PD IEC/TS 62644:2012

BSI Standards Publication

# Professional video storage equipment — Guideline of time code transmission

bsi.

...making excellence a habit.™

## National foreword

This Published Document is the UK implementation of IEC/TS 62644:2012.

The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio, video and multimedia systems and equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.



Published by BSI Standards Limited 2013

ISBN 978 0 580 79773 6

ICS 33.160.40

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 May 2013.

## Amendments issued since publication

| Amd. No. | Date | Text affected |
|---|---|---|

IEC/TS 62644

Edition 1.0 2012-10

# TECHNICAL SPECIFICATION

## Professional video storage equipment – Guideline of time code transmission

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE K

ICS 33.160.40

ISBN 978-2-83220-414-6

# CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

# PROFESSIONAL VIDEO STORAGE EQUIPMENT – GUIDELINE OF TIME CODE TRANSMISSION

## FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- 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.

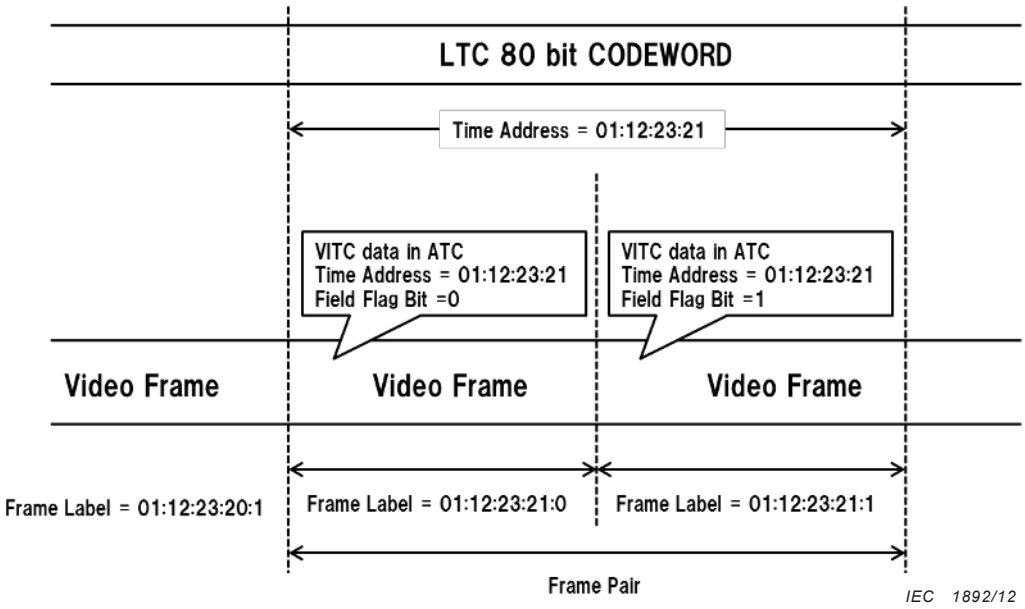


**Figure 1 – Time address of frame pair**

### 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

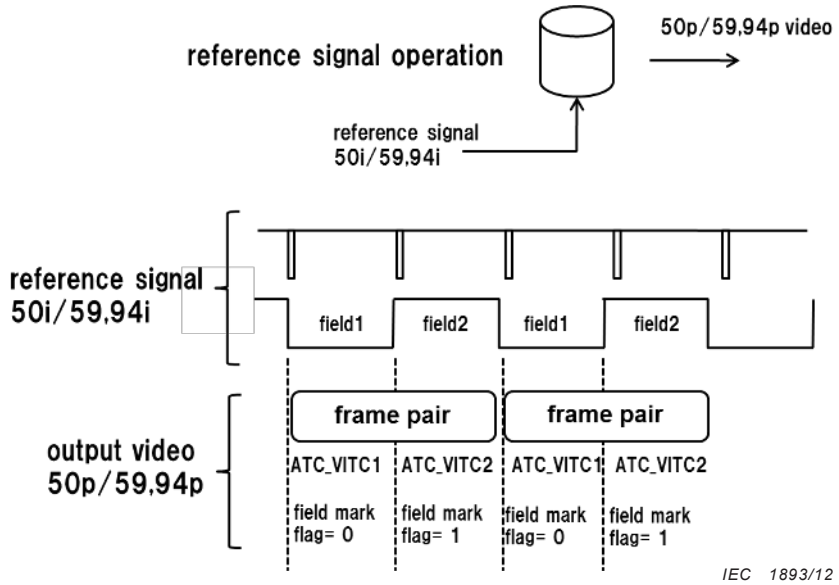


