IEC 60461

Edition 4.0 2010-03

INTERNATIONAL STANDARD

Time and control code

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TIME AND CONTROL CODE

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International Standard IEC 60461 has been prepared by technical area 6: Professional electronics storage media, data structures and equipment, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This fourth edition cancels and replaces the third edition published in 2001, of which it constitutes a technical revision.

It includes the following significant change with regard to the previous edition: The time code for progressive television systems with a frame rate greater than 30 frames per second is added.

The text of this standard is based on the following documents:

CDV	Report on voting
100/1515/CDV	100/1616/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

IEC 60461 was originally developed for analogue 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 support for progressive video systems with frame rates above 30 frames per second is described in this International Standard.

Clauses 4, 5, and 6 specify the manner in which time is represented in frame-based systems. Clause 7 specifies the structure of the time address and control bits of the code, and sets guidelines for storage of user data in the code. Clause 8 specifies the modulation method and interface characteristics of a linear time code (LTC) source. Clause 9 specifies the modulation method for inserting the code into the vertical interval of a television signal. Clause 10 summarises the relationship between the two forms of time and control code. Clause 11 summarises time code implementations for video formats with frame rates greater than 30 fps.

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TIME AND CONTROL CODE

1 Scope

This International Standard specifies a digital time and control code for use in television, film, and accompanying audio systems operating at nominal rate of 60, 59,94, 50, 30, 29,97, 25, 24 and 23,98 frames per second. This International Standard specifies a time address, binary groups, and flag bit structure. In addition, the standard specifies a binary group flag assignment, a linear time code transport, and a vertical interval time code transport.

This International Standard defines primary data transport structures for linear time code (LTC) and vertical interval time code (VITC). This standard specifies the LTC modulation and timing for all video formats. This standard also defines the VITC modulation and location for 525/59,94 and 625/50 analogue composite and component systems only.

NOTE The digital representation of analogue VITC (D-VITC) is specified in SMPTE 266M and is defined for 525/59,94 and 625/50 digital component systems only. High definition formats, such as those documented in SMPTE 274M and SMPTE 296M, should use ancillary time code (ATC) as specified in SMPTE 12M-2 (formerly SMPTE RP 188) for transport of time code in the digital video data stream. For future implementations of time code for digital standard definition formats, the use of ATC rather than D-VITC is encouraged.

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2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 646:1991, *Information processing – ISO 7-bit coded character set for information interchange*

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ISO/IEC 2022:1994, *Information technology – Character code structure and extension techniques*

ITU-R BT.1700-1(2005), Annex 2, *Characteristics of composite video signals for conventional analogue television systems*

SMPTE 170M:2004, *Television – Composite Analog Video Signal – NTSC for Studio Applications*

SMPTE 258M:1993, *Television – Transfer of Edit Decision Lists*

SMPTE 262M:1995, *Television, Audio and Film – Binary Groups of Time and Control Codes – Storage and Transmission of Data*

SMPTE 309M:1999, *Television – Transmission of Date and Time Zone Information in Binary Groups of Time and Control Code*

3 Terms, definitions and reserved

3.1 Terms and definitions

For the purposes of this document the following terms and definitions apply.

3.1.1
binary coded decimal system
BCD system
means for encoding decimal numbers as groups of binary bits

NOTE 1 Each decimal digit (0-9) is represented by a unique four-bit code. The four bits are weighted with the digit's decimal weight multiplied by successive powers of two.

NOTE 2 For example, the bit weights for a "units" digit would be 1×2^0, 1×2^1, 1×2^2, and 1×2^3, while the bit weights for a "tens" digit would be 10×2^0, 10×2^1, 10×2^2, and 10×2^3.

3.1.2
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)

NOTE 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.

3.1.3
field
frame consists of two fields for interlaced video: one of these fields will commence one field period later than the other

NOTE See SMPTE 170M for an example of such a system. Composite television standards might require multiple fields in a “colour sequence,” but that does not alter this standard’s nominal terminology.

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3.1.4
linear time code
LTC
code word format and modulation system which is normally used to record the time code signal on a linear recording medium or to transport the serial signal over an interface independent of any video signal

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3.1.5
vertical interval time code
VITC
code word format and modulation system used to insert the time code signal in an active line within the vertical blanking interval of an analogue standard definition television (SDTV) signal

3.1.6
time and control code
encompasses all aspects of the time address, flag bits, and binary groups for user-defined data codes, as well as two methods of modulation of the resulting code words

NOTE It is commonly abbreviated as “time code” (note also that some users spell this “timecode”).

3.1.7
time code source
any device which generates a time and control code signal, or regenerates a time and control code signal from a recorded medium or transmission channel

3.1.8
original source
refers specifically to a device which is generating the time and control code signal in synchronization with its associated video and/or audio

NOTE The time address and binary group (“user data”) payload is attached to a particular frame or frame pairs either directly or by reference within the user’s system. For frame-based systems the time address that forms part of the time code is primarily intended as a label to identify discrete frames. It also may imply that a particular frame