RECOMMENDATION ITU-R BR.1440*, **

16:9 VIDEO IMAGES TRANSFERRED TO 35 mm FILM FOR OPTICAL PROJECTION

(Question ITU-R 240/11)

(2000)

The ITU Radiocommunication Assembly,

considering

a) that programmes produced on 16:9 video are transferred to 35 mm film for optical projection;

b) that the 16:9 image on 35 mm film should match the television presentation;

c) that current video to film transfer processes expose a camera film image and current printing and projection processes will crop the exposed image on film by about 4.6% overall;

d) that at the moment, there are no international standards for 16:9 film projection,

recommends

1 that 16:9 video images to be transferred to film for conventional printing should be aligned to expose the image width dimensions according to the International Standard, ISO 2906, for camera exposed area (Cinematography – Image area produced by camera aperture on 35 mm motion-picture film – Position and dimensions). The height of the exposed image should correspond to the aspect ratio of 16:9 (see Table 1);

2 that the film should, if possible, be projected with a projector aperture of 16:9 aspect ratio (see Table 1);

3 that, where possible, when composing 16:9 images on video that may be transferred to film, it should take into account the loss of image area that will occur during the printing and projection processes (see Annex 1);

4 that, when transferring video images that were not originally intended for projection to 35 mm film, the possible loss of image area if the film is projected using an existing cinema projector aperture should be taken into account (see Table 2).

TABLE 1

Standard and proposed dimensions of 16:9 camera aperture on 35 mm film

Aperture	Image width (mm)	Image height (mm)	Reference
Exposure	21.95	12.35	ISO 2906(1)
Projection	20.95	11.78(2)	ISO 2907(3)

(1) ISO 2906 – Cinematography – Image area produced by camera aperture on 35 mm motion-picture film – Position and dimensions.

(2) ISO TC 36 is currently studying the 16:9 aspect ratio for an international projection standard.

(3) ISO 2907 – Cinematography – Maximum projectable image area on 35 mm motion-picture film – Position and dimensions.

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* This Recommendation is intended to replace Recommendation ITU-R BR.713-1, which is hereby deleted.

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

ANNEX 1

Transfer of 16:9 television programmes to 35 mm film for optical projection: image dimensions

1 Background

Video images may be transferred to film for optical projection. This happens in situations where it is convenient to be able to present television programmes on a cinema screen. The more important situation is where the film is the end product in a mixed video and film production process. In particular, this transfer is useful when HDTV is used as an alternative method for feature film production. Different technologies are used to transfer video to film but common to all is the use of traditional printing of a film for projection. The TV aspect ratio of 16:9 is not yet an established standard for optical projection. It is therefore important to be aware of the consequences of merging video and film technologies for optical presentation.

2 General

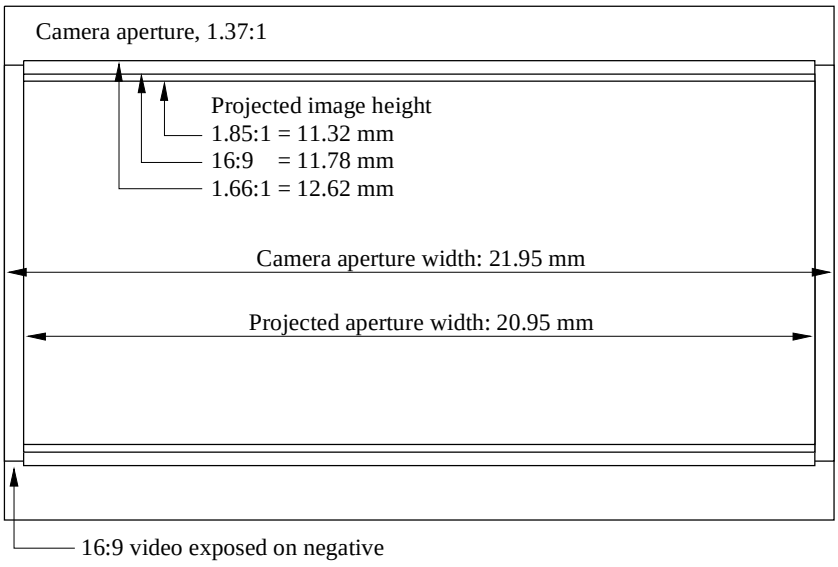
Most equipment for transferring images on video to film is based on transferring the video image from an image surface, or as a beam of light, optically onto a camera film in a camera much like an ordinary film camera. Then the camera film follows traditional film processes of printing and projection.

3 Properties of traditional film printing and projection

The traditional image processes from camera to projection are specified in agreed international standards. These standards take into account the necessary flexibility and safety margins necessary for printing and projection. Therefore there is an overall image cropping from camera negative to projection of about 4.6%. A video image will therefore be reduced about 4.6% overall in this process (see Fig. 1).

