

# SMPTE RECOMMENDED PRACTICE

**RP 158-1999**

Revision of RP 158-1991

## Basic System and Transport Geometry Parameters for 1/2-in Type M-2 Format



Page 1 of 4 pages

### 1 Scope

This practice specifies the video recording system, scanner parameters, and test conditions for 1/2-in type M-2 helical-scan video tape recorders operating with video signals having a typical scanning structure of 525 lines, 59.94 fields/s, 2:1 interlace, and utilizing the cassettes specified in ANSI/SMPTE 250M. The parameters described in this practice are for reference purposes only and should not be taken as the only method available to attain the specifications as defined in ANSI/SMPTE 249M.

### 2 Definitions

**2.1 scanner:** A mechanical assembly containing a drum, rotating pole tips, and tape-guiding elements used to record and reproduce video and PCM audio mode signals.

**2.2 drum:** A cylindrical column around which the tape is at least partially wrapped in order to form the head-to-tape interface of a video tape recording system.

**2.3 upper drum:** The part of the drum which is not in contact with the reference edge of the tape. (See figure 1.)

**2.4 lower drum:** The part of the drum which contacts the reference edge of the tape and provides tape-guiding functions. (See figure 1.)

**2.5 effective drum diameter:** The value of drum diameter which yields the actual video and PCM audio record dimensions in a theoretical calculation. This value is equal to or greater than the actual drum diameter.

**2.6 helix angle:** The angle formed between the path of the rotating pole tips and the tape reference edge guiding system.

**2.7 track angle:** The angle formed between the video record and the reference edge of the tape.

**2.8 center span tension:** A calculated value of the tape tension at a point midway between the tape entrance and exit guides of the scanner in a video tape recording system.

**2.9 wrap angle:** The angle at the center of the drum rotation subtended by the lines of contact between the drum and the reference edge of the tape.

**2.10 lead signal overlap:** That portion of the helical record which is required to provide a duplicate (overlap) recording.

