

RECOMMENDATION ITU-R BR.1441*

**COMPROMISE SCANNED AREA DIMENSIONS FOR TELEVISION
FROM 35 mm WIDE- SCREEN FILMS**

(Question ITU-R 240/11)

(2000)

The ITU Radiocommunication Assembly,

considering

- a) that the scanned area dimensions listed in Recommendation ITU-R BR.1374 are:
 - a.1) maximum projectable image area dimensions corresponding to ISO standards for cinematographic film intended for optical projection;
 - a.2) maximum safe areas to be scanned from film specially shot and framed for television;
- b) that the scanned areas for wide-screen films given in Recommendation ITU-R BR.1374 are based on one of the principles:
 - b.1) to fill the television display with a full height central area of the film image (full screen);
 - b.2) to show the full width of the film with black areas top and bottom of the television display (letterbox);
- c) that for some wide-screen films, a compromise, between the full-screen and letterbox scanning areas, may be preferred for artistic or heritage reasons;
- d) that there should be some recognized image aspect ratios and related image area dimensions that can be used as compromise alternatives for telecine scanning,

recommends

- 1** that, if required for artistic or other reasons, the following compromise presentation formats for wide-screen film on television should be used:
 - For 4:3 television: 14:9, 16:9, 18:9
 - For 16:9 television: 18:9;
- 2** that those who prefer to use a compromise scanning area for wide-screen films should use one of the scanning areas listed in Annex 1:
 - Table 1 for 4:3 television systems;
 - Table 2 for 16:9 television systems;
- 3** that a suitable test film should be used to align telecine equipment according to the recommended scanned areas (a suitable 35 mm test film is being prepared at the British Kinematograph Sound and Television Society (BKSTS), London, United Kingdom (<http://www.bksts.com>));
- 4** that it should be taken into account that the dimensions and diagrams in this Recommendation relate to the image content of the transmitted signal. The possible cropping of the image due to over-scanning in the receiver is discussed in Annex 1, § 1.

* This Recommendation should be brought to the attention of the International Standardization Organization (ISO).

Compromise scanned aspect ratios for 4:3 and 16:9 television

1 Background

Many of the wide-screen films produced in the past and at present for cinema presentation exist in formats with aspect ratios that are different to those used on television. These film aspect ratios include:

- 1.66:1 – non anamorphic, wide-screen;
- 1.85:1 – non anamorphic, wide-screen;
- 2.39:1 – anamorphic, wide-screen.

When these wide-screen film formats are scanned for 4:3 and 16:9 television, two basic principles are applied:

- The full screen method fills the TV screen. The full height of the film image is shown but image area at each side will be cropped.
- The letterbox method reproduces the film in its intended presentation format but leaves black areas at top and/or bottom of the television screen.

In different countries, one or the other method is established and preferred by the audience.

Some broadcasters have adopted a third, compromise, method to present some wide-screen films on television. This method is based on scanning between the full-screen and the letterbox presentations. There will be smaller black areas top and bottom of the TV screen than in full letterbox presentation and less of the film image area each side will be cropped than in the full screen presentation.

This Recommendation specifies a set of compromise aspect ratios and the corresponding image area dimensions to be scanned from 35 mm wide-screen motion picture films. It is intended to be a reference document for compromise transfer from telecine of programmes intended for transmission, exchange or distribution.

2 Television presentation

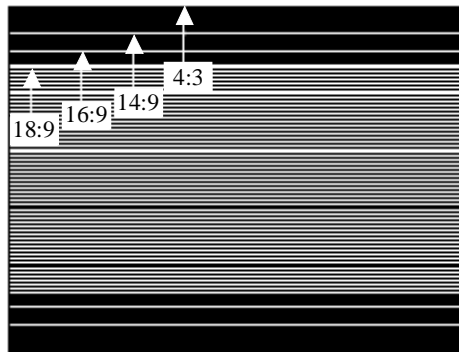
The recommended compromise aspect ratios for reproduction on television are:

Television system	Recommended compromise aspect ratios			
4:3 television	14:9	16:9	18:9 (2:1)	(See Fig. 1)
16:9 television			18:9 (2:1)	(See Fig. 2)

Wide-screen films reproduced with one of these compromise aspect ratios will show the full height of the film image but some of the film image area will be cropped each side. In addition, there will be black areas at the top and/or bottom of the television display.

