

# SMPTE RECOMMENDED PRACTICE

RP 92-1980

## Specifications for Audio Level and Multifrequency Test Films for 8-mm Type S Sound Reproducers, Magnetic Type



Page 1 of 2 pages

1. Scope

This practice specifies two audio frequency test films to be used for adjusting the sensitivity and frequency response of 8-mm Type S motion picture magnetic sound reproducers; one operating at 24 and the other at 18 frames per second.

2. Test Film Signal

2.1 Frequencies

2.1.1 Type 24 Film. The sound record on the Type 24 film shall be an original recording which will reproduce at the frequencies specified in Sec. 3 when the linear velocity of the film is 24 frames per second or approximately 20 ft (6.1 m) per minute (4 in or 10.2 cm per second).

2.1.2 Type 18 Film. The sound record on the Type 18 film shall be an original recording which will reproduce at the frequencies specified in Sec. 3 when the linear velocity of the film is 18 frames per second or approximately 15 ft (4.6 m) per minute (3 in or 7.6 cm per second).

2.2 Distortion. The total harmonic distortion of the recorded signals shall not exceed 1 percent.

2.3 Sound Record. The location and dimensions of the recorded sound record shall be in accordance with American National Standard Position, Dimensions, and Reproducing Speed of Magnetic Sound Record on 8-mm Type S (Super 8) Motion Picture Film, ANSI PH22.164-1975.

2.4 Signal Fluctuation. The signal levels shall not fluctuate more than  $\pm 0.5$  dB within the test section lengths.

2.5 Flutter. The weighted peak flutter of the sound record shall not exceed  $\pm 0.10$  percent when measured in accordance with American National Standard Method of Measurement of Weighted Peak Flutter of Sound Recording and Reproducing Equipment, ANSI/IEEE Std 193-1971.

2.6 Azimuth. The azimuth of the sound record shall be  $90^\circ \pm 5^\circ$  to the reference edge of the film.

2.7 Signal Identification. Each test section and segment shall be preceded by voice announcements identifying the content. Voice announcements shall be recorded at a level approximately 10 db below program level. (See Sec. 3.4.)

3. Test Sections

3.1 Azimuth Section

3.1.1 Frequency. A frequency of 5000 Hz for Type 18 film or 6300 Hz for Type 24 film  $\pm 2$  percent shall be recorded ahead of all other tones on the film.

3.1.2 Recorded Level. The azimuth frequency shall be a recording having an rms short circuit flux per unit track width of 19.85 nanowebers per meter for Type 18 or 16.08 nWb/m for Type 24.

3.1.3 Duration. The minimum duration of this section shall be 30 seconds.

3.1.4 Purpose. The purpose of this section is to compare reproduce head azimuth before response check.

3.2 Reference Frequency Section

3.2.1 Frequency. A frequency of 400 Hz  $\pm 2$  percent shall be recorded ahead of the Frequency Response Section.

3.2.2 Recorded Level. The reference frequency shall be a recording having an rms short circuit flux per unit track width of 58.50  $\pm 10$  nWb/m (10 dB below program level).

3.2.3 Duration. The minimum duration of this section shall be 30 seconds.

3.2.4 Purpose. The purpose of this section is to establish a comparative reference level for the following frequency response section.

3.3 Frequency Response Section

3.3.1 Frequencies. The following test segment frequencies in hertz  $\pm 2$  percent shall be recorded in the order given:

5000 for Type 18 or 6300 for Type 24 azimuth / 400 reference level / 7500 for Type 18 or 10 000 and 8000 for Type 24 / 6300 / 3150 / 2000 / 1000 / 500 / 315 / 200 / 100 / 50 / 400 program level

3.3.2 Recorded Levels. The values in the table may be expressed as a curve that is the composite of (a) the inverse of the voltage attenuation of a single resistance-capacitance high-pass filter having a time constant,  $\tau_1$ , and (b) the voltage attenuation of a single resistance-capacitance low-pass

Page 2 of 2 pages

filter having a time constant,  $\tau_2$ . The ordinates of this curve, expressed in decibels, are

$$N_{dB} = -20 \log_{10} \frac{1 + \omega\tau_1^2}{1 + \omega\tau_2^2}$$

where  $\omega = 2\pi f$ ,  $f =$  frequency in hertz,  $\tau_1 = 3180 \mu s$ , and  $\tau_2 = 90 \mu s$ .