**Figure 2 – Relationship between reference signal and ATC**

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.

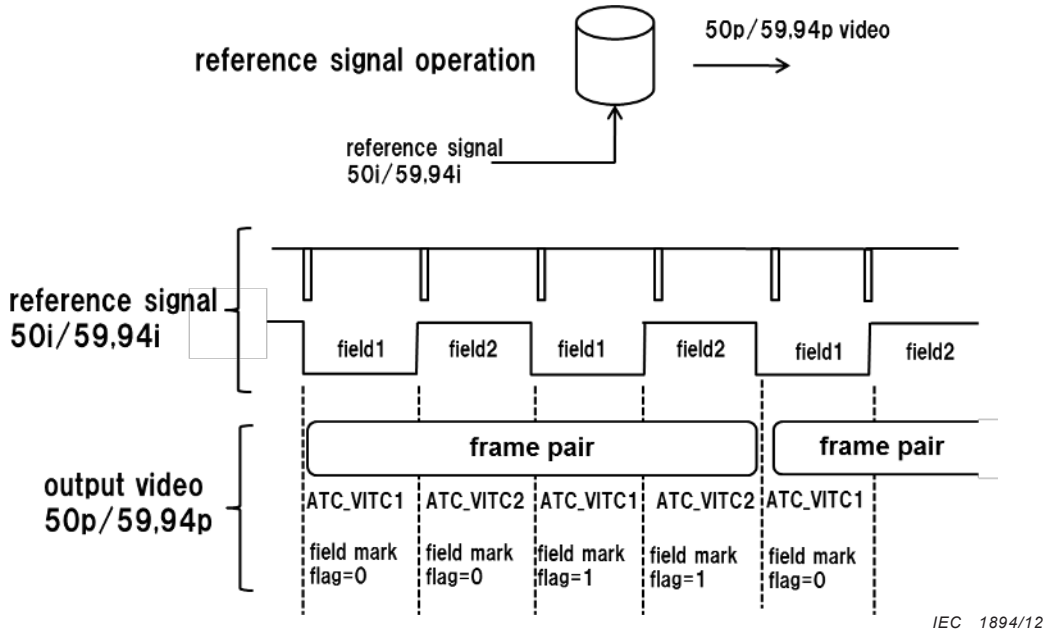


**Figure 3 – Example of relationship between reference signal and ATC (1/2 speed play)**

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

## Bibliography

IEC 60461, *Time and control code*

_____

*This page deliberately left blank*

# British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

## About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

## Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

## Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

## Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

**PLUS** is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

**BSI Group Headquarters**

389 Chiswick High Road London W4 4AL UK

## Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

## Copyright



## Useful Contacts:

**Customer Services**
**Tel:** +44 845 086 9001
**Email (orders):** orders@bsigroup.com
**Email (enquiries):** cservices@bsigroup.com

**Subscriptions**
**Tel:** +44 845 086 9001
**Email:** subscriptions@bsigroup.com

**Knowledge Centre**
**Tel:** +44 20 8996 7004
**Email:** knowledgecentre@bsigroup.com

**Copyright & Licensing**
**Tel:** +44 20 8996 7070
**Email:** copyright@bsigroup.com

bsi.

...making excellence a habit.™