

## RECOMMENDATION ITU-R BR.265-8\*

**STANDARDS FOR THE INTERNATIONAL EXCHANGE OF PROGRAMMES  
ON FILM FOR TELEVISION USE**

(Question ITU-R 240/11)

(1956-1959-1963-1966-1970-1974-1982-1986-1990-1992-1997)

The ITU Radiocommunication Assembly,

*recommends*

that the films for television use intended for the international exchange of programmes should meet the following definitions and standards:

## 1 Definitions

The types of film referred to in this Recommendation are designated by code words as defined below. The code words should be placed on the identification leader of any film intended for international exchange of programmes and should be used in any related correspondence. The code word consists of a letter and a number (or numbers) followed by a two- or three-syllable word, for example: C 35 COMOPT.

The first letter indicates either monochrome, B, or colour, C, film type. The number, usually 16 or 35, indicates the nominal width of the film in millimetres. The first syllable indicates either a combined sound and picture recording, COM, or separate sound and picture recording, SEP. The last syllable indicates whether the sound recording is magnetic, MAG, or optical, OPT:

- 35 mm colour film with an optical track is C 35 COMOPT;
- 16 mm monochrome film with a magnetic stripe is B 16 COMMAG;
- 16 mm colour film with sound on a separate magnetic film, having one or more tracks, is C 16 SEPMAG.

**1.1** For picture films without sound, the designation is MUTE, for example: B 16 MUTE.

**1.2** If the picture and the sound films have the same width, this is indicated by a single number. If not, then two numbers separated by an oblique stroke are used, the first indicating the width of the picture film, for example:

- 35 mm picture film with magnetic sound track on 16 mm film is 35/16 SEPMAG.

## 2 Types of films recommended for international exchange of television programmes

**2.1** The international exchange of recorded television programmes on monochrome and colour (types B and C) films should be effected by means of one of the following types:

- 1 – 35 COMOPT
- 2 – 16 COMOPT
- 3 – 16 COMMAG
- 4 – 16 SEPMAG
- 5 – 35 MUTE
- 6 – 16 MUTE
- 7 – 35 COMMAG
- 8 – 35 SEPMAG.

An identification of the tracks utilized must be added after the word SEPMAG.

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\* This Recommendation should be brought to the attention of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

*For example:*

- 35 SEPMAG (tracks 1 and 2) or
- 35 SEPMAG (track 1) or
- 35 SEPMAG (tracks 1 and 3) or
- 16 SEPMAG (edge track) or
- 16 SEPMAG (both tracks), etc.

**2.2** Films of types 7 and 8 cannot be exchanged unless there is agreement between the organizations concerned.

NOTE 1 – Although the quality of sound obtainable with 16 COMOPT films is marginal, this type cannot be excluded because of its widespread use. A reduction of the number of recommended types of sound recordings appears to be impossible at present.

**2.3** The fundamental technical parameters of each type listed in § 2.1 should conform to the standards given below.

### **3 Standards common to all types of film**

**3.1** Safety film must be used.

**3.2** Normally the image on the film should be a photographic positive.

**3.3** The picture (frame) frequency should be either 25 or 24 per second. The picture frequency should accompany any reference to programme duration.

**3.4** For accurate reproduction of films in television systems some limitations should be placed on the film density range. In colour systems the colour balance of films should also be defined.

All film densities specified below are measured in singly-diffused light.

The spectral characteristic of the densitometer should conform with ISO Standard 5-1974 for diffuse visual density, Type VIb.

**3.4.1** For monochrome film the density corresponding to television white level should be 0.3 to 0.4 but in the case of dyed-base film the total density corresponding to television white level should not exceed 0.5.

NOTE 1 – Television white level preferably corresponds to a fully-lit object in the scene, having a reflectance of about 60%. This results in reproduction of fully-lit human faces having reflectances of about 15% to 35% at film densities between 0.2 and 0.5 greater than the density corresponding to television white level.

The maximum density of a film is determined by the scene contrast and the film transfer characteristic. The gradation in areas in the film having densities in excess of 1.6 above that corresponding to white level may be distorted or lost entirely.

**3.4.2** For colour film the density corresponding to television white level should be 0.3 to 0.4.

NOTE 1 – Television white level preferably corresponds to a fully-lit object in the scene, having a reflectance of about 60%. This results in reproduction of fully-lit human faces having reflectances of about 15% to 35% at film densities between 0.2 and 0.5 greater than the density corresponding to television white level.

