

INTERNATIONAL STANDARD

IEC 61834-2

First edition
1998-08

**Recording –
Helical-scan digital video cassette recording
system using 6,35 mm magnetic tape for
consumer use
(525-60, 625-50, 1125-60 and 1250-50 systems) –
Part 2:
SD format for 525-60 and 625-50 systems**

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*



Reference number
IEC 61834-2:1998(E)

INTERNATIONAL STANDARD

IEC 61834-2

First edition
1998-08

**Recording –
Helical-scan digital video cassette recording
system using 6,35 mm magnetic tape for
consumer use
(525-60, 625-50, 1125-60 and 1250-50 systems) –
Part 2:
SD format for 525-60 and 625-50 systems**

© IEC 1998 Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE **XF**

For price, see current catalogue

CONTENTS

	Page
FOREWORD	15
Clause	
1 General	19
1.1 Scope	19
1.2 Normative reference	19
1.3 Definitions, symbols and abbreviations	19
1.4 Environment and test conditions	21
1.5 Reference tape	21
1.6 Calibration tape	21
1.6.1 Record locations and dimensions	21
1.6.2 Calibration signals	21
1.6.3 Purchase	21
2 Helical recordings	21
2.1 Record location and dimensions	23
2.1.1 The effective area upper edge	23
2.1.2 Record and playback guarantee	23
2.1.3 Overwrite margin (OM)	23
2.1.4 Switching margin for recording amplifiers	23
2.1.5 Scanner example	23
3 Programme track data arrangement	23
3.1 Introduction	23
3.2 Labelling convention	25
3.3 Audio sector	25
3.3.1 Structure	25
3.3.2 Sync patterns	25
3.3.3 ID part	25
3.3.4 Pre-sync block	27
3.3.5 Post-sync block	27
3.3.6 Data-sync block	27
3.4 Video sector	27
3.4.1 Structure	27
3.4.2 Sync patterns	27
3.4.3 ID part	29
3.4.4 Pre-sync block	29
3.4.5 Post-sync block	29
3.4.6 Data-sync block	29
3.5 Subcode sector	29
3.5.1 Structure	29
3.5.2 Sync patterns	29
3.5.3 ID part	29
3.5.4 Pre-sync block	29
3.5.5 Post-sync block	29
3.5.6 Data-sync block	31
4 Audio interface	31
5 Video interface	31
6 Audio signal processing	31
6.1 Introduction	31
6.2 Error correction code	31
6.2.1 Inner error correction code	31
6.2.2 Outer error correction code	33
6.3 Randomization pattern	33
6.4 Audio encoding	35
6.4.1 Encoding mode	35
6.4.2 Emphasis	35
6.4.3 Audio error code	35
6.4.4 Sample to data byte conversion	35

Clause	Page
6.5	37
6.5.1	37
6.5.2	37
6.5.3	37
6.6	37
6.6.1	37
6.6.2	37
6.7	39
6.7.1	39
6.7.2	41
6.8	41
6.9	43
7	43
7.1	43
7.2	43
7.2.1	43
7.2.2	43
7.3	45
7.4	45
7.4.1	45
7.4.2	45
7.4.3	47
7.4.4	47
7.4.5	49
7.4.6	49
7.5	51
7.5.1	51
7.5.2	53
7.5.3	55
7.5.4	55
7.6	55
7.6.1	55
7.6.2	55
7.6.3	55
7.6.4	55
7.6.5	57
7.6.6	57
7.7	57
7.8	57
7.9	59
7.10	63
7.11	63
7.12	65
8	65
8.1	65
8.2	65
8.3	67
8.4	67
8.4.1	67
8.4.2	67
8.4.3	67
8.4.4	69
8.4.5	69
8.5	71
8.5.1	71
8.5.2	71
8.5.3	73

