

## The SMPTE, 1916 to the Present

The SMPTE completed its 65th year in July 1981 — 65 years of continuous opportunity for motion-picture, television, and allied photographic engineers to exchange ideas and information and stimulate the technical progress that has kept engineering several paces ahead of all other developments in both the motion-picture and television industries. The scope of the Society has been expanded from motion pictures to television and photo-instrumentation and other areas of photographic science and engineering.

During these 65 years the Society's objectives have remained

- Advancement in the theory and practice of engineering in motion pictures, television, and allied arts and sciences;
- Establishment of standards and practices employed therein;
- Maintenance of high professional standing among its members;
- Guidance of students and the attainment of high standards of education; and
- Dissemination of scientific knowledge by publication.

Information about membership in the Society, a list of its publications, an index to motion-picture and television standards, and a catalog of test films are available from Society headquarters.

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# STANDARDS AND RECOMMENDED PRACTICES

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### Approved SMPTE Recommended Practices

Two SMPTE Recommended Practices were approved by the Society's Board of Governors on July 16, 1981: RP 101-1981, Requirements for Recording American National Standard Time and Control Code on Quadruplex Video Tape Recorders; and RP 102-1981, Frequency Response and Operating Level of Recorders and Reproducers for Audio 2 Record for 2-in Quadruplex Video Magnetic Tape Operating at 15 and 7.5 in/s. SMPTE Recommended Practices are available from Society Headquarters for \$1.50 each.

### Approved International Standard

The International Organization for Standardization (ISO) recently approved an International Standard, the technical content of which is published here for your information. ISO 3639-1981, Cinematography — Projection Reels/Spools 75 to 312 mm Diameter for 8 mm Type S Motion-Picture Film — Dimensions and Specifications, is in agreement with American National Standard Dimensions of Projection Reels for 8-mm Type S (Super 8) Motion-Picture Film, ANSI PH22.160-1977. This material is reproduced with permission from the ISO and is copyrighted by the American National Standards Institute, 1430 Broadway, New York, NY 10018, from which complete copies are available.

### Editorially Revised Standards

Two proposed American National Standards are subject to a trial period and public review. The technical content is unaffected, as the modifications are editorial in nature. The changes are being published for your information and comment.

V98.9, Specifications for Color Video Magnetic Tape Leader (Revision of ANSI C98.8-1967 published in the September 1967 *JOURNAL*): (a) Minimum lengths have been specified for each recording format; (b) Color bar time has been established for the program length.

V98.18M, Basic System and Transport Geometry Parameters for 1-in Type C Helical-Scan Video Tape Recording (Revision of ANSI C98.18M-1979 published in the February 1980 *JOURNAL*): (a) The actual lower drum diameter is specified; (b) A new definition for the drum is given.

Copies of the proposals are available from Society Headquarters for \$1.00 each.

Comments should be addressed to Alex E. Alden, Manager of Engineering Services, at Society Headquarters prior to March 1, 1982. The proposals have been submitted to American National Standards Committee V98. Consequently, all comments received from *Journal* publication will be reviewed prior to conclusion of action by the committee. — Alex E. Alden, Manager of Engineering Services.

# SMPTE RECOMMENDED PRACTICE

RP 101-1981

## Requirements for Recording American National Standard Time and Control Code on Quadruplex Video Tape Recorders



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### 1. Scope

This practice specifies the record level and conditions for recording the time and control code, as specified in American National Standard Time and Control Code for Video and Audio Tape for 525 Line/60 Field Television Systems, ANSI V98.12M-1981, on quadruplex video tape recorders which use 2-in tape at 7.5 or 15 in/s recording tape speed.

### 2. Recorder Requirements

The code shall not require any special or unusual adjustments to the recording channel of the audio 2 (cue) track. High-frequency bias, normally on this channel during recording, shall be used.

### 3. Code Position

3.1 The code shall be recorded on the audio 2 (cue) track, the location of which is specified in American National Standard Dimensions of Video, Audio and Tracking Control Records on 2-in

Video Magnetic Tape Quadruplex Recorded at 15 and 7.5 in/s, ANSI V98.6-1981.

3.2 The start of the address shall be as specified in Sec. 3.5 of ANSI V98.12M-1981.

3.3 The position of the address start point along the tape is determined by the position of the audio 2 head as specified in ANSI V98.6-1981.

