

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 1: General specifications

The European Standard EN 61834-1:1998, with the incorporation of amendment A1:2001, has the status of a British Standard

ICS 33.160.40

National foreword

This British Standard is the English language version of EN 61834-1:1998, including amendment A1:2001. It is identical with IEC 61834-1:1998.

The UK participation in its preparation was entrusted by Technical Committee EPL/100, Audio, Video and Multimedia Systems and Equipment, to Subcommittee EPL/100/2, Recording, which has the responsibility to:

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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Contents

	Page
National foreword	Inside front cover
Foreword	2
Text of EN 61834-1	5

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English version

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 1: General specifications

(includes amendment A1:2001)

(IEC 61834-1:1998 + A1:2001)

Enregistrement — Système de magnétoscope numérique à cassette à balayage hélicoïdal utilisant la bande magnétique de 6,35 mm, destiné au grand public (Systèmes 525-60, 625-50, 1125-60 et 1250-50) —
Partie 1:Spécifications générales
(inclut l'amendement A1:2001)
(CEI 61834-1:1998 + A1:2001)

Aufzeichnung — Videokassettensystem mit digitaler Schrägspuraufzeichnung auf Magnetband 6,35 mm für den Heimgebrauch (Systeme 525-60, 625-50, 1125-60 und 1250-50) —
Teil 1: Allgemeine Festlegungen
(enthält Änderung A1:2001)
(IEC 61834-1:1998 + A1:2001)

This European Standard was approved by CENELEC on 1998-10-01; amendment A1:2001 was approved by CENELEC on 2001-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

The text of document 100B/165/FDIS, future edition 1 of IEC 61834-1, prepared by SC 100B, Recording, of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61834-1 on 1998-10-01.

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Annexes designated “normative” are part of the body of the standard.

In this standard, Annex ZA is normative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61834-1:1998 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A1

The text of document 100B/285/FDIS, future amendment 1 to IEC 61834-1:1998, prepared by SC 100B, Audio, video and multimedia information storage systems, of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61834-1:1998 on 2001-05-01.

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Contents

	Page
Foreword	2
1 General	5
1.1 Scope	5
1.2 Normative reference	5
1.3 Definitions, symbols and abbreviations	5
1.4 Environment and test conditions	6
2 Cassette	6
2.1 Mechanical parameters	6
2.1.1 Cassette dimensions	6
2.1.2 Identification of cassette	6
2.1.3 Tape length	6
2.1.4 Coating face	6
2.1.5 Datum hole and datum plane	6
2.1.6 Window and labels	7
2.1.7 Identification/MIC contacts	7
2.1.8 Accidental erasure prevention holes	7
2.1.9 Leader/trailer tape	8
2.1.10 Reels	8
2.1.11 Protection lid	8
2.2 Tape specification	8
2.2.1 Type of magnetic tape	8
2.2.2 Base	8
2.2.3 Width	9
2.2.4 Width fluctuation	9
2.2.5 Tape thickness	9
2.2.6 Transmissivity	9
3 Helical recordings	9
3.1 Tape speed	9
3.2 Record location and dimensions	9
3.2.1 Reference edge	9
3.2.2 Effective area	9
3.2.3 Record and playback guaranteed heights	9
3.2.4 Track pitch	9
3.2.5 Helical track	10
4 System data	10
4.1 Introduction	10
4.2 Application ID	10
4.3 System data for tape	10
4.3.1 Basic system data	10