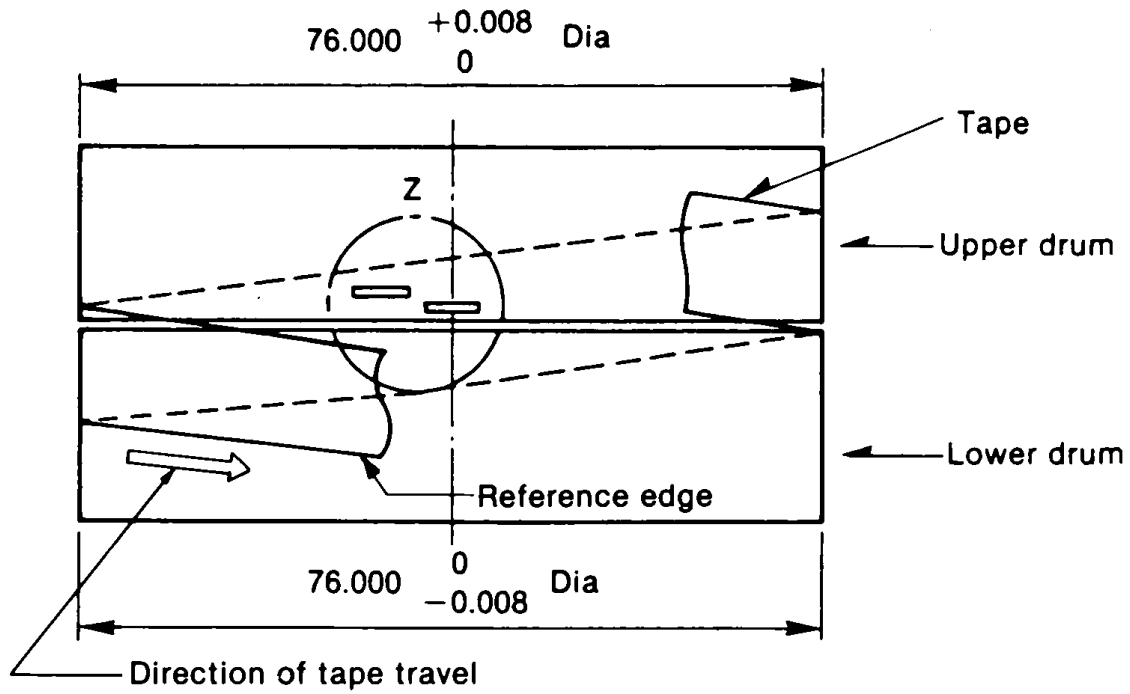
### 3 General specifications

**3.1** Dimensions are in the metric system.

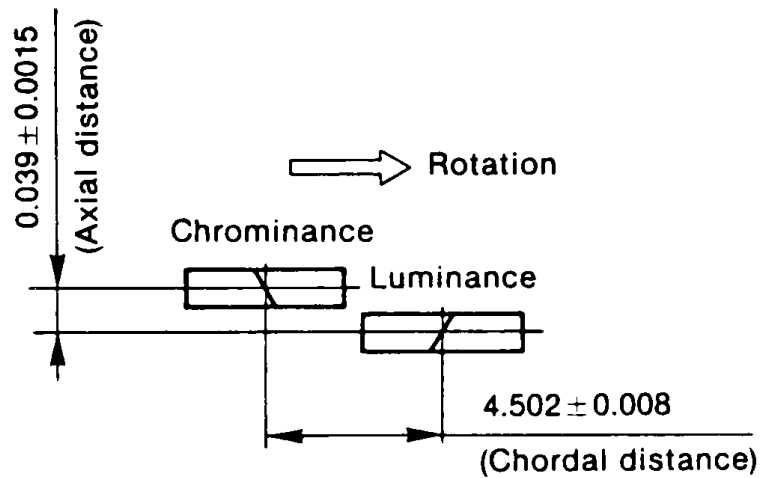
**3.2** A basic dimension is a fundamental dimension to which no tolerance is applicable.

**3.3** Tests and measurements made on the recorder to check the parameters specified in this practice shall be made under the following atmospheric conditions:

Temperature for drum diameter	20°C ± 0.5°C
Temperature for all other tests	20°C ± 1.0°C
Relative humidity	(50% ± 2)%
Barometric pressure	86 kPa to 106 kPa
Conditioning time before testing	24 hours



(a) Drum and tape wrap



(b) Details of zone Z

Figure 1 – Side view of chrominance and luminance pole tips

## 4 Tape speed

The tape speed shall be 67.693 mm/s, basic.

## 5 Representative scanner parameters

### 5.1 Drum diameter and structure

The effective drum diameter, tape tension, helix angle, and tape speed taken together completely determine the track angle. Different methods of design and/or minor variations in drum diameter and tape tension will produce equivalent recordings for interchange purposes.

#### 5.1.1 Actual upper drum diameter

The actual upper drum diameter shall be 76.000 mm + 0.008 mm - 0.000 mm.

#### 5.1.2 Actual lower drum diameter

The actual lower drum diameter shall be 76.000 mm + 0.000 mm - 0.008 mm.

#### 5.1.3 Upper drum section

The upper drum section shall rotate together with the video heads.

#### 5.1.4 Center span tension

The center span tension shall be 0.31 N  $\pm$  0.05 N.

#### 5.1.5 Helix angle

The helix angle formed by the scanner and all associated tape guides shall be  $4.250^\circ \pm 0.001^\circ$ .

## 5.2 Scanner pole tips

Four circumferential pole tips shall be located as shown in figure 2.

### 5.2.1 Pole tip projection

Each pole tip should project radially 0.035 mm (nominal value) above the upper drum surface.

### 5.2.2 Luminance pole tips

Two pole tips circumferentially arranged  $180^\circ \pm 0.003^\circ$  apart shall be provided for the luminance signal.

### 5.2.3 Chrominance pole tips

Each luminance pole tip shall have an associated pole tip for the time compressed chrominance signal and the FM audio signals. The chrominance pole tips shall be located at a chordal distance of  $4.502 \text{ mm} \pm 0.008 \text{ mm}$  in a counterrotational direction from the associated luminance pole tips, and are axially displaced from the associated luminance pole tips by  $0.0390 \text{ mm} \pm 0.0015 \text{ mm}$  in a direction away from the reference edge of the tape. (See figure 1b.)