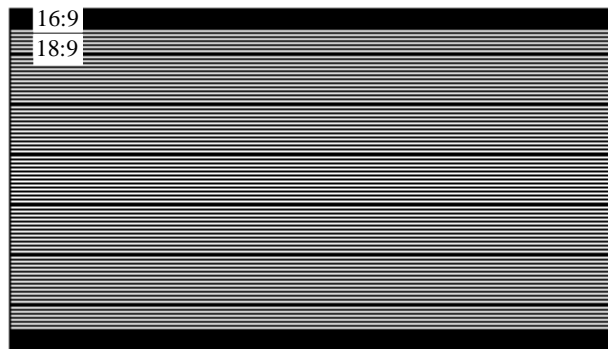
Over-scanning in traditional cathode ray tube display results in some cropping of the transmitted image. The actual image content and the size of the black bars on the screen will depend on the amount of over-scanning. Receivers typically crop 5-10% of the overall image. In an image displayed full-screen, both the image height and width will be cropped. In a letterbox display, the width will be cropped but only part of the black bars will be cropped from the height. This will result in a change in the aspect ratio of the displayed image. However, future flat screen displays are not expected to suffer from the over-scanning effect and therefore will display the transmitted image without cropping.

FIGURE 1
Compromise aspect ratios for 4:3 television systems



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FIGURE 2
Compromise aspect ratios for 16:9 television systems



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3 The scanning principle

Following Recommendation ITU-R BR.1374 – Scanned area dimensions from 16 mm and 35 mm cinematographic film used in television, the wide-screen images on films should be scanned according to the international standards for projected image height. The related scanned width shall be according to the preferred compromise aspect ratio.

4 Reference values for calculating scanned area dimensions

The reference dimensions adopted for calculating the scanned areas for 4:3 and 16:9 television are based on the current ISO Standard for projection of 35 mm cinematographic films (ISO 2907 – Cinematography – Maximum projectable image area on 35 mm motion-picture film – Position and dimensions). The anchor dimensions are:

Format	Standard	Reference dimension (mm)	Derived dimension (mm)	Image centre (mm)
35 mm Academy aperture aspect ratio: 1.37:1	ISO 2907	Image height: 15.29	Image width: 20.95	18.75

Based on the derived width, the calculated image heights for the projection apertures from film are:

Aspect ratio	Height (mm)
1.66:1	12.62
16:9	11.78
1.85:1	11.32
2.39:1	17.53

5 Scanned area dimensions for television






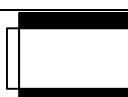
5.1 4:3 television systems

Scanned dimensions for 4:3 television systems are given in Table 1. The relationship between the scanning and film formats is shown in Figs. 3, 4 and 5.

TABLE 1

Film shot and framed for projection: compromise scanned areas for 4:3 television

(Scanned area dimensions from images on film intended for contact printing and projection.
The film material can be a print, an intermediate or camera original.)

Item	Image aspect ratio		Scanned area dimensions (mm)			Appearance	Notes
	Framed for	Displayed on 4:3 television	Width	Height	Centre		
1	35 mm: Academy aperture width						
1.1	1.66:1	14:9 letterbox	19.63	12.62	18.75		1
1.2	16:9	14:9 letterbox	18.33	11.78	18.75		1
1.3	1.85:1	14:9 letterbox	17.61	11.32	18.75		1
1.4	2.39:1	14:9 letterbox	13.63	17.53	18.75		1
1.5	2.39:1	16:9 letterbox	15.58	17.53	18.75		1
1.6	2.39:1	18:9 letterbox	17.53	17.53	18.75		1

NOTE 1 – These dimensions will crop film image area on each side and there will be black areas top and bottom of the screen.

