standards and recommended practices

Draft American National Standards

Two Draft American National Standards are published here for a trial period and public review.

C98.12, Time and Control Code for Video and Audio Tape for 525 Line/60 Field Television Systems, specifies a digital code format for use on video and audio magnetic tape recorders to be used for timing and control purposes.

C98.13, Cartridge Spools for Dimensions of 2-Inch Quadruplex Video Magnetic Tape, specifies the dimensions for a supply spool to be used in quadruplex equipment designed to utilize a reloadable cartridge or cassette.

Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to 1 April 1974. The proposals have been submitted to American National Standards Committee C98. All comments received through *Journal* publication will be reviewed before conclusion of action by that Committee.

Approved International Standard

The International Organization for Standardization (ISO) approved during December 1973 International Standard ISO 2968-1973, Recording Characteristics for Magnetic Sound Record on 8mm Type S Motion-Picture Prints, the technical content of which is published here. The Standard is in complete agreement with the USA practice on which there has been no need to standardize nationally. Copies of all International Standards are available from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

ISO is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. The International Standard published here was developed by Technical Committee 36 on Cinematography. The work of this Committee is administered by the Engineering Department of the SMPTE which functions as the Secretariat in ANSI's name. The report of the last meeting of the Committee was published in the October 1971 *Journal of the SMPTE*. — Alex E. Alden, *Staff Engineer*

Draft American National Standard

C98.12

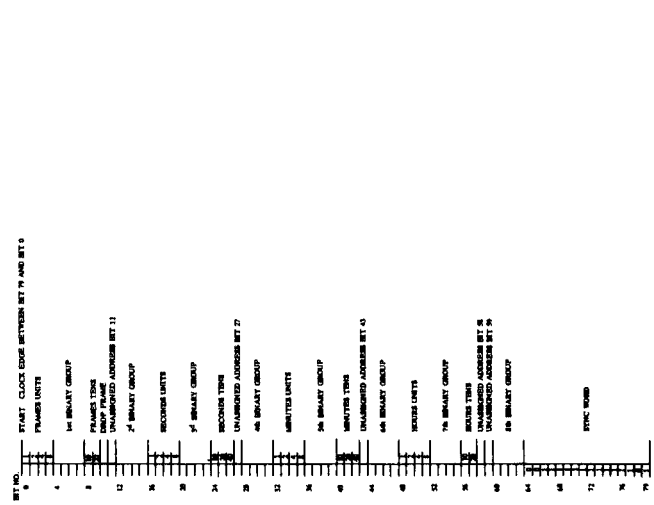
Time and Control Code for Video and Audio Tape for 525 Line/60 Field Television Systems

1. Scope

This standard specifies a digital code format and modulation method for video and audio magnetic tape recorders to be used for timing and control purposes. The standard also specifies the location of the code on the tape and its relationship to other signals on the tape.

2. Modulation Method

The modulation method shall be such that a transition occurs at the beginning of every bit period. "One" is represented by a second transition one half a bit period from the start of the bit. "Zero" is represented when there is no transition within the bit period. (See Figure.)



THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY

3. Code Format

3.1 Each television frame shall be identified by a unique and complete address. A frame consists of two television fields or 525 horizontal lines.

3.1.1 The frames shall be numbered successively 0 through 29.

3.2 Each address shall consist of 80 bits numbered 0 through 79.

3.3 The bits shall be assigned as shown in the figure and described below:

0-3 Units of frame
4-7 First binary group
8-9 Tens of frames
10 Drop frame flag (See Sec. 4.2.2)
11 Unassigned address bit (0 until assigned by the SMPTE Video Tape Recording Committee)
12-15 Second binary group
16-19 Units of seconds
20-23 Third binary group
24-26 Tens of seconds
27 Unassigned address bit (0 until assigned by the SMPTE Video Tape Recording Committee)
28-31 Fourth binary group
32-35 Units of minutes
36-39 Fifth binary group
40-42 Tens of minutes
43 Unassigned address bit (0 until assigned by the SMPTE Video Tape Recording Committee)
44-47 Sixth binary group
48-51 Units of hours
52-55 Seventh binary group
56-57 Tens of hours
58-59 Unassigned address bits (0 until assigned by the SMPTE Video Tape Recording Committee)
60-63 Eighth binary group
64-79 Synchronizing word
64-65 Fixed zero
66-77 Fixed one
78 Fixed zero
79 Fixed one

3.4 Boundaries of Address. The address shall start at the clock edge before the first address bit (bit zero). The bits shall be evenly spaced throughout the address period, and they shall occupy fully the address period which is one frame. Consequently, the bit rate shall be 80 times the frame rate in frames per second. (See Sec. 3.1 for definition of a television frame.)