The maximum density of a film is determined by the scene contrast and the film transfer characteristic. Shadow areas, in which the reproduction of detail is not essential to the picture, may have densities in the range of 2.0 to 2.5, but it must be recognized that in such areas both image gradation and colour may be distorted or lost entirely. The density range for optimum colour reproduction is expected to be between 0.5 and 1.7.

Since the white point of colour television systems is either International Commission on Illumination (CIE) Illuminant C or CIE Illuminant  $D_{65}$ , adequate prints of both 35 mm and 16 mm colour films may be obtained if the print is balanced for projection by an illuminant approximating in spectral distribution to a black body of a colour temperature of 5 400 K. The print, when so illuminated, should provide a pleasing reproduction of neutral grey and skin colours.

NOTE 2 – This neutral grey balance is very close to a metameric match with a neutral grey in the scene. (The metameric match of two colours of which the spectral compositions are different is obtained when the visual comparison of these two colours does not permit them to be distinguished by the CIE standard observer.)

**3.4.3** Optimum viewing conditions for films intended for colour television are specified in Recommendation ITU-R BR.501.

**3.5** The dimensions of the films and images recorded thereon should conform to appropriate international standards (see ISO Standard 2939-1975 for 35 mm film and ISO Standard 4243-1979 for 16 mm film).

**3.6** When films are produced for television by conventional cinematographic methods, allowances should be made for the loss of picture area that occurs both in film-scanning and in domestic receivers. The television-scanned area, the action field and the title and sub-title areas should conform with appropriate international (ISO Recommendation R1223) or equivalent national standards.

**3.7** The normal position for the emulsion side of 35 mm films is internationally recognized as facing the light source when projecting on a reflecting-type screen.

For 16 mm film the position of the emulsion is dependent on the process of preparation and either emulsion-to-light source or emulsion-to-objective-lens orientations may be encountered. The actual position of the emulsion should be indicated on the leader and on the label of the film by clear statement or diagram, as defined in ISO Standard 4241-1978.

**3.8** Film splices should be carried out in accordance with appropriate international or national standards.

**3.9** A leader for protection and identification should be attached to each film.

**3.9.1** The minimum length of the protection and identification leader should be 3 m (10 ft).

**3.9.2** The minimum information given on the identification leader should be as follows:

- name of sending organization,
- title of programme,
- code word (see § 1),
- position of emulsion (see § 3.7),
- total programme duration and picture frequency,
- total number of reels,
- reel number,
- duration or length of the film on the reel.

Further information may be given, such as: production methods used, for example, telerecording or a code word according to ISO.

**3.9.3** The identification leader should have the same type of base and perforations as the film to which it is attached. Leaders should be attached to the film in such a manner that the emulsion on both leader and film is on the same side.

**3.10** Films may be transported on flanged reels or on cores as specified in the appropriate international or national standards. The boxes in which films are transported should be identified with labels carrying the same information as the corresponding film leader (see § 3.9.2).

**3.11** The diameter of a flanged reel or the outer diameter of the film on a core should not exceed 380 mm (15 in). It is desirable that 16 mm films exceeding 300 m (1 000 ft) in length should be on flanged reels.

**3.12** Cores and reels intended for films with magnetic sound stripe should be made of non-magnetic material.

## 4 Special standards for certain types of film

### 4.1 COMOPT types

The preferred types of optical sound tracks are variable area, bilateral or double bilateral.

The nominal optical sound-recording characteristic for 35 mm and 16 mm film is that which produces a constant modulation of its optical transmission as a function of frequency within the given frequency range on the sound track of the film when a sine-wave signal of constant amplitude is fed into the input of the recording channel.

The corresponding nominal reproducing characteristic is that which produces a sine-wave output signal whose level is independent of frequency when reproducing a sound-track recorded with the nominal recording characteristic specified above.

NOTE 1 – The preferred method of measurement of the recording characteristic of optical sound tracks is by reference to the output signal of an ideal replay chain. (An ideal replay chain is defined as having a signal output proportional to the modulation of the optical transmission of the sound-track when this is scanned by a slit whose width is negligible in relation to the shortest recorded wavelength on the film.) This condition may be verified by measuring the modulation of the optical transmission of the film by means of a microdensitometer adjusted to have a slit-width which is negligible in relation to the shortest recorded wavelength on the film.