3.3.3 Flux Level Variation. The film flux level at each frequency in respect to the value specified in Sec. 3.3.2 shall be as follows:

Type 24 Film	Type 18 Film
50 to 100 Hz	50 to 100 Hz
200 to 3000 Hz	200 to 3150 Hz
6300 to 10 000 Hz	500 to 7500 Hz
$\pm 1 -2$ dB	$\pm 1 -2$ dB
$\pm 1$ dB	$\pm 1$ dB
$\pm 1 -2$ dB	$\pm 1 -2$ dB

3.3.1 Duration. The duration of frequency response test segments shall be approximately 10 seconds.

Flux Level Versus Frequency

Frequency (Hz)	Short Circuit Flux (nWb/m)	Relative Level (dB)
6300 azimuth (Type 24 only)	16.08	-11.22
5000 azimuth (Type 18 only)	19.85	-9.39
400 reference level	58.50	0
10 000 (Type 24 only)	10.37	-15.03
8000 (Type 24 only)	12.85	-13.17
7500 (Type 18 only)	13.65	-12.64
6300	16.08	-11.22
5000	19.85	-9.39
2000	29.14	-6.05
1000	39.44	-3.43
500	57.36	-0.14
315	59.33	+0.12
200	60.96	+0.36
100	66.45	+1.11
50	84.18	+3.16
400 program level	185.00	+10.00

3.1 Program Level Section

3.4.1 Frequency. A frequency of 400 Hz  $\pm 2$  percent shall be recorded after the Frequency Response Section.

RP 92-1980

3.4.2 Recorded Level. The program level frequency shall be a recording having an rms short circuit flux per unit track width of 185  $\pm 10$  nanowebers per meter.

3.4.3 Duration. The minimum duration of this section shall be 30 seconds.

3.1.4 Purpose. The purpose of this section is to verify and reestablish the program level after the possible preceding adjustments.

1. Film Stock

1.1 The film stock shall be full-coat, splice-free, of the low-shrinkage, safety type in compliance with American National Standard Specifications for Motion-Picture Safety Film, ANSI PH22.31M-1980, and cut and perforated in accordance with American National Standard Dimensions for 8-mm Motion-Picture Film Perforated 8-mm Type S (Super 8), IR, ANSI PH22.149-1975.

1.2 The film stock shall be conditioned for 10 days at  $20^\circ C \pm 3^\circ$  ( $68^\circ F \pm 5.4^\circ$ ) at a relative humidity of  $50 \pm 10$  percent prior to recording.

1.3 The film shall be recorded and packaged within the temperature and humidity limits specified in Sec. 4.2. The recorded film shall be packaged in a metal can and sealed either with a low-moisture permeability plastic tape or a fabric tape having a moisture barrier.

3. Identification

Each test film shall be suitably identified.

6. Calibration

6.1 Flux. The short circuit flux on the test film shall be determined by means of the calibrated short-gap ferromagnetic core reproducer technique. The technique is described in American National Standard Method of Measuring Recorded Flux of Magnetic Sound Records at Medium Wavelengths, ANSI/IEEE Std 317-1972.

6.2 Level Fluctuation. The signal level measurements specified in Sec. 2.1 shall be measured with a standard volume indicator conforming to American National Standard Volume Measurements of Electrical Speech and Program Waves, ANSI/IEEE Std 152-1953 (R1976).

NOTE: Test films made in accordance with this practice are available from the Society of Motion Picture and Television Engineers.

# SMPTÉ RECOMMENDED PRACTICE

RP 93-1980

## Requirements for Recording American National Standard Time and Control Code on 1-in Types B and C Helical-Scan Video Tape Recorders



Page 1 of 2 pages

### 1. Scope

This practice specifies the recorded signal and the conditions for recording the time and control code on 1-in Types B and C helical-scan video tape recorders 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.

### 2. Format Standards and Practices

American National Standards referred to in this practice for the various formats are given in the table.

### 3. Position of the Code on the Video Tape

- 3.1 The code, if used, shall be recorded on the audio track.

- 3.2 The start of the address for original recording shall be as specified in Section 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 appropriate audio head gap for each format.

#### 1. Recorded Signal

- 4.1 The input waveform of the recorder for original time and control code recordings shall be as specified in ANSI V98.12M-1981.

- 4.2 Response of the recording channel shall be as required to meet the appropriate American National Standard or SMPTÉ Recommended Practice for the audio track being used in each format.

- 4.3 The amplitude of the recorded signal shall be such as to produce a peak-to-peak short circuit recorded flux level on the tape of at least 185 nWb/m of track width.