### 4. Recorded Signal

4.1 The waveform of the code at the input of the recorder shall be as specified in ANSI V98.12M-1981.

4.2 The response of the record channel shall be as specified in Sec. 3.1 of SMPTE Recommended Practice on Frequency Response and Operating Level of Recorders and Reproducers for Audio 2 Record for 2-in Quadruplex Video Magnetic Tape Operating at 15 and 7.5 in/s, RP 102-1981.

4.3 The recording level shall be such as to produce a peak-to-peak short circuit flux level on the tape of at least 600 nWb/m of track width. (See Appendix A1.)

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## Appendix

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

### A1. Flux Level Measurements

Means for measuring the short circuit flux level on magnetic recordings usually are not available to users of audio and video tape recorders. The value recommended in this document may be established by use of reference tapes supplied by the manufacturer of the tape recording equipment. These tapes contain a sine-wave reference level recording on each audio track whose rms short circuit flux level is as specified for the format being used. The recorder is adjusted to record the same level that exists on the reference tape when its volume indicator reads 0 vu. If the recording level of the code is then adjusted so that the volume indicator reads +2 vu, the recorded code will have the required peak-to-peak flux level specified in Sec. 4.3 above. Measurements should be made with a standard volume indicator (vu meter), as specified in American National Standard Volume Measurements of Electrical Speech and Program Waves, ANSI/IEEE Std 152-1953 (R1976). Although the ballistics of the meter are of little importance with respect to the code, the use of a full-wave rectifier and the approximate average reading characteristic of the volume indicator are essential to the accuracy of the procedure.

### A2. Dub Recordings

A2.1 Preferred Method. The preferred method of producing time and control code dubs is by inserting a slaved time code generator in the video and time code signal paths between reproducer and recorder which ensures compliance with ANSI V98.12M-1981. When using this method, the user bit information, if any, will be delayed by two frames due to the length of a complete code group and the mechanical tolerance of audio head gap location specified in each format.

A2.2 Other Methods. Other acceptable methods of producing time and control code dubs are:

A2.2.1 Retlock and Reshape the time code waveform to meet Sec. 6 of ANSI V98.12M-1981. The resulting waveform will not comply with Sec. 3.5 of ANSI V98.12M-1981 thereby allowing build up of video-to-address timing errors on multiple generation dubs.

A2.2.2 Reshape the time code waveform to meet Secs. 6.1 and 6.2 of ANSI V98.12M-1981. Video-to-address timing errors and waveform transition jitter will build up on multiple generation dubs.

A2.2.3 Provide no special time code signal processing. The usefulness of dubs will be limited.

**SMPTe RECOMMENDED PRACTICE**  
**RP 102-1981**  
*Frequency Response and Operating Level of Recorders and Reproducers for Audio 2 Record for 2-in Quadruplex Video Magnetic Tape Operating at 15 and 7.5 in/s*



1. Scope

This practice specifies the frequency response and operating level of recorders and reproducers for audio 2 record (cue) for 2-in quadruplex video magnetic tape recording at 15 and 7.5 in/s (381 and 190.5 mm/s), as defined in American National Standard Dimensions of Video, Audio and Tracking Control Records on 2-in Video Magnetic Tape Quadruplex Recorded at 15 and 7.5 in/s, ANSI V98.6-1981.

2. Operating Level

2.1 Recording and Reproducing Level Indicator. The audio and reproduce levels of the audio 2 record of the quadruplex video magnetic tape recorder shall be adjusted and monitored with a standard volume indicator (vu meter), as specified in American National Standard Volume Measurements of Electrical Speech and Program Waves, ANSI/IEEE Std 152-1993 (R1976).

2.2 Recorder Operating Level. When a quadruplex video tape audio 2 record is recorded from a sinusoidal voltage having a frequency of 1000 Hz, such that the rms short circuit tape flux per unit track width on the record is  $200 \pm 7$  nanowebers per meter of track width, the recording volume indicator shall be adjusted to deflect to its reference level (0 vu) scale mark.

2.3 Reproducer Operating Level. When a tape audio 2 record having an rms sinusoidal flux per unit track width of 260 nWb/m and a frequency of 1000 Hz is reproduced, the reproducing volume indicator shall deflect to its reference level (0 vu) scale mark.

