SMPTE RECOMMENDED PRACTICE — RP 85–1985

Tracking-Control Record for 1-in Type C Helical-Scan Video Tape Recording

1. *Scope*

This practice specifies the characteristics of the tracking-control record and the relationship between the recorded video and tracking-control signal for 1-in type C helical-scan video tape recorders operating on 525/60 monochrome or NTSC color systems.

2. *Tracking-Control Record*

2.1 The tracking-control record consists of a series of constant flux levels alternating in polarity at a field rate as shown in Fig. 1. An extra pair of transitions is added to alternate frames.

2.2 The polarity of the tracking-control record flux shall be such that the south poles of magnetic domains point in the direction of tape travel during the vertical interval identifying fields I and III, and the north poles of the magnetic domains point in the direction of tape travel during the vertical interval identifying fields II and IV. Therefore, the north-to-south transition which occurs during fields II and IV will be adjacent south magnetic poles, that is, the transition area will attract the south-seeking pole of a bar magnet.

2.3 The amplitude of the tracking control recorded flux shall be at least 30 dB above the residual flux of any previous recording.

2.4 The 10-to-90 percent rise time of record current required to produce the specified flux level changes shall be 0.015 ± 0.010 milliseconds.

2.5 The width of the record-current pulses for the extra pair of transitions on alternate frames shall be 0.20 ± 0.03 milliseconds or 0.40 ± 0.06 milliseconds for the N-S-N transitions. Signal timing shall be measured at the zero-crossing points of record head current.

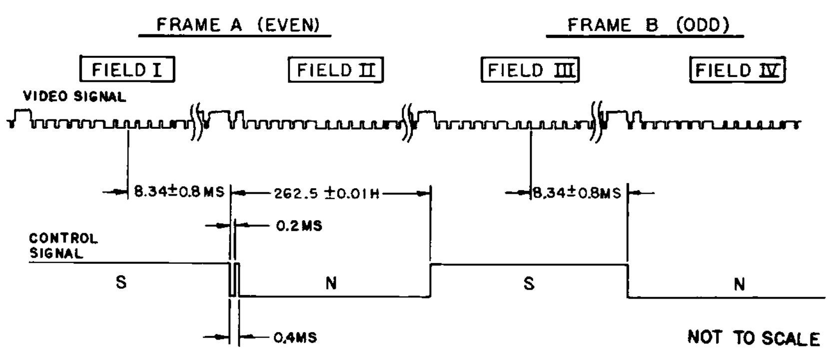

Fig. 1
Tracking Control Waveform and Timing

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Approved 2 January 1985

3. *Tracking Control and Video Timing*

3.1 Recording current transitions representing video fields shall occur 8.34 ± 0.80 milliseconds after the negative-going transition of the third broad pulse, as shown in Fig. 1. The south-to-north transition shall occur in fields I and II, identified as the fields which end with a half line of video information.

3.2 Alternate frames shall be identified by an extra pair of transitions of recorded flux occurring at the south-to-north transition of every other frame, as shown in Fig. 1.

3.3 It is possible to use the alternate-frame identification to specify odd and even frames, as designated by EIA Industrial Electronics Tentative Standard No. 1, Color Television Studio Picture Line Amplifier Output Drawing. When not limited by other system requirements, the alternate-frame identification shall represent frame A (even). Since not all video signals meet the EIA standard and certain types of edits may prohibit compliance with the specified frame identification, the reproduce system must be able to use or ignore the alternate-frame information as directed by the operator.

NOTE: In addition to this practice, there is available American National Standard for Video Recording — 1-in Type C Helical-Scan — Basic System and Transport Geometry Parameters, ANSI V98.18M-1983.

SMPTE RECOMMENDED PRACTICE — RP 86-1985

Video Record Parameters for 1-in Type C Helical-Scan Video Tape Recording

1. *Scope*

This practice specifies parameters of the recorded information essential to the interchange of 1-in type C helical-scan video tape recordings of the 525/60 monochrome or NTSC color systems. The parameters include video pre-emphasis characteristics, recorded carrier frequencies, and record-current frequency response.

