V16.22/4, Draft American National Standard Dimensions and Locations of Records on One-Inch, Type C, Helical-Scan Video Tape Recordings.

V16.22/5, Draft American National Standard Frequency Response and Reference Level of Audio Records for One-Inch, Type C, Helical-Scan Video Tape Recordings.

V16.22/6, Proposed SMPTE Recommended Practice Specifications on Tracking Control Record for One-Inch, Type C, Helical-Scan Video Tape Recordings.

V16.22/7, Proposed SMPTE Recommended Practice on Video Record Parameters for One-Inch Type C Helical-Scan Video Tape Recordings.

As with the other proposals, once approved by the parent committee, they will be reviewed by the SMPTE Standards Committee and then published in the *SMPTE Journal* for public review and comment. The basic format configuration is shown in Figs. 4 and 5.

Basic Standards for All One-Inch Formats

An additional working group under Mr. H. L. Marks is currently preparing standards for one-inch tape and one-inch tape reels which will be common for all three formats. These are:

V16.42, Draft American National Standard Dimensions of One-Inch Video Magnetic Tape.

V16.41, Draft American National Standard Dimensions of One-Inch Video Magnetic Tape Reels.

Summary

It was noted that, in accordance with SMPTE, the documents specifying the three formats are published in the *SMPTE Journal* once they are cleared by the SMPTE Standards Committee. This *Journal* publication affords all those concerned with the subject being proposed for standardization the opportunity to review the proposals and to recommend modification or rejection of any parts of the documents. Concurrently with *Journal* publication, the draft standards will also be reviewed by the American National Standards Committee C98 on Magnetic Video Tape Recording for acceptance as proposed national standards.

Upon completion of these two actions (approximately six weeks) all comments received are cleared by the originating groups and the documents are submitted by SMPTE to the American National Standards Institute for consideration and acceptance as national standards.

The impact of the Society's forthright action in bringing about a standard for the three formats is immense. From an operational standpoint, every future user of a one-inch helical video tape recorder will benefit greatly from the ease of interchange, uniformity of equipment, post-production adaptability and, most of all, standardized distribution formats for recorded programs.

The Society and the television industry must indeed extend a vote of gratitude to the many experts who devoted their valuable time and the many organizations, both national and international, which gave their support to this tremendous task assuring its unprecedented rapid conclusion. In the long run, all of the committee participants, manufacturers, users and even viewers are the beneficiaries of comprehensive and practical standards.

Standards & Recommended Practices

Approved SMPTE Recommended Practices

On 31 March 1977, the Executive Committee for Standards Approval, acting on behalf of the Board of Governors, approved the following SMPTE Recommended Practices: RP 9-1977, Dimensions of Double-Frame 35-mm 2 × 2 Slides for Precise Applications in Television, and RP 16-1977, Specifications of Tracking Control Record for 2-in Quadruplex Video Magnetic Tape Recordings. Copies of SMPTE Recommended Practices are available from Society Headquarters for $1.00 per copy.

Reaffirmed SMPTE Recommended Practices

On behalf of the Board of Governors, the Executive Committee for Standards Approval reaffirmed two SMPTE Recommended Practices on 7 October 1977: RP 33-1968, Specifications for 35mm Subjective Picture Test Film for Theaters and Review Rooms, and RP 46-1972, Density of Color Films and Slides for Television. — Alex E. Alden, *Manager of Engineering Services*

SMPTE RECOMMENDED PRACTICE

RP 9-1977

Revision of RP 9-1966

Dimensions of Double-Frame 35-mm 2x2 Slides for Precise Applications in Television

Introduction

The use of 2x2 slides has increased enormously in many television stations. The handling of these slides is or will be by automatic or remote methods. Slides containing titles or geometric material must not tilt. In many sequences, slides bear related subject matter and it is necessary to lap-dissolve between them. Under these conditions, it is important that the material be accurately located on the film clip and that the film clip be accurately located in the mount. This is achieved in this practice by locating the picture information relative to the sprocket holes of the film clip and then using the sprocket holes to locate the clip in the mount. The dimensions and tolerances specified below are based on the fact that information on successive slides will register in a suitable television slide projector within the equivalent of ± 5 television lines in a horizontal and vertical direction when the Datum B and Datum C edges of the mount are against the stops in the projector.

Television scanned area has an aspect ratio of 4:3. The mask dimensions shown in Figure 2 are sufficiently larger than those of the scanned area to permit convenient use.

1. *Scope*

1.1 This practice specifies dimensions and tolerances for a double-frame 35-mm film clip and an associated 2x2-in mount which are intended to ensure that picture information is accurately and consistently positioned in a suitable slide projector.

1.2 The slide mount described in Section 3 represents one suitable method for attaining accurate and consistent positioning of picture information in a suitable slide projector. The use of alternate methods of mounting the film clip to within the same accuracy shall be considered as meeting the requirements of this practice.

