PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 101

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

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 C98.12-1975, 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 C98.6-1973.

3.2 The start of the address shall be as specified in Sec. 3.5 of ANSI C98.12-1975.

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 C98.6-1973.

4. *Recorded Signal*

4.1 The waveform of the code at the input of the recorder shall be as specified in ANSI C98.12-1975.

4.2 The response of the record channel shall be as specified in Sec. 3.1 of Proposed 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.

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.)

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 C98.12-1975. 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 Reclock and reshape the time code waveform to meet Sec. 6 of ANSI C98.12-1975. The resulting waveform will not comply with Sec. 3.5 of ANSI C98.12-1975 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 C98.12-1975. 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.

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 102

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 C98.6-1973.

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 152-1953 (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 260 ± 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 meter 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:

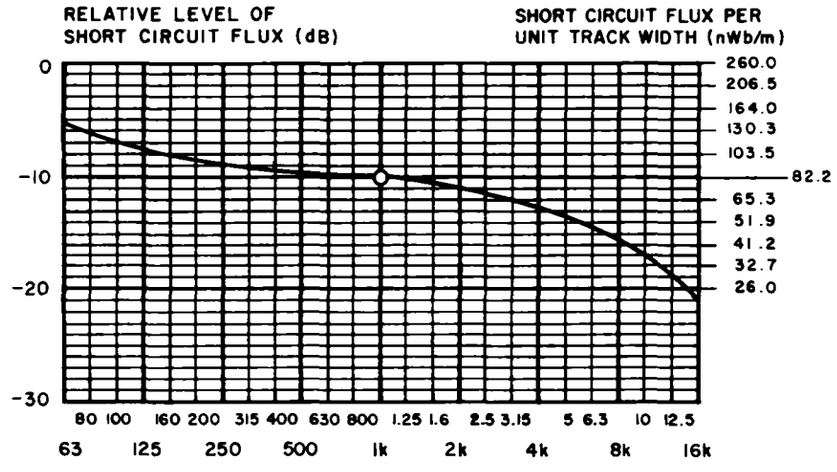
$$L\Phi(f) = -9.8 + 10\log_{10}\{[1 + (F_1/f)^2]/[1 + (f/F_h)^2]\} \quad [dB]$$

where f is the frequency at which the response is being computed; F_1 is the low-frequency transition frequency, 80 Hz; and F_h 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 Reproducesr (See Appendix A3)*

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 Level and Multifrequency Test Tape for Quadruplex Video Magnetic Tape Recorders Operating at 15 in/s (381 mm/s), C98.8, or American National Standard Specifications for an Audio Level and Multifrequency Test Tape for Quadruplex Video Magnetic Tape Recorders Operating at 7.5 in/s (190.5 mm/s), C98.11. 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 Response Test Section of the specified test tape. The 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.

Appendix

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

A1. Although the absolute values of flux are different, the relative response/frequency values given in Sec. 3.1 are the same as those standardized in American National Standard Frequency Response and Operating Level of Recorders and Reproducers for Audio Record One for 2-in Quadruplex Video Magnetic Tape Operating at 15 and 7.5 in/s, ANSI C98.3-1973.

A2. Previous frequency response standards for recorders and reproducers have been given in terms of a standard reproducing system, having an ideal reproducing head followed by a standardized RC equalizing network whose time constant was given.

Because an adequate description of the ideal head and its interconnection to the following network is quite lengthy, it is simpler to specify the system responses in terms of the basic physical quantity for the recorded signal, the short circuit tape flux. The concepts are explained in detail by J. G. McKnight in the paper "Flux and flux-frequency measurements and standardization in magnetic recording," Jour. SMPTE, vol. 78, no. 6, June 1969, pp. 457-472.

Rather than specifying flux/frequency response in terms of admittances of electrical networks, the equation and graph of the response function have been specifically given. The equation does, in fact, describe the response of the previously specified RC equalizing network with time constants of 2000 and 35 microseconds.

A3. It has been the practice of quadruplex video magnetic recorder/reproducer manufacturers to insert a band-elimination filter with maximum attenuation at 240 Hz in the reproducing channel for the audio 2 record. The purpose of this filter is to minimize interference from the adjacent tracking control record. It is necessary to disconnect this filter during response frequency measurements.

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 103

Care and Handling of Video Magnetic Recording Tape

1. *Scope*

This practice specifies the storage, operating, and shipping conditions that ensure maximum life and interchange performance of video magnetic recording tape used in quadruplex or helical-scan recording systems.

2. *Storage Conditions*

2.1 Temperature and Humidity. Temperature and humidity in the storage area should be maintained as follows:

Temperature	21 ± 2°C
Relative humidity	40 ± 5 percent (See Note.)

2.2 Dust. To minimize the accumulation of dust which could be transported later to the operations area, it is recommended that the controlled air to the storage area be filtered. The filtering used shall have an efficiency rating of at least 90 percent, based on the National Bureau of Standards Dust Spot Efficiency Test—Atmospheric Dust.

