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SMPTE RECOMMENDED PRACTICE

RP 136-2004

Revision of RP 136-1999

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



Page 1 of 8 pages

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 SMPTE 12M.

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 SMPTE 12M. 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 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this practice. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this practice are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

ISO/IEC 2022:1994, Information Technology — Character Code Structure and Extension Techniques

SMPTE RP 114-1994 (R1999), Dimensions of Photographic Control and Data Record on 16-mm Motion-Picture Film

SMPTE RP 115-1997, Dimensions of Photographic Control and Data Record on 35-mm Motion-Picture Release Prints

SMPTE RP 116-2000, Dimensions of Photographic Control and Data Record on 35-mm Motion-Picture Camera Negatives

SMPTE RP 135-1999, Use of Binary User Groups in Motion-Picture Time and Control Codes

3 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.

4 Code formats

Two code formats are described: type C and type B. Clauses 4.1 and 4.2 describe the unique characteristics of the two code types. The other clauses, 4.3 and 4.4, apply to both code types.

4.1 Type C code format

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

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

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

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

4.1.5 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.

4.1.6 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 figure 2.)

4.2 Type B code format

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

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

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

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

4.2.5 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 figure 3).

4.2.6 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 the 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.