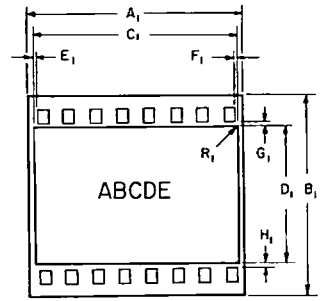

Figure 1
Location of Image on Film

Table 1

Dimensions	Inches	Millimeters
A_1	1.496 ± 0.004	38.00 ± 0.10
B_1*	1.377 nom	34.98 nom
C_1	1.429 ± 0.012	36.30 ± 0.30
D_1	0.964 ± 0.012	24.49 ± 0.30
E_1-F_1	0 ± 0.004	0 ± 0.10
G_1-H_1	0 ± 0.004	0 ± 0.10
R_1	0.016 max	0.41 max

*For information only

1.3 This practice is not intended to replace or to void American National Standard Dimensions of Image Areas and Mounts for Slides and Opaques for Television, PH22.94-1973, or American National Standard Dimensions for Projector Slides, PH3.43-1969.

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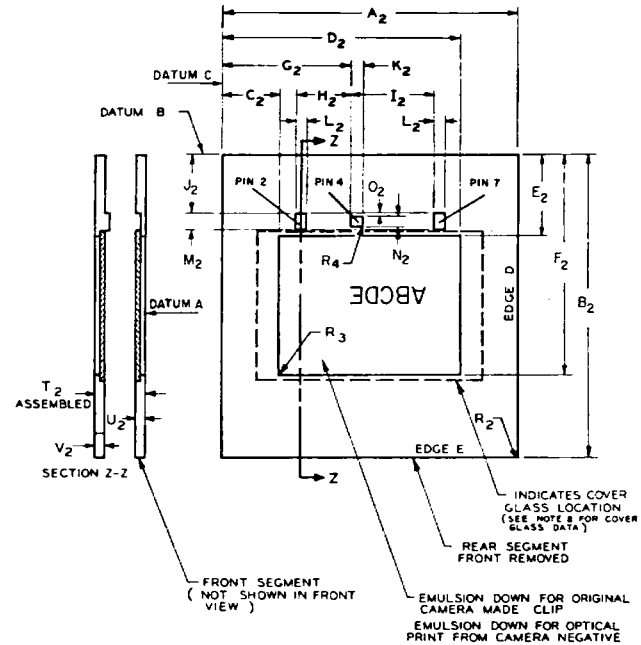

Figure 2
Slide Mount

Table 2

Dimensions	Inches	Millimeters
A_2	1.984 ± 0.004	50.39 ± 0.10
B_2	1.984 ± 0.004	50.39 ± 0.10
C_2	0.3780 ± 0.0020	9.601 ± 0.051
D_2	1.6060 ± 0.0020	40.792 ± 0.051
E_2	0.5244 ± 0.0020	13.320 ± 0.051
F_2	1.4496 ± 0.0020	36.820 ± 0.051
G_2	0.8602 ± 0.0017	21.849 ± 0.043
H_2	0.3681 ± 0.0020	9.350 ± 0.051
I_2	0.5659 ± 0.0010	14.374 ± 0.025
J_2*	0.3831 ± 0.0025	9.731 ± 0.064
K_2	0.0768 ± 0.0005	1.951 ± 0.013
L_2	0.0656 ± 0.0010	1.666 ± 0.025
M_2	0.1088 ± 0.0005	2.764 ± 0.013
N_2	0.1000 ± 0.0010	2.540 ± 0.025
O_2	0.0036 ± 0.0020	0.091 ± 0.051
R_2	0.062 max	1.57 max
R_3	0.062 max	1.57 max
R_4	0.018 ± 0.002	0.46 ± 0.05
T_2	0.115 ± 0.005	2.92 ± 0.13
U_2	0.060 ± 0.002	1.52 ± 0.05
V_2	0.060 ± 0.002	1.52 ± 0.05

*See Note 5.

2. *Double-Frame 35-mm Film Clip*

2.1 The film for double-frame 35-mm film clips to be mounted and used in compliance with this practice shall be in accordance with American National Standard Dimensions for 35 mm Motion-Picture Film Perforated KS, PH22.139-1974, and shall be of low-shrinkage safety film base.

2.2 The camera used for exposure shall produce an image on the film the dimensions of which are in accordance with American National Standard Picture Sizes for Roll Film, 35mm Film, and 126 Film Still-Picture Cameras, PH3.39-1972.

2.3 The location of the image on the film and the length of the film clip shall be in accordance with Figure 1 and Table 1 (see Note 10).