	Page		Page
4.3.2 Application ID on tape	10	Figure 10 — Light path and leader/trailer tape for standard cassette	25
4.3.3 Area	11	Figure 11 — Contact area of ID board or MIC for standard cassette	26
4.4 System data for MIC	11	Figure 12 — Top and side view of small cassette	27
4.4.1 Basic system data	11	Figure 13 — Bottom view of small cassette	28
4.4.2 Application ID on MIC	11	Figure 14 — Datum area and support area for small cassette	29
4.4.3 Space	11	Figure 15 — Internal structure and tape path for small cassette	30
5 Modulation	11	Figure 16 — Reels for small cassette	31
5.1 Introduction	11	Figure 17 — Reel lock and release for small cassette	32
5.2 Byte position number 0, 1, 2	12	Figure 18 — Lid lock and release for small cassette	33
5.2.1 Sync patterns	12	Figure 19 — Lid for small cassette	34
5.2.2 Randomization and modulation	12	Figure 20 — Minimum space for recorder/player loading mechanism for small cassette	35
5.3 Byte position number $3k$, $3k + 1$, $3k + 2$ (where $k > 1$)	12	Figure 21 — Light path and leader/trailer tape for small cassette	36
5.3.1 Randomization	12	Figure 22 — Contact area of ID board or MIC for small cassette	37
5.3.2 Modulation	12	Figure 23 — Record location and dimensions	38
5.4 Track F0, track F1, track F2	13	Figure 24 — ITI sector location from SSA	39
5.5 Edit gap, run-up, guard area, preamble and postamble	13	Figure 25 — Lag between each pair of successive tracks at the beginning of the SSA	39
6 ITI sector (area 0)	13	Figure 26 — Division of a track prescribed by APT	40
6.1 Introduction	13	Figure 27 — The layer of application IDs on tape	40
6.2 ITI preamble	13	Figure 28 — Address 0 of bank 0	40
6.3 SSA (start-sync block area)	13	Figure 29 — MIC memory space	41
6.4 TIA (track information area)	14	Figure 30 — Bit stream before interleaved NRZ1 modulation	41
6.5 ITI postamble	14	Figure 31 — Frequency characteristics	42
7 Magnetization	15	Figure 32 — Structure of ITI sector	43
7.1 Polarity	15	Figure 33 — Structure of a start-sync block	43
7.2 Recorded equalization	15	Figure 34 — Structure of a TI-sync block	43
7.3 Record level	15	Table 1 — Mechanical tolerances	15
Annex A (normative) LP mode (long play mode with narrow track pitch)	52	Table 2 — Assignment of the four contacts	15
Annex ZA (normative) Normative references to international publications with their corresponding European publications	55	Table 3 — Record location and dimensions	38
Figure 1 — Top view and side view of standard cassette	16	Table 4 — ITI sector location from SSA	38
Figure 2 — Bottom view of standard cassette	17	Table 5 — Bit stream of ITI preamble for track F0	44
Figure 3 — Datum area and support area for standard cassette	18	Table 6 — Bit stream of ITI preamble for track F1	45
Figure 4 — Internal structure and tape path for standard cassette	19		
Figure 5 — Reels for standard cassette	20		
Figure 6 — Reel lock and release for standard cassette	21		
Figure 7 — Lid lock and release for standard cassette	22		
Figure 8 — Lid for standard cassette	23		
Figure 9 — Minimum space for recorder/player loading mechanism for standard cassette	24		

	Page
Table 7 — Bit stream of ITI preamble for track F2	46
Table 8 — Bit stream of SSA for track F0	47
Table 9 — Bit stream of SSA for track F1	48
Table 10 — Bit stream of SSA for track F2	49
Table 11 — Bit stream of TIA for track F0	50
Table 12 — Bit stream of TIA for track F1	50
Table 13 — Bit stream of TIA for track F2	50
Table 14 — Application ID of a track in TIA	50
Table 15 — Bit stream of ITI postamble for track F0	51
Table 16 — Bit stream of ITI postamble for track F1	51
Table 17 — Bit stream of ITI postamble for track F2	51
Table A.1 — Record location and dimensions	52
Table A.2 — ITI sector location with respect to SSA	53
Table A.3 — Sector location from SSA (525-60 system)	54
Table A.4 — Sector location from SSA (625-50 system)	54

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. It describes the common specifications for cassettes, modulation method, magnetization and basic system data, for helical-scan digital video cassette recording system using 6,35 mm (1/4 inch) magnetic tape. The object of this standard is to define the electrical and mechanical characteristics of equipment which will provide for the interchangeability of recorded cassettes.