The preferred method of calibrating a reproducing chain is by means of a standard test film recorded with a number of audio sine-waves producing constant modulation of the optical transmission.

#### 4.1.1 35 COMOPT

The location and dimensions of picture frames and sound track should conform with appropriate international standard (ISO Standard 2939-1975).

The useful audio-frequency range is 40 Hz to 8 000 Hz.

#### 4.1.2 16 COMOPT

The location and dimensions of picture frames and sound track should conform with appropriate international standards (ISO Standard 359-1977 and ISO Standard 4243-1979).

The useful audio-frequency range is 50 Hz to 5 000 Hz.

### 4.2 16 COMMAG

4.2.1 The dimensions and position of the magnetic sound stripes should be as given in Fig. 1.

4.2.2 The sound record should be in advance of the centre of the corresponding picture by  $28 \pm 1/2$  frames.

4.2.3 The magnetic stripe should be on the side of the film that faces the light source of a projector arranged for direct projection onto a reflecting-type screen.

4.2.4 The maximum additional thickness due to the magnetic coating should be 0.02 mm (0.0008 in).

4.2.5 If a balancing magnetic stripe is used, it should have the same thickness as the main magnetic stripe. No sound recording should be made on the balancing stripe.

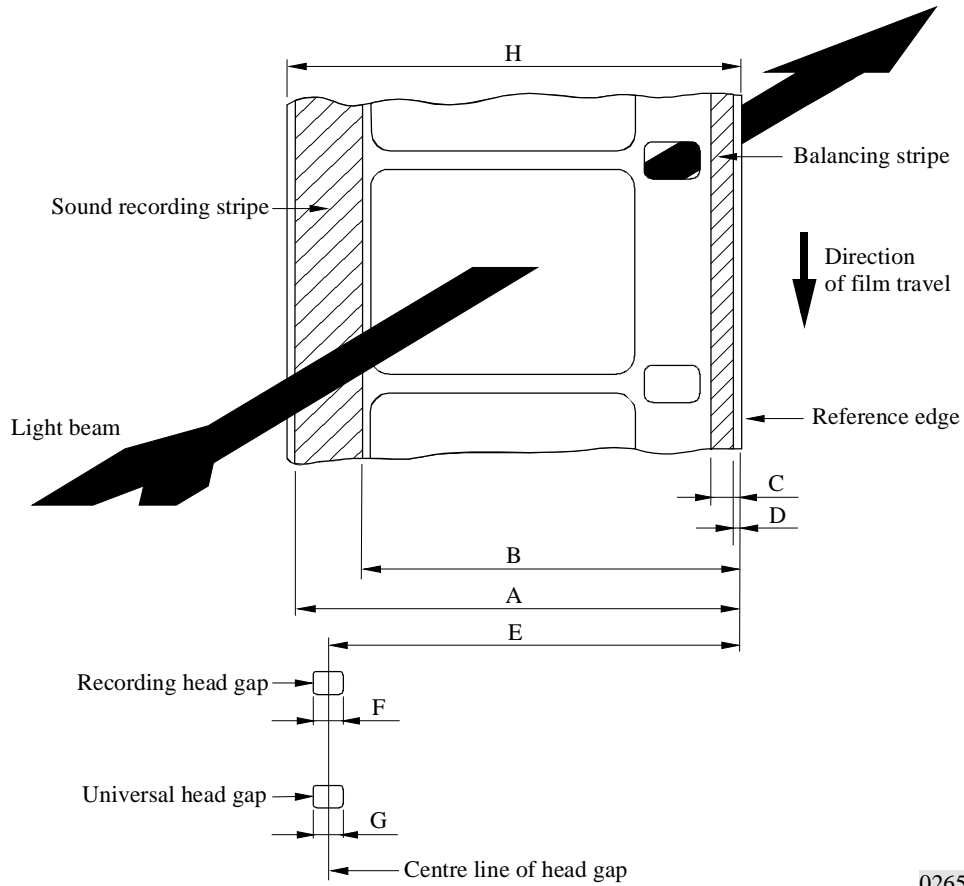
4.2.6 The recording and reproducing characteristics should be those standardized by the ISO (ISO Standard 1188-1974: Specification for recording characteristics for magnetic sound record on 16 mm motion-picture film).