3.5 Timing of Start of Address. The start of the address shall occur at the beginning of the frame as defined by the leading edge of the third wide pulse of that vertical interval in which that edge is coincident with the leading edge of a horizontal sync pulse. The tolerance shall be plus or minus one line.

3.6 Use of Binary Groups. The binary groups are intended for storage of supplementary data by the users, and the 32 bits within the eight groups may be assigned in any fashion without restrictions. It is anticipated that the use of these bits will be standardized in the future.

3.7 Assigned and Unassigned Address Bits. Six bits are reserved within the address groups, one for identifying operational modes, and five unassigned but reserved for future assignment and defined as zeros until further specified by the SMPTE Video Tape Recording Committee.

Bit No. 10—Drop Frame Flag. If certain numbers are being dropped to resolve the difference between real time and color time as defined in Sec. 4.2.2, a "1" shall be recorded.

Bits No. 11, 27, 43, 58, 59—Unassigned Address Bits. "0" until assigned by the SMPTE Video Tape Recording Committee.

4. Time Discrepancies

4.1 Definitions of Real Time and Color Time
Real time is defined as the time elapsed during the scanning of 60 fields (or any multiple thereof) in an ideal television system at a vertical field rate of exactly 60 fields per second.

Color time is defined as the time elapsed during the scanning of 60 fields (or any multiple thereof) in a color television system at a vertical field rate of approximately 59.94 fields per second.

4.2 Because the vertical field rate of a color signal is approximately 59.94 fields per second, straightforward counting at 30 frames per second (60 fields per second) will yield an error of +108 frames (+216 fields), equivalent to +3.6 seconds timing error, in one hour of running time. For correction of this time discrepancy, two methods of operation are allowed:

4.2.1 Uncompensated Mode. During a continuous recording, no numbers shall be omitted from the chain of addresses. Each address shall be increased by 1 frame over the frame number immediately preceding it. When this mode is used, bit No. 10 of each address shall be a "0" as specified in Sec. 3.7.

4.2.2 Compensated Mode. To resolve the color time error, the first two frame numbers (0, 1) at the start of each minute, except minutes 0, 10, 20, 30, 40 and 50, shall be omitted from the count. When this mode is used, bit No. 10 of each address shall be a "1" as specified in Sec. 3.7.

5. Structure of the Address Bits

5.1 The basic structure of the address is based upon the Binary Coded Decimal (BCD) system. Because the count in some cases does not rise to 9, conservation of bits is achieved because 4 bits are not needed as in an ordinary BCD code.

5.1.1 Units Frames. Bits 0-3—4 bit BCD arranged 1, 2, 4, 8. Count 0-9.

5.1.2 Tens Frames. Bits 8-9—2 bit BCD arranged 1, 2. Count 0-2.

5.1.3 Units Seconds. Bits 16-19—4 bit BCD arranged 1, 2, 4, 8. Count 0-9.

5.1.4 Tens Seconds. Bits 24-26—3 bit BCD arranged 1, 2, 4. Count 0-5.

5.1.5 Units Minutes. Bits 32-35—4 bit BCD arranged 1, 2, 4, 8. Count 0-9.

5.1.6 Tens Minutes. Bits 40-42—3 bit BCD arranged 1, 2, 4. Count 0-5.

5.1.7 Units Hours. Bits 48-51—4 bit BCD arranged 1, 2, 4, 8. Count 0-9.

5.1.8 Tens Hours. Bits 56-57—2 bit BCD arranged 1, 2. Count 0-2.

(The 24-hour clock system is used.
2:00 p.m. is 1400 hours.)