2. *Signal Processing*

2.1 A signal processing system consisting of elements specified by this practice will contain, in order of signal flow, the following elements:

2.1.1 A means to modify the burst amplitude

2.1.2 A video pre-emphasis network

2.1.3 A linear frequency-modulator having constant deviation with respect to modulating frequencies

2.1.4 An amplifier of the frequency-modulated carrier to provide alternating current drive to the video and sync record heads

3. *Burst Amplitude*

A means shall be used to increase the burst amplitude of the signal to be recorded by 6.0 ± 0.1 dB with respect to the video and sync portion of the composite video waveform. Phase of the burst shall be maintained to within ±1°.

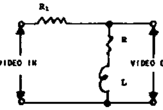
4. *Pre-emphasis*

4.1 Pre-emphasis is defined by the frequency and phase characteristics of a network such as shown in the figure. Accuracy of the pre-emphasis time constants shall be maintained by including source and load impedances (not shown) in calculation of circuit values.

4.2 Time-constant values specifying the pre-emphasis networks are:

Time constant $t_1 = 240$ ns

Time constant $t_2 = 600$ ns



$$t_1 = \frac{L}{R_1 + R}$$

$$t_2 = \frac{L}{R}$$

$$\frac{V\,out}{V\,in} = \frac{j\omega t_2 + 1}{j\omega t_1 + 1}\;\frac{t_1}{t_2}$$

5. *Recorded Carrier Frequencies*

Carrier frequencies corresponding to reference video levels shall be:

Peak-white	10.00 ± 0.05 MHz
Blanking	7.90 ± 0.05 MHz
Sync-tip	7.06 MHz nom

6. *Record Head Current*

6.1 Amplitude of the record current shall be such that a maximum tape-flux level is produced when recording a signal with 50% average picture level.

6.2 The amplitude versus frequency characteristic of the current applied to the record head windings shall decrease with increasing frequency. The recorded tape-flux frequency characteristic shall be equivalent to recording a constant current versus frequency sine wave modified by one time-constant low-pass filter with a 6-MHz, 3-dB bandwidth driving a head with pole tips made of ferrite material.

NOTE: In addition to this practice, there is available American National Standard for Video Recording — 1-in Type C Helical-Scan — Basic System and Transport Geometry Parameters, ANSI V98.18M-1983.

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PROPOSED SMPTE RECOMMENDED PRACTICE — RP 135

Use of Binary User Groups in Motion-Picture Time and Control Codes

1. *Scope*

This practice specifies a method of coding data into the binary user groups of time and control codes for motion-picture systems. The type of data recorded is useful in the production of motion pictures.

This practice also specifies a directory system to accommodate the various types of data that may need to be recorded. Whether or not to use a particular type of data, and if used, the repetition frequency, is left to the discretion of the equipment manufacturer and/or the user.

This practice also specifies the use of a checksum in one of the binary user groups.

2. *Reference Document*

The following document is intended to be used in conjunction with this practice:

SMPTE Recommended Practice on Time and Control Codes for 24, 25, or 30 Frame-Per-Second Motion-Picture Systems, RP 136

3. *Binary Group Flag Bits*

When the data format corresponding to this practice is used, the binary group flag bits specified in RP 136 shall be set as follows:

Bit 43 of the type C code or bit 67 of the type B code shall be set to a zero. Bit 59 of the type C code or bit 83 of the type B code shall be set to a one.

4. *Data Structure*

4.1 There are 8 binary groups specified in RP 136, each consisting of four bits. Unless otherwise specified, when a group of these bits is used to represent a number of characters, the bit with the lowest number specified in RP 136 shall be the least significant bit, and the bit with the highest number shall be the most significant bit.

4.2 The first binary group shall be used as a data identification index, identifying the data in the second through seventh binary groups as specified below and as shown in Table 1. There are 16 possible index values, numbered 0 through 15.

Each frame of time and control code may thus contain only one type of data, depending on the value of the data identification index. A sequence of more than one frame may be required, therefore, to record all the required data. However, the choice of which data types to use and their repetition frequency is left to the discretion of the user and/or manufacturer.

4.3 The eighth binary group shall be used as a checksum. It shall contain the negative of the modulo-256 sum of the first through seventh binary groups.

4.4 Directory

4.4.1 Entry 0. When the value of the data identification index is zero, the bits of the second through seventh binary groups shall be used as individual flags as defined in Table 2. Flag bits that are not used or that are unassigned should be set to zero.