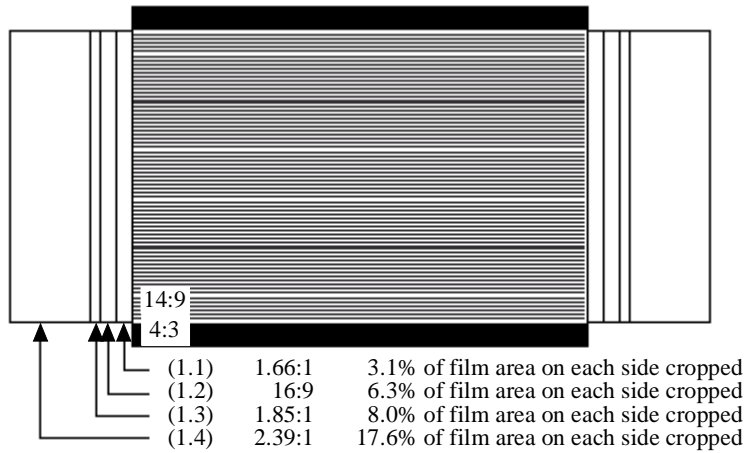


Cropped area on the film image



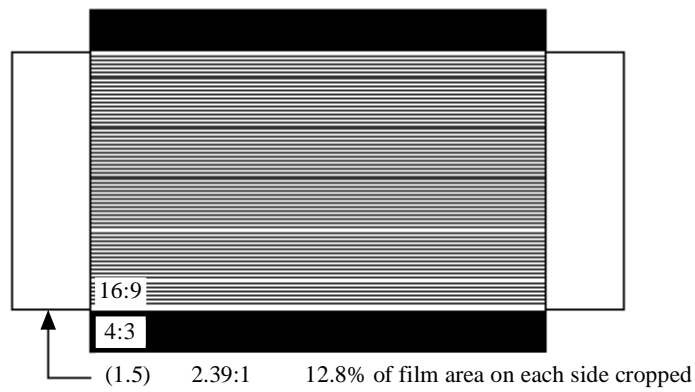
Black area on the television display

FIGURE 3
Compromise scanned areas, 14:9 for 4:3 television



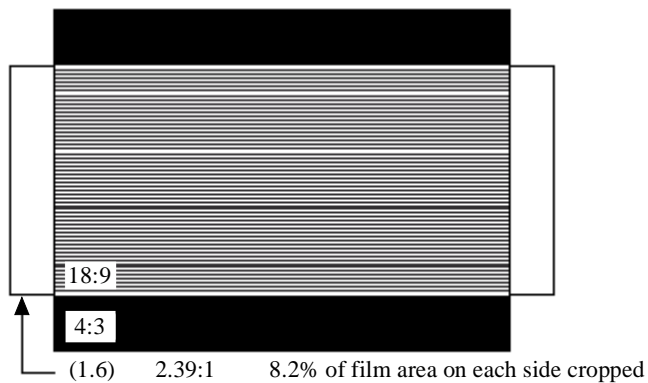
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FIGURE 4
Compromise scanned areas, 16:9 for 4:3 television



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FIGURE 5
Compromise scanned areas, 18:9 for 4:3 television



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5.2 16:9 television systems

Scanned dimensions for 16:9 television systems are given in Table 2. The relationship between the scanning and film formats are shown in Fig. 6.

TABLE 2

Film shot and framed for projection: scanned for 16:9 television

(Scanned area dimensions from images on film intended for contact printing and projection. The film material can be a print, an intermediate or camera original.)

Item	Image aspect ratio		Scanned area dimensions (mm)			Appearance	Notes
	Framed for	Displayed on 16:9 television	Width	Height	Centre		
35 mm: Academy aperture width							
	2.39:1	18:9	17.53	17.53	18.5		1

NOTE 1 – These dimensions will crop film image area on each side and there will be black areas top and bottom of the screen.



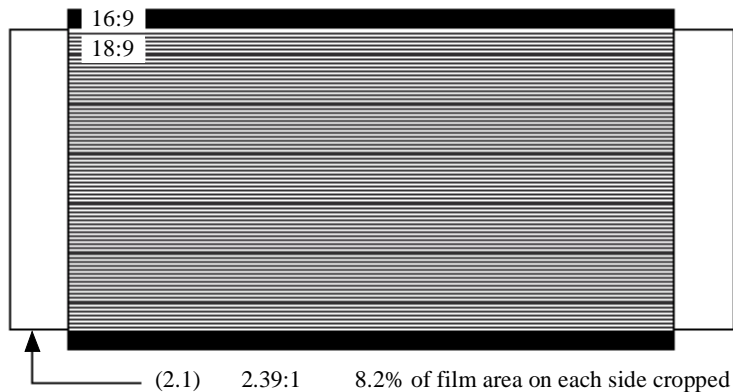
Cropped area on the film image



Black area on the television display

FIGURE 6

Compromise scanned areas, 18:9 for 16:9 television



6 Image area and television scanning

The scanned areas from film should relate to the nominal active picture area of analogue television systems as determined by the blanking given in Recommendation ITU-R BT.470 – Conventional television systems.

For the digital representation of television systems, based on Recommendation ITU-R BT.601 – Studio encoding parameters of digital television for standard 4:3 and wide-screen 16:9 aspect ratios, it is important to note that the horizontal scanned dimension on film should coincide with the central 702 samples of the digital active line (samples 9 to 710).

BIBLIOGRAPHY

EBU [1997] Recommendation R86. Scanned image area dimensions from films for television.

EBU [1998] Recommendation R92. Active line length in analogue and digital 625/50 television systems.

EBU [1998] Recommendation R93. Compromise scanned area dimensions for television from 35 mm wide-screen films.
