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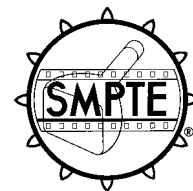
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SMPTE RECOMMENDED PRACTICE

RP 133-1991

Revision of RP 133-1986

Specifications for Medical Diagnostic Imaging Test Pattern for Television Monitors and Hard-Copy Recording Cameras



Page 1 of 6 pages

1 Scope

This practice describes the format, dimensions, and contrast required to make diagnostically significant measurements of the display and camera system resolution for both digital and analog monochrome signal sources. (See note.) The practice provides users of medical diagnostic imaging systems with a comprehensive test pattern for day-to-day operational checks and adjustments of focus, brightness and contrast, resolution response, mid-band streaking, uniformity, and linearity of viewing monitors and hard-copy recordings. This practice is not intended to create a standard for image characteristics such as resolution, geometry and linearity, uniformity, phosphor defects, etc. However, use of the pattern is encouraged as an appropriate tool for evaluating the measurement and specification of such image characteristics.

2 Description

2.1 Pattern

A reproduction of the test pattern is shown in figure 1. Figure 2 is a drawing of the pattern for reference to the following text:

2.2 Background

The background is presented at 50% of maximum white to obtain an approximate average picture level (APL) of 50% (figure 2 [1]).

2.3 Crosshatch pattern

This pattern allows verification of linearity, either by using a straightedge or by overlaying or projecting a perfect reference image (Ball chart) (figure 2 [2]).

2.4 Resolution pattern

Three zones of vertical and horizontal, high-contrast bar patterns are placed in five locations (four corners and the center). The modulation depth of the pattern is 100%. Placement of the patterns facilitates comparison of the resolution in the center and in the corners of the screen (figure 2 [3]). A detailed view of the resolution pattern is shown in figure 3.

2.5 Low-contrast imaging resolution

Three zones of vertical and horizontal, low-contrast, equally-spaced bars are located next to the patterns described in 2.4. The modulation depth of these areas is 1%, 3%, and 5%. This is the most sensitive test for various types of imaging noise (figure 2 [4]).

2.6 Gray step pattern

Blocks of specified signal amplitude, representing 0% to 100% of the input signal in steps of 10%, allow measurements of the response characteristics of the viewing monitors and hard copy (figure 2 [5]).

2.6.1 Small-contrast changes

Small-contrast changes of 5% of the input signal are superimposed on a 0% background, and a 95% value is superimposed on a 100% maximum signal background to allow quick verification that all available gray-scale information can be presented in the image to be displayed (figure 2 [6]).

2.7 White window and black window

During display of these patterns, the display or recording device signal stays relatively long in one state (black or white). These large areas of maximum contrast facilitate detection of mid-band streaking (poor low-frequency response), video amplifier ringing or overshoot, deflection interference, and halo (figure 2 [7] and [8]).

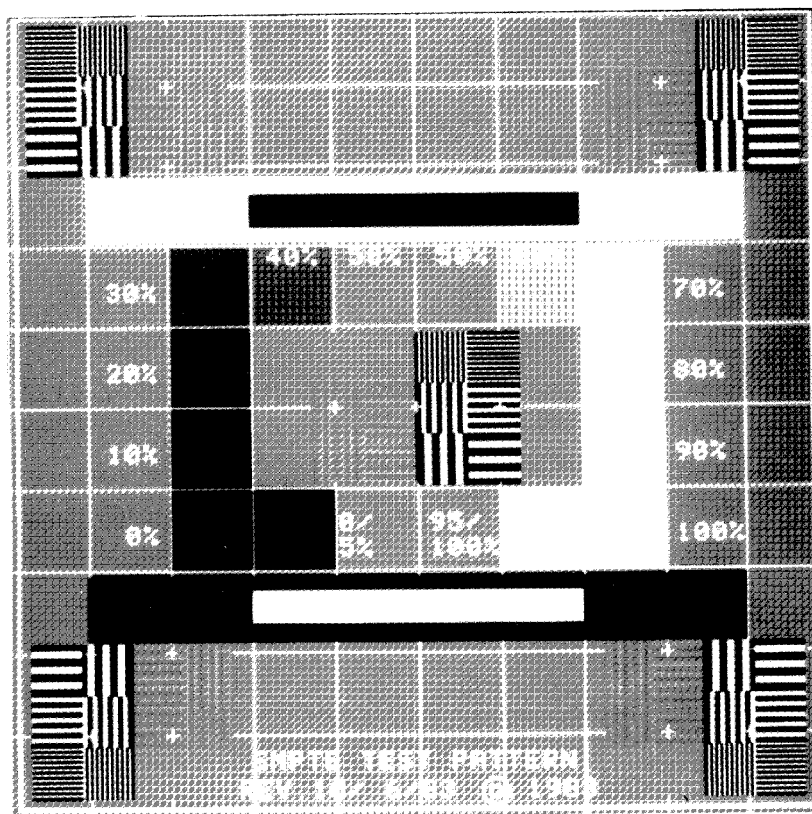


Figure 1 – Video hard-copy camera image of test pattern

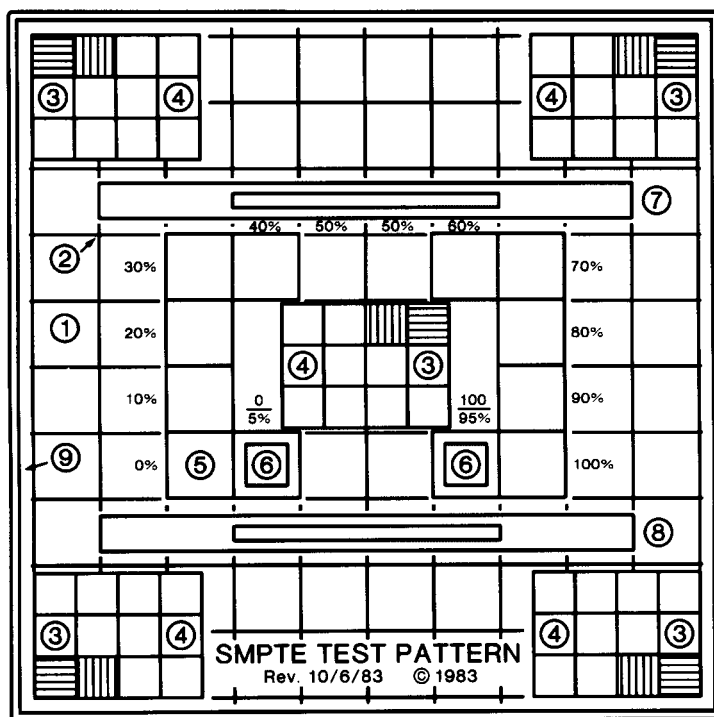


Figure 2 – Schematic drawing of test pattern in a square format