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SMPTE STANDARD

SMPTE 315M-2004

Revision of
SMPTE 315M-1999

for Television — Camera Positioning Information Conveyed by Ancillary Data Packets



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1 Scope

This standard provides a method for multiplexing camera positioning information into the ancillary data space described in SMPTE 291M. Applications of the standard include the 525-line, 625-line, component or composite, and high-definition digital television interfaces which provide 10-bit ancillary data space. Two types of camera positioning information are defined in this standard: binary and ASCII.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was 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 standard indicated below.

SMPTE 291M-1998, Television — Ancillary Data Packet and Space Formatting

3 Overview

3.1 Camera positioning information, as defined in this standard, contains the following parameters. These parameters, and other parameters described in the note, are carried selectively upon the need:

- camera relative position
- camera pan
- camera tilt
- camera roll
- origin of world coordinate longitude
- origin of world coordinate latitude
- origin of world coordinate altitude
- vertical angle of view
- focus distance
- lens opening (iris or f -value)
- time address information
- object relative position

NOTE — There may be other parameters, required for other applications, for which data are carried within this type of ancillary data signal, but which are not defined in this standard. Such parameters will have parameter identifications which do not conflict with those used in this standard. When such parameters are received by equipment that does not recognize them, they should be ignored.

3.2 Data for each parameter can be obtained from several kinds of pick-up devices, such as rotary encoders. These data are formatted as an ancillary data packet and multiplexed into the ancillary data space of serial digital video and conveyed to the receiving end. This specification defines the packet structure, word structure, coordinate, range, and accuracy of each parameter, and the method of multiplexing packets.

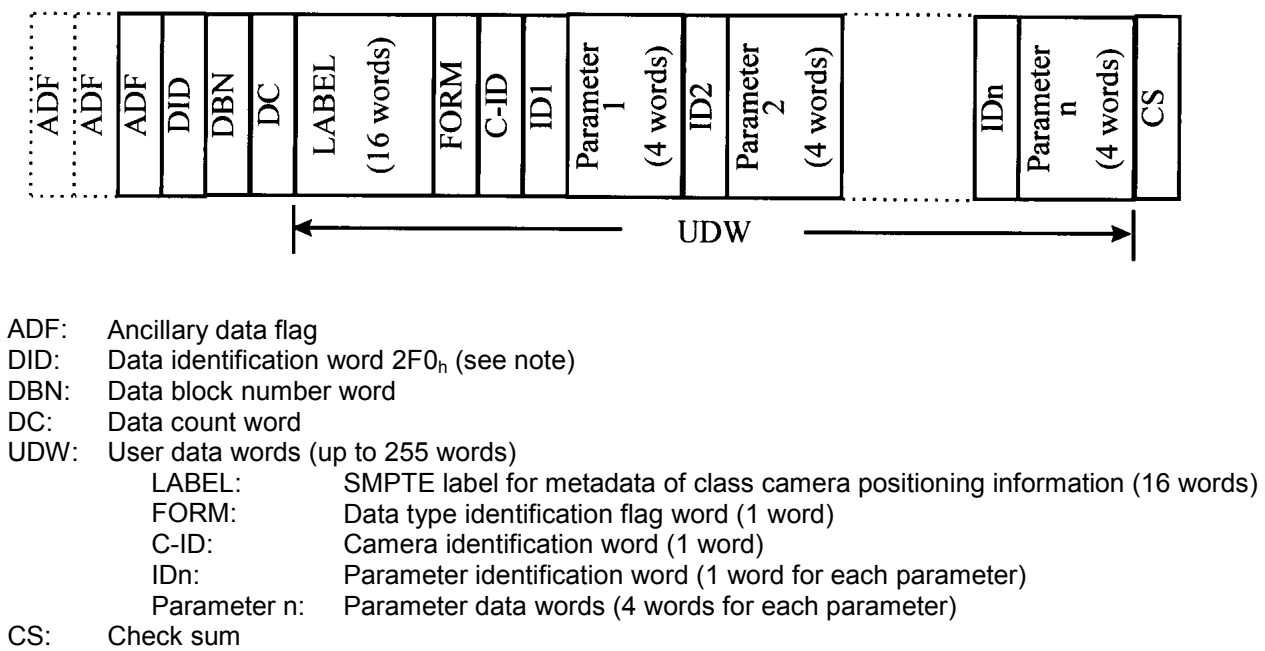
4 Packet structure

4.1 Camera positioning data packet

4.1.1 Camera positioning data packets are formatted in a data stream into one of two types, binary or ASCII. These are identified by the data type identification flag word (FORM) in the user data words and are described in 4.1.2 and 4.1.3.

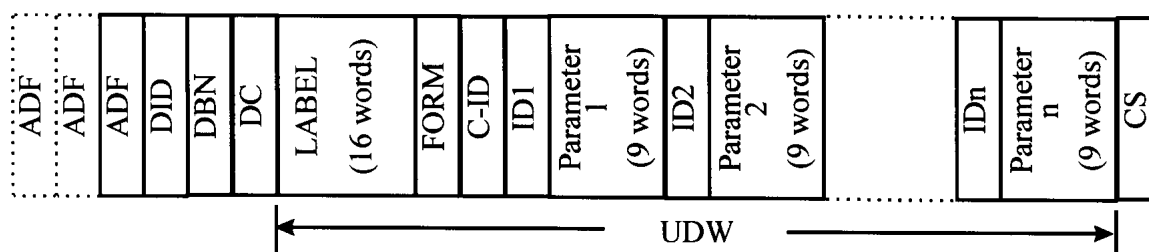
4.1.2 The structure of a binary-type camera positioning data packet is shown in figure 1.

