

American National Standard basic system parameters for 1-in type B helical-scan video tape recording

Approved November 28, 1979

Secretariat: Society of Motion Picture and Television Engineers

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1. Scope

This standard specifies the basic system parameters, i.e., the positions of recording head gaps, the scanning configuration, the axis of rotation of the video head wheel and the appropriate tape tension for 1-in Type B helical-scan video tape recorders for 525/60 monochrome or NTSC color systems.

2. General Specifications

2.1 The dimensions in the metric system are primary. The English equivalents are derived and may deviate from established conversion practices.

2.2 The video modulation system shall be the FM type.

2.3 The tape speed shall be 245.0 ± 1.2 mm/s (9.646 ± 0.047 in/s).

2.4 Tests and measurements made on the recorder to check the requirements of this standard shall be made under the following atmospheric conditions:

Temperature	$23 \pm 1^\circ\text{C}$ ($73 \pm 2^\circ\text{F}$)
Relative humidity	50 ± 2 percent
Barometric pressure	86 to 106 kPa (860 to 1060 mbar)

Conditioning before testing	24 h
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By publication of this standard, no position is taken with respect to the validity of this claim or of any patent rights in connection therewith. The patent holder has, however, filed a statement of willingness to grant a license

3. Video Head and Scanner Parameters

3.1 Two video heads shall be positioned $180^\circ \pm 30''$ apart, β , measured from the gap of video head 1 to the gap of video head 2, as shown in the figure.

3.2 The drum size shall be $50.330 +0 -0.003$ mm ($1.98150 +0 -0.00012$ in).

3.2.1 The nominal rotational speed of the head wheel shall be 150 r/s.

3.3 The video head tip protrusion shall be 0.060 mm (0.00236 in) max from the outer surface of the drum to the end of the head tip.

3.4 The video head gap shall be 90° nominal to the plane of rotation of the video head.

3.5 The control head gap shall be located at point Y (see figure) which lies on a line which is at $90^\circ \pm 15''$, measured from diameter F-G which is the centerline through the plate assembly.

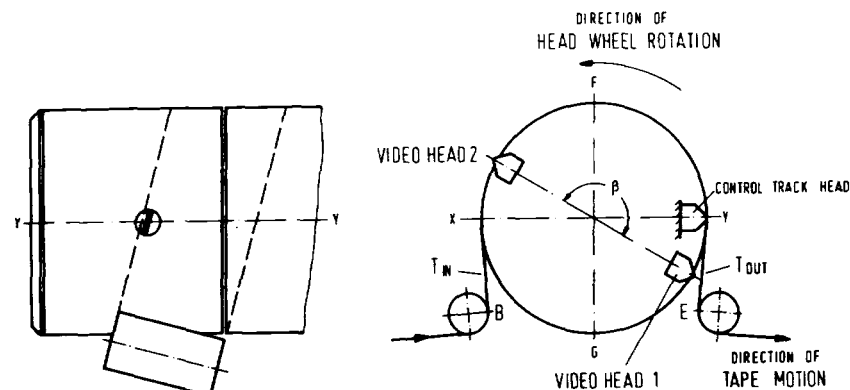
4. Record Tape Tension

The record tape tension shall be as follows:

T_{in} , tape tension in	measured between B and X $= 2\text{N}$ (204 g) $\pm 10\%$
T_{out} , tape tension out	measured between Y and E $= 2.3\text{N}$ (234 g) $\pm 10\%$

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NOTE: In addition to this standard, there are available the following documents relating to 1-in Type B helical-scan video tape recording:

American National Standard Dimensions and Location of Records for 1-in Type B Helical-Scan Video Tape Recording, ANSI C98.16M-1980.

American National Standard Frequency Response and Operating Level of Recorders and Reproducers for Audio

Records for 1-in Type B Helical-Scan Video Tape Recording, ANSI C98.17M-1980.

SMPTE Recommended Practice on Specifications of Tracking Control Record for 1-in Type B Helical-Scan Video Tape Recording, RP 83-1980.

