SMPTE RECOMMENDED PRACTICE — RP 109-1982

Spectral Response of Photographic Sound Reproducers for 8-mm Type S Motion-Picture Film

1. *Scope*

This practice specifies the spectral response of the photographic sound reproducer light source and receptor as a unit, including any optical filtering that may be interposed.

2. *Spectral Response*

2.1 The peak or maximum response of the combined sound reproducer light source, filter, and receptor shall be at 550 + 130 — 0 nanometers.

2.2 The integrated response of the unit to all wavelengths greater than 800 nm shall be less than 5 percent of the total integrated response measured from 400 to 800 nm.

Appendix

(The Appendix is not a part of this SMPTE Recommended Practice, but is included for information purposes only.)

Dyes used in positive color films for projection usually have a layer order with the magenta dye on top, the cyan dye in the middle, and the yellow dye on the bottom (nearest the support). For reversal color films, the yellow dye layer is usually on top with the magenta dye in the middle, and the cyan dye on the bottom. The production of a sound track recording with maximum resolution is most conveniently accomplished in the top dye layer with progressive spread as the sound track image lies further below the top surface. Therefore, the magenta dye layer is not only the most favorably located single layer for reproduction with good resolution but also the dye layer which contributes the maximum to visual image resolution. The absorption maximum for magenta dye is approximately 550 nm.

Photoreceptors having a maximum response of 550 nm and a useful output signal level leading to a sufficient signal-to-noise ratio have not been demonstrated. The signal-to-noise ratio may be improved by optical filters which remove the longer wavelengths; however, the maximum response of approximately 680 nm does not fully utilize the best capabilities of existing films.

Dyes used in color films often have a relatively high transmission for wavelengths greater than 800 nm. Dirt and other film support imperfections may have an effective optical density, which is relatively high at all wavelengths including those greater than 800 nm. The purpose of limiting the spectral response of the sound reproducer is to use advantageously the absorption of the dye image to modulate the scanning beam while obtaining the minimum contribution from dirt particles and other nonfunctional absorbers. This provides nearly the maximum signal-to-noise ratio of which the dye record is capable.

A tungsten filament light source emits its peak energy and a typical silicon photoreceptor is most sensitive at wavelengths of about 850 to 1000 nm. Filters that transmit energy for wavelengths shorter than 800 nm and reflect or absorb wavelengths longer than 800 nm can be used to introduce a bandpass limitation that provides the response specified in Sec. 2 in a reproducer employing a tungsten filament source and a conventional silicon photoreceptor.

Approved 7 November 1982

PROPOSED SMPTE RECOMMENDED PRACTICE — RP 120

Measurement of Intermodulation Distortion in Motion-Picture Audio Systems

1. *Scope*

This practice specifies the technique of measuring, by the intermodulation method, the signal distortion introduced by motion-picture audio systems.

2. *Test Method*

2.1 An arrangement of apparatus as shown in Fig. 1 may be used for the measurement of intermodulation distortion.

2.2 The signal supplied to the audio system under test shall consist of a linear combination of a low frequency, nominally 60 Hz; and a high frequency, nominally 7000 Hz. The amplitude of the high-frequency signal shall be 12 ± 1 db below that of the low frequency. The test signals shall be not more than ±3 percent from the nominal frequencies to be used. Neither frequency shall contain more than 0.5 percent harmonic distortion. The peak amplitude of the complex wave at either the input or the output of the audio system under test shall be specified along with the measurement results.

3. *Test Equipment*

3.1 A block diagram of an acceptable intermodulation analyzer is shown in Fig. 2. The output of the analyzer shall be calibrated to provide an indication of percentage modulation of the high-frequency component after removal of the low-frequency component. The meter should be sensitive to modulating frequencies in the range from approximately 10 to 400 Hz.

