SMPTE RECOMMENDED PRACTICE

RP 107-1995
Revision of RP 107-1988

Video and Audio Reference Tape for 1-in Type B Helical-Scan Format

1 Scope

This practice specifies a video and audio reference tape to be used with 1-in type B helical-scan video tape recorders as defined in ANSI/SMPTE 15M. It is to be used for:

indication of video frequency response characteristics for both main and sync channels of the reproducing system;

adjustment of gain of the video reproducing system;

comparison of carrier frequencies of the video recording system;

verification of level and phase of the control track recording system;

adjustment of the gain of the program audio reproducing system;

indication of the audio frequency response of the audio reproducing system;

comparison of the audio recording gain and frequency response characteristics of the audio recording system;

verification of levels and timings of time code information recorded on audio 3 record.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this practice. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this practice are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

ANSI S4.6-1982 (R1992), Method of Measuring Recorded Flux of Magnetic Sound Records at Medium Wavelengths

ANSI/SMPTE 12M-1995, Television, Audio and Film — Time and Control Code

ANSI/SMPTE 17M-1992, Television Analog Recording — 1-in Type B Helical Scan — Frequency Response and Operating Level

ANSI/SMPTE 26M-1995, Video Recording — 1-in Helical-Scan Recorders — Raw Stock for Reference Tapes

ANSI/SMPTE 29M-1995, Television Analog Recording — 1-in Type B Reference Recorders — Basic System and Transport Geometry

ANSI/SMPTE 30M-1995, Television Analog Recording — 1-in Type B Reference Recorders — Records on Reference Tapes

EIA 189-A, Encoded Color Bar Signal

EIA Industrial Electronic Tentative Standard No. 1, Color Television Studio Picture Line Amplifier Output Drawing

IEEE 205-1958 (R1972), Method of Measurement of Television Luminance Signal Levels

NAB Standard for Magnetic Tape Recording and Reproducing (Reel-to-Reel)

Approved March 5, 1993

SMPTE RP 83-1992, Specifications of Tracking Control Record for 1-in Type B Helical-Scan Television Analog Recording

SMPTE RP 84-1992, Reference Carrier Frequencies and Preemphasis Characteristics for 1-in Type B Helical-Scan Television Analog Recording

SMPTE RP 93-1994, Requirements for Recording American National Standard Time and Control Code for 1-in Type B Helical-Scan Video Tape Recorders

3 General specifications

3.1 Recorder

The recorder used to record this tape shall comply with ANSI/SMPTE 29M.

3.2 Dimensions of records

The dimensions of pertinent records making up this test tape shall conform to ANSI/SMPTE 30M.

3.3 Tape stock

The tape stock shall be as specified in ANSI/SMPTE 26M.

3.4 Tracking control signal

The tracking control signal shall conform to SMPTE RP 83 and ANSI/SMPTE 30M.

3.5 Recorded video parameters

The recorded video parameters shall conform to those specified in SMPTE RP 84, except that the tolerances in table 1 are tightened to ± 0.025 MHz and the nominal values in other sections shall be held as close as possible.

3.6 Video signals

Video synchronizing waveforms and video amplitudes shall conform to EIA Industrial Electronics Tentative Standard No. 1 to ensure proper color framing. Blanking width shall be 10.7 μs horizontal and 20 lines vertical.

3.7 Recorded audio flux levels

The record reference level and the record flux level versus frequency shall conform to ANSI/SMPTE 17M, except that the short circuit flux recorded on the tape at each frequency shall be within ± 0.5 dB of the level specified. The tolerance of ± 0.5 dB may be extended to ± 2 dB provided that the manufacturer supplies a calibration chart with the reference tape.

3.8 Audio test calibration

The calibration values in decibels furnished with the reference tape shall represent the levels to be added algebraically to the reproducer output level when the particular reference tape is reproduced. With the addition of these values, the output level of the reproducer will be that which would have resulted if the short circuit flux on the reference tape at a given frequency had been exactly as specified in ANSI/SMPTE 17M.

3.9 Audio flutter

The unweighted flutter of this recording shall not exceed 0.1% RMS, measured in accordance with NAB Standard on Magnetic Tape Recording and Reproducing (Reel-to-Reel).

4 Recorded signals

4.1 Voice announcements

Voice announcements at the beginning of this tape shall reference this practice. Voice announcements shall be recorded at a level approximately 5 dB below reference level. These announcements shall be recorded on audio 1 record and audio 2 record. A video identification signal may be included during the voice announcement section. If no video identification signal is used, sync, burst, and setup or test signal shall be recorded on the video channel during the voice announcement.

4.2 Video signals

Seven types of video signals, as specified in 4.2.1 through 4.2.7, shall be recorded on the tape.

4.2.1 Color bars

A 100% saturated, 75% amplitude color bar signal conforming to EIA 189-A.

4.2.2 Multiburst

A white pulse followed by a series of six sine wave bursts. The white pulse width and the width of each sine wave burst should be 1/7 the width of the scan line between the end of H blanking and the start of H blanking. The white bar level shall be at 100 IRE units ± 1 IRE unit. The axis of the burst shall be at a level of 55 IRE units ± 1 IRE unit. The peak-to-peak amplitude of the bursts shall be 90 IRE units ± 1 IRE unit. The frequencies of the bursts in time sequence shall be 500 kHz, 1.5 MHz, 2.0 MHz, 3.0 MHz, 3.58 MHz, and 4.2 MHz.