4.4.2 Entry 1. When the value of the data identification index is one, the bits of the second through seventh binary groups shall be used to record the date in binary coded decimal format. The binary groups shall be assigned as follows:

Binary Group	Contents
Second	Units of the day of the month
Third	Tens of the day of the month
Fourth	Units of the month
Fifth	Tens of the month
Sixth	Units of the year
Seventh	Tens of the year

The date will be displayed in increasing quantities of time: day, month, year.

4.4.3 Entry 2. When the value of the data identification index is two, the bits of the second through seventh binary groups shall be used to record a production identification number or code. This code may be alphanumeric and shall be recorded with the 6-bit character set described in Sec. 5. Any of the character symbols may also be used.

4.4.4 Entry 3. When the value of the data identification index is three, the bits of the second through seventh binary groups shall be used to record a four-digit equipment identification number or code. For example, if more than one

THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY camera is used, the camera number could be recorded. This code may be alphanumeric and shall be recorded with the 6-bit character set described in Sec. 5. Any of the character symbols may also be used.

4.4.5 Entry 4. When the value of the data identification index is four, the bits of the second through seventh binary groups shall be used to record a four-digit scene number. This number may be alphanumeric and shall be recorded with the 6-bit character set described in Sec. 5. Any of the character symbols may also be used.

4.4.6 Entry 5. When the value of the data identification index is five, the bits of the second through seventh binary groups shall be used to record a four-digit take number. This number may be alphanumeric and shall be recorded with the 6-bit character set described in Sec. 5. Any of the character symbols may also be used.

4.4.7 Entry 6. When the value of the data identification index is six, the bits of the second through seventh binary groups shall be used to record a four-digit roll number. For example, when recording sound, this number could identify the roll of magnetic tape, or when shooting pictures, this roll could identify the roll of film. This number may be alphanumeric and shall be recorded with the 6-bit character set described in Sec. 5. Any of the character symbols may also be used.

4.4.8 Entries 7 through 14. These index values are unassigned and shall not be used. Their assignment is reserved to the SMPTE.

Table 1
Directory

Index	Data	Digits	Format
0	Flags	24	Binary
1	Date (DDMMYY)	6	BCD
2	Production number	6	BCD
3	Equipment identification	4	6-BIT CHAR
4	Scene number	4	6-BIT CHAR
5	Take number	4	6-BIT CHAR
6	Roll number	4	6-BIT CHAR
7-14	Unassigned		
15	Extended directory		

Table 2
Flags

Bit No. Type C	Bit No. Type B	Data: Zero	Data: One
12	36	Pictures	Audio
13	37	Sync sound or picture	No sound/no picture
14	38	To be printed	Not printed
15	39	Sync speed	Not sync speed
20	44	Day photography	Night photography
21	45	Daylight	Tungsten

4.4.9 Entry 15. When the value of the data identification index is 15, an extended directory is invoked. The second binary group becomes an extended data identification index and data is recorded in the third through seventh binary groups. No extended data identification values are assigned at this time and their assignment in the future is reserved to the SMPTE. Until they are assigned, a data identification index of 15 shall not be used.

5. *Six-Bit Character Format*

5.1 Certain types of data are recorded using a six-bit character set. This section specifies the allocation of the four-bit user groups when recording this type of data and the character set to be used.

5.1.1 Use of the Bits. The data bits of the second through seventh binary groups shall be assigned as specified in Table 3.

Table 3
Data Bit Assignment

Bits, Type C Code	Bits, Type B Code	Use
12,13,14,15,20,21	36,37,38,39,44,45	Least significant character
22,23,28,29,30,31	46,47,52,53,54,55	Character
36,37,38,39,44,45	60,61,62,63,68,69	Character
46,47,52,53,54,55	70,71,76,77,78,79	Most significant character

5.1.2 Character Set. The character set shall be as defined in Table 4. This character set is a sub-set of the one defined in International Standard ISO 2022-1982, Information Processing — ISO 7-Bit and 8-Bit Coded Character Sets — Code Extension Techniques.