Clause	Page
8.6 Rewrite of subcode sector.....	73
8.6.1 Rewrite of TAG ID and subcode data	73
8.6.2 Insert recording	73
8.6.3 Invalid recording of video and/or audio.....	73
9 System data	73
9.1 System data for APT = 000b and APM = 000b.....	73
9.2 Pack structure	75
9.2.1 Fixed length pack	75
9.2.2 Variable length pack.....	75
9.2.3 Pack header.....	75
9.2.4 Error expression.....	75
9.3 Main area and optional area.....	75
9.3.1 Concept of main area and optional area.....	75
9.3.2 Tape	77
9.3.3 MIC.....	79
9.4 AAUX	79
9.5 VAUX	81
9.6 Subcode	83
9.7 MIC	83
9.8 Title, chapter, part and program	83
9.9 Full recording system of horizontal lines.....	83
9.10 Full recording system of teletext	83
9.11 Character information system of consumer digital VCR	83
9.11.1 Full mode	85
9.11.2 Simple mode	85
10 MIC (memory in cassette)	87
10.1 Introduction	87
10.2 MIC data structure	87
10.2.1 Main area and optional area	87
10.2.2 Data structure of space 0	87
10.2.3 Data structure of space 1	87
10.2.4 MIC contents of a new cassette tape	87
10.2.5 MIC and VCR	87
10.3 Event.....	89
10.3.1 Main event and optional event for space 0	89
10.3.2 Event header pack	89
10.3.3 Examples of pack arrangement for optional events	89
10.3.4 The correlation between OETM events and text events	91
10.3.5 Maker's optional event.....	91
10.4 Warning system for inconsistency.....	91
10.4.1 ME flag and TT flag.....	91
10.4.2 Correcting inconsistency.....	91
10.5 MIC IC.....	93
10.5.1 Electrical characteristics.....	93
10.5.2 Memory.....	93
10.5.3 Multiple bytes operation.....	93
10.5.4 MIC communication protocol	93
11 Data structure for digital interface	95
11.1 Introduction	95
11.2 Data structure.....	95
11.3 DIF sequence	95
11.4 DIF block.....	95
11.4.1 ID part.....	95
11.4.2 Data part.....	97
11.5 Frame period.....	99
11.6 Playback speed	99

	Page
Annex A (normative) DCT-operation precision	229
Annex B (normative) Data through the digital interface.....	233
Annex C (informative) Manufacturers.....	247
Annex D (informative) Bibliography.....	249
 Tables	
Table 1 – Sector location from SSA (525-60 system)	103
Table 2 – Sector location from SSA (625-50 system)	103
Table 3 – Scanner example	103
Table 4 – Application ID of area 1 (AP1)	113
Table 5 – Sequence number (525-60 system)	115
Table 6 – Sequence number (625-50 system)	115
Table 7 – Track pair number (525-60 system).....	117
Table 8 – Track pair number (625-50 system).....	117
Table 9 – Application ID of area 2 (AP2)	121
Table 10 – Application ID of area 3 (AP3)	123
Table 11 – Randomization pattern used for a pre-sync block and a post-sync block	125
Table 12 – Randomization pattern used for a data-sync block	127
Table 13 – Audio encoding mode in an audio block.....	129
Table 14 – The construction of an audio block	131
Table 15 – Basic channel allocation rule in SD-2ch audio.....	133
Table 16 – Basic channel allocation rule in SD-4ch audio.....	133
Table 17 – The number of audio samples per frame (unlocked mode).....	135
Table 18 – The allowance range of the accumulated difference value between the numbers of audio samples per frame in CH1 and CH2	135
Table 19 – The number of audio samples per frame (locked mode).....	135
Table 20 – The construction of video signal sampling (4:2:2)	145
Table 21 – Class number and the DCT block	161
Table 22 – An example of the classification for reference.....	161
Table 23 – Quantization step	163
Table 24 – Length of code-words.....	165
Table 25 – Code-words of variable length coding	167
Table 26 – Definition of STA.....	171
Table 27 – Code-words of the QNO	173
Table 28 – Randomization pattern used for a subcode-sync block.....	179
Table 29 – Subcode data of the main area and recommended data of the optional area for no optional use (for user's tape)	187
Table 30 – Subcode data of the main area and recommended data of the optional area for no optional use (for pre-recorded tape).....	187
Table 31 – AAUX data of the main area	191
Table 32 – VAUX data of the main area	193
Table 33 – Event header packs	209
Table 34 – Inconsistency status of events by ME flag and TT flag	209
Table 35 – Relation of memory size and applied protocol.....	209
Table 36 – DIF block type	215
Table 37 – DIF sequence number (525-60 system)	217
Table 38 – DIF sequence number (625-50 system)	217
Table 39 – TIA data in the header section.....	219
Table 40 – DIF blocks and subcode sync blocks	221
Table 41 – DIF blocks and VAUX data-sync blocks	223
Table 42 – DIF blocks and audio data-sync blocks.....	225
Table 43 – DIF blocks and compressed macro blocks.....	227

