SMPTE 19M-2003
Revision of
ANSI/SMPTE 19M-1996

SMPTE STANDARD

for Television Analog Recording — 1-in Type C — Records

1 Scope

This standard specifies the dimensions and location of recorded video, audio, and tracking-control records for 1-in type C helical-scan television analog recorders operating in the 525/60 monochrome or NTSC color systems.

2 General specifications

2.1 Tests and measurements made on the tape record to check the requirements of this standard shall be made under the following conditions unless otherwise specified:

Temperature:	20°C ± 1°C
Relative humidity:	(50 ± 2)%
Barometric pressure:	86 kPa to 106 kPa
Tape tension:	1.7 N ± 0.3 N

2.2 Conditioning before recording and testing shall be as follows:

Environmental:	Stabilized at measurement conditions
Tape tension:	Wound on a reel at 0.5 N to 3.0 N

2.3 The reference edge of the tape for dimensions in this standard shall be the lower edge as shown in figure 1. The magnetic coating is on the side facing the observer in the figures.

3 Tape speed

The tape speed shall be 244.0 mm/s ± 0.5 mm/s.

4 Record location and dimensions

4.1 Record location and dimensions shall be as specified in figure 1 and table 1.

4.2 Dimensions P, Q, R, and θ are for reference purposes only. The parameters given in SMPTE 18M and the tape speed completely determine these values and their tolerances. The nominal values given are based on tensioned tape; therefore, direct measurement without tension must take into account tape elasticity.

5 Video record curvature

The edge of the video record shall be contained within two parallel straight lines 0.030 mm apart.

Approved
February 7, 2003

6 Relative positions of recorded signals

6.1 Video, sync, tracking-control, and audio signals with information intended to be time coincident shall be positioned as specified in figure 2 and table 1. Dimensions T, U, Y, and Z are for reference purposes only.

6.2 The start of the video record is that location on the video record which would be produced by scanner and guide locations with no electronic switching of the recording signal.

6.3 The vertical-interval dropout location with respect to a television frame is determined by the phase dimension, T, measured from the start of video to the negative-going edge of line 25 H-sync in odd-numbered fields.

6.4 The start and end of the sync record must be produced by electronic switching of the recording signal due to geometric constraints (see SMPTE 18M). Phasing of the sync record electronic switching shall be as per phase dimension W in odd-numbered fields.

6.5 Even-numbered fields have a different video and sync phasing (dimensions U and X) due to the odd number of lines in a television frame.

7 Gap azimuth

7.1 The azimuth of all head gaps used to produce longitudinal track records shall be perpendicular to the direction of relative head-to-tape motion.