1.2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was 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 edition of the normative document listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 61834-2, *Recording — Helical-scan digital video cassette recording system using 6,5 mm magnetic tape for consumer use (525-60, 625-50, 1 125-60 and 1 250-50 systems) — Part 2: SD format for 525-60 and 625-50 systems*¹⁾.

1.3 Definitions, symbols and abbreviations

For the purpose of this International Standard, the following definitions or abbreviations apply.

525-60 system

standard definition television signal in the 525-line system with a frame frequency of 29,97 Hz

625-50 system

standard definition television signal in the 625-line system with a frame frequency of 25,00 Hz

1125-60 system

high definition television signal in the 1125-line system with a frame frequency of 30,00 Hz

1250-50 system

high definition television signal in the 1250-line system with a frame frequency of 25,00 Hz

VCR:	Video cassette recorder.
AP _i :	Application ID of area <i>i</i> , where <i>i</i> = 1, 2, 3,..., <i>n</i> .
APM:	Application ID of MIC.
APT:	Application ID of a track.
BCID:	Basic cassette ID.
EEPROM:	Electrical erasable programmable read only memory.
FeRAM:	Ferroelectric random access memory.
FID:	First ID of a start-sync block.
FTI:	First track information of a TI-sync block.
GF:	Galois field.
ITI:	Insert and track information.
LSB:	Least significant bit of data.
MIC:	Memory in cassette.
MSB:	Most significant bit of data.
NRZ1:	Non-return to zero change on one or non-return to zero mark.
PF:	Pilot frame of tracking servo.
SCK:	Serial clock line.
SDA:	Serial data line.

¹⁾ To be published.

SID:	Second ID of a start-sync block.
SP:	Standard play.
SSA:	Start-sync block area.
STI:	Second track information of a TI-sync block.
TIA:	Track information area.
UV:	Undefined value.

1.4 Environment and test conditions

Tests and measurements for checking the conformity with the requirements of this standard shall be carried out under the following conditions.

— Temperature:	20 °C ± 1 °C
— Relative humidity:	(50 ± 2) %
— Barometric pressure:	from 86 kPa to 106 kPa
— Tape conditioning:	not less than 24 h

2 Cassette

2.1 Mechanical parameters

2.1.1 Cassette dimensions

The dimensions of the two types of cassettes shall be in accordance with Figure 1 to Figure 22 and symmetrical in form unless specified otherwise. The dimensions of the cassette shall correspond to the dimensions indicated for surfaces including the radii of the ridgelines outlining the cassette which shall be 0,3 mm or less, unless specified otherwise. General tolerances for dimensions shall be as specified in Table 1 except for special specified tolerances. The dimensions marked with □ are nominal values.

2.1.2 Identification of cassette

The sizes of the two types of cassettes shall be identified as follows:

Standard cassette (approximate size: 125,0 mm × 78,0 mm × 14,6 mm)

Small cassette (approximate size: 66,0 mm × 48,0 mm × 12,2 mm).

2.1.3 Tape length

The length of the magnetic tape L shall be determined by the following formula:

$$L_{\text{CAL}} = (1 + 0,005) \times Vt \times (T + 2) \times 0,06 \text{ m}$$

$$L = L_{\text{CAL}} \begin{smallmatrix} +k \\ 0 \end{smallmatrix} \text{ m}$$

where

L_{CAL}	is the calculated length of a magnetic tape;
L	is the length of the magnetic tape;
Vt	is the tape speed in millimetres per second;
T	is the playable time in minutes;
k	is the tolerance
	— 1 m for less than 120 min cassette,
	— 2 m for not less than 120 min cassette.

2.1.4 Coating face

The magnetic coating on the tape shall face out of the cassette as specified in Figure 4 and Figure 15.

2.1.5 Datum hole and datum plane

Datum holes shall be as specified in Figure 3 and Figure 14.

Datum plane Z is determined by datum areas A, B and C as specified in Figure 1, Figure 3, Figure 12 and Figure 14.

Datum plane X shall be orthogonal to datum plane Z and shall run through the centre of datum hole A and datum hole B as specified in Figure 2, Figure 3, Figure 13 and Figure 14.