	Page
Table B.1 – Definition of the symbols	235
Table B.2 – Definition of the additional symbols about the delays	235
Table B.3 – Method of transmitting and recording data of header DIF block.....	237
Table B.4 – Method of transmitting and recording data of subcode DIF block.....	239
Table B.5 – Method of transmitting and recording data of VAUX DIF block	241
Table B.6 – Method of transmitting and recording data of AAUX.....	243
Table B.7 – Method of transmitting and recording data of a video DIF block	245
Table B.8 – Playback or transmitting error for the symbol C	245
Figures	
Figure 1 – Record location and dimensions.....	101
Figure 2 – Sector location from SSA	101
Figure 3 – Sector arrangement on helical track (525-60 system)	105
Figure 4 – Sector arrangement on helical track (625-50 system)	107
Figure 5 – Frame and tracks (525-60 system)	109
Figure 6 – Frame and tracks (625-50 system)	109
Figure 7 – Structure of sync blocks in audio sector.....	111
Figure 8 – ID data in audio sector	111
Figure 9 – Bit assignment of ID code-words	113
Figure 10 – Structure of sync blocks in video sector.....	119
Figure 11 – ID data in video sector	119
Figure 12 – Structure of sync blocks in subcode sector	121
Figure 13 – ID data in subcode sector.....	123
Figure 14 – Data and inner parity of a data-sync block	125
Figure 15 – Data and outer parity of a data-sync block for audio sector	125
Figure 16 – The 16-12 compressing rule.....	129
Figure 17 – Sample to data bytes conversion for 16 bits.....	131
Figure 18 – Sample to data bytes conversion for 12 bits.....	131
Figure 19 – Audio shuffling pattern for 525-60 system: 48k mode/44,1k mode/32k mode...	137
Figure 20 – Audio shuffling pattern for 625-50 system: 48k mode/44,1k mode/32k mode...	139
Figure 21 – Audio shuffling pattern for 525-60 system: 32k-2ch mode	141
Figure 22 – Audio shuffling pattern for 625-50 system: 32k-2ch mode	143
Figure 23 – Data and outer parity of a data-sync block for video sector	145
Figure 24 – Transmitting samples for 525-60 system	147
Figure 25 – Transmitting samples for 625-50 system	149
Figure 26 – DCT block and the pixel coordinate	151
Figure 27 – The rightmost DCT block in colour difference signal for 525-60 system.....	151
Figure 28 – DCT block arrangement for 525-60 system.....	153
Figure 29 – DCT block arrangement for 625-50 system.....	153
Figure 30 – Macro block and DCT blocks.....	153
Figure 31 – Super blocks and macro blocks in a frame on TV screen for 525-60 system ...	155
Figure 32 – Super blocks and macro blocks in a frame on TV screen for 625-50 system ...	157
Figure 33 – Macro block order in a super block for 525-60 system	159
Figure 34 – Macro block order in a super block for 625-50 system	159
Figure 35 – The output order of a weighted DCT block.....	161
Figure 36 – Area numbers	163
Figure 37 – The arrangement of a compressed macro block	171
Figure 38 – The arrangement of a video segment after the bit rate reduction.....	175
Figure 39 – The video error code.....	175