3. *Slide Mount*

3.1 The mount for the double-frame 35-mm film clip shall be manufactured in accordance with Figure 2 and Table 2.

3.2 Slide mounts produced in accordance with this practice shall meet the dimensional tolerances of Figure 2 and Table 2 for at least one year following manufacture.

3.3 In the event that both halves of the mount are hinged together, the hinge shall be located along Edge E. In the absence of a hinge, Datum B shall be identified in an appropriate manner on the external edge of the mount.

Notes

1. The surfaces indicated by Datum A shall be plane within 0.002 in (0.05 mm).
2. The edges indicated by Datums B and C and Edge D shall be straight within 0.002 in (0.05 mm).
3. Datums B and C and Edge D shall be perpendicular to Datum plane A within 1 degree.
4. Datum C and Edge D shall be perpendicular to Datum B within 0.002 in (0.05 mm).
5. Pins 2 and 7 must not depart from Dimension J_2 by more than 0.0020 in (0.051 mm) with respect to each other.
6. The pins must maintain their indicated dimensions at least 0.010 in (0.25 mm) beyond the emulsion position.
7. The pins should extend through the film clip but must not project beyond either exterior surface of the slide mount.
8. Cover glass should be built into the mount on each side of the film surface. This glass should be nominally 0.030 in (0.76 mm) thick and should be treated to reduce Newton's rings where film contacts the glass. When the mount is assembled, there should be sufficient space between the cover glasses to accommodate a film thickness of 0.006 in (0.15 mm) in a snug manner.
9. Material shrinkage and other practical considerations should be taken into account when choosing dimensions and tolerances for manufacturing purposes. The dimensions and tolerances in Table 2 provide a guide for the final product.
10. The recommended emulsion position is that of an original reversal camera film.
11. Slide mounts manufactured in accordance with the reference edges specified as Datums B and C will have minimum position variations among different mounts when these edges are against the projector stops. When Edges D and E are against the projector stops, slightly poorer positioning accuracy results due to the added dimensional tolerances of A_2 and B_2.

SMPTE RECOMMENDED PRACTICE

RP 16–1977
Revision of RP 16-1970

Specifications of Tracking Control Record for 2-in Quadruplex Video Magnetic Tape Recordings

1. *Scope*

This practice specifies the recorded dimensional relationships among (a) tracking control signal, (b) frame pulse signal and (c) vertical synchronizing signal for 2-in (50.8 mm) quadruplex video magnetic tape recordings.

2. *Dimensions*

2.1 The dimensional relationships among the tracking control record, frame pulse record and video record, not specified elsewhere in this practice, shall be as specified in Figs. 1a and 1b and the table.

2.2 Dimensions pertaining to the video, audio and control records on 2-in magnetic tape shall be as specified in American National Standard Dimensions of Video, Audio and Tracking Control Records on 2-inch Video Magnetic Tape Quadruplex Recorded at 15 and 7.5 in/s, C98.6-1973.

3. *Magnetic Coating*

With the direction of tape motion shown, the magnetic coating is on the surface facing the observer.

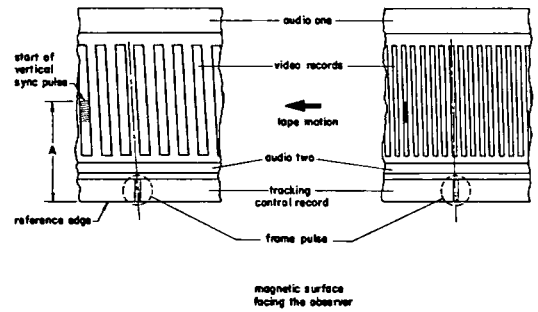

Fig. 1a. 15 in /sec

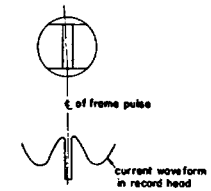

Fig. 1b. 7.5 in /sec **Fig. 1c. Enlargement of Frame Pulse Area**

	Inch		Millimeter	
Dimension	Minimum	Maximum	Minimum	Maximum
A	1.135	1.165	28.83	29.59

4. *Frame Pulse*

4.1 A pulse to identify the position of the vertical synchronizing pulse shall be superimposed on the tracking control signal.

4.2 One pulse shall be recorded per television frame to identify the vertical blanking interval that is preceded by a full horizontal line when the tape is recorded at 15 in/s (381 mm/s) and to identify the vertical blanking interval that is preceded by a half horizontal line when the tape is recorded at 7.5 in/s (190.5 mm/s). (See Appendix A5.)

To assist in certain restricted types of color editing, alternate frame pulses may be omitted. Since omission of alternate frame pulses may result in slightly lengthened lock-up time in tape replay, users may wish to obtain prior agreement before distributing such tapes.