Datum plane Y shall be orthogonal to both datum plane X and datum plane Z, and shall run through the centre of datum hole A as specified in Figure 2, Figure 3, Figure 13 and Figure 14.

2.1.6 Window and labels

Window and label areas shall be as specified in Figure 1 and Figure 12.

Windows and labels shall not extend beyond the height of the holding area 1 within the area 7 mm from both sides of the cassette where the height is measured from datum plane Z.

Labels attached to the cassette shall not extend beyond the external dimensions as shown in Figure 1 and Figure 12 and shall not interfere with the identification contacts, the hub drive and the support mechanism.

2.1.7 Identification/MIC contacts

Both cassettes with ID board and cassettes with memory (MIC) shall have four electrical contacts whose dimensions and locations shall be as specified in Figure 11 and Figure 22. Characteristics between these contacts and connectors shall be as described below on condition that the ID board or MIC is inside a cassette.

The contact force of each connector shall be between 0,25 N to 0,4 N.

The contact resistance value of each connector shall be less than 0,5 Ω .

The contact impedance of each connector shall be less than 1,0 Ω .

The contact resistance value is measured between each pair of connectors on condition that two corresponded contacts are short-circuited and the supplied d.c. current is between 50 μ A and 300 mA.

The contact impedance is measured between each pair of connectors on condition that two corresponded contacts are short-circuited and supplied a.c. peak current is 10 mA at 4 MHz.

For cassette with ID board

The contact number 1 shall indicate the tape thickness.

The contact number 2 shall indicate the tape type.

The contact number 3 shall indicate the tape grade.

The contact number 4 shall be ground level.

The resistance value between contact numbers 1 to 3 and the contact number 4 designates the cassette identifications as specified in Table 2.

For cassette with memory (MIC)

The contact number 1 shall be VDD level.

The contact number 2 shall be used for SDA.

The contact number 3 shall be used for SCK.

The contact number 4 shall be ground level.

MIC data are transferred through the contact number 2. MIC includes the cassette identifications, such as the tape thickness, the tape type and the tape grade. More details are described in 4.4 and Figure 28.

All VCRs shall detect the cassette identifications for both cassettes with ID board and MIC.

2.1.8 Accidental erasure prevention holes

All cassettes shall have two accidental erasure prevention holes. One of the holes shall be on the bottom and the other on the rear as shown in Figure 1, Figure 2, Figure 11, Figure 12, Figure 13 and Figure 22.

When the switching plug to detect the hole's situation is open, the VCR shall not record any data either on the tape or on the MIC.

The switching plug mechanism shall withstand an axial force of 0,4 N. The switching plug shall not be red or a similar colour.

2.1.9 Leader/trailer tape

There shall be a leader tape at the beginning of the tape and a trailer tape at the end of the tape. When the tape is attached to the hub, the length between the splice point and the clamping point on the reel hub shall be $80 \text{ mm} \pm 10 \text{ mm}$ for standard cassettes and $65 \text{ mm} \pm 10 \text{ mm}$ for small cassettes and the leader/trailer tape shall not come off the hub when subjected to a force of 4 N or less for 1 s.

The width of the leader/trailer tape shall be $6,35_{-0,05}^0 \text{ mm}$. The thickness of the leader/trailer tape shall be $15 \text{ }\mu\text{m}$ or less. The splicing tape used to attach the leader/trailer tape shall be applied to the non-magnetic coating surface of the tape and shall not come off when subjected to a force of 4 N or less for 1 s.

Transmissivity of the leader/trailer tape through the light path is described in 2.2.6.

2.1.10 Reels

The dimensions of the reels and the relationship between the reels and reel tables shall be as specified in Figure 5 and Figure 16. The reels shall be mechanically locked when the cassette is removed from the recorder/player.

When a cassette is inserted into the recorder/player, the reels shall be mechanically unlocked by the unlocking lever as specified in Figure 6 and Figure 17. The force required to release the reel lock shall be less than 1,2 N for standard cassettes, and less than 0,8 N for small cassettes in direction X.