4.2.3 Ramp

A continuous ramp extending from 0 to 100 IRE units and repeating at line rate. Color subcarrier having a peak-to-peak amplitude of 40 IRE units ± 2 IRE units shall be added to the ramp signal.

4.2.4 Window and pulses

A window signal, a modulated 12.5T (1.56 μs) pulse, and a 2T (0.25 μs) sine-squared pulse. All signals shall extend from 7.5 IRE units ± 2.5 IRE units to 100 IRE units ± 1 IRE unit. The window shall have a 1T rise time.

4.2.5 Chroma field

A flat, full-field signal corresponding to the cyan bar of EIA 189-A color bars at 75% amplitude.

4.2.6 Gray field

A flat, full-field signal at 50 IRE units.

4.2.7 Vertical interval test signals

Vertical interval test signals will be added to both fields as follows:

Line 17 2T and 12.5T pulses and 1T bar;
Line 19 multiburst.

4.3 Audio signals

Audio signals as specified in 4.3.1 through 4.3.3 shall be recorded on the tape.

4.3.1 Frequency response

This section is to be used to calibrate the frequency response of the audio reproducing system of a video magnetic tape recorder. The test signals shall be recorded at a flux level corresponding to 10 dB below the reference level. The test segment frequencies shall be recorded as follows: 1 kHz (reference), 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 10 kHz, 12.5 kHz, 16 kHz, and 1 kHz (secondary reference). The frequency of each recording shall be ± 3% of its specified value when the tape is reproduced at exactly 245 mm/s. Each frequency shall be preceded by a voice announcement identifying that frequency.

4.3.2 Stereo phase test

A 4-kHz tone shall be recorded at reference level on each channel. The recorded stereo phase error between channels 1 and 2 shall be less than 5°.

4.3.3 Crosstalk test

Tones of 63 Hz, 1 kHz, and 16 kHZ shall be recorded on channel 1 only and then channel 2 only for a test of audio channel crosstalk. These signals shall be recorded at 8 dB above the reference level. A recorded crosstalk calibration shall be supplied with the reference tape.

4.3.4 SMPTE time and control code test

SMPTE time and control code complying with ANSI/SMPTE 12M and SMPTE RP 93 shall be recorded on audio 3 channel.

4.4 Sequence

The video and audio reference signals shall be recorded in the sequence and for the duration shown in table 1.

4.4.1 Time tolerance

The tolerance of all start and end times shown in table 1 shall be ± 5.0 s.

5 Calibration

5.1 Video calibration

5.1.1 Video level measurements

All video measurements of luminance level shall be made in accordance with IEEE 205.

5.2 Audio calibration

5.2.1 Calibration of short-circuit tape flux

The short-circuit tape flux on the test tape shall be determined by means of the calibrated short-gap ferromagnetic core reproducer technique. This technique is described in the following references:

American National Standard ANSI S4.6.

McKnight, J.G. Flux and flux-frequency response measurements and standardization in magnetic recording. Journal of the SMPTE 78:457-472; 1969 June.

Lovick, R.C., Bartow, R.E., and Scheg, R.F. Recording and calibration of super-8 magnetic reproducer test films. Journal of the SMPTE 78:473-481; 1969 June.

Table 1 – Reference signal sequence

Video	Audio 1	Audio 2	Audio 3	Start	End
Multibursts	1 kHz	1 kHz	1 kHz	00.00	01:00
Ramp	63 Hz	63 Hz	63 Hz	01:00	02:00
Window and pulses	4 kHz	4 kHz	4 kHz	02:00	03:00
Color bars	16 kHz	16 kHz	16 kHz	03:00	04:00
Chroma field	Silent	Silent	Silent	04:00	05:00
Multiburst	1 kHz (+8 dB)[1)]	Silent	Time code	05:00	05:15
Multiburst	63 Hz (+8 dB)[1)]	Silent	Time code	05:15	05:30
Multiburst	16 kHz (+8 dB)[1)]	Silent	Time code	05:30	05:45
Multiburst	Silent	1 kHz (+8 dB)[1)]	Time code	05:45	06:00
Ramp	Silent	63 Hz (+8 dB)[1)]	Time code	06:00	06:15
Ramp	Silent	16 kHz (+8 dB)[1)]	Time code	06:15	06:30
Ramp	Silent	Silent	Time code	06:30	07:00
Window and pulses	Frequency response (--10 dB)[1)]	Frequency response (--10 dB)[1)]	Frequency response (--10 dB)1)	07:00	08:00
Color bars	Frequency response (--10 dB)[1)]	Frequency response (--10 dB)1)	Frequency response (--10 dB)[1)]	08:00	09:00
50 IRE gray field	Frequency response (--10 dB)[1)]	Frequency response (--10 dB)1)	Frequency response (--10 dB)[1)]	09:00	10:00

NOTE -- Frequency response sequence: 1kHz (reference), 30 seconds; each tone, 12 seconds; and final 1 kHz (secondary reference), 18 seconds.

[1)]Relative to reference level.

Annex A (informative)
Bibliography

ANSI/SMPTE 15M-1992, Television Analog Recording — 1-in Type B Helical Scan — Basic System Parameters