RP 181-1999
Revision of
RP 181-1994

SMPTE RECOMMENDED PRACTICE

Audio Sector Time Code and Equipment Type Information for 19-mm Type D-1 Digital Component Recording

1 Scope

This practice is intended to provide an audio sector time code (ASTC) and an equipment type information (ETI). The ASTC can assist the D-1 DTTR to accurately read time code, especially under still-frame conditions. The ETI is designed to provide identification of the record DTTR. This practice applies to recorders operating on the 525-line television system with a frame frequency of 29.97 Hz and the 625-line television system with a frame frequency of 25 Hz.

2 ASTC general

ASTC shall be:

– A time code internal to the D-1 DTTR for the purpose of assisting LTC under some operational modes.

– Derived from LTC and be recorded in the user bit area of audio sectors of D-1 helical tracks.

– Recordable or editable independently from digital audio data so as to be consistent with LTC in terms of lift-off capability of audio data using advance read heads.

NOTE – Lift-off for the purpose of this practice is to read-rewrite the data.

3 ASTC format

3.1 Time code data, binary groups data, and assigned and unassigned bits are extracted from LTC bits. The other bits are ignored. The ordering of the extracted bits are rearranged to form two different types of data groups. The first group contains the time code and the second group contains the binary groups, as shown in figure 1.

3.2 The time code data, namely frame, second, minute, and hour, are placed into the user-control word area of the digital audio data block as defined in ANSI/SMPTE 227M (see figure 2). The relation between LTC data and the user-control words is shown in figure 1.

4 ASTC channel allocation

4.1 The ASTC is changing every frame. Within one frame, the ASTC is written in every audio data block of audio channels 2, 3, and 4 (see figure 3).

4.2 One frame contains 5 audio segments (525/60 — see figure 5) or 6 audio segments (625/50 — see figure 4). One audio segment contains 16 audio data blocks, four for every audio channel distributed in EVEN- and ODD-data blocks, which are recorded twice (see figure 3).

4.3 The EVEN- and ODD-data blocks of channels 2, 3, and 4 contain the same ASTC information within one frame (as shown in figures 4 and 5).

5 ETI general

ETI shall be:

– An equipment type information internal to the D-1 DTTR for the purpose of providing identification of the record DTTR.

– Derived from internal manufacturer settings and be recorded in the user bit area of audio sectors of D-1 helical tracks.

– Recordable or editable independently from digital audio data so as to be consistent with the recorded video data.

Approved April 23, 1999

Longitudinal Time Code Bit No.		Coding	ASTC Data	Audio Data Block USER No. EVEN	Audio Data Block USER No. ODD
Bit 0	1		Bit 0		
Bit 1	2	Frame	Bit 1		
Bit 2	4	Units	Bit 2		
Bit 3	8		Bit 3		
Bit 8	10	Frame	Bit 4	USER0	USER1
Bit 9	20	tens	Bit 5		
Bit 10		Drop frame flag	Bit 6		
Bit 11		Color frame flag	Bit 7		
Bit 16	1		Bit 0		
Bit 17	2	Seconds	Bit 1		
Bit 18	4	Units	Bit 2		
Bit 19	8		Bit 3		
Bit 24	10		Bit 4	USER2	USER3
Bit 25	20	Seconds	Bit 5		
Bit 26	40	tens	Bit 6		
Bit 27		Biphase mark correction bit	Bit 7		
Bit 32	1		Bit 0		
Bit 33	2	Minutes	Bit 1		
Bit 34	4	Units	Bit 2		
Bit 35	8		Bit 3		
Bit 40	10		Bit 4	USER4	USER5
Bit 41	20	Minutes	Bit 5		
Bit 42	40	tens	Bit 6		
Bit 43		Binary group flag bit	Bit 7		
Bit 48	1		Bit 0		
Bit 49	2	Hours	Bit 1		
Bit 50	4	Units	Bit 2		
Bit 51	8		Bit 3		
Bit 56	10	Hours	Bit 4	USER6	USER7
Bit 57	20	tens	Bit 5		
Bit 58		Unassigned address bit	Bit 6		
Bit 59		Binary group flag bit	Bit 7		
Bit 4	Bit0		Bit 0		
Bit 5	Bit1	1st	Bit 1		
Bit 6	Bit2	Binary Group	Bit 2		
Bit 7	Bit3		Bit 3		
Bit 12	Bit0		Bit 4	USER8	USER9
Bit 13	Bit1	2nd	Bit 5		
Bit 14	Bit2	Binary Group	Bit 6		
Bit 15	Bit3		Bit 7		
Bit 20	Bit0		Bit 0		
Bit 21	Bit1	3d	Bit 1		
Bit 22	Bit2	Binary Group	Bit 2		
Bit 23	Bit3		Bit 3		
Bit 28	Bit0		Bit 4	USER10	USER11
Bit 29	Bit1	4th	Bit 5		
Bit 30	Bit2	Binary Group	Bit 6		
Bit 31	Bit3		Bit 7		
Bit 36	Bit0		Bit 0		
Bit 37	Bit1	5th	Bit 1		
Bit 38	Bit2	Binary Group	Bit 2		
Bit 39	Bit3		Bit 3		
Bit 44	Bit0		Bit 4	USER12	USER13
Bit 45	Bit1	6th	Bit 5		
Bit 46	Bit2	Binary Group	Bit 6		
Bit 47	Bit3		Bit 7		
Bit 52	Bit0		Bit 0		
Bit 53	Bit1	7th	Bit 1		
Bit 54	Bit2	Binary Group	Bit 2		
Bit 55	Bit3		Bit 3		
Bit 60	Bit0		Bit 4	USER14	USER15
Bit 61	Bit1	8th	Bit 5		
Bit 62	Bit2	Binary Group	Bit 6		
Bit 63	Bit3		Bit 7		