	Page
Figure 40 – The relation between the compressed macro block number and the data-sync block	177
Figure 41 – Bit assignment for the subcode data and subcode parity	179
Figure 42 – Structure of ID data	181
Figure 43 – Structure of the absolute track number	181
Figure 44 – Recommendation for the recording start position of a tape	183
Figure 45 – Numbering of the absolute track number for invalid tracks	183
Figure 46 – Main area and optional area (525-60 system)	185
Figure 47 – Main area and optional area (625-50 system)	185
Figure 48 – The layers of the pack	189
Figure 49 – Arrangement of AAUX packs in audio sector	189
Figure 50 – Arrangement of VAUX packs in VAUX sync blocks	191
Figure 51 – The layers of tape	193
Figure 52 – The division of tape	195
Figure 53 – An example of recorded topic data on tape	195
Figure 54 – Recording order of topic data	197
Figure 55 – Text unit for simple mode	197
Figure 56 – Data structure of space 0	199
Figure 57 – Optional events order of space 0	199
Figure 58 – MIC contents of new cassette tape	201
Figure 59 – Examples of pack arrangement for optional events	203
Figure 60 – State transition of ME flag and TT flag	205
Figure 61 – Multi-bytes writing operation for the I ² C protocol	207
Figure 62 – An example of multi-bytes reading operation for the I ² C protocol	207
Figure 63 – Block diagram on the digital interface	211
Figure 64 – Data structure for transmission	211
Figure 65 – Transmission order of DIF blocks in a DIF sequence	213
Figure 66 – ID data in a DIF block	215
Figure 67 – Data in the header section	219
Figure 68 – Data in the subcode section	221
Figure 69 – Data in the VAUX section	223
Figure 70 – Data in the audio section	225
Figure 71 – Data in the video section	227
Figure A.1 – Measurement method of DCT operation precision	231

INTERNATIONAL ELECTROTECHNICAL COMMISSION

RECORDING – HELICAL-SCAN DIGITAL VIDEO CASSETTE RECORDING SYSTEM USING 6,35 mm MAGNETIC TAPE FOR CONSUMER USE (525-60, 625-50, 1125-60 and 1250-50 systems) –

Part 2: SD format for 525-60 and 625-50 systems

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61834-2 has been prepared by subcommittee 100B: Audio, video and multimedia information storage systems, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

FDIS	Report on voting
100B/168/FDIS	100B/180/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.

IEC 61834 consists of the following parts, under the general title *Recording – Helical-scan digital video cassette recording system using 6,35 mm magnetic tape for consumer use (525-60, 625-50, 1225-60 and 1250-50 systems)*

- Part 1:1998, General specifications
- Part 2: SD format for 525-60 and 625-50 systems
- Part 3: HD format for 1125-60 and 1250-50 systems ¹⁾
- Part 4: The pack header table and the contents
- Part 5: The character information system

¹⁾ To be published.

This part 2 describes the specifications for 525-60 and 625-50 systems which are not included in part 1.

Part 1 describes the common specifications which are cassettes, helical recordings, modulation method, magnetization and basic system data.

Part 3 describes the specifications for 1125-60 and 1250-50 systems which are not included in part 1 and part 2.

Part 4 describes the pack header table and the contents of packs which are applicable to the whole recording system of helical-scan digital video cassette.

Part 5 describes the character information system which is applicable to the whole recording system of helical-scan digital video cassette.

For manufacturing SD digital video cassette recording systems, part 1, part 2, part 4 and part 5 are referred to.

For manufacturing HD digital video cassette recording systems, part 1, part 2, part 3, part 4 and part 5 are referred to.

Annexes A and B form an integral part of this standard.

Annexes C and D are for information only.

RECORDING – HELICAL-SCAN DIGITAL VIDEO CASSETTE RECORDING SYSTEM USING 6,35 mm MAGNETIC TAPE FOR CONSUMER USE (525-60, 625-50, 1125-60 and 1250-50 systems) –

Part 2: SD format for 525-60 and 625-50 systems

1 General

1.1 Scope

This part of IEC 61834 specifies the content, format and recording method of the data blocks forming the helical records on the tape containing audio, video, and system data. It describes the specifications for the 525-line system with a frame frequency of 29,97 Hz (hereinafter referred to as 525-60 system) and 625-line system with a frame frequency of 25,00 Hz (hereinafter referred to as 625-50 system) which are not included in part 1. One video channel and two independent audio channels are recorded in the digital format. Each of these channels is designed to be capable of independent editing. The video channel records and reproduces a component television signal in 525-60 and 625-50 systems.

In this part, the data structure of a track is defined by APT = 000b which consists of four areas as described in 4.3.2 in part 1 and AP1 = AP2 = AP3 = 000b.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60461:1986, *Time and control code for video tape recorders*

IEC 60735:1991, *Measuring methods for video tape properties*

IEC 60958:1989, *Digital audio interface*

ITU-R Recommendation BT601-5:1995, *Studio encoding parameters of digital television for standard 4:3 and wide screen 16:9 aspect ratios*

ITU-R Report 624-4:1990, *Characteristics of television systems*