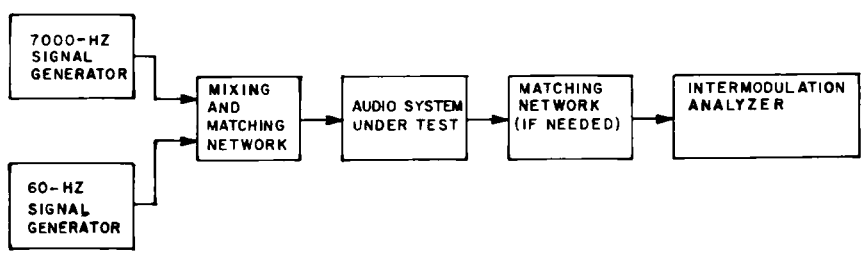

Fig. 1

Arrangement of Intermodulation Test Apparatus to Determine Distortion in Audio Systems

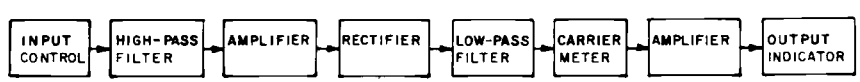

Fig. 2

Acceptable Intermodulation Analyzer

Appendix

(The Appendix is not a part of this SMPTE Recommended Practice, but is included for information purposes only.)

The method of measuring distortion by intermodulation was originally developed as a means for controlling the quality of variable-density audio tracks. Previous documents described the use of intermodulation tests for this purpose. Variable-density audio tracks have now become obsolete. However, a variation of the original intermodulation test, with a high frequency of 7000 Hz instead of the original 2000 Hz, is commonly used in the measurement of distortion in audio systems. It is this version of the test which is described in this practice. Those wishing to use the intermodulation test for control and evaluation of variable-density audio tracks are urged to consult the references listed below.

References:

Frayne, J. G.; Scoville, R. R. Analysis and measurement of distortion in variable-density recording. Jour. SMPE. 32: 648-673; 1939 June.

Frayne, J. G.; Wolfe, Halley. Sound Recording. John Wiley & Sons, New York. Chapter 21; 1949.

LeBel, C. J. An experimental study of distortion. J. Aud. Eng. Soc. 2: 215-218; 1954 October.

MacDonald, J. R. The calibration of amplitude modulation meters with a heterodyne signal. Proc. IRE. 52: 1515-1518; 1954 October.

Read, G. W.; Scoville, R.R. An improved intermodulation measuring system. Jour. SMPE. 50: 162-173; 1948 February.

Warren, W. J.; Hewlett, W. R. An analysis of the intermodulation method of distortion measurement. Proc. IRE. 36: 457-466; 1948 April.

IEC Publication 268-3, Sound System Amplifiers, Clause 20.4, Intermodulation Distortion, pp. 61, 63 and 65.

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 121

Tape Dropout Specifications for 1-in Types B and C Video Tape Recorder/Reproducer

1. *Scope*

   1.1 This practice defines the parameters for tape dropouts encountered in the reproduced FM signal of 1-in Types B and C video magnetic recorder/reproducers.

   1.2 This practice is intended as an aid in the evaluation of dropout characteristics of magnetic tape, not as a specification for recorder/reproducer set-up.

2. *Basic Parameters*

   Basic parameters of the recorder/reproducer are defined in the following documents:

   Type B Recorder/Reproducer

Basic parameters	ANSI C98.15M-1980
Carrier frequencies and pre-emphasis	RP 84-1980
Audio frequency response and operating level	ANSI C98.17M-1980
Record dimensions	ANSI C98.16M-1980
Tracking-control record	RP 83-1980

   Type C Recorder/Reproducer

Basic parameters	ANSI C98.18M-1979
Audio frequency response and reference level	ANSI C98.20M-1979
Record dimensions	ANSI C98.19M-1979
Video record parameters	RP 86-1979
Tracking-control record	RP 85-1979

3. *Definition*

   For the purpose of this document, a dropout is a momentary random reduction of the recovered frequency modulated RF playback signal that is sufficient to cause a substantial impairment in the video output signal of a 1-in Type B or Type C tape recorder/reproducer.

4. *Specifications*

   The signal level reduction to be classified as a dropout must be at least 5 microseconds in duration and have an RF level reduction of 16 dB or more.

5. *Measurement Conditions*

   When dropout measurements are conducted, the pole tip protrusion and tape tension of the video recorder/reproducer shall be as follows:

Pole Tip Protrusions:	Type B	30 ± 5 micrometers
	Type C	60 ± 10 micrometers
Tape Tension:	Tape tension for the recorder/reproducer shall be in accordance with the manufacturer's published specifications.	