

INTERNATIONAL STANDARD

IEC 61937-3

First edition
2003-05

**Digital audio –
Interface for non-linear PCM encoded
audio bitstreams applying IEC 60958 –**

**Part 3:
Non-linear PCM bitstreams
according to the AC-3 format**



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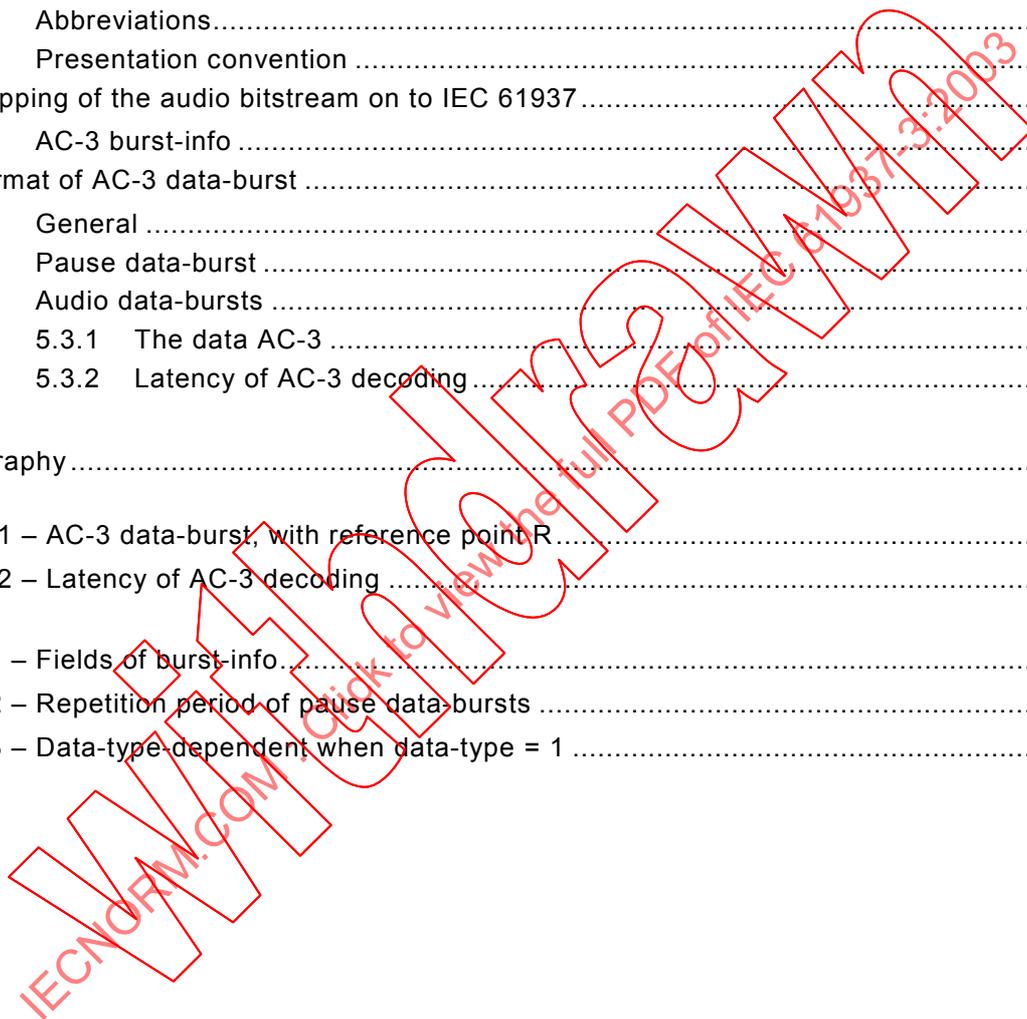
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DIGITAL AUDIO –
 INTERFACE FOR NON-LINEAR PCM ENCODED
 AUDIO BITSTREAMS APPLYING IEC 60958 –**

Part 3: Non-linear PCM bitstreams according to the AC-3 format

FOREWORD

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International Standard IEC 61937-3 has been prepared by technical area 4: Digital system interfaces, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This standard cancels and replaces IEC 61937, published in 2000, which has been divided into four parts (see below). This first edition constitutes a technical revision.

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

FDIS	Report on voting
100/646/FDIS	100/672/RVD

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.

IEC 61937 consists of the following parts under the general title *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958*:

Part 1: General

Part 2: Burst-info

Part 3: Non-linear PCM bitstreams according to the AC-3 format

Part 4: Non-linear PCM bitstreams according to the MPEG audio formats

Part 5: Non-linear PCM bitstreams according to the DTS (Digital Theatre Systems) format(s)

Part 6: Non-linear PCM bitstreams according to the MPEG-2 AAC format

Part 7: Non-linear PCM bitstreams according to the ATRAC and ATRAC2/3 formats

The committee has decided that the contents of this publication will remain unchanged until October 2005. At this date, the publication will be

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- withdrawn;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

The contents of the corrigendum of March 2004 have been included in this copy.

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Withdrawn

DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM ENCODED AUDIO BITSTREAMS APPLYING IEC 60958 –

Part-3: Non-linear PCM bitstreams according to the AC-3 format

1 Scope

This part of IEC 61937 specifies the method for the digital audio interface specified in IEC 60958 to convey non-linear PCM bitstreams encoded in accordance with the AC-3 format.

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.

