

# Basic System Parameters for 1-in Type B Helical-Scan Video Tape Recording

C98.15

## 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  $24.50 \pm 0.12$  cm/s ( $9.6457 \pm 0.0472$  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 48 to 52 percent
- Barometric pressure 86 to 106 kPa (860 to 1060 mbar)

Conditioning before testing 24 h

The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights.

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

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## 3. Video Head and Scanner Parameters

3.1 Two video heads shall be positioned  $180^\circ \pm 30'$  apart,  $\beta$ , 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  $50.330 \pm 0 - 0.003$  mm ( $1.98150 \pm 0 - 0.00012$  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  $90^\circ$  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

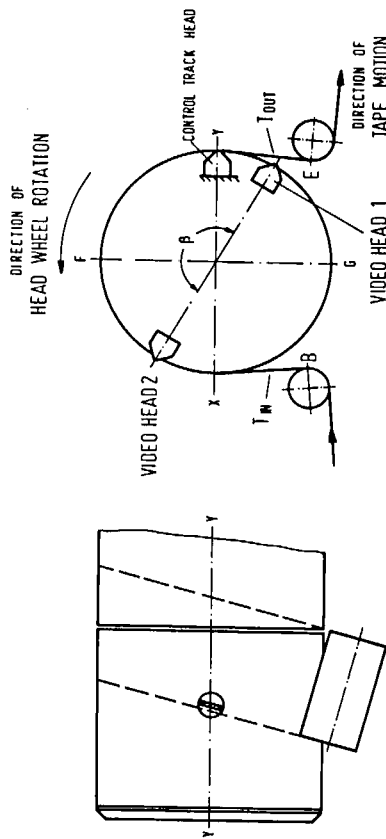
The record tape tension shall be as follows:

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

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

C98.17, Draft American National Standard Frequency Response and Operating Level of Recorders and Repro-

ducers for Audio Records for 1-in Type B Helical-Scan Video Tape Recording

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

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

# Dimensions and Location of Records for 1-in Type B Helical-Scan Video Tape Recording

## 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 ± 1°C (73 ± 2°F)
Relative humidity	48 to 52 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).

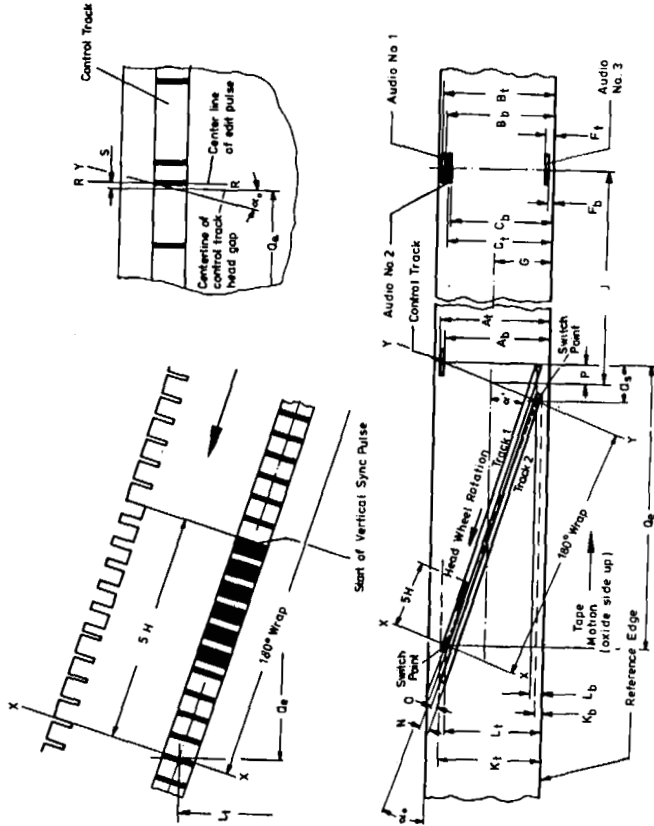
**3.3** The audio and cue recordings shall be downstream from the associated video information (See Dimension J in the figure and table).

**3.4** The audio recording shall be made so that the azimuth of the recorded record is at an angle of 90° ± 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<sub>1</sub> 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 Draft American National Standard Basic System Parameters for 1-in Type B Helical-Scan Video Tape Recording, C98.15.



# Frequency Response and Operating Level of Recorders and Reproducers for Audio Records for 1-in Type B Helical-Scan Video Tape Recording

C98.17

	Dimensions	
	Millimeters	Inches
A <sub>b</sub> * Control track	23.55 min 23.65 max	0.9272 min 0.9311 max
A <sub>r</sub> † Control track	23.95 min 24.06 max	0.9429 min 0.9472 max
B <sub>b</sub> Audio 1 track	24.35 min 24.45 max	0.9587 min 0.9626 max
B <sub>r</sub> Audio 1 track	25.15 min 25.26 max	0.9902 min 0.9945 max
C <sub>b</sub> Audio 2 track	22.35 min 22.45 max	0.8799 min 0.8839 max
C <sub>r</sub> Audio 2 track	23.15 min 23.26 max	0.9114 min 0.9157 max
F <sub>b</sub> Audio 3 track	0.195 min 0.205 max	0.00768 min 0.00807 max
F <sub>r</sub> Audio 3 track	1.01 min 12.70 ref	0.0398 min 0.5000 ref
G Center of video tape	232.0 min 233.0 max	9.134 min 9.173 max
J Position of audio heads	1.18 min 22.19 max	0.0465 min 0.8736 max
K <sub>b</sub> Full video width	1.82 min 21.55 max	0.0717 min 0.8484 max
K <sub>r</sub> Video width (180°)	0.200 ref 0.155 min	0.00787 ref 0.00610 min
L <sub>b</sub> Video width (180°)	0.165 max 2.84 min	0.00650 max 0.1118 min
L <sub>r</sub> Video track pitch	2.88 max 82.096 min	0.1134 max 3.23213 min
O Video track width	82.121 max 5.523 min 5.533 max	3.23311 max 0.21744 min 0.21783 max
P Position of control head	0.040 ref 14.434° 14.288°	0.00157 ref
Q <sub>a</sub> Switch point video track 2		
Q <sub>b</sub> Switch point video track 1		
S Distance between control track head gap and center edit pulse at 180° switch point		
a <sup>b</sup> Scanning angle		
a <sup>c</sup> Video track angle (525/60)		

\*<sub>b</sub> is the dimension from the reference edge to the bottom of the record.  
†<sub>r</sub> is the dimension from the reference edge to the top of the record.

$$L_q(f) = 10 \log_{10} \frac{1 + \left(\frac{F_1}{f}\right)^2}{1 + \left(\frac{f}{F_2}\right)^2} \quad [\text{dB}]$$

where  $L_q$  is the relative tape flux level;  $f$  is the frequency at which the response is being computed;  $F_1$  is the low-frequency transition frequency, 50 Hz; and  $F_2$  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.

## 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 Draft American National Standard Basic System Parameters for 1-in Type B Helical-Scan Video Tape Recording, C98.15.

## 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  $117 \pm 3$  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 117 nWb/m and a frequency of 1000 Hz is reproduced, the reproducing volume indicator shall deflect to its reference level (0 dB) scale mark.

**2.4** Time Constants. Time constants of 15  $\mu$ s (t) and 3180  $\mu$ s (t<sub>2</sub>) 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,  $L_q(f)$ , shall be as given by the following equation:

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