Specifications	Type B	Type C
Basic System Parameters (lists associated documents)	ANSI C98.15M-1980	ANSI C98.18M-1979
Dimensions and Locations of Records	ANSI C98.16M-1980	ANSI C98.19M-1979
Frequency Response and Audio Recording Levels	ANSI C98.17M-1980	ANSI C98.20M-1979

Page 2 of 2 pages

## Appendix

(The Appendix is not a part of this SMPTÉ 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 values recommended in this document may be established by use of reference tapes. Such tapes usually 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. Usually, 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 then is adjusted so that the volume indicator reads 0 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 The preferred method of producing time and control code dubs is by insertion of a slaved time code generator in the video and time code signal paths between reproducer and recorder to ensure compliance with all sections of ANSI V98.12M-1981 and the sections of this practice for original recordings. When using this method, the user bit information, if any, may be delayed by two or more 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 acceptable methods of producing time and control code dubs are:

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

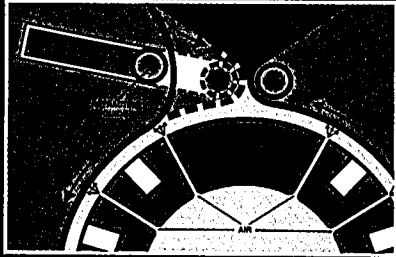
A2.2.2 Reshape the time code waveform to meet Secs. 6.1 and 6.2 of ANSI V98.12M-1981. Video-to-address timing errors and waveform transition jitter will build up on multiple-generation dubs.

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

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• Tape guide retracts for threading ease • Air drum eliminates head contact in shuttle/standby modes

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## 4. Audio and Video Confidence

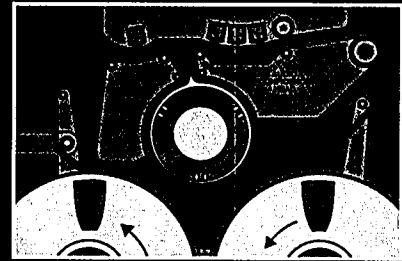
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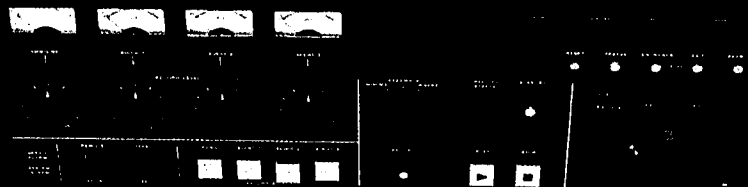
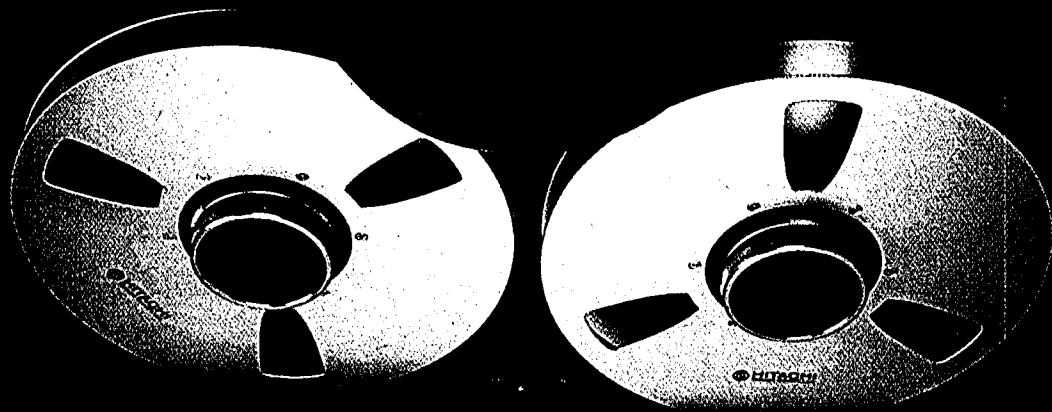
resistance, yielding shuttle times of only 80 seconds end to end.

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**Paul A. Kaufman**—President of Du Art Film Laboratories, Kaufman has made many important technical contributions during his 39 years at Du Art and has presented many technical papers on laboratory practices at SMPTE Conferences. He is a Fellow of the SMPTE. He joined the Society in 1948. He resides in Albertson, N.Y.

**Eric V. Knutsen**—A long-time member of the SMPTE, Knutsen is currently Chairman of the Film Technology Committee, a post he has held since 1978. He has been a member of the U.S.A. delegation to ISO TC/36 Cinematography for three meetings (Williamsburg '73, Paris '76, and Antwerp '79). He is currently Project Engineer for Eastman Kodak Co. He resides in Rochester, N.Y.