Table 4
Six-Bit Character Set

Character	Binary Equivalent	Decimal Equivalent	Character	Binary Equivalent	Decimal Equivalent
space	000000	0	@	100000	32
!	000001	1	A	100001	33
"	000010	2	B	100010	34
#	000011	3	C	100011	35
$	000100	4	D	100100	36
%	000101	5	E	100101	37
&	000110	6	F	100110	38
'	000111	7	G	100111	39
(	001000	8	H	101000	40
)	001001	9	I	101001	41
*	001010	10	J	101010	42
+	001011	11	K	101011	43
,	001100	12	L	101100	44
-	001101	13	M	101101	45
.	001110	14	N	101110	46
/	001111	15	O	101111	47
0	010000	16	P	110000	48
1	010001	17	Q	110001	49
2	010010	18	R	110010	50
3	010011	19	S	110011	51
4	010100	20	T	110100	52
5	010101	21	U	110101	53
6	010110	22	V	110110	54
7	010111	23	W	110111	55
8	011000	24	X	111000	56
9	011001	25	Y	111001	57
:	011010	26	Z	111010	58
;	011011	27	[	111011	59
<	011100	28	\	111100	60
=	011101	29	]	111101	61
>	011110	30	^	111110	62
?	011111	31	—	111111	63

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 136

Time and Control Codes for 24, 25 or 30 Frame-Per-Second Motion-Picture Systems

1. Scope

This practice specifies digital code formats and modulation methods for motion-picture film to be used for timing, control, editing, and synchronization purposes. This practice also specifies the relationship of the code to the motion-picture frame. The codes described in this practice are similar to the continuous code described in American National Standard Time and Control Code for Video and Audio Tape for 525-Line/60-Field Television Systems, ANSI V98.12M-1981.

There are two types of codes described in this practice. The first type, type C, is a continuous code which is very similar to the continuous code specified in ANSI V98.12M-1981. This type of code can be used in situations where the film is moving continuously at the time of both recording and reproduction.

The second type of code, type B, is a noncontinuous, block-type code, composed of blocks of data, each complete in itself, with gaps between the blocks. It is designed so that the code may be recorded and played back on equipment with intermittent film motion but still be decoded with the same type of electronic equipment used to read the type C or continuous time code.

The codes described in this practice can be used at various frame rates, the ones currently of interest being 24, 25, and 30 frames per second.

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.

3. Code Formats

Two code formats are described: type C and type B. Sections 3.1 and 3.2 describe the unique characteristics of the two code types. The other sections, 3.3 and 3.4, apply to both code types.

3.1 Type C Code Format

3.1.1 Each motion-picture frame shall be defined by a unique and complete address.

3.1.2 The frames shall be numbered successively 0 through 23, 24, or 29, corresponding to the frame rate being used.

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

3.1.4 The bits shall be assigned as shown in the appropriate columns of Fig. 1 and the table.

3.1.5 Timing of the 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 fully occupy the address period, which is one frame. Consequently, the bit rate shall be 80 times the frame rate in frames per second.

3.1.6 The start of the address, i.e., the clock edge before the first bit, shall coincide with the frameline at the beginning of the image to which the address refers. The tolerance of this location is + 0% (in direction of film travel) and —50% of a frame length (in the other direction). (Thus, the start of the address may lie anywhere in the top half of the frame with the preferred position at the frameline.) (See Fig. 2.)

3.2 Type B Code Format

3.2.1 Each motion-picture frame shall be identified by a unique and complete address.

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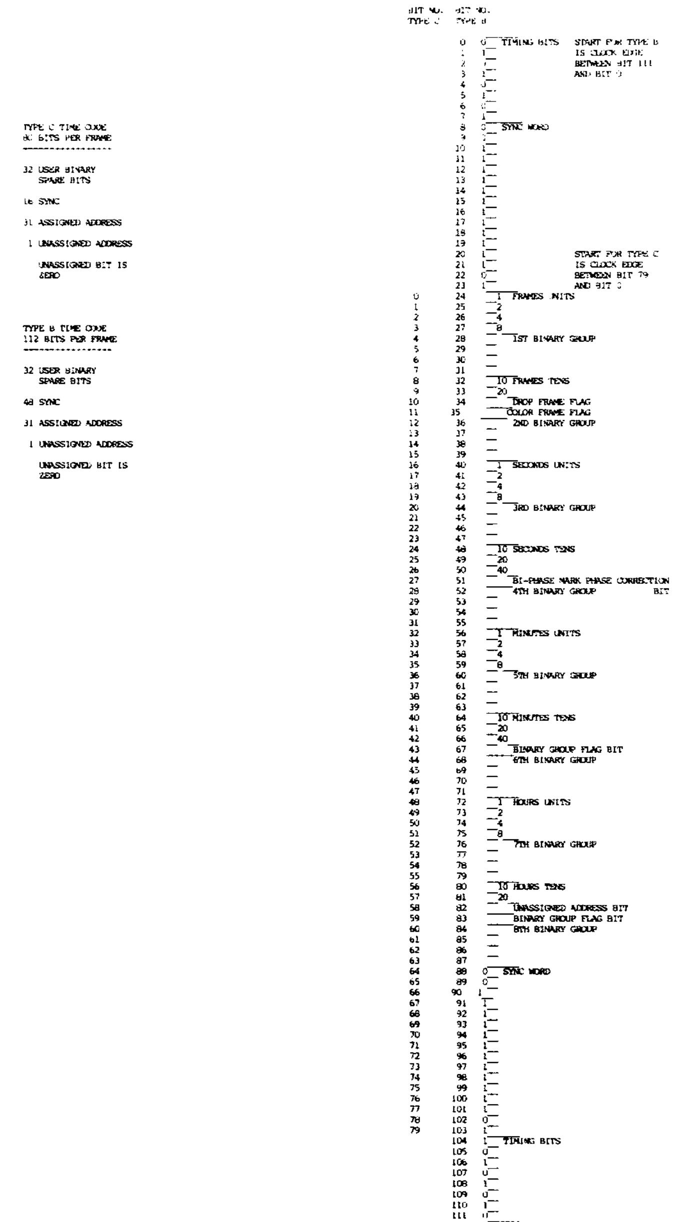