SMPTE Recommended Practice on Video Reference Carrier Frequencies and Pre-Emphasis Characteristics for 1-in Type B Helical-Scan Video Tape Recording, RP 84-1980.

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American National Standard dimensions and location of records for 1-in type B helical-scan video tape recording

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1. Scope

This standard specifies the dimensions and location of the video, audio and tracking control records and the longitudinal separation of the simultaneously-recorded information of the video and audio records, as recorded on 1-in Type B helical-scan video tape recordings.

2. General Specifications

2.1 The dimensions in the metric system are primary. The English equivalents are derived and may deviate from established conversion practices.

2.2 The reference edge for dimensions in this standard shall be the lower edge as shown in the figure.

2.3 Tests and measurements made on the recorder to check the requirements of this standard shall be made under the following atmospheric conditions:

Temperature	$23 \pm 1^\circ\text{C}$ ($73 \pm 2^\circ\text{F}$)
Relative humidity	50 ± 2 percent
Barometric pressure	86 to 106 kPa (860 to 1060 mbar)
Conditioning before testing	24 h

3. Dimensions and Position of the Recorded Records

3.1 The lateral location and dimensions of the video, audio and control tracks shall be in accordance with the figure and table.

3.2 The nominal width of audio records 1, 2 and 3 shall be 0.8 mm (0.031 in).

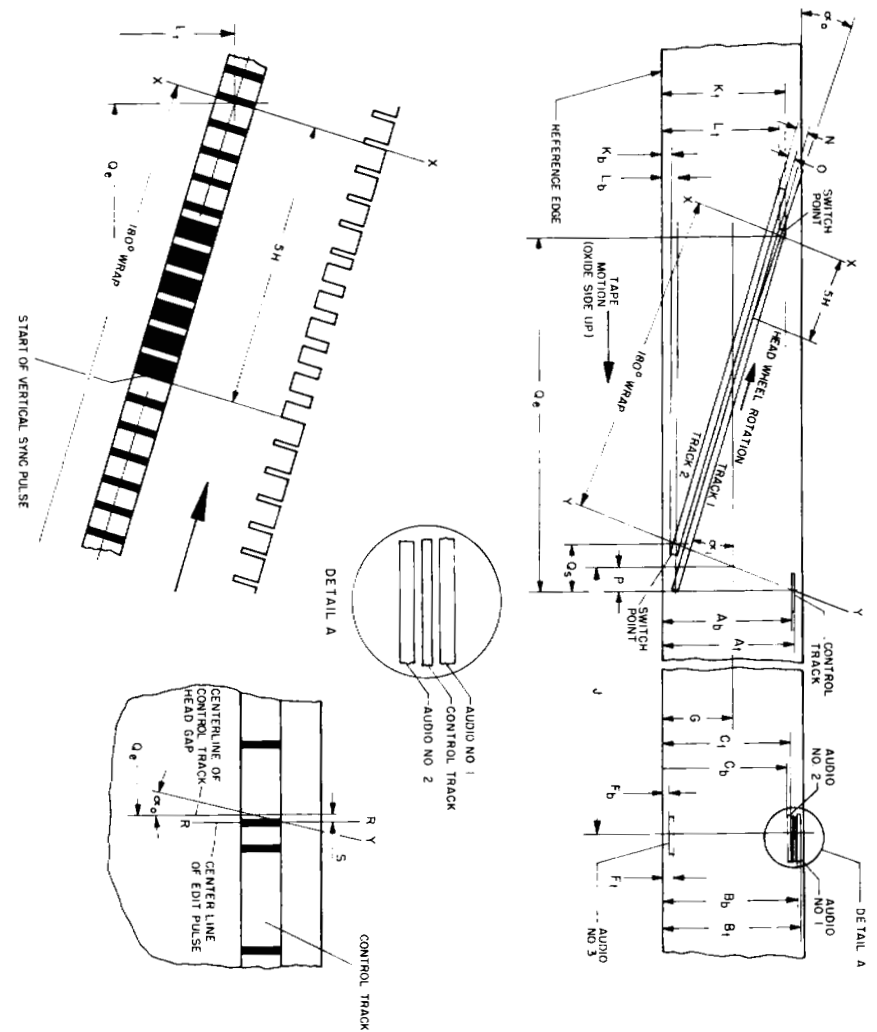
3.3 The audio and cue recordings shall be downstream from the associated video information (See Dimension J in the figure and table).