### 4.3 16 SEPMAG

4.3.1 The location and dimensions of sound tracks should conform to ISO Standard 4242-1980, as given in Fig. 2.

4.3.2 The COM and SEP types should not be combined. That is to say, if one or more sound tracks are provided on a separate film, only the SEP tracks should be used for reproduction.

FIGURE 1  
Sound recording on film type 16 COMMAG



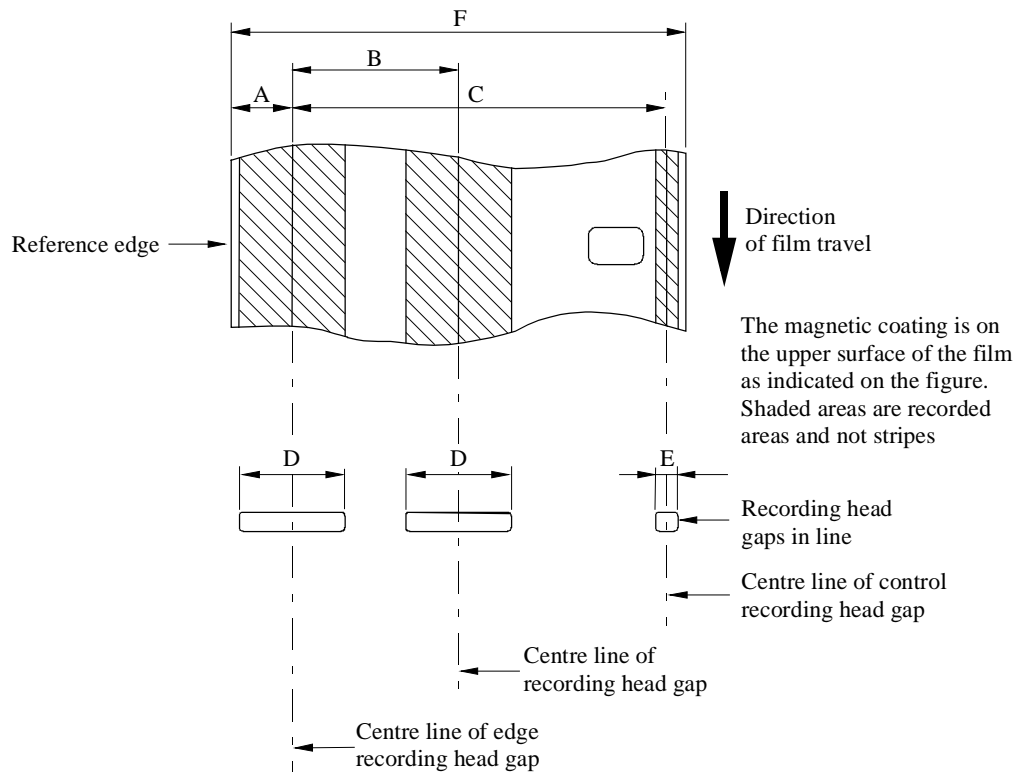
0265-01

Dimensions		
	(mm)	(in)
A (minimum)	15.80	0.622
B	13.25 <sup>0</sup> <sub>-0.15</sub>	0.522 <sup>0</sup> <sub>-0.006</sub>
C	0.80 <sup>0</sup> <sub>-0.15</sub>	0.031 <sup>0</sup> <sub>-0.006</sub>
D (maximum)	0.15	0.006
E	14.55 ± 0.05	0.573 ± 0.002
F	2.35 ± 0.10	0.092 ± 0.004
G <sup>(1)</sup>	2.15 ± 0.10	0.085 ± 0.004
H (reference)	15.95	0.628

<sup>(1)</sup> When it is desired to employ a single head for the dual function of recording and reproducing, the universal head dimensions shall apply.

4.3.3 The recording and reproducing characteristics should be those standardized by the ISO (ISO Standard 1188-1974: Specification for recording characteristics for magnetic sound record on 16 mm motion-picture film).

