

RECOMMENDATION 501-2*

APPRAISAL OF PROGRAMMES ON COLOUR FILM
INTENDED FOR TELEVISION USE

(Question 41/11, Study Programme 41A/11)

(1974-1978-1990)

The CCIR,

UNANIMOUSLY RECOMMENDS

1. that the appraisal of films intended for the international exchange of programmes for colour television should be by means of optical projection. The optical projection arrangements must conform to standards of colour temperature and viewing conditions which are defined in § 3 (attention is drawn to the fact that the required viewing conditions are not the same as those which are conventionally accepted for the cinema theatre);
2. that broadcasting authorities should aim to provide a standard of telecine performance such that any film which appears to be of good technical quality when evaluated under the special optical viewing conditions can also be expected to appear to be of good quality when transmitted by colour television. They should not require the film to have any abnormal colour balance or special characteristic to suit a particular telecine specification;

Note – Recommendations concerning the technical parameters of colour motion picture films intended for the international exchange of colour television programmes are contained in Recommendation 265. To make a reliable visual appraisal of the technical quality of a colour motion-picture film intended for television presentation, it is necessary to take into account the different circumstances under which the picture will be viewed when it is so presented.

In colour television, the displayed picture is relatively small; it has a white point corresponding to Illuminant D₆₅ and is normally viewed in familiar surroundings with a considerable amount of ambient light. The field of view of the observer therefore includes not only the television screen but also other objects in the room which provide a constant reference of colour balance and this increases his sensitivity to errors in colour reproduction in the picture. There are also frequent programme changes to signals derived from television cameras and these offer comparisons with a different type of picture source.

In the cinema the environment is dark and there are no external colour references; consequently there is a tendency for the observer to adapt to whatever balance the film may have. Furthermore, it is found that when a bright object, such as the projected picture, is viewed in an otherwise dark field, the eye exercises a contrast-reducing effect upon the viewed picture and the contrast (gamma) in film for cinema presentation is desirably made substantially greater than unity. This effect is much less pronounced under normal domestic television viewing conditions and less contrast, although still greater than unity, is desirable in the television display. Hence, the appraisal of films by optical projection in an otherwise dark review theatre is not the best procedure when films are intended for television presentation.

3. that colour motion pictures intended for television presentation should be appraised in optical review theatres which have been arranged to give viewing conditions more suited to the purpose than the conventional review theatre. The projected picture should be surrounded by a relatively large illuminated area, of a standard fraction of the brightness of whites in the projected picture and a standard correlated colour temperature. The following characteristics are recommended:

3.1 the projection screen should be of such a size that the viewer is seated at a distance of between four times and six times the height of the picture. The absolute dimensions of the screen will depend upon the number of observers that it is desired to accommodate simultaneously. (The experimental results upon which this Recommendation is based are known to be valid for screens having diagonals of between 50 cm and 1.5 m. For larger review theatres, it may be necessary for the broadcaster to carry out special experiments to confirm the consistency of results.);

3.2 either front projection or back projection may be used. The display must have reflectance or transmittance over angles wide enough to ensure satisfactory uniform brightness from all viewing positions;

* The Director, CCIR, is requested to transmit this Recommendation to the ISO, in accordance with Opinion 16.

3.3 the illuminated surround to the projection screen should extend the illuminated field of view symmetrically to an area which is preferably not less than three times the width and three times the height of the projection screen, with the latter placed centrally in this area;

3.4 the illumination of the surround may be from the front on to a reflecting surface or from the rear to a diffusing, translucent material;

3.5 since the white point of colour television systems is either International Committee on Illumination (CIE) Illuminant C or D₆₅, the correlated colour temperature of the light reflected from, or transmitted by, the projection screen under open-gate conditions should be near to 6500 K for the most critical evaluation of television films. However, the range around 5400 K attained by Xenon projection systems will provide an acceptable white point for evaluation purposes;

3.6 the correlated colour temperature of the illumination of the surround should match that reflected from, or transmitted by, the projection screen, under open-gate conditions, to ± 200 K. There should be no significant departure from the black-body locus in either case, neither should the spectral emission have very pronounced peaks;

Note – A simple check of the accuracy of the match of colour temperature between the surrounding illumination and that of the white point of the projection system can be made in the following manner:

The light flux from the projector, *in open-gate condition*, should be attenuated without changing its colour temperature and the brightness of the projection screen should be reduced until it closely approximates to that of the surround. It will then be possible visually to judge the colour match between the light reflected from the projection screen and that from the surround. A satisfactory match may be achieved by adjustment of the colour temperature of the projector or that of the surround; any remaining difference in colour should be significantly less than that created when a 05 CC Wratten colour compensating filter of appropriate colour is placed in the light path of the projector.

