

5. Video Record Curvature

The edge of the video record shall be contained within two parallel straight lines 0.010 mm (0.0004 in) apart.

6. Relative Positions of Recorded Signals

6.1 Video luminance, color difference, tracking control, audio, and time code signals, with information intended to be time coincident, shall be positioned as shown in Fig. 2.

6.2 Luminance and color difference records for fields 2 and 4 are offset by one-half line (see Fig. 2).

2) due to the odd number of lines in a television frame.

7. Gap Azimuth

7.1 The azimuth of the audio, tracking control, and time code head gaps used to produce longitudinal track records shall be perpendicular to the direction of relative head-to-tape motion. (See Fig. 2.)

7.2 The azimuth of the video head gaps for the luminance signal shall be -15° and for the color difference signals shall be $+15^\circ$ to the perpendicular of the direction of head motion.

**Table
Record Locations and Dimensions**

| | Dimensions | | Micrometers | | | | Inches | |
|-------------------------------------|---------------------|---------|-------------|---------|---------|---------|---------|---------|
| | Minimum | Nominal | Minimum | Maximum | Nominal | Maximum | Minimum | Maximum |
| A Time code track lower edge | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B Time code track upper edge | 330 | 400 | 0.01299 | 0.01575 | 0.01575 | 0.01850 | 0.01575 | 0.01850 |
| C Color track width | 68 | 73 | 0.00268 | 0.00287 | 0.00287 | 0.00307 | 0.00287 | 0.00307 |
| D Y-C track pitch | 77.5 | 80.5 | 0.00305 | 0.00317 | 0.00317 | 0.00329 | 0.00317 | 0.00329 |
| E Control track lower edge | 635 | 700 | 0.02500 | 0.02756 | 0.02756 | 0.03012 | 0.02756 | 0.03012 |
| F Control track upper edge | 1035 | 1100 | 0.04075 | 0.04331 | 0.04331 | 0.04587 | 0.04331 | 0.04587 |
| G Video track lower edge | 880 | 950 | 0.03465 | 0.03740 | 0.03740 | 0.04016 | 0.03740 | 0.04016 |
| H Video track upper edge | — | 10720 | — | 0.42205 | 0.42205 | 0.42539 | 0.42205 | 0.42539 |
| J Audio 1 track lower edge | 10805 | 10850 | 0.42539 | 0.42717 | 0.42717 | 0.42894 | 0.42717 | 0.42894 |
| K Audio 1 track upper edge | 11390 | 11450 | 0.44843 | 0.45079 | 0.45079 | 0.45315 | 0.45079 | 0.45315 |
| L Audio 2 track lower edge | 11790 | 11850 | 0.46417 | 0.46654 | 0.46654 | 0.46890 | 0.46654 | 0.46890 |
| M Audio 2 track upper edge | 12405 | 12450 | 0.48839 | 0.49016 | 0.49016 | 0.49193 | 0.49016 | 0.49193 |
| N Y track width | 83 | 86 | 0.00327 | 0.00339 | 0.00339 | 0.00350 | 0.00339 | 0.00350 |
| O Lead signal overlap | 8.3H ref | | | | | | | |
| P Y-C track offset | 4.99 (= 10H) ref | | | | | | | |
| Q Video track pitch | 161.0 | 161.4 | 0.00634 | 0.00635 | 0.00635 | 0.00637 | 0.00635 | 0.00637 |
| R Video track length | 115032 (262.5H) ref | | | | | | | |
| S Control track head distance | 36600 | 36700 | 36800 | 1.44094 | 1.44488 | 1.44882 | 1.44488 | 1.44882 |
| T Audio and time code head distance | 180681 | 180918 | 181155 | 7.11343 | 7.12276 | 7.13209 | 7.12276 | 7.13209 |
| W Video area effective width | 9384 ref | | | | | | | |
| Y Lower limit of W | 1238 | 1248 | 0.04874 | 0.04913 | 0.04913 | 0.04953 | 0.04913 | 0.04953 |
| Ø Track angle | 4.6760° | 4.6790° | 4.6820° | 4.6760° | 4.6790° | 4.6820° | 4.6790° | 4.6820° |

Note: Ref indicates those measurements which are fixed by other parameters and are given for reference purposes only.

ANSI/SMPTE 229M-1987

SMPTE RECOMMENDED PRACTICE

RP 144-1987

Basic Systems and Transport Geometry Parameters for 1/2-in Type L



Page 1 of 3 pages

1. Scope

This practice specifies the tape speed, scanner parameters, tape tension, and test conditions for achieving the record dimensions specified in American National Standard for Video Recording—1/2-in Type L, Mode 1—Records, ANSI/SMPTE 229M-1987. The parameters are for reference purposes only and should not be interpreted as the only method available to attain the specifications in American National Standard for Video Recording—1/2-in Type L, Mode 1 Electrical Parameters—Video, Audio, Time and Control Code and Tracking Control, ANSI/SMPTE 230M-1987.

2. Definitions

Scanner: A mechanical assembly containing a drum, rotating pole tips, and tape-guiding elements used to record and reproduce video tape recordings. (See Fig. 1.)

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.

Upper Drum: That part of the drum in a helical-scan video tape recording system which does not contact the reference edge of the tape. (See Fig. 2.)

Effective Drum Diameter: A value of drum diameter which when used in theoretical calculations will correspond to the actual video recording produced in a helical-scan video tape recording system. The effective value is equal to or greater than the actual drum diameter.

Helix Angle: The angle formed between the path of the rotating pole tips and the tape reference edge-guiding system on the scanner of a helical-scan video tape recording system.

Track Angle: The angle of the video record with respect to the reference edge of the tape in a helical-scan video tape recording.

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.

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.