2.1.11 Protection lid

The magnetic tape shall be covered with a protection lid, and the lids shall have no undesirable opening. The outline of the front piece in the side view and the centre of its rotation shall be as specified in Figure 8 and Figure 19.

The lower edge of the lid shall be separated by the minimum distance or more, as specified in Figure 9 and Figure 20, while the lid is opened by the appropriate lid opener.

The lid shall be unlocked and opened by the recorder/player when the cassette is inserted.

The lid shall be mechanically unlocked when the cassette is inserted into the recorder/player by the unlocking lever, installed on both sides for standard cassettes and on the take-up side for small cassettes, to move in the direction X as specified in Figure 7 and Figure 18. The force required to unlock the lid in direction X shall be less than 0,2 N for each lock of standard cassettes and 0,15 N for small cassettes. The minimum space for cassettes for the tape loading mechanism shall be as shown in Figure 9 and Figure 20.

The rotating angle of the front piece shall be $87,5^\circ \pm 1,25^\circ$ when the lid is opened by the appropriate lid opener as specified in Figure 8 and Figure 19. The maximum rotating angle shall be more than 90° . When the cassette is inserted into the recorder/player, the rotating angle should be 85° to 90° as specified in Figure 9 and Figure 20. An additional mode with a minimum rotating angle of 90° is under consideration for small cassettes.

When the cassette is removed from the recorder/player, even if the lid lock is free, the lid shall be closed and locked mechanically. The maximum force to open the lid shall be less than 1,0 N for standard cassettes, and less than 0,6 N for small cassettes while the lids are opened by appropriate lid-opening mechanisms as specified in Figure 8, Figure 9, Figure 19 and Figure 20.

Antistatic treatment should be applied to the front and inner pieces.

2.2 Tape specification

2.2.1 Type of magnetic tape

The magnetic tape shall be metal evaporated tape or equivalent.

2.2.2 Base

The base material shall be polyester or equivalent.

2.2.3 Width

The tape width shall be $6,350 \text{ mm} \pm 0,005 \text{ mm}$.

The tape, covered with a glass plate, is measured without tension at a minimum of five different positions along the tape using a calibrated comparator having an accuracy of $1/1\,000 \text{ mm} = 1 \text{ }\mu\text{m}$. The tape width is defined as the average of the five readings.

2.2.4 Width fluctuation

Tape width fluctuation shall not exceed $5 \text{ }\mu\text{m}$ peak-to-peak.

2.2.5 Tape thickness

The thickness including all coatings of the tape shall be $7,0^{+0,3}_{-0,5} \text{ }\mu\text{m}$.

2.2.6 Transmissivity

Transmissivity of magnetic tape shall be less than 5 %, measured using a light source over the range of wavelengths 800 nm to 1 000 nm.

Transmissivity of the leader/trailer tape through the light path in a cassette shall be at least 65 % when measured with a light source of 800 nm to 1 000 nm wavelength.

3 Helical recordings

3.1 Tape speed

The tape speed is 18,831/1,001 mm/s (525-60 system) or 18,831 mm/s (625-50 system).

The tape speed tolerance is $\pm 0,5 \text{ }\%$.

3.2 Record location and dimensions

Record location and dimensions for continuous recording shall be as specified in Figure 23 and Table 3. Helical tracks shall be recorded within the tolerance specified in Table 3. Tape pattern shall be as specified by the centre line of each track. There are two longitudinal tracks which are optional and reserved. The ITI sector location shall be as specified in Figure 24 and Table 4. For recording successive tracks, the lag between each pair of successive tracks at the beginning of the SSA shall be as specified in Figure 25.

3.2.1 Reference edge

The reference edge of the tape for dimensions specified in this standard shall be the lower edge as shown in Figure 23. The magnetic coating, with the direction of tape travel as shown in Figure 23, is on the side facing the observer.

3.2.2 Effective area

The effective area lower edge (He) is specified by the intersection of the beginning line of the ITI pre-amble and the centre line of the track.

