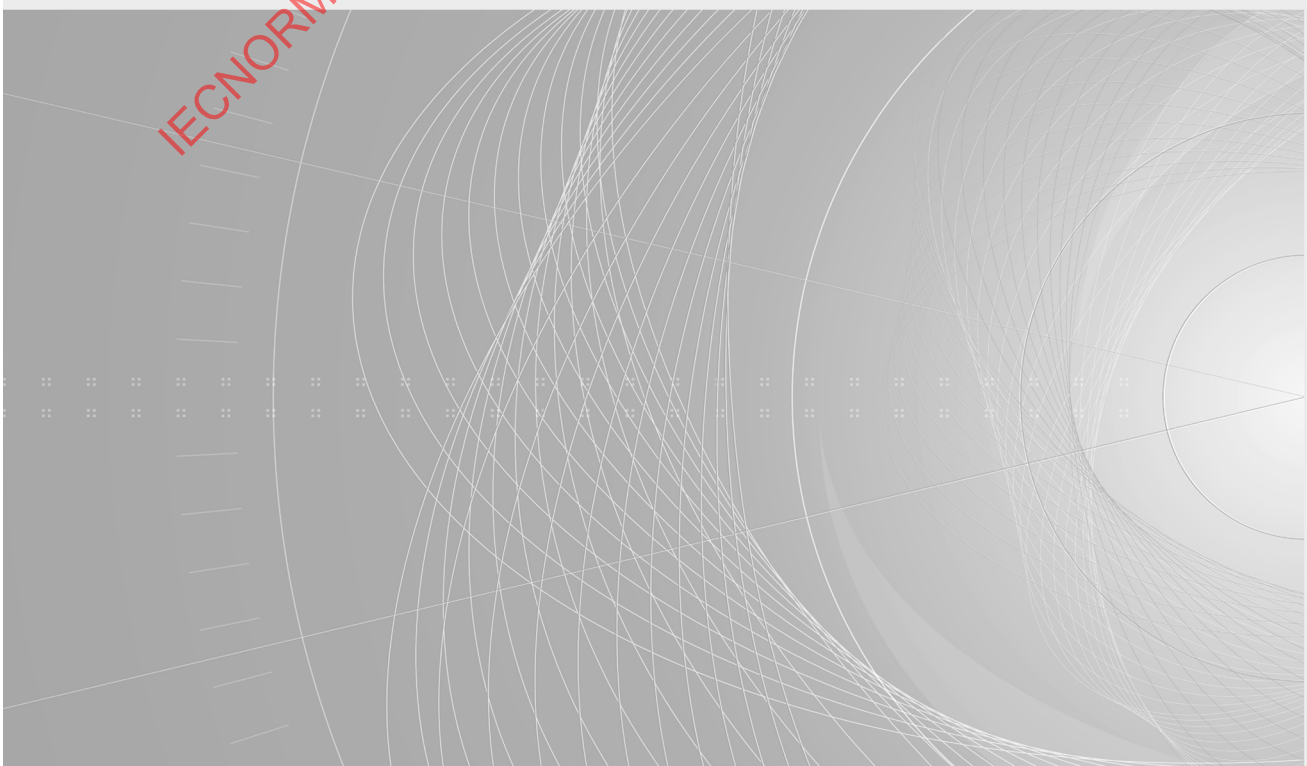
IEC/TS 62644

Edition 1.0 2012-10

TECHNICAL SPECIFICATION

Professional video storage equipment – Guideline of time code transmission



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PROFESSIONAL VIDEO STORAGE EQUIPMENT – GUIDELINE OF TIME CODE TRANSMISSION

FOREWORD

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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62644, which is a technical specification, has been prepared by technical area 6: Storage media, data structures, equipment and systems, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
100/1968/DTS	100/2022/RVC

Full information on the voting for the approval of this technical specification 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

- transformed into an International Standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

INTRODUCTION

Time and control code is standardized in IEC 60461 and SMPTE ST 12-1:2008. Transmission of time code is standardized in SMPTE ST 12-2:2008.

Reference signal is often used for professional video storage in order to synchronize all equipment in a system. However there are no clear specifications for the transmission of time code under such system operation in these standards. When the system treats progressive video whose frame rate is 50 Hz or 59,94 Hz and when it uses reference signal, time code transmission of equipment may be treated differently and the interoperability may not be maintained.

Therefore, clear guidelines of time code transmission for professional video storage in such a system operation are expected.

PROFESSIONAL VIDEO STORAGE EQUIPMENT – GUIDELINE OF TIME CODE TRANSMISSION

1 Scope

This Technical Specification specifies the relationship between the reference signal and Ancillary Time Code (ATC) for use in professional storage equipment operating at 50 frames-per-second or 59,94 frames-per-second and handling progressive video signal under the system operation to maintain the frame pair which is composed of two frames.