Fig. 1
Bit Assignment

Table

Bits Type C Code	Bits Type B Code	
•	0-7	Alternating zero, one pattern
•	8-23	Synchronizing word
•	8-9	Fixed zero
•	10-21	Fixed one
•	22	Fixed zero
•	23	Fixed one
0-3	24-27	Units of frame
4-7	28-31	First binary group
8-9	32-33	Tens of frames
10	34	Drop frame flag (see 3.4)
11	35	Color frame flag (see 3.4)
12-15	36-39	Second binary group
16-19	40-43	Units of seconds
20-23	44-47	Third binary group
24-26	48-50	Tens of seconds
27	51	Bi-phase Mark Phase correction bit (see 3.4)
28-31	52-55	Fourth binary group
32-35	56-59	Units of minutes
36-39	60-63	Fifth binary group
40-42	64-66	Tens of minutes
43	67	Binary group flag bit (see 3.4)
44-47	68-71	Sixth binary group
48-51	72-75	Units of hours
52-55	76-79	Seventh binary group
56-57	80-81	Tens of hours
58	82	Unassigned address bit (0 until assigned by the SMPTE)
59	83	Binary group flag bit (see 3.4)
60-63	84-87	Eighth binary group
64-79	88-103	Synchronizing word
64-65	88-89	Fixed zero
66-77	90-101	Fixed one
78	102	Fixed zero
79	103	Fixed one
•	104-111	Alternating one, zero pattern

•These bits do not exist in the Type C code.

3.2.2 The frames shall be numbered successively 0 through 23, 24, or 29, corresponding to the frame rate being used.

3.2.3 Each address shall consist of 112 bits numbered 0 through 111.

3.2.4 The bits shall be assigned as shown in the appropriate columns of Fig. 1 and in the table.

3.2.5 Boundaries of the Address. The block of data for a single frame may be recorded anywhere within that frame except that no part of the block may occupy the region extending from the frameline to 5% of a frame length on either side of it. This region is thus a gap in the data which has a minimum length of 10% of a frame length. (See Fig. 3.)

3.2.6 Bit Length. The length of any one bit shall not differ by more than 5% from the length of either adjacent bit. In addition, the length of no bit shall be so short as to make the recording and reproduction of that data, using practical equipment, unreliable; and the length of no series of bits may cause the total length of 112 bits to exceed 90% of frame length.

3.2.7 Data in the Gap. In order to reduce the dc content of the signal, a repetitive pattern of zeros and ones shall be recorded in as much of gap area (the frameline region defined in 3.2.5) as is practical. In no case may this region contain a sync word nor may these bits, together with the second sync word of the previous frame and the first sync word of the following frame, be decodable as a valid time code word. The bit length tolerance in 3.2.6 does not apply to data in the gap.

3.3 Use of Binary Groups. The binary groups are intended for storage of data by the users, and the 32 bits within the 8 groups may be assigned in any fashion without restrictions if the character set used for the data insertion is not specified and the binary group flag bits, Nos. 43 and 59, both are zero.

