SMPTE STANDARD

ANSI/SMPTE 15M-1992
Revision of
ANSI/SMPTE 15M-1987

for Television Analog Recording — 1-in Type B Helical Scan — Basic System Parameters

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 television 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 mm/s ± 1.2 mm/s (9.646 in/s ± 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°C ± 1°C (73°F ± 2°F)
Relative humidity	(50 + 2)%
Barometric pressure	86 to 106 kPa (860 to 1060 mbar)
Conditioning before testing	24 h

3 Video head and scanner parameters

3.1 Two video heads shall be positioned 180° ± 30' apart, β, measured from the gap of video head 1 to the gap of video head 2, as shown in figure 1.

3.2 The drum size shall be 50.330 mm +0 mm −0.003 mm (1.98150 in +0 in −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 1) which lies on a line which is at 90° ± 2', measured from diameter F-G which is the centerline through the plate assembly.

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4 Record tape tension

The record tape tension shall be as follows:

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

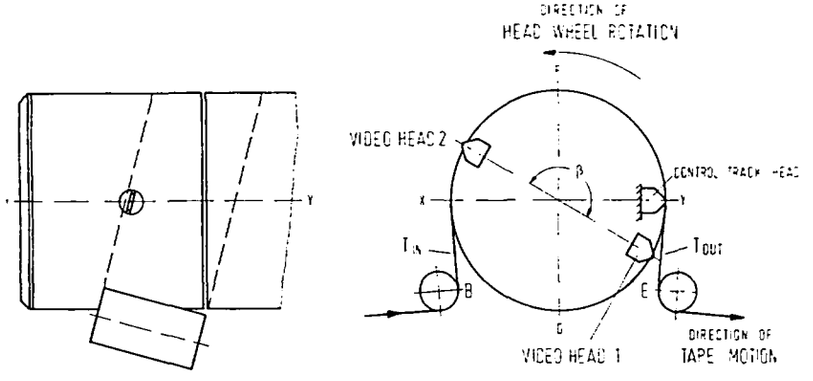

Figure 1 – Video head

Annex A (informative)
Bibliography

ANSI/SMPTE 16M-1992, Television Analog Recording — 1-in Type B Helical Scan — Records

ANSI/SMPTE 17M-1992, Television Analog Recording — 1-in Type B Helical Scan — Frequency Response and Operating Level

ANSI/SMPTE 24M-1991, Television Recording — 1-in Reels

ANSI/SMPTE 25M-1989, Video Recording —1-in Magnetic Recording Tape

SMPTE RP 83-1992, Specifications of Tracking Control Record for 1-in Type B Helical-Scan Television Analog Recording

SMPTE RP 84-1992, Reference Carrier Frequencies and Preemphasis Characteristics for 1-in Type B Helical-Scan Television Analog Recording

SMPTE STANDARD

ANSI/SMPTE 16M-1992
Revision of
ANSI/SMPTE 16M-1987

for Television Analog Recording — 1-in Type B Helical Scan — Records

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 television 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 figure 1.

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°C ± 1°C (73°F ± 2°F)
Relative humidity	(50 ± 2)%
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 figure 1 and table 1.

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 figure 1 and table 1).

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 mm ± 0.024 mm (0.29957 in ± 0.00094 in) from the intersection of L_t 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.

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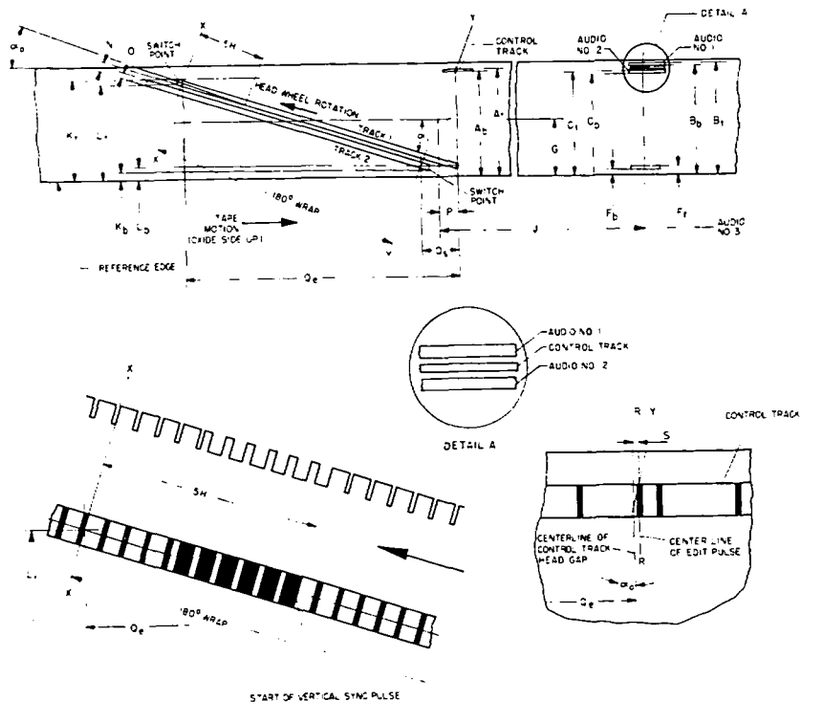