2.3 Physical Characteristics

2.3.1 To minimize the possibility of the tape taking an unwanted set due to stepped or scattered winding, it is recommended that the tape be given a continuous, smooth, full-length rewind before storage.

2.3.2 The reels of tape should be stored in such a manner that they are supported by the hub only, and protected from dust. The original tape manufacturer's container, which serves this purpose, is recommended.

2.3.3 The outer end of the tape should be secured by means of an adhesive tab which leaves no residue after removal. This material is usually obtained from the tape manufacturer.

3. *Operating Conditions*

3.1 Temperature and Humidity. The temperature and humidity in the operations area should be the same as those in the storage area, i.e., 21 ± 2°C and 40 ± 5 percent relative humidity. Tapes that have been exposed to other atmospheric conditions should be allowed to acclimatize in the normal environment for 24 hours before usage. This applies to cartridge/cassette tapes as well as reel-to-reel tapes.

3.2 Physical Conditions. Ideally, the operations area should be maintained at "clean room" conditions. Since, in most cases, this is impractical, the user should adhere to as many of the following recommendations as possible in order to minimize drop-out, scratch, and head-wear problems:

3.2.1 Air entering the area should be filtered as specified in Sec. 2.2 and maintained at a positive pressure compared to adjacent rooms or hallways.

3.2.2 Floors should be finished so that dust and debris are not generated due to pedestrian traffic; e.g., tile floors should not be waxed and cement floors should be sealed. Indoor-outdoor carpeting with static drain treatment is acceptable and sometimes desirable.

3.2.3 All surfaces of the transport that touch either side of the tape should be cleaned in accordance with the method and frequency recommended by the manufacturer.

3.2.4 Reels of tape should be kept in their containers when not on the machine.

3.2.5 Smoking, eating, and drinking should not be allowed in the operations area.

3.2.6 Take-up reels on reel-to-reel machines should be cleaned at the start of each day to remove dust and debris from the tape winding surface and inside flange surfaces.

3.2.7 The tape should not be fingered or handled except at the ends for thread-up.

3.2.8 Frayed or wrinkled ends of the tape should be cut off.

3.2.9 Cardboard cartons, such as master shipping cartons, should not be ripped open in the operations area.

3.2.10 Reel flanges should not be squeezed together during handling; the reel should be held by the bottom flange or carried by the hub.

4. *Shipping Conditions*

4.1 Winding. All tapes should be given an even uniform winding before shipment, as described in Sec. 2.3.1.

4.2 Containers. Tapes should be shipped in containers designed to withstand rugged handling and still protect the tape. Heavy reels, such as those for 1- or 2-in applications, should be supported by the hub and free to rotate inside the case.

4.3 Fastening. All tapes should be secured at the outer end as specified in Sec. 2.3.3.

NOTE: Raw tape stocks will withstand relatively short-term storage conditions, for example during shipment, of —30 to +50°C temperature and 10 to 90 percent relative humidity. The short-term range of temperature and humidity conditions that a prerecorded video tape can withstand and still have acceptable playback is dependent on the tape and machine format used. This is due to the dimensional changes that take place in the tape which will change the amount of time-base error and tracking error on the prerecorded signal. The machine and tape manufacturer should be consulted for guidelines.

Cinematography — Image area produced by 65 and 70 mm motion-picture camera aperture and maximum projectable image area on 70 mm motion-picture prints — Positions and dimensions

1 Scope and field of application

This International Standard specifies, for 65 and 70 mm motion-picture cameras and projectors, the dimensions of the image area produced by the camera on the film and the maximum projectable image area as well as the image positions relative to the reference edge of the film, and the perforations used to position the film in the camera.

2 Reference

ISO 3023, *Cinematography — 65 mm and 70 mm motion-picture film — Cutting and perforating dimensions.*

3 Dimensions and characteristics

3.1 The dimensions shall be as shown in the figures and given in the tables and apply to measurements of the image as formed on, or projected from, a recently exposed and processed film.

3.2 The angle between the horizontal edges of the camera aperture image and the reference edge of the film shall be 90° ± 30′.

3.3 The angle of the vertical edges of the camera aperture image shall be 0° ± 30′ to the reference edge of the film.

NOTES

1 It is the intent of this International Standard to provide a camera image such that the exposed area will be larger than the maximum projectable image area. Observance of the dimensions given meets this objective without causing double exposure of the area between the frames.

2 It is recognized that, in many cases, the actual film image area that is projected may be smaller than the projectable maximum. It is intended that the actual projected image area be the largest appropriately shaped figure that can be inscribed within the specified dimensions.

3 Since dimension *B* is the minimum width for available projection, it is necessary that for release prints by contact printing or any other system the plus tolerance should be used in the printing system.

4 Image steadiness could be improved if the reference edge is the guided edge as well.