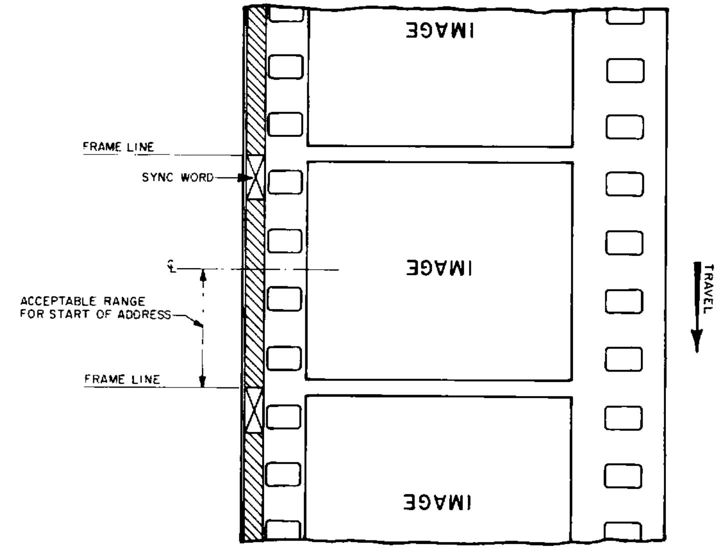


Fig. 2
Type C Code

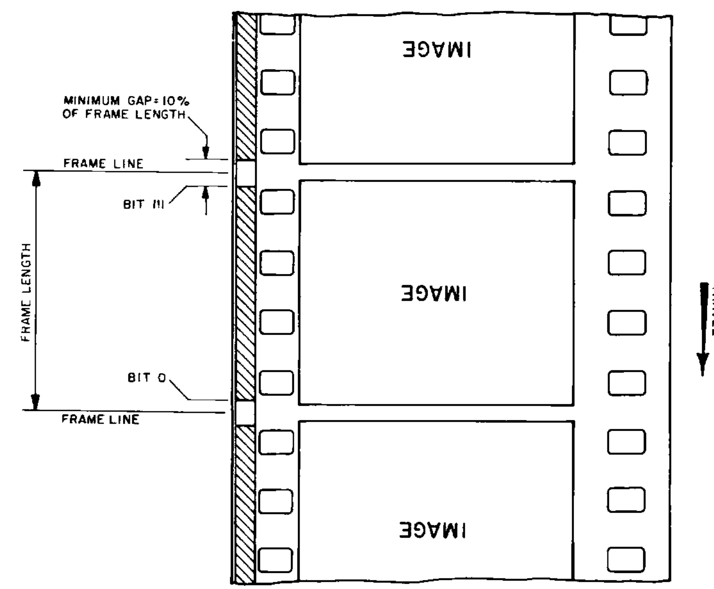


Fig. 3
Type B Code

(Figs. 2 and 3 illustrate the preferred longitudinal placement of a frame of time code relative to the picture frame. It it not intended to identify the track position on the film. The figures apply to all film formats, even though 35-mm film is shown.)

The binary group flag bits 43 and 59 (67 and 83 for Type B code) shall be set according to the following truth table:

	Bit 43 (67)	Bit 59 (83)
Character set not specified	0	0
Character set as defined in International Standard ISO 2022-1982, Information Processing — ISO 7-Bit and 8-Bit Coded Character Sets — Code Extension Techniques	1	0
Data and check sum as defined in SMPTE Recommended Practice on Use of Binary User Groups in Motion-Picture Time and Control Codes, RP 135	0	1
Unassigned	1	1

The unassigned state of the truth table cannot be used and its assignment is reserved to the SMPTE.

3.4 Assigned and Unassigned Address Bits. Six bits are reserved within the address groups, 4 for identifying operational modes when this type of code is used for television systems (see ANSI V98.12M-1981), 1 for bi-phase correction, and 1 unassigned but reserved for future assignment and defined as zero until further specified by the SMPTE.

Bit 10, Type C code; Bit 34, Type B code — Drop frame flag. If certain numbers are being dropped to resolve the difference between real time and color time, as defined in 4.2.2, a "1" shall be recorded.

Bit 11, Type C code; Bit 35, Type B code — Color frame flag. If color frame identification has been intentionally applied, a "1" shall be recorded.