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4.3 The pulse shall be positioned so that the centerline of the recorded pulse and the extended centerline of the area between the second and third video tracks after the track containing the vertical synchronizing pulse shall intersect within ± 0.002 in (± 0.05 mm) at the reference edge of the tape when the recording is made at 15 in/s tape speed (Fig. 1a). The pulse shall be positioned so that the centerline of the recorded pulse and the extended centerline of the fifth video track after the track containing the vertical synchronizing pulse shall intersect within ± 0.002 in at the reference edge of the tape when the recording is made at 7.5 in/s tape speed (Fig. 1b).

4.4 The amplitude of the frame pulse shall be 150 ± 25 percent of the peak-to-peak value of the sinusoidal tracking control signal current in the record head.

4.5 The polarity of the pulse with respect to the tracking control signal shall be as shown in Fig. 1c.

4.6 The pulse shall be 150 ± 30 μsec wide at the 50 percent amplitude points of the current waveform in the record head. The rise and fall times of the pulse shall be 15 ± 10 μsec measured between the 10 and 90 percent points on the waveform.

Widths observable and measurable on developed tape will vary with recording level and properties of the developing solution. (See Appendix A4.)

5. *Tracking Control Signal*

5.1 The frequency of the tracking control signal shall be four times the field frequency of the television video signal.

5.2 The amplitude of the tracking control signal current in the recording head shall be such that the tape is driven to the verge of saturation. This amplitude can be established by the method described in Appendix A1.

5.3 The tracking control signal shall be positioned so that a point of maximum record current and the extended centerline of the area between the second and third video tracks after the track containing the vertical synchronizing pulse shall coincide within ± 0.001 in (± 0.03 mm) at the reference edge of the tape when the recording is made at 15 in/s tape speed.

The tracking control signal shall be positioned so that a point of maximum record current and the extended centerline of the fifth video track after the track containing the vertical synchronizing pulse shall coincide within ± 0.001 in (± 0.03 mm) at the reference edge of the tape when the recording is made at 7.5 in/s tape speed.

5.4 The point of maximum record current coinciding with the frame pulse shall be one that immediately follows an area on the control record to which a south-seeking pole of a compass will be attracted.

5.5 The wave shape of the tracking control signal current in the record head should be sinusoidal.

Appendix

(The Appendix is not a part of this SMPTE Recommended Practice, but is included for information purposes only.)

A1. The transfer characteristic of magnetic tape is nonlinear. The B_r, I_r curve of the tape as recorded has a shape indicated in Fig. 2a. When a sinusoidal record current (Fig. 2c) is applied to the record head, the resulting recorded flux density is as shown in Fig. 2b. The playback voltage waveform (Fig. 2d) is the first derivative of the recorded flux. Thus, the zero axis crossing region of the reproducing signal corresponds to the maximum recorded flux region. The verge of saturation is considered to be the condition where the recorded flux waveform is just noticeably flattened on its peaks. This flattening of the flux peaks results in an inflection in the reproducing signal waveform in the zero axis crossing region. The verge of saturation can thus be determined by increasing the record current until a barely perceptible inflection occurs in the zero axis crossing region of the reproducing signal.

A2. Areas to which a compass is attracted (see Section 5.4) do not coincide with point of maximum record current. The compass will be attracted to two areas (X, as shown in Fig. 2) adjacent to the point where the record current crosses the zero axis. The two areas will appear as bars when the track is developed with carbonyl iron or an equivalent material.

A3. The location of vertical sync and the frame pulse, as specified herein, will apply only if the recorder video head and capstan servos are referenced to a synchronizing signal that is in time coincidence with the video at the recorder.

A4. Recordings made in accordance with this frame pulse specification will reproduce satisfactorily on equipment presently in use without requiring equipment modification. However, modification of existing recording equipment to meet this specification may be made by users or manufacturers in order to increase the overall reliability of the frame pulse recovery. Recordings made according to earlier versions of RP 16 contain less energy in the recorded frame pulse and this fact should be taken into account in the design of new equipment.

A5. In present practice, this pulse is derived from the vertical sync signal that is preceded by a half horizontal line, for both the 15 in/s case and the 7.5 in/s case. The placement on the tape specified by Sec. 4.2 is a consequence of the displacement between the video head wheel and the control track head which records this pulse.

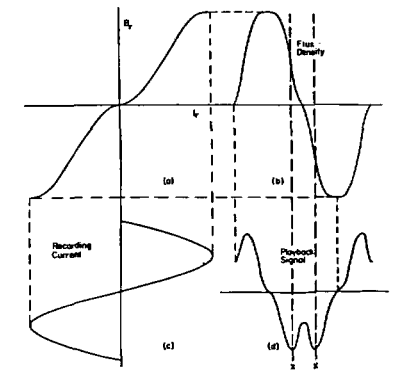

Fig. 2

The Annual Index to Volume 86, 1977 will be published in the next issue, January 1978