The effective area upper edge (Ho) is specified by the intersection of the ending line of the track data and the centre line of the track.

The effective area width (We) is derived from He and Ho .

3.2.3 Record and playback guaranteed heights

Every recorder or player shall guarantee to record or play back the track data between $0,535 \text{ mm}$ ($= He - 0,025 \text{ mm}$) from the reference edge and $5,798 \text{ mm}$ ($= Ho - 0,047 \text{ mm} + 0,045 \text{ mm}$) from the reference edge.

3.2.4 Track pitch

As indicated in Figure 23, there shall be no guard band between recorded tracks in this standard. The track pitch shall be $10,00 \text{ }\mu\text{m}$ for SP mode and the different track pitches from $10 \text{ }\mu\text{m}$ are reserved. The track pitches for the 525-60 system, 625-50 system, 1125-60 system and 1250-50 system shall be the same.

3.2.5 Helical track

The azimuth of the head gaps used for the helical track recording shall be inclined at angles α_0 and α_1 and specified in Table 3 to the perpendicular to the helical track recording. The azimuth of the first track of every frame shall be oriented in the clockwise direction with respect to the line perpendicular to the track direction when viewed from the magnetic coating side.

4 System data

4.1 Introduction

In addition to video and audio data, there is a third group of digital data called system data. The system data consists of basic system data including application ID and other system data prescribed by its application ID.

4.2 Application ID

Application ID defines the data structure.

The application ID identifies the particular application which the tape is intended for. In order to change the application, changing SSA and modulation is not necessary. There are several application IDs on a track. Each application ID consists of three bits.

There are seven categories available for each application ID except for 111b which is indicative of no information.

4.3 System data for tape

Since application using a helical scanning machine needs to rewrite data in a specific area, a sector for making each rewrite timing is always prepared. In this standard, the ITI sector has the role of the sector and has information on the entire track. There is a main application ID called APT in the ITI sector.

4.3.1 Basic system data

The basic system data for tape are stored in TIA of ITI as described in 6.4. It includes the information of a track, such as track pitch information (TP_1 , TP_0), track servo information (PF) and track data structure information (APT).

4.3.2 Application ID on tape

For some applications, a track may have several areas, such as ITI, video, etc. The area is numbered from the entrance side of a track and in order. Therefore ITI is area 0.

APT defines the data structure of a track.

APT defines the number of areas in a track, their positions and sync block structure (sync block length, sync patterns, ID part, data part and parity byte). Figure 26 shows some examples of division of a track. For APT = 000, four areas exist in a track and their positions and sync block structure are pre-determined. Details are described in IEC 61834-2. Additionally, each area has its own application ID as shown in Figure 27.

APi defines the data structure of area number i (where $i = 1, 2, 3, \dots, n$).

There are two levels of application IDs on tape. More than two levels of the layer are permitted, if needed.

Since APT is the most important system data, each application shall prepare an area at the exit side of a track which is called APT saving area. The APT saving area has a special sync pattern (see 5.2.1) for distinguishing the area from other areas. APT shall be stored in the third byte of the last data-sync block of the APT saving area.

Three bits of APT shall be set in the byte as below.

MSB							LSB
UV	APT ₂	APT ₁	APT ₀	UV	UV	UV	UV

where UV is an undefined value, but may be determined by the application ID of the APT saving area. For APT = 000, subcode sector has the role of APT saving area.

4.3.3 Area

Basically, each area on tape consists of a preamble, data sync blocks and a postamble. Each area is called sector, such as ITI sector, video sector, etc.

4.4 System data for MIC

4.4.1 Basic system data

The basic system data for MIC are stored in address 0 and address 1. They include the information of a cassette (BCID), cassette-use information (address 1) and MIC data structure information (APM). Details are described in clause 10 in IEC 61834-2.

Address 0 includes APM and BCID. APM occupies the most significant three bits as shown in Figure 28. The BCID data is the same as the ID board recognition data which represents the tape thickness, tape type and tape grade. The bit assignment of BCID is shown in Figure 28. The data of address 1 indicates the type of application.