Figure 1 – Record location and dimensions

Table 1 – Dimensions

		Millimeters	Inches
A_b*	Control track bottom edge	23.55 min 23.65 max	0.9272 min 0.9311 max
A_t†	Control track top edge	23.95 min 24.06 max	0.9429 min 0.9472 max
B_b	Audio 1 track bottom edge	24.35 min 24.45 max	0.9587 min 0.9626 max
B_t	Audio 1 track top edge	25.15 min 25.26 max	0.9902 min 0.9945 max
C_b	Audio 2 track bottom edge	22.35 min 22.45 max	0.8799 min 0.8839 max
C_t	Audio 2 track top edge	23.15 min 23.26 max	0.9114 min 0.9157 max
F_b	Audio 3 track bottom edge	0.15 min 0.25 max	0.0059 min 0.0098 max
F_t	Audio 3 track top edge	0.95 min 1.05 max	0.0374 min 0.0413 max
G	Center of video tape	12.70 ref	0.5000 ref
J	Position of audio heads	232.0 min 233.0 max	9.134 min 9.173 max
K_b	Full video width bottom edge	1.18 min	0.0465 min
K_t	Full video width top edge	22.19 max	0.8736 max
L_b	Video width (180°) bottom edge	1.82 min	0.0717 min
L_t	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 0.165 max	0.00610 min 0.00650 max
P	Position of control track head	2.84 min 2.88 max	0.1118 min 0.1134 max
Q_e	Switch point distance video track 2	82.096 min 82.121 max	3.23213 min 3.23311 max
Q_s	Switch point distance video track 1	5.523 min 5.533 max	0.21744 min 0.21783 max
S	Distance between control track head gap and center edit pulse at 180° switch point	0.040 ref	0.00157 ref
α_0	Scanning angle	14.434°	
α_1	Video track angle (525/60)	14.288°	

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

Annex A (informative)
Bibliography

ANSI/SMPTE 15M-1992, Television Analog Recording — 1-in Type B Helical Scan — Basic System Parameters

SMPTE STANDARD

ANSI/SMPTE 17M-1992
Revision of
ANSI/SMPTE 17M-1987

for Television Analog Recording — 1-in Type B Helical Scan — Frequency Response and Operating Level

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 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below.

IEC 268-17 (1990), Standard Volume Indicators

3 Operating levels

3.1 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 IEC 268-17.

3.2 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 nWb/m ± 3 nWb/m of track width, the recording volume indicator shall be adjusted to deflect to its reference level (0 dB) scale mark.

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

3.4 Time constants

Time constants of 15 μs (t_1) and 3180 μs (t_2) shall be applied.

4 Frequency response

4.1 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, $L_\Phi(f)$, shall be as given by the following equation:

$$L_\Phi(f) = 10 \log_{10} \frac{1 + \left(\frac{F_l}{f}\right)^2}{1 + \left(\frac{f}{F_h}\right)^2} \text{ [dB]}$$

where L_Φ is the relative tape flux level; f is the frequency at which the response is being computed; F_l is the low-frequency transition frequency, 50 Hz; and F_h is the high-frequency transition frequency, 10610 Hz.

4.2 Reproducer flux/frequency response

When a tape record having a short circuit tape flux level versus frequency given in 4.1 is reproduced, the output voltage level of the reproducer versus frequency shall be constant.

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5 Track usage

5.1 When a single program record is used, it shall be placed on the audio 1 track.

5.2 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.

5.3 A cue signal or time and control code shall be placed on audio 3 track.

6 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.

Annex A (informative)
Bibliography

ANSI/SMPTE 15M-1992, Television Analog Recording — 1-in Type B Helical Scan — Basic System Parameters

SMPTE RECOMMENDED PRACTICE

RP 83-1992
Revision of RP 83-1987

Specifications of Tracking Control Record for 1-in Type B Helical-Scan Television Analog 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 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below:

ANSI/SMPTE 16M-1992, Television Analog Recording — 1-in Type B Helical Scan — Records

EIA Industrial Electronics Tentative Standard No. 1, Color Television Studio Picture Line Amplifier Output Drawing

CCIR Report 624-3 (MOD F), Characteristics of Television Systems

3 Dimensions

3.1 The recorded relationships among the tracking control signal, the edit pulse signal, and the video signal shall be as specified in figure 1.

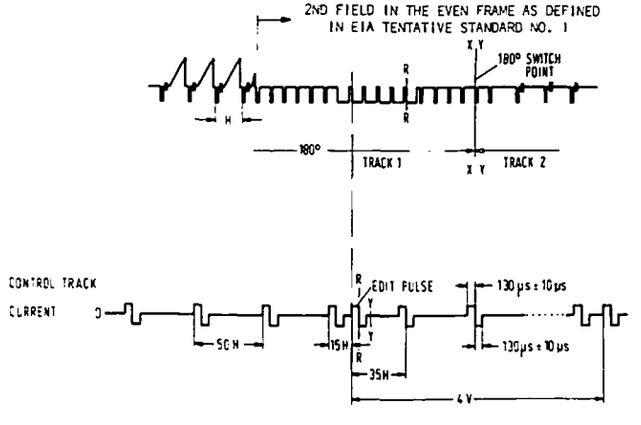

Figure 1 – Position and waveform of control track and edit pulse 525 line–60 field systems (NTSC)

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