Figure 1 – ASTC data structure

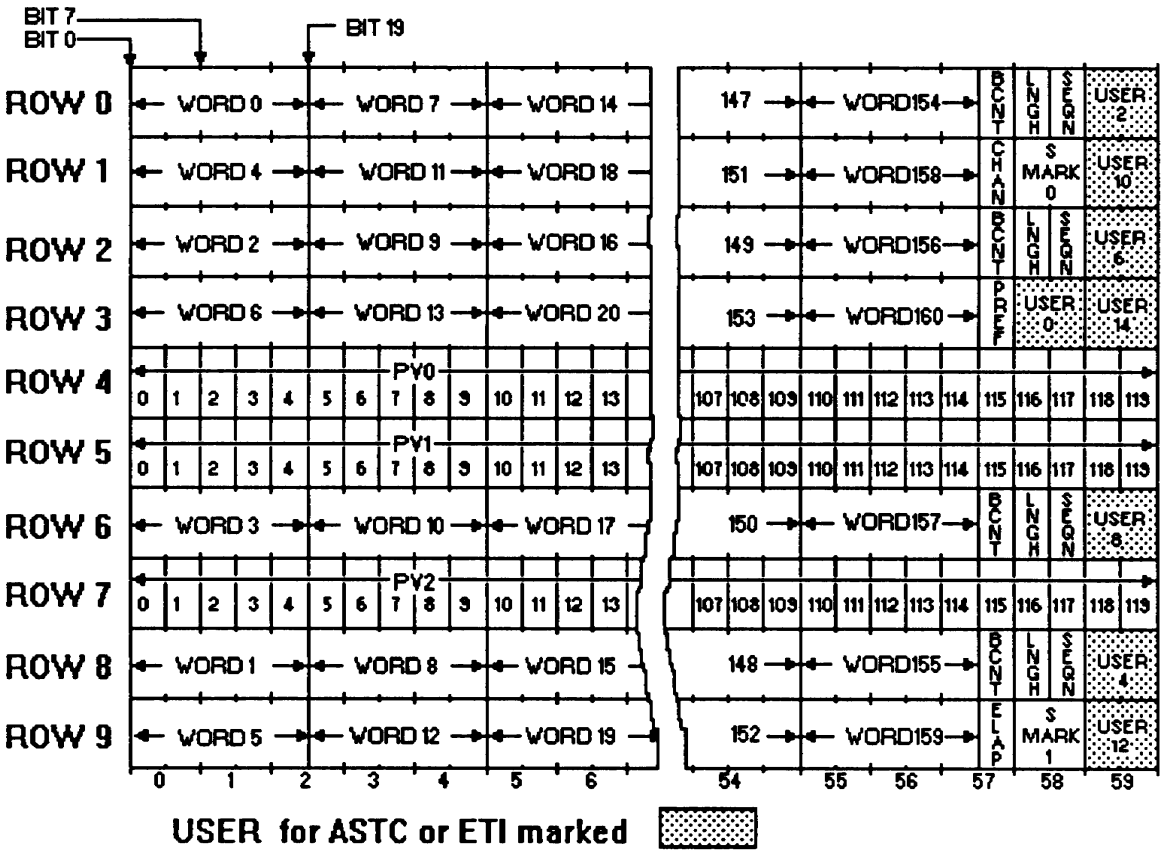

Figure 2 – Audio EVEN-data-block layout (ODD is similar)