3. Frequency Response

3.1 Recorder Flux/Frequency Response. When a tape record is recorded from a constant voltage level applied to the input terminals of the recording system, the short circuit flux level on the record versus frequency,  $L\phi(f)$ , shall be as given by the following equation:

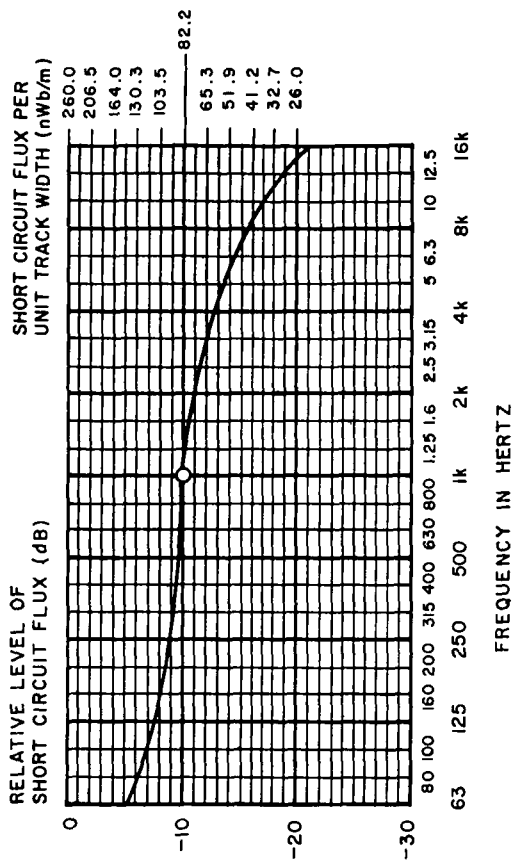
$$L\phi(f) = -9.8 + 10 \log_{10} \left\{ 1 + \frac{(F_1/f)^2}{1 + (f/F_2)^2} \right\} \text{ [dB]}$$

where  $f$  is the frequency at which the response is being computed;  $F_1$  is the low-frequency transition frequency, 80 Hz; and  $F_2$  is the high-frequency transition frequency, 4500 Hz. A graph of this equation is shown in the figure.

3.2 Reproducer Flux/Frequency Response. When a tape audio 2 record having a short circuit tape flux level versus frequency given in Sec. 3.1 is reproduced, the output voltage level of the reproducer versus frequency shall be constant.

4. Field Method of Calibrating Recorders and Reproducers (See Appendix A)

4.1 The practical calibration of a reproducer shall be performed by reproducing the Audio Level and Multifrequency Test Tape defined in American National Standard Specifications for an Audio Operating Level and Multifrequency Test Tape for Quadruplex Video Magnetic Tape Recorders Operating at 15 in/s (381 mm/s), ANSI C98.8-1977, or American National Standard Specifications for an Audio Operating Level and Multifrequency Test Tape for Quadruplex Video Magnetic Tape Recorders Operating at 7.5 in/s (190.5 mm/s), ANSI C98.11-1977. The practical calibration of a recorder shall then be performed by recording on a medium representative of that to be used and comparing the recording so made with the recording on the test tape.



Short Circuit Tape Flux Per Unit Track Width and Relative Level vs Frequency for Audio 2 Record

4.2 The flux/frequency response of a reproducer shall be calibrated by reproducing the Frequency Reproducing Equalizer is adjusted so that output voltage level versus frequency of the reproducer is constant.

4.3 The operating level of a reproducer shall be calibrated by reproducing the Audio Operating Level Test Section of the specified test tape. The reproducing gain control is adjusted so that the volume indicator deflects to its reference level (0 vu) scale mark.

4.4 The flux/frequency response of a recorder shall be calibrated by comparing the tape flux recorded by the recorder (with constant input voltage level)

to the flux recorded on the Frequency Response Test Section of the specified test tape. The recording equalizer is adjusted so that the tape flux level versus frequency of a recorder (including the tape) is the same as that on the test tape.

4.5 The operating level of a recorder shall be calibrated by comparing the tape flux recorded by the recorder when the recording volume indicator deflects to its reference level (0 vu) scale mark to the recording of the Audio Operating Level Test Section of the specified test tape. The recording gain control is adjusted so that, when the recording volume indicator deflects to its reference level (0 vu) scale mark, the recorded tape flux is the same as that on the test tape.