Address 1 = 00h means that the cassette is suitable for use with the VCR.

Address 1 ≠ 00h means that the cassette is not suitable for use with the VCR.

4.4.2 Application ID on MIC

APM defines the data structure of an MIC.

APM defines the memory space of an MIC and data structure on and after address 2. For APM = 000, two spaces exist in an MIC as shown in Figure 29. MIC adopts a bank structure. Every bank has 64 K bytes space with up to 256 banks. Therefore, the maximum size of the memory space is 128 Mbits.

The basic system data are stored in address 0 and address 1 of bank 0.

The layer of application ID on MIC is reserved.

4.4.3 Space

Bank 0 is in the area named space 0. The other banks are in the area named space 1.

Space 0 shall be realized by EEPROM, FeRAM or equivalent. Space 1 should be realized by a memory which is suitable for a large quantity of data such as flash memory.

5 Modulation

5.1 Introduction

In this standard the modulation adopts a randomization distribution and a 24-25 modulation.

Bit streams of data except sync patterns shall be randomized. Randomized distribution is equivalent to the performance of the exclusive OR operation between the serial data stream and serial stream generated by the polynomial function below,

$$X^7 + X^3 + 1$$

where X^i are place-keeping variables in GF(2), the binary field.

The first term is the most significant and the first to enter the division computation.

The randomization limits the run length of a same binary value. The 24-25 modulation is defined as insertion of an extra bit to the 24-bits data and interleaved NRZ1 modulation. Pilot signals and notches for tracking are generated consecutively by the 24-25 modulation.

Each sector adopts a sync block structure. The sync block structure consists of a sync pattern, an ID part and a data part. The data in a sync block are expressed in bytes using the Reed Solomon code and are numbered from 0 to the end of the sync block as the byte position number. Though the byte position numbers 0 and 1 are used for the sync patterns, all sync patterns are already defined as the 17-bits-modulated patterns under the rule of interleaved NRZ1 coding.

The modulation method of this standard except for area 0 is applied in every three bytes from the byte position number 0 to the end. For area 0, the modulation method is different from the above; however, the same pilot signals are generated.

5.2 Byte position number 0, 1, 2

5.2.1 Sync patterns

There are several sync patterns on tape to generate the pilot signals.

Sync patterns for area 0

There are three sync patterns such as sync pattern A, sync pattern B and sync pattern C to generate the pilot signals. The details of the sync patterns are defined in clause.

Sync patterns for APT saving area

There is an area which includes APT, similar to the ITI sector. The area is called APT saving area.

Two types of sync patterns are defined for APT saving area:

	MSB														LSB	
Sync pattern D:	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	1
Sync pattern E:	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0

A sync pattern to be recorded shall be chosen from the two above, according to the restrictions described in 5.3.

Sync patterns for other areas

For other areas except area 0 and the APT saving area, two types of sync patterns are defined:

	MSB														LSB	
Sync pattern F:	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	1
Sync pattern G:	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0

A sync pattern to be recorded shall be chosen from the two above, according to the restrictions described in 5.3.

5.2.2 Randomization and modulation

The data of the byte position number 2 are performed by the exclusive OR operation on the randomization pattern for the byte position number 2. Then the randomized data are modulated under the rule of interleaved NRZ1 coding based on the sync patterns. Total 25-bits data are referred to as a codeword.

Randomization patterns are described in each sector.

5.3 Byte position number 3k, 3k + 1, 3k + 2 (where k > 1)

5.3.1 Randomization

The data of the byte position number 3k, 3k + 1, 3k + 2 are performed by the exclusive OR operation on the randomization pattern for the same byte position number.

5.3.2 Modulation

Bit streams of randomized data shall be modulated by 24-25 modulation. An extra bit is inserted to the beginning of the three consecutive randomized bytes. Then the interleaved NRZ1 modulation is processed for the extra bit and three consecutive randomized bytes as shown in Figure 30. Total 25-bits data are referred to as a codeword. The extra bit shall be chosen to satisfy two restrictions in a modulated sequence, as shown below.