6. Position of the Address on the Video Tape

6.1 Audio No. 2 Track (Cue Track) Record on Quadruplex Recorders. The address shall be recorded upon the Audio No. 2 Track (Cue Track) whose location is 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. Since the timing of the address is specified by Sec. 3.5, the position of its start point along the tape will be determined with respect to the video record by the position of the audio No. 2 head as set forth in C98.6–1973.

6.2 Audio Track Record on Helical Scan Recorders. When this code is used on helical scan recorders, provisions of Sections 2 through 5 shall apply. Since no American standards exist for helical scan recorders, location of the address has yet to be determined.

6.3 Recording in Vertical Interval of the Video Signal. The concept of the SMPTE Time and Control Code includes consideration for recording the address in the vertical interval of the video signal. However, the characteristics of this method have not yet been specified.

Draft American National Standard

Dimensions of Cartridge Spools for 2-inch Quadruplex Video Magnetic Tape

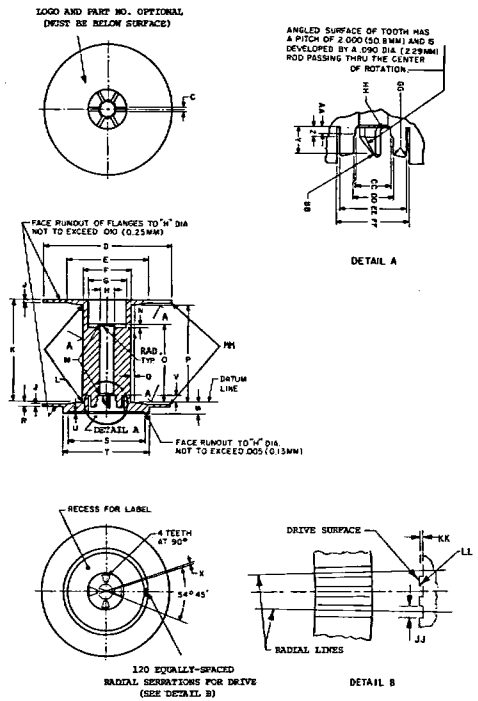
C98.13

1. Scope

This standard specifies the dimensions of a 2.7 inch (68.58 mm) diameter supply spool for quadruplex equipment designed to utilize a reloadable cartridge or cassette.

2. Dimensions

The dimensions of the spool shall be as specified in the figure and table.



DIMENSIONS		INCHES	MILLIMETERS
A		See Note 2	
C		0.060 (6 equal spaces)	1.52 (6 equal spaces)
D	(diameter)*	2.70 ± 0.010	68.58 ± 0.25
E	(diameter)	1.700 ± 0.030	43.18 ± 0.76
F	(diameter)†	1.000 +0.005 −0.010	25.40 +0.13 −0.25
G	(diameter)	0.812 ± 0.010	20.62 ± 0.25
H	(diameter)	0.313 +0.001 −0.000	7.95 +0.03 −0.00
J		0.055 ± 0.005	1.40 ± 0.13
K		2.120 ± 0.010	53.85 ± 0.25
L	(radius)	0.004 max	0.10 max
M		0.015 × 45° (chamfer)	0.38 × 45° (chamfer)
N		0.060	1.52
O		1.611 ± 0.010	40.92 ± 0.25
P		2.030 ± 0.005	51.56 ± 0.13
Q		0.070 ± 0.040	1.78 ± 1.02
R		0.090 ± 0.005	2.29 ± 0.13
S	(diameter)‡	1.625 ± 0.005	41.28 ± 0.13
T	(diameter)‡	1.820 ± 0.005	46.23 ± 0.13
U		0.020 min 0.070 max	0.51 min 1.78 max
V		0.137 ± 0.005	3.48 ± 0.13
W		0.230 ± 0.005	5.84 ± 0.13
X		0.045 typ	1.14 typ
Y		0.227 ref	5.77 ref
Z		0.100	2.54
AA		0.090	2.29
BB	(radius)	0.01 typ	0.3 typ
CC	(diameter)	0.375 ± 0.010	9.52 ± 0.25
DD	(diameter)	0.410 ± 0.010	10.41 ± 0.25
EE	(diameter)	0.710 +0.040 −0.010	18.03 +1.02 −0.25
FF	(diameter)	0.750	19.05
GG	(radius)	0.031 max	0.79 max
HH	(radius)	0.031	0.79
JJ		0.017 min 0.020 max	0.43 min 0.51 max
KK		0.005 min 0.008 max	0.13 min 0.20 max
LL	(radius)	0.003 max typ	0.08 max typ
MM	(radius)	0.010 ± 0.005	0.25 ± 0.13

* D shall be concentric to H within 0.006 inch (0.15 mm).