2 Normative references

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

SMPTE ST 12-1:2008, *Television – Time and Control Code*

SMPTE ST 12-2:2008, *Television – Transmission of Time Code in the Ancillary Data Space*

SMPTE ST 318:1999, *Television and Audio – Synchronization of 59.94 – or 50-Hz Related Video and Audio Systems in Analog and Digital Areas – Reference Signals*

SMPTE ST 274:2008, *Television – 1 920 × 1 080 Image Sample Structure, Digital Representation and Digital Timing Reference Sequences for Multiple Picture Rates*

3 Terms and definitions

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

3.1
time code
abbreviation of time and control code defined in SMPTE ST 12-1:2008

3.2
frame pair
two time-consecutive frames of a video signal for which there is a first frame and a second frame

3.3
ATC_VITC1
Ancillary Time Code Vertical Interval Code #1 Payload Type defined in SMPTE ST 12-2:2008

3.4
ATC_VITC2
Ancillary Time Code Vertical Interval Code #2 Payload Type defined in SMPTE ST 12-2:2008

3.5
field mark flag
field identification flag defined in SMPTE ST 12-1:2008

3.6
reference signal
external reference signal for synchronization defined in SMPTE ST 318:1999 or SMPTE ST 274:2008

4 Transmission of time code

4.1 Time address of a frame pair in progressive systems

This subclause is given for information.

Time address of a frame pair in progressive systems is specified in SMPTE ST 12-1:2008 as follows.

Since the frame frequency of 50 frames-per-second and 59,94 frames-per-second progressive system exceeds the frame count capacity of the time address, the count is constrained to increment only every other frame (as shown in Figure 1). This results in an edit resolution of two frames.

Where the time code is conveyed as VITC data (for example as in ATC), it is recommended that the field mark flag is used to identify each frame of the frame pair. The preferred implementation is to set the field mark flag of the VITC data to zero for the first frame of a pair and to one for the second frame of a pair.

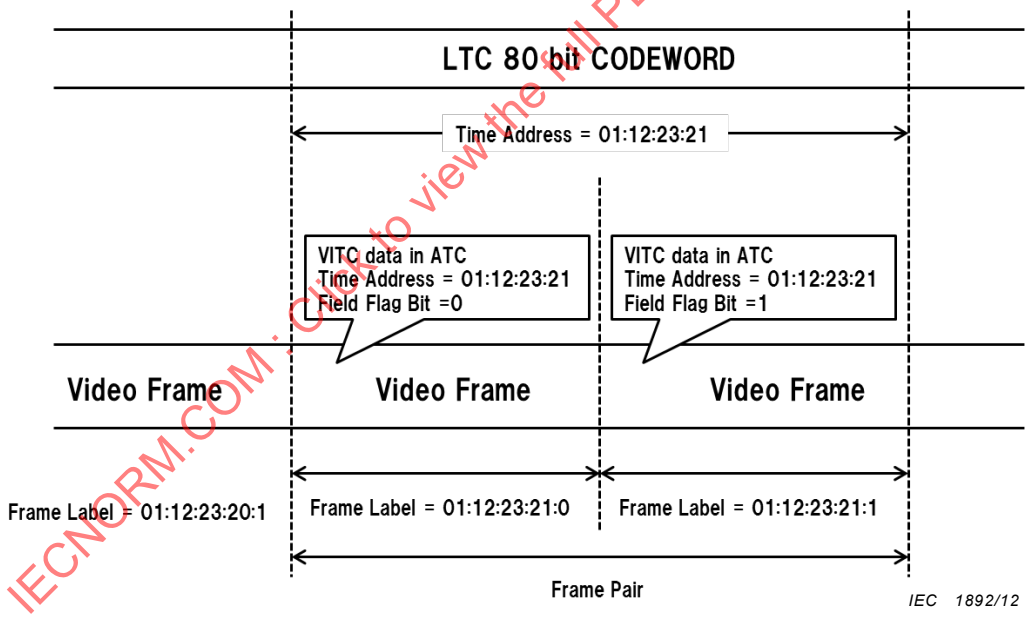

Figure 1 – Time address of frame pair

4.2 Relationship between frame pair and ATC

This subclause is given for information only.

The relationship between frame pair and ATC is specified in SMPTE ST 12-2:2008 as follows.

For progressive systems running at 50 frames-per-second or 59,94 frames-per-second, it is recommended that a packet of the ATC_VITC1 payload type with the field mark flag set to zero and associated with the first frame of a pair alternate with a packet of the ATC_VITC2 payload type with the field mark flag set to one and associated with the second frame of a pair.

VITC data in ATC_VITC1 and ATC_VITC2 payload types use the field mark flag to identify each of the frames of a frame pair as follows: A logical zero represents the first frame and a logical one represents the second frame of the pair of progressive frames.

4.3 Relationship between the reference signal and ATC

This guideline is for use in professional storage equipment operating at 50 frames-per-second or 59,94 frames-per-second and handling a progressive video signal under the operation using the reference signal to maintain a frame pair by limiting the edit resolution of two frames.

A packet of the ATC_VITC1 payload type in the output of storage equipment associated with the first frame of a pair should associate with field1 of the reference signal. A packet of the ATC_VITC2 payload type in the output of storage equipment associated with the second frame of a pair should associate with field2 of the reference signal. Figure 2 shows the relationship between the reference signal and ATC.

A field mark flag associated with the time code of recorded video content should be played back synchronized with the play back video content.