FIGURE 2  
Sound recording on film type 16 SEPMAG



0265-02

Dimensions		
	(mm)	(in)
A	$2.05 \pm 0.05$	$0.081 \pm 0.002$
B	$5.95 \pm 0.05$	$0.234 \pm 0.002$
C <sup>(1)</sup>	$13.45 \pm 0.05$	$0.529 \pm 0.002$
D <sup>(2)</sup>	$4.0 \begin{matrix} 0 \\ -0.1 \end{matrix}$	$0.157 \begin{matrix} 0 \\ -0.004 \end{matrix}$
E	$0.7 \begin{matrix} 0 \\ -0.1 \end{matrix}$	$0.028 \begin{matrix} 0 \\ -0.004 \end{matrix}$
F (reference)	15.95	0.628

(1) The inch dimension C deviates from the standard conversion practice to reflect the practices in those countries where that system is used.

(2) To prevent the erase head overlapping the film edge, a dimension of:

$$3.8 \begin{matrix} 0 \\ -0.1 \end{matrix} \text{ mm} \left( 0.150 \begin{matrix} 0 \\ -0.004 \end{matrix} \text{ in} \right)$$

is preferred in some countries.

#### 4.3.4 The allocation of tracks on the separate 16 mm magnetic film should be as follows:

- for stereo sound:
  - centre track: left channel,
  - edge track: right channel,
- for independent synchronous sounds:
  - centre track: dubbing or subtitling sound,
  - edge track: original transmission sound.

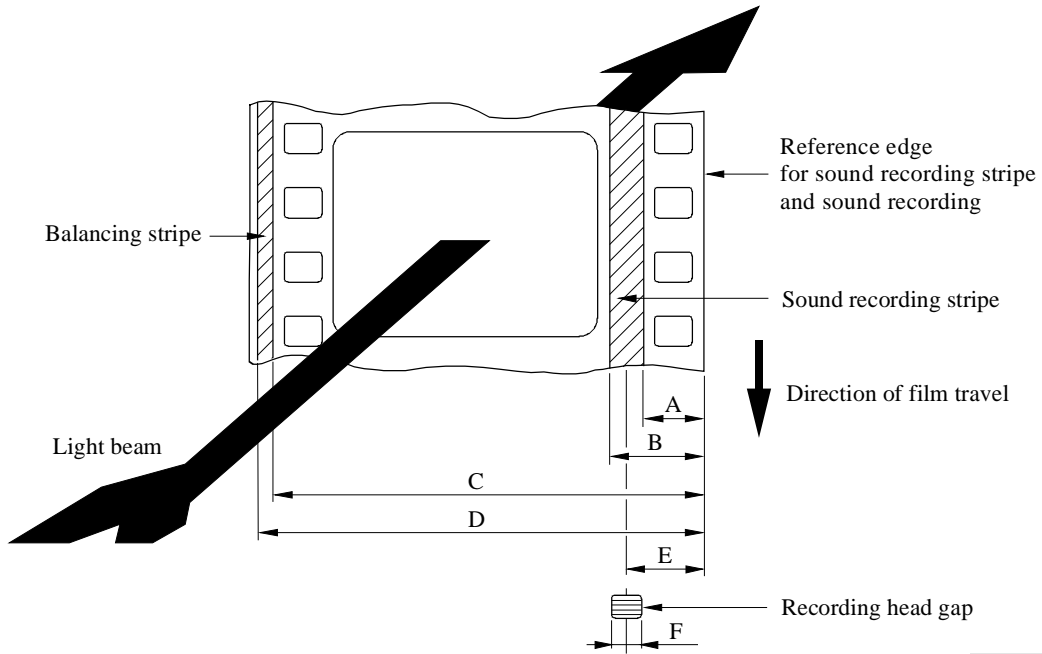
NOTE 1 – An example of a programme leader is given in European Broadcasting Union (EBU) Doc. Tech. 3203.

NOTE 2 – An example of a programme label is given in EBU Doc. Tech. 3211.

4.4 35 COMMAG

4.4.1 The dimensions and position of the magnetic sound stripe should be as given in Fig. 3.

FIGURE 3  
Sound recording on film type 35 COMMAG



0265-03

Dimensions		
	(mm)	(in)
A	5.10 <sup>0</sup> <sub>-0.10</sub>	0.200 <sup>0</sup> <sub>-0.004</sub>
B	7.60 <sup>+0.1</sup> <sub>0</sub>	0.300 <sup>+0.003</sup> <sub>-0.001</sub>
C	33.25 <sup>0</sup> <sub>-0.10</sub>	1.309 <sup>0</sup> <sub>-0.004</sub>
D	34.70 <sup>+0.10</sup> <sub>0</sub>	1.366 <sup>+0.004</sup> <sub>0</sub>
E	6.35 ± 0.05	0.250 ± 0.002
F	2.35 ± 0.05	0.093 ± 0.002

Note 1 – If the magnetic sound stripe increases the thickness of the film, a balancing stripe shall be applied to equalize the thickness of the two edges of the film. The balancing stripe shall be of the same material and thickness as the main magnetic stripe and its location and dimensions should be as referred to in the Figure and given in the Table. For television programme exchange, no programme recording shall be made on the balancing stripe.