3.4 The audio recording shall be made so that the azimuth of the recorded record is at an angle of $90^\circ \pm 5'$ to the reference edge of the tape. Audio 1 and 2 head gaps shall be in line.

3.5 The position of the field synchronizing signal on the video record shall be 7.609 ± 0.024 mm (0.29957 ± 0.00094 in) from the intersection of L and X, in the direction of tape travel as measured along the video track.

3.6 The cue signal and time code shall be recorded on the audio 3 track.

NOTE: In addition to this standard, there is available American National Standard Basic System Parameters for 1-in Type B Helical-Scan Video Tape Recording, ANSI C98.15M-1980.



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C98.16M-1980

American National Standard of recorders and reproducers for audio records for 1-in type B helical-scan video tape recording

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ume indicator shall deflect to its reference level (0 dB) scale mark.

2.4 Time Constants. Time constants of 15 μs (ti) and 3180 μs (tr) shall be applied.

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 tape flux level on the record versus frequency, $L_p(f)$, shall be as given by the following equation:

$$L_p(f) = 10 \log_{10} \frac{1 + \left(\frac{f}{f_h}\right)^2}{1 + \left(\frac{f}{f_l}\right)^2} \quad [\text{dB}]$$

where L_p is the relative tape flux level; f is the frequency at which the response is being compared; f_l is the low-frequency transition frequency, 50 Hz; and f_h is the high-frequency transition frequency, 10610 Hz.

3.2 Reproducer Flux/Frequency Response. When a tape 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.

1. Scope

This standard specifies the frequency response and operating level of recorders and reproducers for audio records for 1-in Type B helical-scan video tape recording.

2. Operating Levels

2.1 Recording and Reproducing Level Indicator. The audio recording and reproducing levels of a video tape recorder shall be adjusted with a standard volume indicator, as specified in American National Standard Recommended Practice for Volume Measurements of Electrical Speech and Program Waves, ANSI/IEEE Std 152-1953 (R1976).

2.2 Recorder Operating Level. When a tape 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 $100 = 3 \text{ nWb/m}$ of track width, the recording volume indicator shall be adjusted to deflect to its reference level (0 dB) scale mark.

2.3 Reproducer Operating Level. When a tape record having an rms short circuit tape flux per unit track width of 100 nWb/m and a frequency of 1000 Hz is reproduced, the reproducing vol-

Dimensions		Inches		Millimeters	
A*	Control track bottom edge	0.9311	max	0.9272	min
A†	Control track top edge	0.9429	min	23.95	min
B*	Audio 1 track bottom edge	24.45	max	0.9587	min
B†	Audio 1 track top edge	25.15	min	0.9902	min
C*	Audio 2 track bottom edge	22.45	max	0.8839	max
C†	Audio 2 track top edge	23.15	min	0.9114	max
D*	Audio 3 track bottom edge	0.15	min	0.0059	min
D†	Audio 3 track top edge	0.25	max	0.0098	max
E*	Audio 3 track top edge	0.95	min	0.0374	min
F	Center of video tape	12.70	ref	0.5000	ref
G	Position of audio heads	232.0	min	9.134	min
J	Position of audio heads	233.0	max	9.173	max
K*	Full video width bottom edge	1.18	min	0.0465	min
K†	Full video width top edge	22.19	max	0.8736	max
L*	Video width (180°) bottom edge	1.82	min	0.0717	min
L†	Video width (180°) top edge	21.55	max	0.8484	max
N	Video track pitch	0.200	ref	0.00787	ref
O	Video track width	0.155	min	0.00610	min
P	Position of control track head	0.165	max	0.00650	max
P	Position of control track head	2.84	min	0.1118	min
Q*	Switch point distance video track 2	82.121	max	3.23213	min
Q†	Switch point distance video track 1	5.523	min	0.21744	min
S	Distance between control track head gap and center edit pulse at 180° switch point	0.040	ref	0.00157	ref
a*	Scanning angle	14.434°			
a†	Video track angle (525/60)	14.288°			

* is the dimension from the reference edge to the bottom of the record.
† is the dimension from the reference edge to the top of the record.