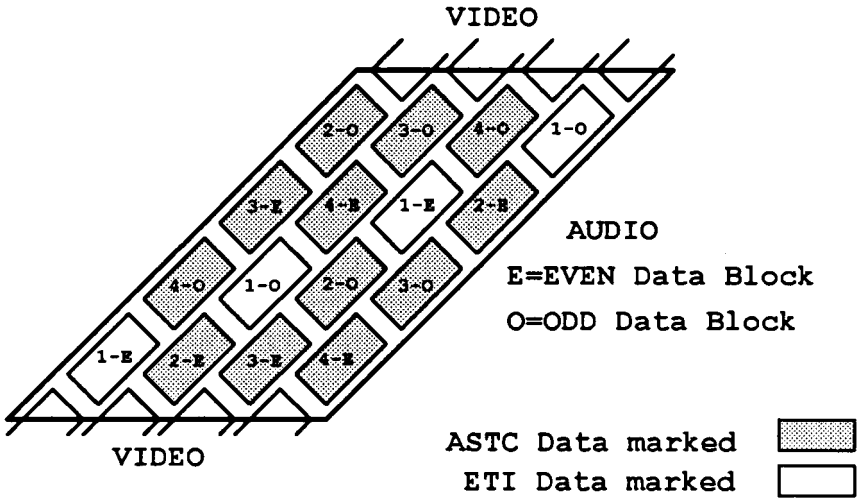

Figure 3 – Audio segment on tape

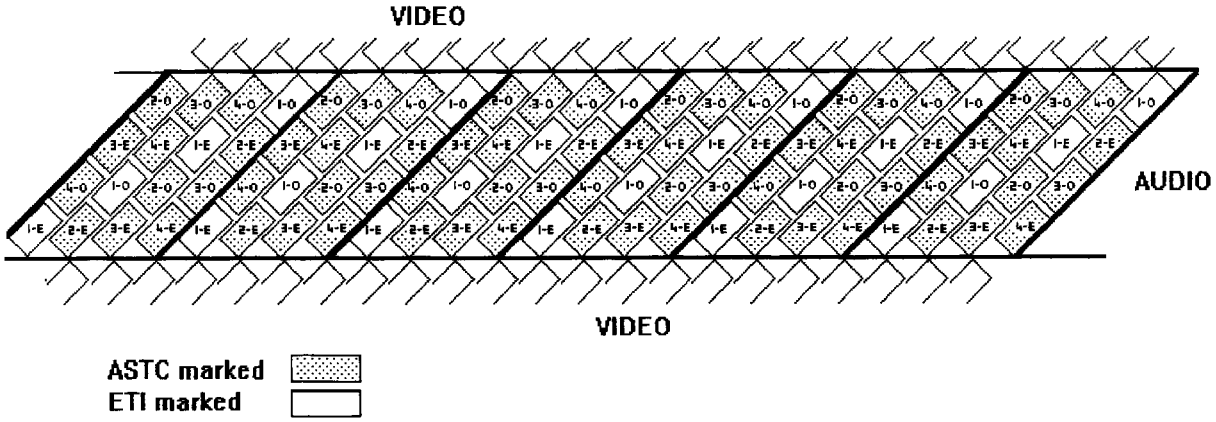

Figure 4 – Digital audio data blocks for one frame (625/50)