† F shall be concentric with H within 0.002 inch (0.05 mm). Maximum taper in 2.030-inch (51.56 mm) dimension shall not exceed 0.002 inch (0.05 mm).

‡ S and T shall be concentric to H within 0.010 inch (0.25 mm).

NOTE 1: The teeth described in Detail A and the serrations described in Detail B are intended as alternate methods for driving the spools.

NOTE 2: Surfaces indicated by the letter A should contain surface finish designated as No. 63 (microinch measurement of surface polish), as defined in American National Standard Surface Texture, B46.1-1971 (R-1962).

Cinematography — Recording characteristics for magnetic sound record on 8 mm Type S motion-picture prints — Specifications

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the recorded characteristic for magnetic sound records on 8 mm Type S motion-picture perforated film conforming to ISO . . ., running at the nominal speed of 24 frames (10,2 cm or 4.0 in) per second or 25 frames (10,6 cm or 4.2 in) per second. Tolerances are specified on the recorded levels.

2 REFERENCES

ISO 1781, *Cinematography — Projector usage of 8 mm Type S motion-picture film for direct front projection.*

ISO 3027, *Cinematography — Magnetic strips and recording and reproducing head gaps for sound record on 8 mm Type S motion-picture prints — Positions and width dimensions.*[1]

3 RECORDED CHARACTERISTIC

With constant sine-wave signal applied to the input of the recording system, the nominal characteristic of the short-circuit magnetic flux versus frequency shall fall with increasing frequency in conformity with the impedance of a parallel combination of a capacitance and resistance having a time constant $t = 90\ \mu s$.

The curve defined above is represented by :

$$N\ (\text{dB}) = -10 \log_{10} (1 + 4\pi^2 f^2 t^2)$$

where

f is the frequency in hertz;

t is the time constant in seconds;

N is the recorded level in decibels.

The approximate numerical values are given in the table.

Frequency Hz	N dB
50	− 0,00
63	− 0,01
80	− 0,01
100	− 0,01
125	− 0,02
160	− 0,04
200	− 0,06
250	− 0,09
315	− 0,14
400	− 0,22
500	− 0,33
630	− 0,52
800	− 0,81
1 000	− 1,20
1 250	− 1,76
1 600	− 2,60
2 000	− 3,58
2 500	− 4,77
3 150	− 6,20
4 000	− 7,86
5 000	− 9,54
6 300	− 11,36
8 000	− 13,32
10 000	− 15,18

1) At present at the stage of draft.

4 TOLERANCES ON RECORDED LEVELS

The magnetic sound records on the film shall be recorded to the characteristic specified in section 3 within the tolerances given in the figure.

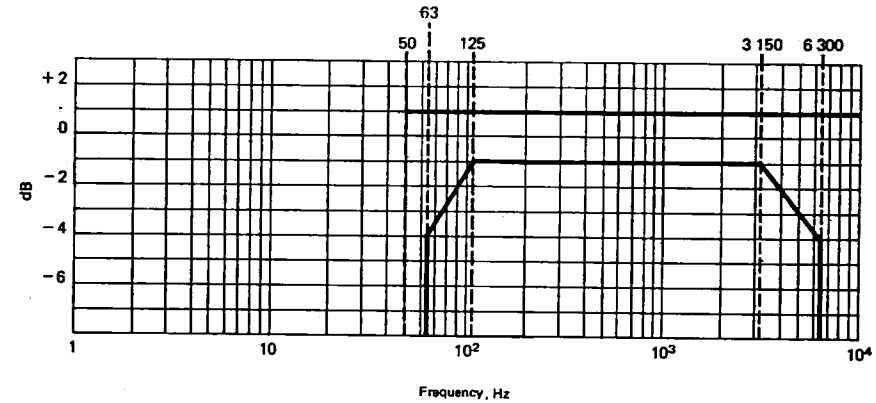


FIGURE — Tolerances on recorded levels