3.7 for screens as described in § 3.1, and fitted with illuminated surrounds as described in §§ 3.3 and 3.4, the brightness of whites in the projected picture should lie in the range 51 cd/m² (15 fL) to 68 cd/m² (20 fL). For films made in conformity with Recommendation 265, this corresponds to an open-gate brightness of not less than 115 cd/m² (33.5 fL) and desirably about 140 cd/m² (41 fL);

3.8 the surround to the screen should be illuminated reasonably uniformly to approximately one third that of picture whites, for example, 14 cd/m² (4 fL) to 22 cd/m² (6.5 fL);

Note 1 – The surround brightness is chosen as a compromise between light levels where the observer is most critical of quality and light levels where the eye suffers fatigue.

Note 2 – When it is important to visually appraise the density of colour film intended for the international exchange of television programmes, it is useful to have comparison fields, composed of reference luminance and chrominance areas, placed in the surround in the immediate vicinity of the projection screen (see Annex II).

3.9 care must be taken to ensure that the characteristics of the remainder of the review room do not affect the performance of the projection system, screen and surround. The wall facing the screen should be of low reflectance and the remaining walls, floor and ceilings should not reflect light onto the screen; their total reflectance should integrate approximately to a neutral grey;

3.10 for normal appraisal purposes no ambient light should be used in the room since it would modify the standardizing effect of the surround. It may, however, be considered desirable for special test purposes, to have available a controlled degree of light of appropriate colour temperature which falls on the screen, further to reduce the luminance range.

Note – To create optimum review room conditions which will give the most complete indication of the effects likely to be observed during television presentation, some users may find it desirable to cause a small amount of additional light to fall upon the screen in such a way that it simulates the effects of optical flare in the television system, and possibly that of ambient light in the room where television viewing takes place. The level of light which is intended to simulate optical flare in the television system and its colour temperature will be a function of the picture content; this can simply be produced by some mild diffusing means in the optical projection system. If also desired, the effect of ambient light falling upon the receiver could be simulated by a constant amount of light falling upon the projector screen. In either case, the precise arrangement used would be at the discretion of the user and a suitable choice would be based upon practical experience of the performance of the television system.

ANNEX I

OPTIMUM VIEWING CONDITIONS FOR THE ASSESSMENT OF COLOUR
FILMS INTENDED FOR TELEVISION USE

The appraisal of colour films for television use intended for the international exchange of programmes has frequently involved difficulties due to differing standards of performance in telecine channels. Telecine apparatus exists in a wide range of technical specifications which may vary from a highly complex design incorporating many refinements, both colorimetric and electronic, to a simple uncorrected colour analyser, and many problems of film quality are ultimately found to be attributable to telecine performance. Difficulties also arise because the majority of interests involved in the production of films, particularly film-processing laboratories, do not have television apparatus and are found to carry out their quality control under very variable conditions. It is clearly desirable that when a film is a subject of international exchange, the successive appraisals of its technical characteristics should be carried out in a standard manner.

In addition to its universal availability, optical projection has fewer variables than a colour television system and, until a world-wide standard for telecine performance can be realized, it is to be preferred for appraisal purposes.

Note – European Broadcasting Union (EBU) Technical document 3091-F contains, besides the substance of this Recommendation, examples of installations at present used by members of the EBU.

BIBLIOGRAPHY

CTP [June, 1969] Canadian Telepractices Committee. Recommended practice CTP-1; Viewing conditions for the evaluation of color film for television use. *JSMPT*, Vol. 78, 483-484.

SMPTE [1970] Colour and luminance of review room screens used for 16 mm colour television prints. Society of Motion Picture and Television Engineers (USA). Recommended practice RP41.

ANNEX II

APPRAISAL OF THE DENSITY OF COLOUR FILM FOR TELEVISION USE INTENDED FOR
THE INTERNATIONAL EXCHANGE OF PROGRAMMES, BY MEANS OF OPTICAL PROJECTION

The accuracy of appraisal of colour film density may be considerably improved by means of comparison fields containing reference luminances and chromaticities.

Two of the comparison areas should be visually similar to neutral grey and have luminances corresponding to the film densities of 0.3 and 2.0 which correspond approximately to the picture-white and picture-black levels.

The luminance of the colour areas on the chart should correspond to that of the thematically important image details on the film. Each reference area should be between 1 to 2% of the projection screen area.

Comparison fields may be formed by means of a back-illuminated transparency in an assembly attached to the projection screen [CCIR, 1974-78]. This assembly contains a light source, a light diffuser and neutral grey and colour filters. The correlated colour temperature of the light from neutral greys in the comparison areas should fall between those of the main surround field and the light reflected from the screen under open-gate conditions.

REFERENCES

CCIR Documents

[1974-78]: 11/407 (USSR).
