

SMPTE RECOMMENDED PRACTICE

Mapping of Pictures in Wide-Screen (16:9) Scanning Structure to Retain Original Aspect Ratio of the Work



Page 1 of 3 pages

1 Introduction and scope

1.1 Introduction

The 16:9 aspect ratio employed by digital television standards affords a possibility of avoiding the use of pan and scan techniques when adapting works produced in aspect ratios other than 16:9. The ability to use letterbox and sidebar techniques allows for portrayal of the work in the form originally intended by the artists who created the original work.

1.2 Scope

This practice describes a method of mapping images originating in aspect ratios different from 16:9 into a 16:9 scanning structure in a manner that retains the original aspect ratio of the work.

2 Definitions

For the purposes of this practice, the following definitions of terms apply:

2.1 letterbox: An image mapped into the total 16:9 display area such that the full width is utilized, but the full height is not (see figure 1).

2.2 sidebar: An image mapped into the total 16:9 display area such that the full height of the display area is utilized, but the full width is not (see figure 2).

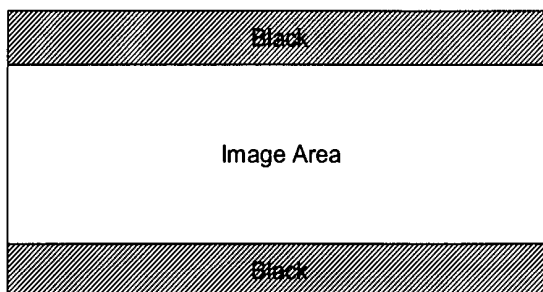


Figure 1 – Letterbox

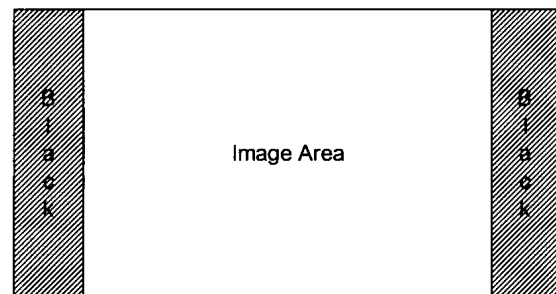


Figure 2 – Sidebar image mapping

3 Mapping images into the scanning structure

3.1 Works shall be mapped into the 16:9 aspect ratio scanning structure as shown in algorithm 1.

3.2 Works shall be mapped into the 16:9 aspect ratio so that the center of the original image corresponds with the center of the 16:9 image.

Algorithm 1

Calculation of the pixel mapping:

Let:

A = the aspect ratio of the film (ratio of width to height, expressed as a decimal)

P_h = number of horizontal pixels in scanned film image

P_v = number of vertical pixels in scanned film image

TV_h = number of horizontal pixels in television display system

TV_v = number of vertical pixels in television display system

If: $A < 16/9$ (1.78)

Then: $P_h = TV_v * A$

$P_v = TV_v$

If: $A > 16/9$ (1.78)

Then: $P_h = TV_h$

$P_v = TV_h / A$

Example:

Transfer a 1.85:1 image using SMPTE 274M (1920 × 1080)

Given:

$A = 1.85$ (greater than 1.78)

$TV_h = 1920$ (number of horizontal pixels in television display system)

$TV_v = 1080$ (number of vertical pixels in television display system)

Therefore:

$1.85 > 1.78$ (true)

so $P_h = TV_h = 1920$ horizontal pixels in target image

and $P_v = TV_h / A = 1038$ vertical pixels in target image

NOTES

1 This leaves the determination of the original aspect ratio to the user of the film. Fractional results should be rounded up to the next highest pixel value.

2 Examples of common film formats are given in table 1.