3. General Specifications

3.1 Dimensions in the metric system are the primary measurements. The English equivalents are derived from them and may deviate from established conversion practices.

3.2 Tests and measurements made on the recorder to check the parameters specified in this standard should be made under the following atmospheric conditions:

- Temperature for drum diameter $23^\circ\text{C} \pm 0.5^\circ\text{C}$
- Temperature for all other tests $23^\circ\text{C} \pm 1.0^\circ\text{C}$
- Relative humidity $50 \pm 2\%$
- Barometric pressure 86 to 106 kPa (860 to 1060 inbar)
- Conditioning before testing 24 hours

4. Tape Speed

The tape speed shall be $118,582 \text{ mm/s} \pm 0.20 \text{ mm/s}$ ($4,6686 \pm 0.008 \text{ m/s}$).

5. 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 $74.487 \pm 0.008 - 0.000 \text{ mm}$ ($2.9326 \pm 0.0003 - 0.0000 \text{ in}$).

5.1.2 Actual Lower Drum Diameter. The actual lower drum diameter shall be $74.487 \pm 0.000 - 0.008 \text{ mm}$ ($2.9326 \pm 0.0000 - 0.0003 \text{ in}$).

5.1.3 Upper Drum Section. The upper drum section shall rotate in synchronism with the video head tips.

5.1.4 Center Span Tension. The center span tension shall be $0.16 \pm 0.05 \text{ N}$.

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Approved November 28, 1986

5.1.5 Helix Angle. The helix angle formed by the scanner and all associated tape guides shall be $4.6^\circ \pm 0.003^\circ$.

5.2 Scanner Pole Tips. Six circumferential pole tips shall be located as shown in Fig. 1.

5.2.1 Pole Tip Projection. Each pole tip shall project radially $0.040 \pm 0.010 - 0.025$ mm ($0.0016 \pm 0.0004 - 0.0010$ in) above the outer surface of the upper drum.

5.2.2 Luminance Pole Tips. Two pole tips circumferentially spaced at $180^\circ \pm 0.003^\circ$ shall be provided for recording the luminance signal.

5.2.3 Color-Recording Pole Tips. Each luminance pole tip shall have an associated pole tip for recording the time-associated color signal. Color-recording pole tips shall be located at a chordal distance of 4.396 ± 0.010 mm (0.1731 ± 0.0004 in) in a counter-rotational direction from the associated luminance pole tips, and are axially

displaced from the associated luminance pole tip by 0.0745 ± 0.0030 mm (0.00295 ± 0.00012 in) in a direction away from the reference edge of the tape. (See Fig. 2.)

5.2.4 Erase Pole Tips. If erase pole tips are employed, each luminance/color-recording pole-tip pair shall have an associated erase pole tip located at any angle selected from the luminance pole tip of the luminance/color-recording pair in the direction of rotation. (See Fig. 1.)

5.2.5 Channel Identification. Suitable means, such as a pulse generator producing one pulse per drum revolution, shall be provided to permit identification of the luminance/color recording pole-tip pair which records field 1. This pair is identified as channel 1 and the remaining pair as channel 2.

5.2.6 Recording Television Field. Each pass of a luminance/color-recording pole-tip pair records one television field plus an overlap.

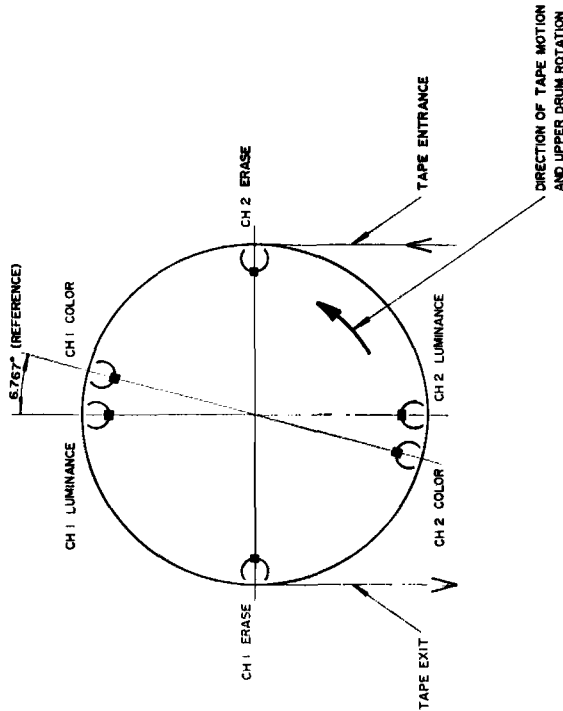


Fig. 1
Top View of Color, Luminance and Erase Pole Tips

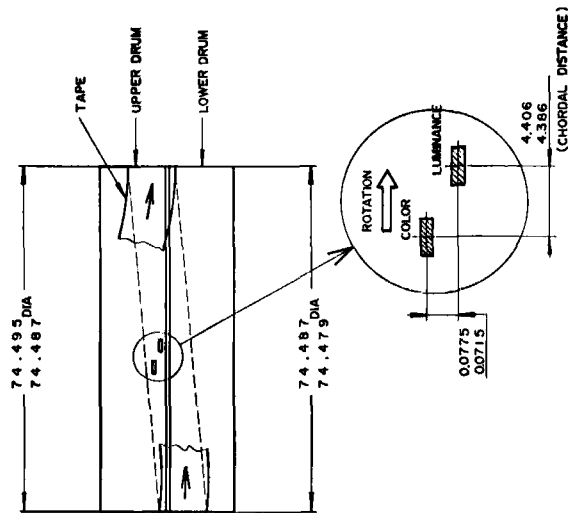


Fig. 2
Drum Showing Tape Wrap