7.2 The azimuth of the video and sync head gaps shall be perpendicular to the direction of head motion.

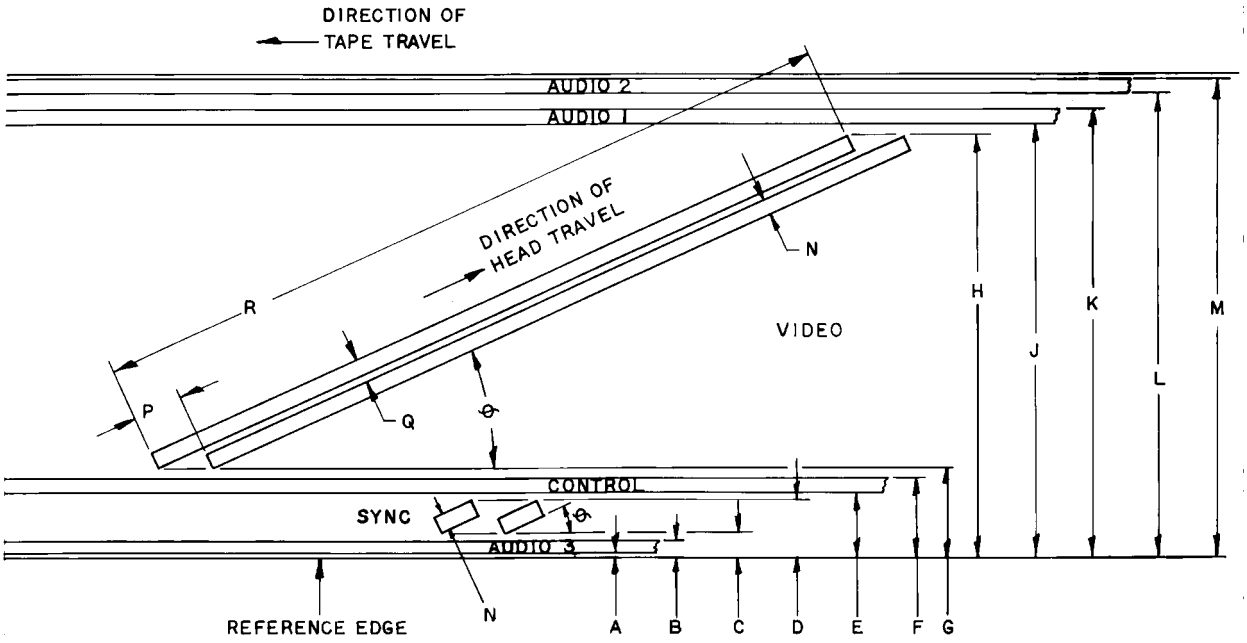

Figure 1 – Record location and dimensions

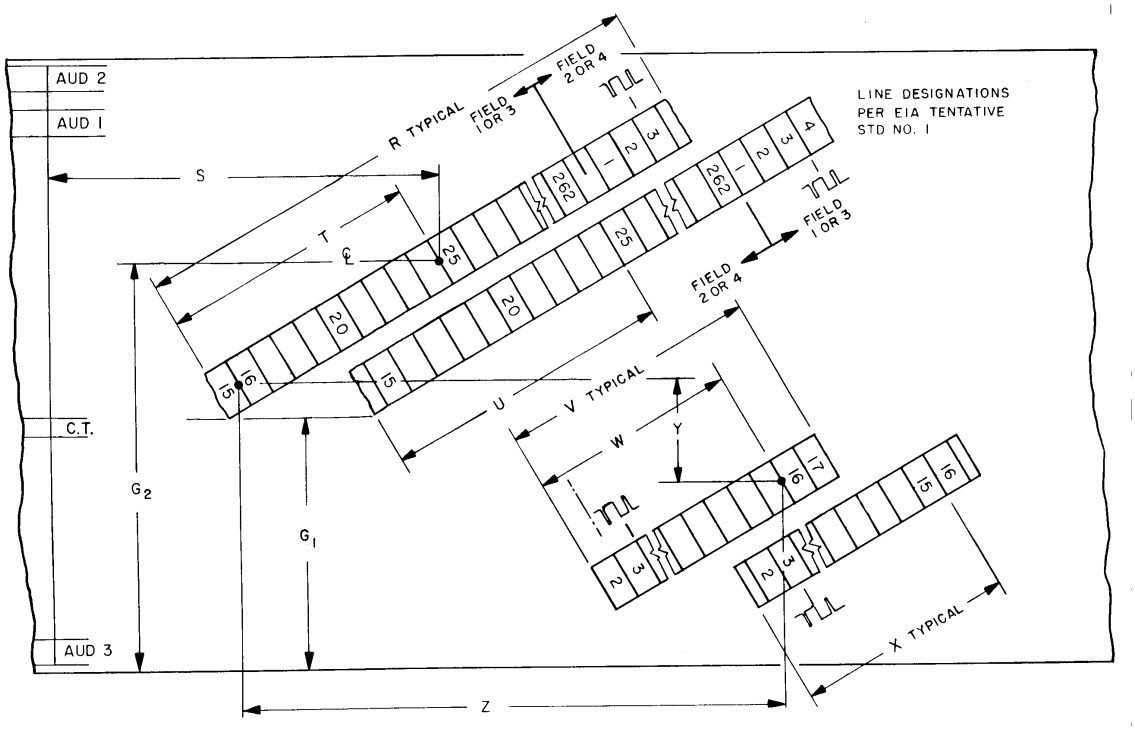

Figure 2 – Video and sync record location

Table 1 – Record dimensions and recorded signals

	Dimensions	Millimeters Minimum	Maximum
A[1)]	Audio 3 lower edge	0.050	0.150
B[1)]	Audio 3 upper edge	0.825	0.975
C	Sync track lower edge	1.385	1.445
D	Sync track upper edge	2.680	2.740
E	Control track lower edge	2.870	3.130
F	Control track upper edge	3.430	3.770
G_1	Video track lower edge	3.860	3.920
G_2	Video line 25 start	4.650	4.710
H	Video track upper edge	22.355	22.475
J[1)]	Audio 1 lower edge	22.770	22.830
K[1)]	Audio 1 upper edge	23.525	23.675
L[1)]	Audio 2 lower edge	24.325	24.475
M[1)]	Audio 2 upper edge	25.150	25.250
N	Video and sync track width	0.125	0.135
P	Video offset	4.067 ref (2.5 H)	
Q	Video track pitch	0.1823 ref	
R	Video track length	410.764 ref (252.5 H)	
S[2)]	Control track head distance (mechanical dimension)	116.23	117.03
S_1	Control track head distance (tape footprint)	114.70	115.10
T	Vertical phase odd field	16.270 ref (10.0 H)	
U	Vertical phase even field	17.080 ref (10.5 H)	
V	Sync track length	25.620 ref (15.75 H)	26.420 (16.25 H)
W	Vertical phase odd sync field	22.360 ref (13.75 H)	23.170 (14.25 H)
X	Vertical phase even sync field	23.170 ref (14.25 H)	23.980 (14.75 H)
Y	Vertical head offset	1.529 ref	
Z	Horizontal head offset	35.380 ref	
θ	Track angle	2°34' ref	

NOTES
1) See annex A.
2) Dimension S is not shown in figure 2. It is a physical transport dimension that should result in the footprint dimension S_1.

Annex A (informative)
Dimensions

Dimensions A, B, J, K, L, and M have been revised to reduce audio level interchange differences. Audio head stacks produced prior to this standard may produce track records with wider tolerances.

Annex B (informative)
Bibliography

SMPTE 18M-2003, Television Analog Recording - 1-in Type C - Basic System and Transport Geometry Parameters

ITU-R BT.470-6 (11/98), Conventional Television Systems