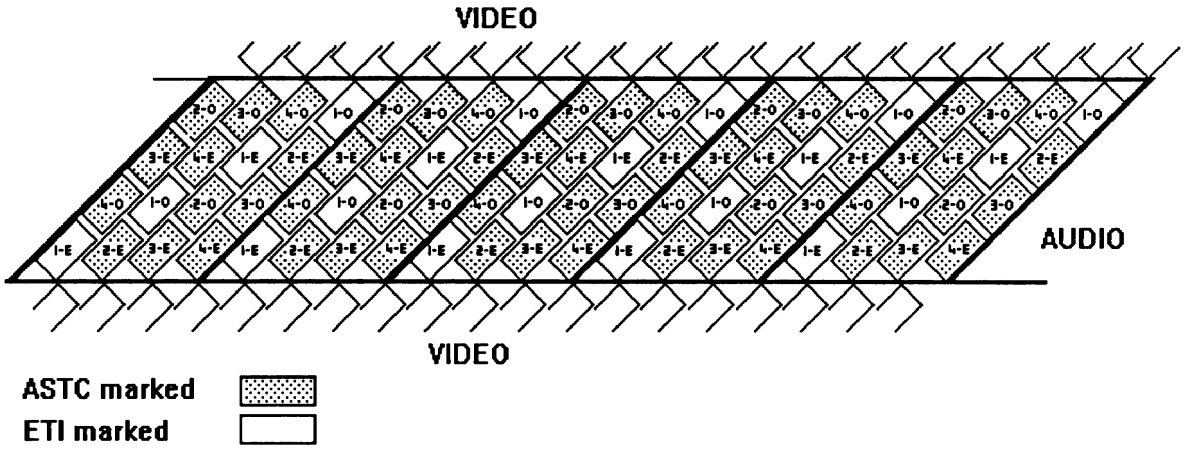

Figure 5 – Digital audio data blocks for one frame (525/50)

6 ETI format

Equipment type (ETI) consists of five different sets of information (see figures 6 and 7 for details).

DATA 0 - 2	Manufacturer identification	ISO/IEC 646, 7-bit printing character
DATA 3 - 6	Serial number of DTTR	ISO/IEC 646, 7-bit printing character
DATA 7 - 10	Serial number of scanner	ISO/IEC 646, 7-bit printing character
DATA 11	DTTR type	8-bit binary number, chosen by manufacturer
DATA 12 - 15	Unused, but reserved (set to 0)	

	Set to '0'	ISO/IEC 646 7-bit printing character						
		MSB						LSB
Bit	7	6	5	4	3	2	1	0

		EVEN audio data block	ODD audio data block
Manufacturer identification	USER0	DATA 0	
	USER1		DATA 1
	USER2	DATA 2	
Serial number of DTTR	USER3		DATA 3
	USER4	DATA 4	
	USER5		DATA 5
	USER6	DATA 6	
Serial number of scanner	USER7		DATA 7
	USER8	DATA 8	
	USER9		DATA 9
	USER10	DATA 10	
DTTR-type	USER11		DATA 11
undefined	USER12	DATA 12	
	USER13		DATA 13
set to '00'	USER14	DATA 14	
	USER15		DATA 15

Figure 6 – Equipment type information (ETI) data structure

			ISO 646 value HEX BIN
Manufacturer identification	USER0	'A'	41 – 0100 0001
	USER1	'B'	42 – 0100 0010
	USER2	'C'	43 – 0100 0011
Serial number of DTTR	USER3	'0'	30 – 0011 0000
	USER4	'1'	31 – 0011 0001
	USER5	'9'	39 – 0011 1001
	USER6	'5'	35 – 0011 0101
Serial number of scanner	USER7	'0'	30 – 0011 0000
	USER8	'4'	34 – 0011 0100
	USER9	'2'	32 – 0011 0010
	USER10	'3'	33 – 0011 0011
DTTR-type	USER11	64 (hex)	64 – 0110 0100
undefined	USER12	0	00 – 0000 0000
	USER13	0	00 – 0000 0000
set to '00'	USER14	0	00 – 0000 0000
	USER15	0	00 – 0000 0000

NOTES

1 Manufacturer identification: ABC
2 Serial number of DTTR: 0195
3 Serial number of scanner: 0423

Figure 7 – Example for equipment type information

7 Channel allocation ETI

7.1 The equipment type information is recorded on tape in the data blocks of audio channel 1 only.

7.2 The 16 ETI-DATAs are distributed in the EVEN-data block (DATAs with even numbers) and in the ODD-data block (DATAs with odd numbers). The EVEN and the ODD data blocks are recorded twice.

7.3 The same equipment type information is recorded in every audio segment.

Annex A (informative)
Bibliography

ANSI/SMPTE 12M-1995, Television, Audio and Film — Time and Control Code

ANSI/SMPTE 227M-1996, Television Digital Component Recording — 19-mm Type D-1 — Helical Data and Control Records

ISO/IEC 646:1991, Information Technology — ISO 7-Bit Coded Character Set for Information Interchange