### 5.2.4 Channel identification

Suitable means, such as a pulse generator producing one pulse per drum revolution, shall be provided for identifying the one head pair which records field 1. This pair is identified as channel 1, and the other pair is identified as channel 2.

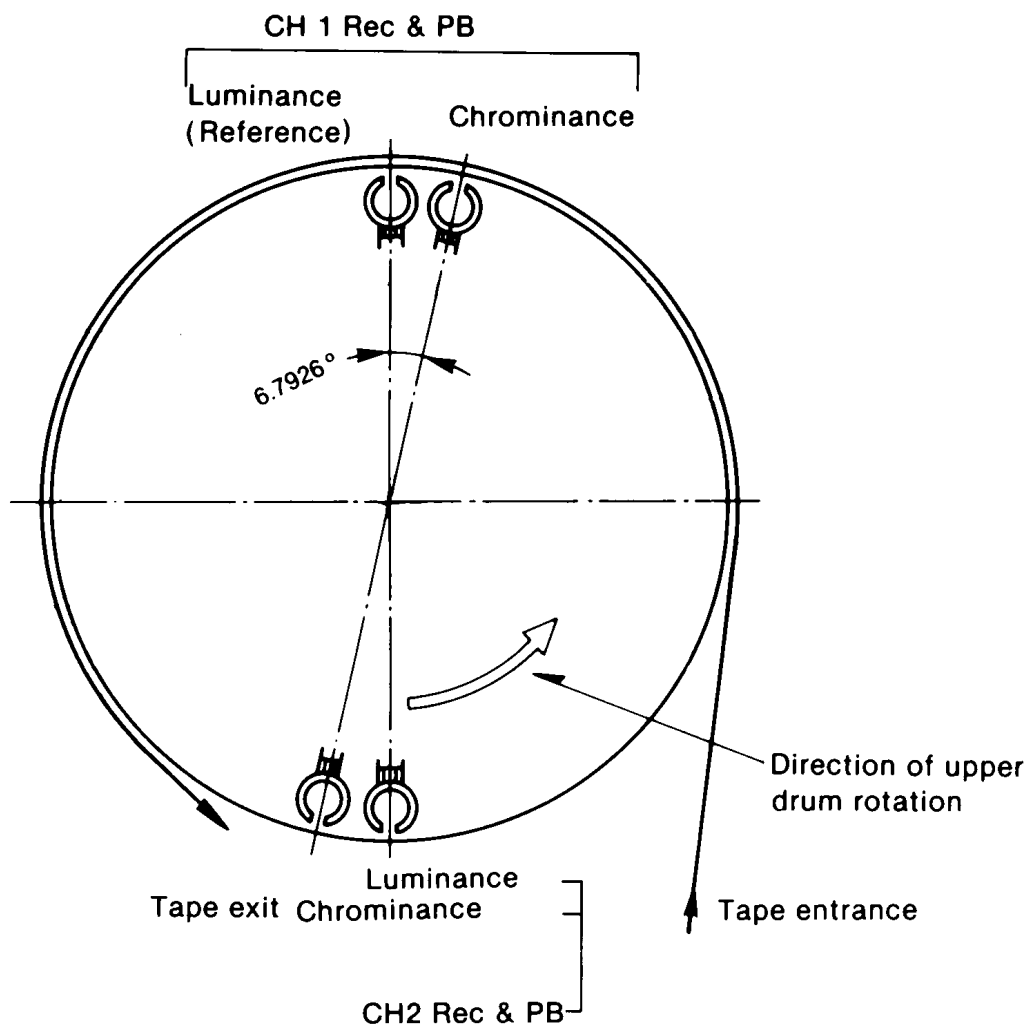


Figure 2 – Top view of chrominance and luminance pole tips

## Annex A (Informative)

### Bibliography

ANSI/SMPTE 249M-1996, Television Analog Recording — 1/2-in Type M-2 — Records

ANSI/SMPTE 250M-1996, Television Analog Recording — 1/2-in Type M-2 — Tapes and Cassettes

ANSI/SMPTE 251M-1996, Television Analog Recording — 1/2-in Type M-2 — Electrical Parameters of Video, Audio, Time and Control Code and Tracking Control

ANSI/SMPTE 252M-1996, Television Analog Recording — 1/2-in Type M-2 — Pulse Code Modulation Audio