog, choose the frequency, level, duration, sample rate, and file format you want, then click Save.

Within the Save dialog, choose the file to save your test signal to and click Save. You're done, and can create another test signal or quit Test Pattern Maker.

Frequency

Choose the frequency of the test signal you wish to generate. The tone used at the head of video tapes is most commonly 1 KHz, although 400 Hz is sometimes used.

Level (dBFs)

Enter the level you want the test signal to be at, in terms of decibels (dB) below full scale. Unlike analog audio, where there is "headroom" to record signals above 0 VU, in digital audio there is no room for error. Any signal that goes above full scale will be severely distorted.

To generate a test signal that can be used in a manner similar to the analog 0 VU test tone, you must leave some headroom. The most

commonly used level is 12 dB below full scale, although some people use 10 or 14. Because this setting represents the value *below* full scale, be sure to enter a negative number.

Duration

Choose the duration of the test signal, in seconds. This is how long the test signal will play for.

Sample Rate

Choose the sample rate for the test signal to match the sample rate used by your editing system. The most commonly used sample rates are available, as well as pull-up and pull-down rates used when going between NTSC video and film.

The available sample rates are:

- 11.025 KHz
- 22.050 KHz
- 31.968 KHz
- 32.000 KHz
- 32.032 KHz
- 44.056 KHz
- 44.100 KHz
- 44.144 KHz
- 47.952 KHz
- 48.000 KHz
- 48.040 KHz

File Format

Choose a file format compatible with your editing system. Choose from AIFF, WAV, and µLaw.

AIFF is supported by virtually all Macintosh programs, while WAV is common on Windows systems.

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