IEC 60958 (all parts), *Digital audio interface*

IEC 61937-1, *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 1: General*

ITU-R Recommendation BS.1196-1, *Audio coding for digital terrestrial television broadcasting*

AC.3, Advanced Television Systems Committee (ATSC) document A/52, *Digital Audio Compression (AC-3) Standard*

3 Terms and definitions

For the purposes of this document, the following definitions, abbreviations and presentation convention apply.

3.1 Definitions

3.1.1 latency

delay time of an external audio decoder to decode an AC-3 data burst, defined as the sum of two values of the receiving delay time and the decoding delay time.

3.2 Abbreviations

3.2.1 ATSC

Advanced Television Systems Committee

3.2.2 MPEG

Moving Pictures Expert Group, a joint committee of ISO and IEC

3.2.3 ITU-R

International Telecommunication Union, Radio Communication Bureau

3.3 Presentation convention

F872h

Value 'F872' in hexadecimal format

4 Mapping of the audio bitstream on to IEC 61937

The coding of the bitstream and data-burst is in accordance with IEC 61937-1.

4.1 AC-3 burst-info

The 16-bit burst-info contains information about the data that will be found in the data-burst (see Table 1).

Table 1 – Fields of burst-info

Bits of Pc	Value	Contents	Reference point R	Repetition period of data-burst in IEC 60958 frames
0 – 4	0	Data-type According to IEC 61937-1		1536
	1	AC-3	R-AC-3	
	2-31	According to IEC 61937-1		
5 - 15		According to IEC 61937-1		

5 Format of AC-3 data-burst

5.1 General

This clause specifies the audio data-burst AC-3. Specific properties such as reference points, repetition period, the method of filling stream gaps, and decoding latency are specified for each data-type.

The decoding latency (or delay), indicated for the data-types, should be used by the transmitter to schedule data-bursts as necessary to establish synchronization between picture and decoded audio.

5.2 Pause data-burst

Pause data-burst for AC-3 is given in Table 2.

Table 2 – Repetition period of pause data-bursts

Data-type of audio data-burst	Repetition period of pause data-burst	
	Mandatory	Recommended
AC-3	–	3 IEC 60958 frames

5.3 Audio data-bursts

5.3.1 The data AC-3

The AC-3 bitstream consists of a sequence of AC-3 frames. The data-type of a AC-3 data-burst is 01h. An AC-3 frame represents 1536 samples of each encoded audio channel (left, centre, etc.). The data-burst is headed with a burst-preamble, followed by the burst-payload. The burst-payload of each data-burst of AC-3 data shall contain 1 complete AC-3-frame.

The length of the AC-3 data-burst will depend on the encoded bit rate (which determines the AC-3-frame length). The specification for the AC-3 bitstream may be found in ATSC document A/52 or in ITU-R Recommendation BS.1196-1.

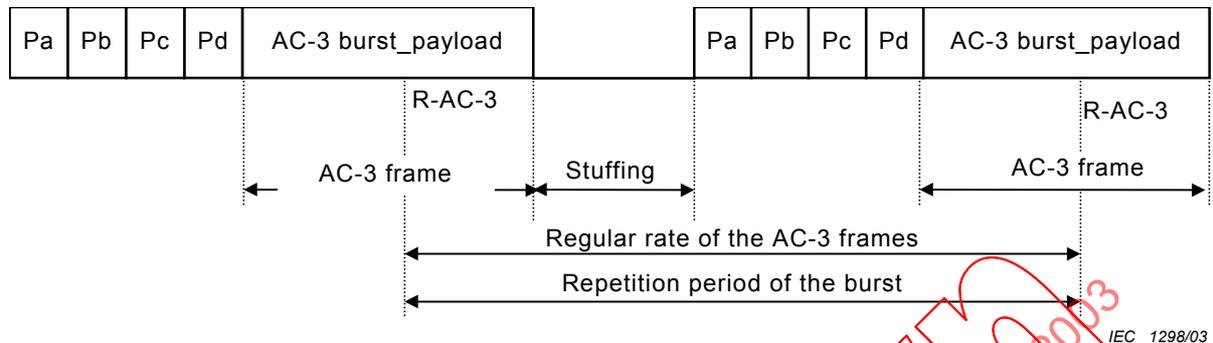


Figure 1 – AC-3 data-burst, with reference point R

The data-type-dependent info for AC-3 is given in Table 3.

Table 3 – Data-type-dependent when data-type = 1

Bits of Pc LSB..MSB	Data type dependent, bit number LSB..MSB	Contents
8-10	0-2	Value of bsmod in AC-3 elementary stream
11 -12	3-4	Reserved, shall be set to '00'

The data-bursts containing AC-3-frames shall occur at a regular rate, with the reference point of each AC-3 data-burst beginning (except in the case of a gap) 1536 sampling periods of the audio after the reference point of the preceding AC-3 data-burst (of the same bitstream number).

The reference point of an AC-3 data-burst (R-AC-3) is the IEC 60958 frame that occurs 2/3 of the way through the AC-3 payload. The definition of the 2/3 value is the closest integer to the value of the AC-3 frame size measured in 32-bit words multiplied by the value 2/3, or

$$\frac{2}{3} \text{ frame size} = \text{int}(0,5 + (2/3) \times (\text{frame size in 32-bit words}))$$

5.3.2 Latency of AC-3 decoding

The latency of an AC-3 decoder which receives this signal is specified, with respect to the reference point of the AC-3 burst, to be equal to 1 AC-3 block time, which is equal to the time occupied by 256 PCM samples at the encoded sampling frequency (5,33 ms for 48 kHz sampling frequency – see Figure 2).