**Richard Marcus**—Formerly with the British Broadcasting Corp., he came to the United States in 1966 where he formed Rombex Productions Corp., a subsidiary of Du Art. He is currently engaged in giving monthly seminars on video technology for filmmakers and has given courses at the New York Institute of Photography. A Fellow of the SMPTE, he was Program Chairman for the 122nd Conference. He recently formed his own production facility—*Richard Marcus Productions*.

**Stanley F. Quinn**—Director of Engineering for the Canadian Broadcasting Corp., Quinn has been working in television technology for more than 30 years. He holds a number of patents. A Fellow of the SMPTE, he has served on a number of committees including (currently) the Public Relations Advisory Committee. He was Chairman of the Journal Award Committee for the 1975–1976 term.

**Franklin R. Reinking**—A member of the SMPTE since 1959, Reinking was made a Fellow in 1978. He joined Eastman Kodak in 1957 as a film engineer, and in 1975 he was sent by Kodak to Teheran, Iran, to conduct training seminars at the Iranian Ministry of Culture and Art on the techni-

cal aspects of operating a color motion picture film laboratory. He has been active in the Rochester Section, serving at various times as Membership Chairman, Program Chairman, Publicity Chairman, and Manager. He resides in Pittsford, N.Y.

**Frederick M. Remley, Jr.**—He is Technical Director of Broadcast Services at the University of Michigan. A Fellow of the SMPTE, he is Vice-President of Television Affairs. In 1978 he received the Citation for Outstanding Service to the Society. He has been Chairman of several SMPTE Engineering Committees, including Video Recording, New Technology, and Standards. He resides in Ann Arbor, Mich.

**Joseph Roizen**—He is President of Telegen, a company that he founded some years ago. A Fellow of the SMPTE, he has been a member of the Society since 1957 and has participated in Society affairs at both local and national levels. He has presented more than 25 programs to various local and national groups and has lectured at a number of SMPTE-sponsored workshops and seminars. He has served three terms as Governor and has been Chairman of the Public Relations Advisory Committee. He resides in Palo Alto, Calif.

**Koichi Sadashige**—A Fellow of the SMPTE, Sadashige is Director of Engineering Development for Matsushita Electric Industrial Company, Secaucus, N.J., where he handles the coordination of specialized engineering and marketing efforts between Japan and the United States. He was the recipient of the SMPTE Journal Honorable Mention Award in 1977 and is the author of numerous technical articles, many of which have appeared in the *SMPTE Journal*.

**Israel Switzer**—Vice-President of Switzer Engineering Services, he became a student member of the SMPTE in 1949 when he was attending the University of Alberta and later became a full-fledged member. Before founding his own firm, he was a petroleum geophysics computer and instrument specialist for the United Geophysical Co., and a computer applications analyst for the McBee Company Ltd. He is a member of the Board of Directors of the National

Community Antenna Television Association of Canada. He resides in Mississauga, Ont., Canada.

**Roland Verbrugghe**—A Fellow of the SMPTE, Verbrugghe received the Herbert T. Kalmus Memorial Award in 1977 for his "continuing substantial contributions to the development of color films . . ." His education at the University of Louvain, Belgium, covered a wide range of disciplines — electrical engineering, financial and commercial sciences, and mechanical engineering. He holds a license as architect (Antwerp 1963) and followed a two-year course in nuclear physics with several post-graduate courses in numerical calculus and advanced mathematics. He joined Agfa-Gevaert (Antwerp, Belgium) in 1957 where he is currently R&D Manager in charge of motion picture film, microfilm, and computer film research and development. His home is in Antwerp, Belgium.

**Petro Vlahos**—President of the Vlahos-Gottschalk Research Corp., Vlahos is the inventor of the Sodium Travelling Matte System, the Color Difference Travelling Matte System, the Electronic Composite Printer, and the Hue-Modulated Multichannel Optical Soundtrack. He has served on several SMPTE committees and is currently a member of the New Technology Committee and the Television Video Technology Committee. A Fellow of the SMPTE, he joined the Society in 1949. He resides in Reseda, Calif.

**John W. Wentworth**—A member of the SMPTE since 1957, Wentworth was made a Fellow in 1962. On that occasion one of his colleagues described him as "one of the most brilliant television engineers in the United States." He is the author of *Color Television Engineering*. He is currently Manager of Broadcast Technical Training for RCA. He resides in Haddonfield, N.J.

**Howard E. Wilkinson**—A member of the SMPTE since 1968, Wilkinson is Assistant Regional Engineer for the Canadian Broadcasting Corp. Prior to joining CBC he had been Chief Engineer, Television Services, for the University of Western Ontario in London, Ont. He resides in Scarborough, Ont., Canada.