4.4.2 The sound record should be  $28 \pm 1/2$  frames behind the centre of the corresponding picture.

4.4.3 The magnetic sound stripe should be on the side of the film towards the lens of a projector arranged for direct projection on to a reflecting screen.

4.4.4 If a balancing stripe is used, it should have the same thickness as the magnetic sound stripe. No sound recording should be made on the balancing stripe.

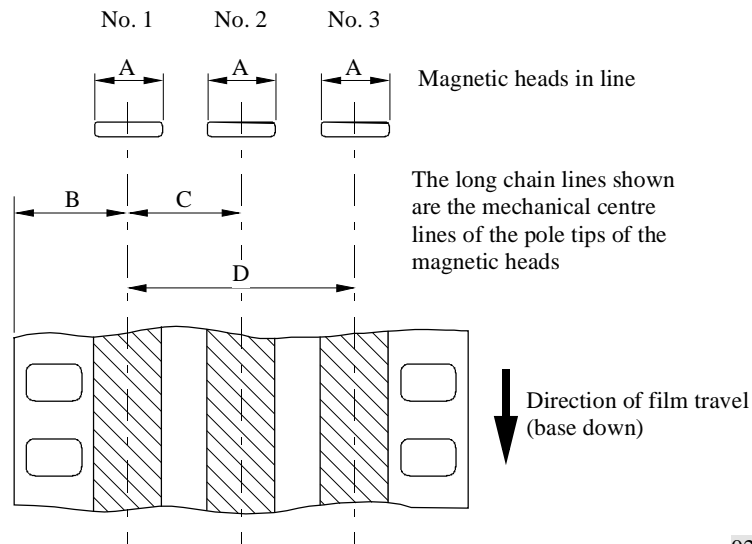
4.4.5 The recording and reproducing characteristics should be those standardized by the ISO (see ISO Standard 1189-1975: Specifications for recorded characteristics for magnetic sound records on 35 mm motion-picture film).

## 4.5 35 SEPMAG

4.5.1 The second (sound) film should be a standard 35 mm magnetic film.

4.5.2 The position of the sound tracks is specified in ISO Recommendation R162. If only one sound track is used, it should be track No. 1 (see Fig. 4). If a second sound track is used, it should be track No. 2.

FIGURE 4  
Sound recording on film type 35 SEPMAG with one or more tracks



0265-04

	Dimensions	
	(mm)	(in)
A	$5.0 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$	$0.200 \begin{smallmatrix} +0.004 \\ 0 \end{smallmatrix}$
B	$8.6 \pm 0.05$	$0.339 \pm 0.002$
C	$8.9 \pm 0.05$	$0.350 \pm 0.002$
D	$17.8 \pm 0.05$	$0.700 \pm 0.002$

*Note 1* – The metric dimensions in the Table are based upon the practice of countries using the metric system, and similarly the inch dimensions follow the practice of those countries using the inch system.

In some instances, the values are not exact conversions, the differences are small and magnetic head assemblies made to either system of dimensions will, for all practical purposes, be interchangeable.



**4.5.3** The COM and SEP types should not be combined. That is to say, if one or more sound tracks are provided on a separate film, only the SEP tracks should be used for reproduction.

**4.5.4** The recording and reproducing characteristics should be those standardized by the ISO (see ISO Standard 1189-1975: Specifications for recorded characteristics for magnetic sound records on 35 mm motion-picture film).

## **5 Absolute polarity of sound recording**

### **5.1 COMOPT**

A positive audio signal (see Note 1) shall correspond to increasing optical transmittance of the sound track.

NOTE 1 – The definition of a positive audio signal is given in EBU Recommendation R50-1988 “Conservation of the polarity of audio signals in radio and television production installations”.

### **5.2 COMMAG and SEPMAG**

The direction of the magnetization in the sound track corresponding to the presence of an instantaneous positive audio signal shall be in the same direction as that of the film movement.

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