4.1.3 The structure of an ASCII-type camera positioning data packet is shown in figure 2.



NOTE – This DID indicates that the UDWs carry metadata. The specific class of metadata is indicated by the LABEL. It is necessary to decode both the DID and the LABEL to identify the UDWs as carrying camera positioning information.

Figure 1 – Binary-type camera positioning data packet



- ADF: Ancillary data flag
 DID: Data identification word $2F0_h$ (see note)
 DBN: Data block number word
 DC: Data count word
 UDW: User data words (up to 255 words)
 LABEL: SMPTE label for metadata of class camera positioning information (16 words)
 FORM: Data type identification flag word (1 word)
 C-ID: Camera identification words (3 words)
 IDn: Parameter identification words (3 words for each parameter)
 Parameter n: Parameter data words (9 words for each parameter)
 CS: Check sum

NOTE – This DID indicates that the UDWs carry metadata. The specific class of metadata is indicated by the LABEL. It is necessary to decode both the DID and the LABEL to identify the UDWs as carrying camera positioning information.

Figure 2 – ASCII-type camera positioning data packet

5 User data words

5.1 SMPTE universal label (LABEL)

The 16 words UDW 0-15 carry the SMPTE-administered universal label to identify the class of metadata camera positioning information.

The label has the value:

```
{ iso org smpte (52)
  registry(1) mpeg(1) rid(1) version1(1)
  C(67) A(65) P(80) O(79)
}
```

and the word sequence is:

```
06 0E 2B 34 01 01 01 01 43 41 50 4F 00 00 00 00
```

The 4 words UDW 8-11 are the ISO/IEC 13818-1 (MPEG) registration identifier.

5.2 Data type identification flag word (FORM)

The data type identification flag word (FORM) indicates the data type of the camera identification word (C-ID), parameter identification word (IDn), and parameter data word (parameter n) contained in the packet. Bit assignments of the data type identification flag word and the data type code are shown in tables 1 and 2, respectively.

Table 1 – Bit assignment of data-type identification flag word (DID)

Bit address	Data-type identification flag
b9 (MSB)	Not b8
b8	Even parity for b(0-7)
b7	AUX
b6	AUX
b5	AUX
b4	AUX
b3	AUX
b2	AUX
b1	FORM 1
b0 (LSB)	FORM 0
NOTE – FORM (0-1): Data type code	
AUX: User defined	

Table 2 – Data-type code

FORM 1	FORM 0	Data type
0	0	Binary
0	1	ASCII
1	0	Reserved
1	1	Reserved

5.3 Camera identification word(s) (C-ID)

The camera identification word(s) indicate(s) the camera number by which the object is shot. It should be noted that the camera number may be any value from 0 through 255, inclusively.

5.3.1 Binary-type camera identification word

The bit assignment of the binary-type camera identification word is shown in table 3.

Table 3 – Bit assignment of binary-type camera identification word

Bit address	Binary-type camera identification
b9 (MSB)	Not b8
b8	Even parity for b(0-7)
b7	C7 (MSB)
b6	C6
b5	C5
b4	C4
b3	C3
b2	C2
b1	C1
b0 (LSB)	C0 (LSB)
NOTE – C(0-7): Camera number data	

5.3.2 ASCII-type camera identification words

Three ASCII-coded characters are used to express the camera number (000 through 255). ASCII-type camera identification is mapped into three contiguous ancillary data words (X, X+1, X+2) as shown in table 4.

Table 4 – Bit assignment of ASCII-type camera identification word

Bit address	ASCII-type camera identification		
	X	X+1	X+2
b9 (MSB)	Not b8	Not b8	Not b8
b8	Even parity for b(0-7)	Even parity for b(0-7)	Even parity for b(0-7)
b7	C7 (MSB)	C15 (MSB)	C23 (MSB)
b6	C6	C14	C22
b5	C5	C13	C21
b4	C4	C12	C20
b3	C3	C11	C19
b2	C2	C10	C18
b1	C1	C9	C17
b0 (LSB)	C0 (LSB)	C8 (LSB)	C16 (LSB)
NOTES C(0-23): Camera number data C(0-7): The first character (hundreds) (0, 1, 2) C(8-15): The second character (tens) (0 through 9, but maximum value is 5 when Word X is 2.) C(16-23): The third character (units) (0 through 9, but maximum value is 5 when Word X is 2 and Word X+1 is 5)			

5.4 Parameter identification word (IDn)

Each parameter datum is preceded by a parameter identification word(s) which indicate(s) the content classification of the parameter.

5.4.1 Binary-type parameter identification word

The bit assignment of the binary-type parameter identification word is shown in table 5. Parameter identification codes are shown in table 6.

Table 5 – Bit assignment of binary-type parameter identification word

Bit address	Binary-type camera identification
b9 (MSB)	Not b8
b8	Even parity for b(0-7)
b7	P7 (MSB)
b6	P6
b5	P5
b4	P4
b3	P3
b2	P2
b1	P1
b0 (LSB)	P0 (LSB)
NOTE – P(0-7): Parameter identification code	