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4. Track Usage

- 4.1 When a single program record is used, it shall be placed on the Audio 1 track.
- 4.2 When two tracks are used for stereo recording, the left channel shall be recorded on the Audio 1 track and the right on Audio 2 track.
- 4.3 A cue signal or time and control code shall be placed on Audio 3 track.

5. Program Audio Head Phasing

When the same signal is recorded on two tracks, the tracks shall be so phased that when reproduced with a full-track head, they will be additive.

NOTE: In addition to this standard, there is available American National Standard Basic System Parameters for 1-in Type B Helical-Scan Video Tape Recording, ANSI C98.15M-1980.

SMPTÉ RECOMMENDED PRACTICE

RP 83-1980



Specifications of Tracking Control Record for 1-in Type B Helical-Scan Video Tape Recording

1. Scope

This practice specifies the recorded relationships among the tracking control signal, the edit pulse signal and the video signal for 1-in Type B helical-scan video tape recordings.

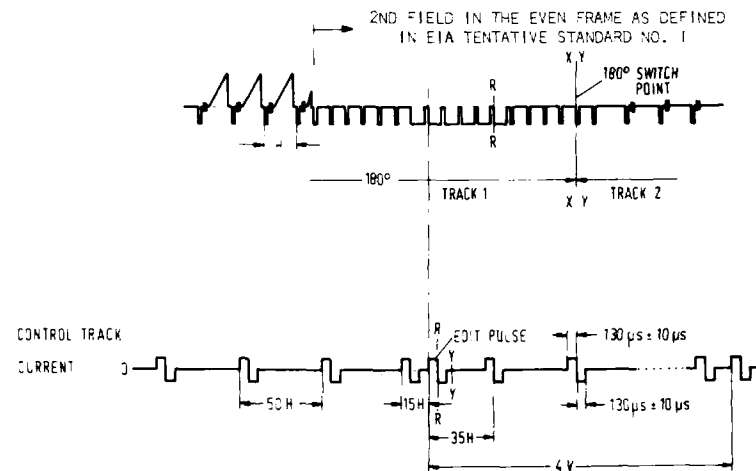
2. Dimensions

- 2.1 The recorded relationship among the tracking control signal, the edit pulse signal and the video signal shall be as specified in the figure.
- 2.2 The position of the field synchronizing signal on the video tracks shall be as specified in Sec. 3.5 of American National Standard Dimensions and Location of Records for 1-in Type B Helical-Scan Video Tape Recording, ANSI C98.16M-1980.
- 2.3 The signal recorded on the control track shall consist of a series of tracking pulses and additional editing pulses as indicated in the figure.
- 2.4 The polarity of the tracking pulses shall be as follows: If the tracking pulses on the tape are

regarded as discrete magnets, the leading part of the pulses constitute a magnet whose south-seeking pole points in the direction of tape motion.

- 2.5 The amplitude of the control signal current flowing through the recording head shall be such that the tape is driven to the verge of saturation.
- 2.6 The edit pulse shall be coincident with the second field of the even frame, as defined in EIA Industrial Electronics Tentative Standard No. 1, Color Television Studio Picture Line Amplifier Output Drawings.
- 2.7 The edit and control pulses shall be $130 \pm 10 \mu\text{s}$ in width.
- 2.8 The rise time of the signal shall be no longer than $10 \mu\text{s}$.

NOTE: In addition to this practice, there is available American National Standard Basic System Parameters for 1-in Type B Helical-Scan Video Tape Recording, ANSI C98.15M-1980.



Position and Waveform of Control Track and Edit Pulse
525 Line—60 Field System (NTSC)

C98.17M-1980

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