Bit 27, Type C code; Bit 51, Type B code — "Bi-phase Mark" Phase Correction. Shall be put in a state so that every 80- or 112-bit word will contain an even number of logic zeros. This requirement results in the following truth table for Bit 27 (51):

Number of Logic Zeros in Bits 0 to 26 (24 to 50), and Bits 28 to 63 (52 to 87)	Type C Bit 27	Type B Bit 51
Odd	1	0
Even	0	1

Bits 43, 59, Type C code; Bits 67, 83, Type B code — Binary Group Flag Bits. These two bits shall be set in accordance with the truth table as specified in 3.3.

Bit 58, Type C code; Bit 82, Type B code — — Unassigned Address. "0" until assigned by SMPTE.

4. *Time Discrepancies*

4.1 When the film on which the time code is recorded is transferred from or will be transferred to television, or is otherwise used in conjunction with a 525-line/60-field television system, there may be a need to use the drop frame counting mode. This section presents pertinent definitions.

4.1.1 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.

4.1.2 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 Nondrop Frame — Uncompensated Mode (30-frame code only). 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 (34) of each address shall be a "0" as specified in 3.4.

4.2.2 Drop Frame — Compensated Mode (30-frame code only). 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 (34) of each address shall be a "1" as specified in 3.4.

5. *Structure of the Address Bits*

The basic structure of the address is based on 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. (Bits shown in parentheses are for Type B code.)

5.1 Units Frames. Bits 0-3 (24-27) — 4 bit BCD arranged 1, 2, 4, 8. Count 0-9.

5.2 Tens Frames. Bits 8-9 (32-33) — 2 bit BCD arranged 1, 2. Count 0-2.

5.3 Units Seconds. Bits 16-19 (40-43) — 4 bit BCD arranged 1, 2, 4, 8. Count 0-9.

5.4 Tens Seconds. Bits 24-26 (48-50) — 3 bit BCD arranged 1, 2, 4. Count 0-5.

5.5 Units Minutes. Bits 32-35 (56-59) — 4 bit BCD arranged 1, 2, 4, 8. Count 0-9.

5.6 Tens Minutes. Bits 40-42 (64-66) — 3 bit BCD arranged 1, 2, 4. Count 0-5.

5.7 Units Hours. Bits 48-51 (72-75) — 4 bit BCD arranged 1, 2, 4, 8 Count 0-9.

5.8 Tens Hours. Bits 56-57 (80-81) — 2 bit BCD arranged 1,2. Count 0-2.
(The 24-hour clock system is used: 2:00 p.m. is 14 hours, 0 minutes.)

6. *Position of the Address on Motion-Picture Film*

6.1 Optical Tracks

6.1.1 35-mm Release Print Film. The address shall be recorded in the data track whose location is specified in SMPTE Recommended Practice on Dimensions of Photographic Control and Data Record on 35-mm Motion-Picture Release Prints, RP 115-1983.

6.1.2 35-mm Camera Film. The address shall be recorded in the data track whose location is specified in SMPTE Recommended Practice on Dimensions of Photographic Control and Data Record on 35-mm Motion-Picture Camera Negatives, RP 116-1983.

6.1.3 16-mm Film. The address shall be recorded in the data track whose location is specified in SMPTE Recommended Practice on Dimensions of Photographic Control and Data Record on 16-mm Motion-Picture Film, RP 114-1983.

6.1.4 Super 8 Release Prints. The address shall be recorded in the data track whose location is specified in SMPTE Recommended Practice on Dimensions of Photographic Control and Data Record on 8-mm Type S Motion-Picture Release Prints, RP 118-1983.

6.2 Magnetic Tracks

6.2.1 Super 8 Film. The address shall be recorded in the data track whose location is specified in SMPTE Recommended Practice on Dimensions of Magnetic Control and Data Record on 8-mm Type S Motion-Picture Film, RP 117-1983.

6.3 Low-Dispersion Magnetic Tracks

6.3.1 35-mm Film. The address shall be recorded in the data track whose location is specified in SMPTE Recommended Practice on Dimensions for Data Track on Low-Dispersion Magnetic Coatings on 35-mm Motion-Picture Film, RP 137.

7. *Addresses on Motion-Picture Prints*

When the time code is used on final prints, the time code of the "picture start" frame shall be 01 hours, 00 minutes, 00 seconds, 00 frames. All frames on the reel prior to the "picture start" frame shall each have the time code 01 hours, 00 minutes, 00 seconds, 00 frames. If the film is longer than one reel, the "picture start" frame and all preceding frames on the second reel shall be 02 hours, 00 minutes, 00 seconds, 00 frames. Successive reels shall be numbered likewise with the number of hours increasing sequentially and the minutes, seconds, and frames being zero for the "picture start" frame.

