

SMPTE STANDARD

Transmission of Time Code
in the Ancillary Data Space



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Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in its Standards Operations Manual.

SMPTE Standard ST 12-2 was prepared by Technology Committee 33TS.

Intellectual Property

At the time of publication no notice had been received by SMPTE claiming patent rights essential to the implementation of this Engineering Document. However, attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

Introduction

This section is entirely informative and does not form an integral part of this document.

This standard forms a portion of one of the oldest SMPTE Standards for Television. SMPTE Time Code was developed originally for analog television recording systems and thus dealt only with interlaced television systems operating with frame rates up to 30 frames per second. It is, however, flexible enough in design to be used in digital television systems, both standard definition and high definition. The actual transport of the codewords for digital systems varies significantly from the transport methods defined for analog systems, and is defined in this document (formerly named SMPTE RP 188). The time and control code information is carried as the payload of ancillary packets which are located in the Ancillary data space of a digital television signal. This type of a time and control code transport is applicable to 8-, 10-, or 12-bit television systems.

For television storage systems the time address that forms part of the time code is primarily intended as a label to identify discrete frames.

1 Scope

This standard defines a transmission format for conveyance of linear (LTC) or vertical interval (VITC) time code data formatted according to SMPTE ST 12-1 in 8-, 10-, or 12-bit digital television data interfaces. Time code information is transmitted in the ancillary data space as defined in SMPTE ST 291-1. Multiple time codes can be transmitted within a single digital video data stream. Other information (such as real time clock, film transfer, DTTR tape timer, and user-defined information) may also be carried in the ancillary time code packet.

This standard is applicable to digital television data interfaces, whether high definition or standard definition.

2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword "reserved" indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword "forbidden" indicates "reserved" and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to this document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

3 Normative References

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

SMPTE ST 12-1:2014, Time and Control Code

SMPTE ST 291-1:2011, Ancillary Data Packet and Space Formatting

SMPTE RP 168:2009, Definition of Vertical Interval Switching Point for Synchronous Video Switching

4 Definitions and Acronyms

4.1

Ancillary Time Code (ATC)

The acronym ATC refers to the bitstream carried in either the Vertical Ancillary space (VANC) or the Horizontal Ancillary space (HANC) of a digital television data stream, as described in this document, and is used to convey time code data formatted as LTC, VITC, or both.

Note: ATC may also be used to carry other information as defined in other documents. ATC is a data transport applicable to both High Definition television (HDTV) and Standard Definition television (SDTV) digital video formats.

4.2

Frame

A frame contains all of the lines of spatial information of a video signal required to make up one complete picture (including any necessary associated synchronization lines). For progressive video, these lines contain picture samples, captured at one time instant, starting from the top of the frame and continuing through successive lines to the bottom of the frame.

4.3

Field

For interlaced video, a frame consists of two fields. One of these fields will commence one field period later than the other. See SMPTE ST 170 for an example of such a system. Composite television standards require multiple fields in a "color sequence," but that does not alter this document's nominal terminology.

4.4

LSB

Least significant bit.

4.5

MSB

Most significant bit.

4.6

UDW

The acronym UDW is an abbreviation for "user data word" as defined in SMPTE ST 291.

5 Format of Ancillary Time Code Packets

Each data packet shall comply with the format defined in SMPTE ST 291 for a type 2 ANC packet. It consists of the ancillary data flag (ADF), the data ID (DID), the secondary data ID (SDID), the data count (DC), the user data words (UDW), and the checksum (CS). The UDW consists of the data payload.

The DID and SDID shall be set to:

DID 60h

SDID 60h

The data count word for ancillary time code shall be set to:

DC 10h

References to User Data Word (UDW) bits in this standard are for a 10-bit User Data Word. Correspondence between an 8-bit word and a 10-bit word is shown in Table 1. In the case of 12-bit representation, the ancillary data is defined by the seven most significant bits of the 12-bit data and the five least significant bits are defined to be zero.