Priority 1

Both run lengths of “0” and “1” shall be less than 10. If the maximum run lengths are greater than nine for the extra bit = 0 and the extra bit = 1, the value of the extra bit shall be chosen to make the maximum run length shorter.

Priority 2

If priority 1 is satisfied in a modulated sequence, the value of the extra bit shall be chosen to make the frequency characteristics of the modulated sequence closer to the characteristics shown in Figure 31.

There are three sync patterns for ITI-sync:

	MSB								LSB	
Sync pattern A:	1	0	0	0	1	1	0	1	1	1
Sync pattern B:	0	0	1	0	0	1	1	1	0	1
Sync pattern C:	0	1	1	1	0	0	1	0	0	0

One sync pattern is selected from the three to generate a pilot signal.

FID consists of data of eight bits and a dummy of two bits. The data of eight bits includes 0, 0, SB₅, SB₅, SB₄, SB₄, SB₃, SB₃ or 1, 1, SB₅, SB₅, SB₄, SB₄, SB₃, SB₃ before modulation, where SB₅, SB₄, SB₃ are the most significant three bits of the start-sync block number. A bit stream to be recorded is made to modulate the above data of eight bits using interleaved NRZ1 modulation. The initial value of the interleaved NRZ1 modulator has two patterns; 01b and 10b which are held on the two registers. The dummy of two bits has three patterns, 00b, 01b and 11b on tape, and is selected as Table 8, Table 9 and Table 10 to generate pilot signals.

SID consists of data of eight bits and a dummy of two bits. The data of eight bits includes 0, 0, SB₂, SB₂, SB₁, SB₁, SB₀, SB₀ or 1, 1, SB₂, SB₂, SB₁, SB₁, SB₀, SB₀ before modulation, where SB₂, SB₁, SB₀ are the least significant three bits of the start-sync block number. A bit stream to be recorded is made by the same method as FID. The dummy of two bits is also the same as FID.

6.4 TIA (track information area)

TIA consists of three track information-sync blocks (TI-sync blocks) and each sync block consists of 30 bits. The bit stream specified in Table 11, Table 12 and Table 13 shall be recorded as TIA.

TI-sync block

Every TI-sync block has the same track information. The TI-sync block consists of an ITI-sync, first track information (FTI) and second track information (STI) as shown in Figure 34. The ITI-sync is the same as the start-sync block.

FTI consists of data of eight bits and a dummy of two bits. The data of eight bits includes 0, 0, APT₂, APT₂, APT₁, APT₁, APT₀, APT₀ or 1, 1, APT₂, APT₂, APT₁, APT₁, APT₀, APT₀ before modulation, where APT₂, APT₁, APT₀ are the three bits of APT as shown in Table 14. A bit stream to be recorded is made in the same manner as FID. The dummy of two bits is the same as FID.

STI consists of data of eight bits and a dummy of two bits. The data of eight bits includes 0, 0, TP₁, TP₁, TP₀, TP₀, PF, PF or 1, 1, TP₁, TP₁, TP₀, TP₀, PF, PF before modulation which are defined as follows.

TP₁ = 1 TP₀ = 1: Track pitch 0 for SP mode

TP₁ = 1 TP₀ = 0: Track pitch 1

TP₁ = 0 TP₀ = 1: Track pitch 2

TP₁ = 0 TP₀ = 0: Track pitch 3

Track pitch 0 for SP mode shall be 10 µm. Other track pitches shall be other than 10 µm and these values are reserved.

PF = 0: pilot frame 0 (record track F0 first and then record track F1 in a video frame)

PF = 1: pilot frame 1 (record track F0 first and then record track F2 in a video frame)

The details of PF are described in 3.1 of IEC 61834-2. A bit stream to be recorded is made in the same manner as FID. The dummy of two bits is the same as FID.

6.5 ITI postamble

The bit stream specified in Table 15, Table 16 and Table 17 shall be recorded as ITI postamble. Each bit stream for track F1 and track F2 generates a pilot signal.