The "picture start" frame referred to above precedes the first frame to be projected by exactly eight seconds, as identified in American National Standard for Motion-Picture Film — Leaders and Cue Marks — 35- and 16-mm Audio Release Prints, ANSI PH22.55-1983.

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 137

Data Tracks on Low-Dispersion Magnetic Coatings on 35-mm Motion-Picture Film

1. *Scope*

This practice specifies the position of three data tracks on 35-mm motion-picture film with a low-dispersion-density magnetic surface coated on the nonimage-forming side of the film. Use of one of the data tracks is also specified. The practice applies to all uses of 35-mm motion-picture film, including camera negative, intermediate, and release print films.

2. *Data Tracks*

2.1 The lateral location and width of the data tracks shall be as specified in the figure and table.

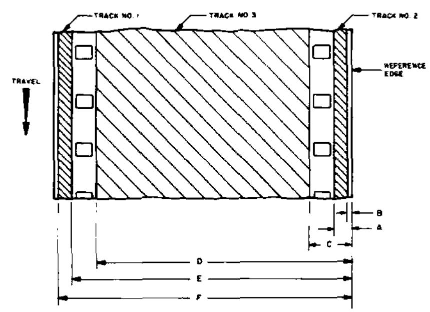
2.1.1 The data tracks shall be referred to by numbers, as shown in the figure, with data track No. 1 farthest from the reference edge. Data track No. 2 shall be the data track nearest the reference edge. Data track No. 3 shall be the data track between the perforations.

2.2 The recording shall be made so that the azimuth of the data track is at an angle of 90° ± 5′ to the reference edge of the film.

2.3 The data tracks shall be recorded in such a manner that they can be reproduced properly by reproducing heads whose gaps are positioned along a common plane or in line.

3. *Track Usage*

3.1 Data track No. 1 shall be designated for the recording of SMPTE time and control code, specified in SMPTE Recommended Practice on Time and Control Codes for 24, 25 or 30 Frame-Per-Second Motion-Picture Systems, RP 136, if the camera frame rate is 24 frames per second. If the frame rate differs, the appropriate time code format shall be used.



As Seen with the Magnetic Surface Toward the Viewer

Dimensions	Inches	Millimeters
A	0.072 ± 0.003	1.83 ± 0.08
B	0.008 max	0.20 max
C	0.179 ± 0.003	4.55 ± 0.08
D	1.207 ± 0.003	30.66 ± 0.08
E	1.306 ± 0.003	33.17 ± 0.08
F	1.369 min	34.77 min

3.2 Data track No. 2 shall be available for the recording of any other data.

3.3 The area designated in the figure as track No. 3 is reserved for noncontact recording and reproduction of a data track or tracks. No format or track location is proposed at this time to encourage development of technology for noncontact recording and reproduction of data tracks.

THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY

Cinematography — Image area produced by camera aperture on 35 mm motion-picture film — Position and dimensions

1 Scope and field of application

This International Standard specifies the position and dimensions for the image area produced by a camera aperture on 35 mm motion-picture film for rectilinear (non-anamorphic) pictures and for anamorphic pictures having a lateral compression ratio of 2 : 1 and an aspect ratio of 2,35 : 1.

It also gives recommendations for the perforations to be used to position the film in the camera.

2 Dimensions

2.1 The dimensions shall be as shown in the figure and given in the table; they apply to measurements of the image as formed on recently exposed and processed film.

NOTES

1 The "reference edge" in the figure serves as the datum for the specified dimensions. When edge guiding, it is recommended that this edge be used.

2 The dimensions specified are applicable to unshrunk film.

3 It is the purpose of this International Standard to provide a camera image such that the exposed area will always be larger than the maximum projectable image area. Observance of the specified dimensions meets this objective without causing double exposure of the area between the frames.

4 When intended for television, a slightly higher picture height can be transmitted than is usual for theatrical projection. The cinematographer is cautioned to take care to ensure that extraneous unwanted objects are clear of the picture.

2.2 The horizontal edge of the aperture shall be at substantially 90° to the edge of the film, with the vertical edge parallel to the edge of the film.