FIGURE 1

Projected 35 mm image areas from 16:9 video



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Further cropping may occur when 16:9 video images are optically projected. Each projector is equipped with exchangeable projection apertures. These relate to the different projection standards. The most frequently used wide-screen formats are 1.85:1 and 1.66:1 as well as anamorphic 2.39:1.

There is no standard at present for 16:9 projection and existing apertures may be used instead. Using the 1.85:1 aperture for 16:9 images will crop an additional 4% overall of the image height (see Figs. 1 and 3).

4 Transferring 16:9 video images to 35 mm film

In principle there are two circumstances in which video images may be transferred to film:

– Images shot on video and framed for optical projection on 35 mm film.

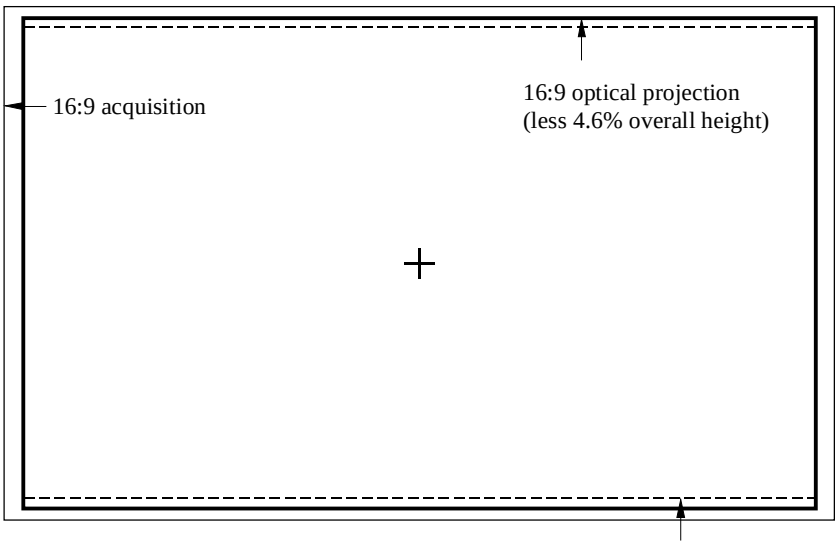
– Programmes on video not originally intended for optical projection.

4.1 Images shot on video and framed for optical projection on 35 mm film

In a video to film production method it is necessary to shoot and frame to the presentation image area. This can be done by showing the projected area in the camera viewfinder. It is therefore recommended that camera viewfinders have markings similar to those in Fig. 2.

FIGURE 2

Video camera viewfinder for programmes intented for projection from 35 mm film



4.2 Programmes on video not intended for optical projection

When images on video are transferred to film without the attention necessary during shooting and post-production, there will be changes to picture content that is projected. It could be important for the programme makers to be aware that:

– The image width will be cropped 4.6% overall.

– The projected image height will depend on the projector aperture used.

At the moment, the 16:9 aspect ratio is not used in cinemas. The current projection apertures that could be used and their effects on picture content are listed in Table 2 and shown in Fig. 3.

TABLE 2

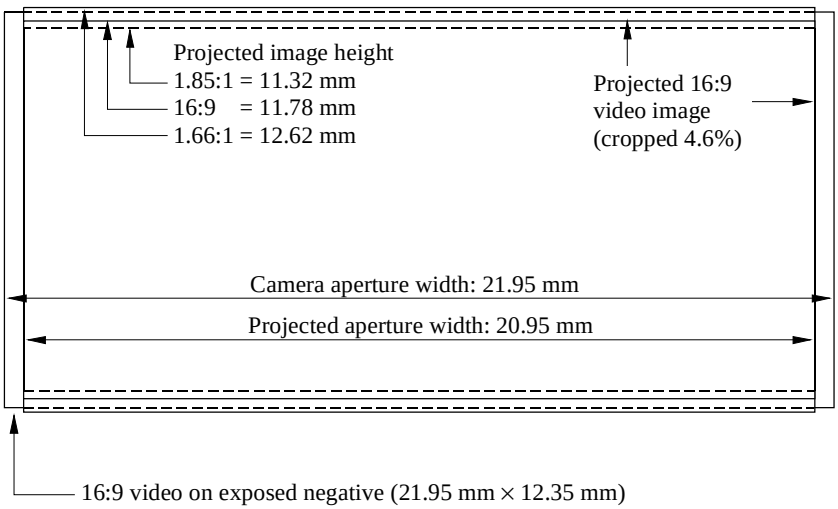
Projected images from 16:9 prints using different projector apertures

Projection format	Projected image		
	Width	Height	Aspect ratio
16:9(1)	Cropped by 4.6% overall	Cropped by 4.6% overall	16:9(1)
1.66:1	Cropped by 4.6% overall	Full height of the printed video image, but overall 2% less than the projected aperture height	1.70:1
1.85:1	Cropped by 4.6% overall	Cropped by 8.3% overall	1.85:1

(1) 16:9 is not yet an internationally agreed standard for projection.

FIGURE 3

Image area reduction when projecting 35 mm film transferred from 16:9 video



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