When the storage equipment is playing back at the same speed as the recorded speed, the relationship of reference signal, ATC_VITC1, ATC_VITC2 and field mark flag should be as follows.

reference signal field1: ATC_VITC1 payload type, field mark flag set to 0

reference signal field2: ATC_VITC2 payload type, field mark flag set to 1

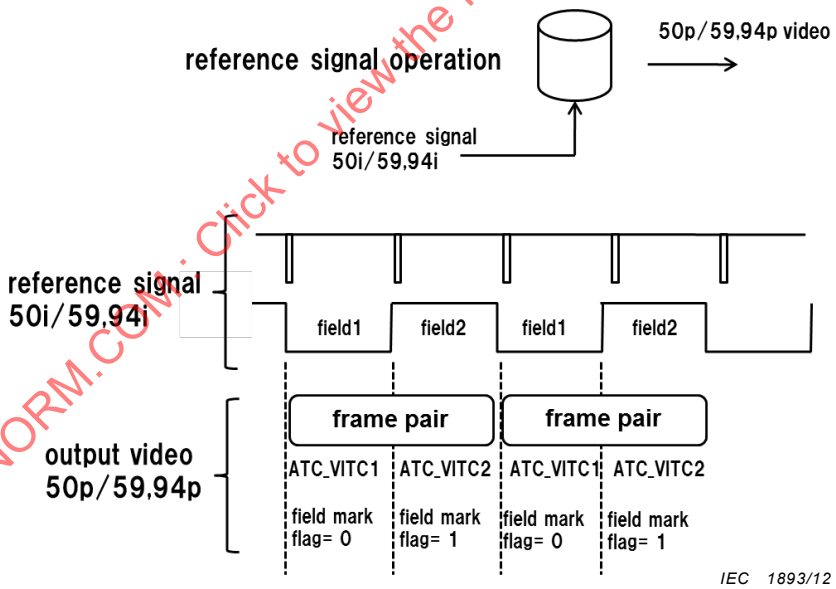

Figure 2 – Relationship between reference signal and ATC

The transmission of ATC Packets playing back at a different speed from the recorded speed is not the same as the transmission in normal play speed.

A field mark flag associated with the time code of recorded video content may synchronize with the frame pair of the video content and may not synchronize with field 1 and 2 of the reference signal. Figure 3 shows an example of a relationship between reference signal and ATC at 1/2 speed play.

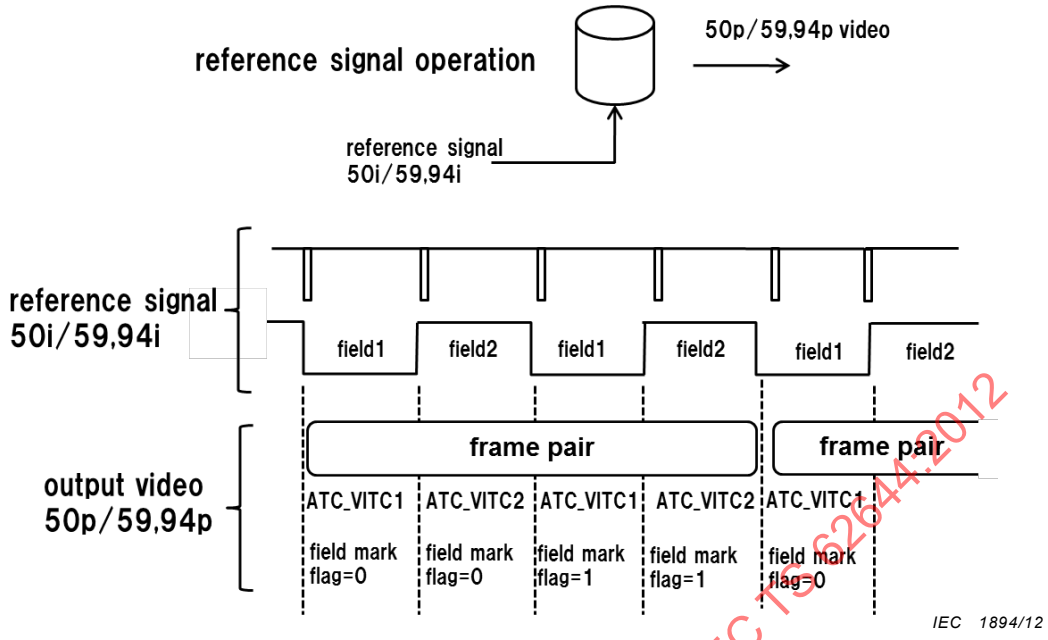

Figure 3 – Example of relationship between reference signal and ATC (1/2 speed play)

Playing back at different speed from the recorded speed

reference signal field1: ATC_VITC1 payload type, field mark flag set to 0 or 1
reference signal field2: ATC_VITC2 payload type, field mark flag set to 0 or 1

EXAMPLE still mode of the video with field flag = 0

Time code of ATC remains the same value as associated video

reference signal field1: ATC_VITC1 payload type, field mark flag set to 0
reference signal field2: ATC_VITC2 payload type, field mark flag set to 0