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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Information processing — Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation recording at 13 262 ftprad, on 80 tracks on each side —

Part 2:
Track format A for 77 tracks

Reference number
ISO 8630-2 : 1987 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8630-2 was prepared by Technical Committee ISO/TC 97, *Information processing systems.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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0 Introduction

ISO 8630 specifies the characteristics of 130 mm (5.25 in) flexible disk cartridges recorded at 13 262 ftprad, using modified frequency modulation (MFM) recording, on 80 tracks on each side.

ISO 8630-1 specifies the dimensional, physical and magnetic characteristics of the cartridge, so as to provide physical interchangeability between data processing systems.

ISO 8630-3 specifies an alternative track format for data interchange.

ISO 8630-1 and ISO 8630-2, together with the labelling scheme specified in ISO 7665, provide for full data interchange between data processing systems.

1 Scope and field of application

This part of ISO 8630 specifies the quality of recorded signals, the track layout, and a track format to be used on 130 mm (5.25 in), 13 262 ftprad flexible disk cartridges intended for data interchange between data processing systems.

NOTE — Numeric values in the SI and/or Imperial measurement system in this part of ISO 8630 may have been rounded off and therefore are consistent with, but not exactly equal to, each other. Either system may be used, but the two should be neither intermixed nor re-converted. The original design was made using Imperial units and further developments were made using SI units.

2 Conformance

A flexible disk cartridge shall be in conformance with ISO 8630 when it meets all the requirements of parts 1 and 2 of ISO 8630 and when it implements one of the three sector sizes specified in 4.11.

Data interchange is possible only when the interchange parties implement the same sector size.

NOTE — ISO 7665 specifies a field in the volume label in which the implemented sector size is identified.

3 References

ISO 646, *Information processing — ISO 7-bit coded character set for information interchange.*

ISO 2022, *Information processing — ISO 7-bit and 8-bit coded character sets — Code extension techniques.*

ISO 4873, *Information processing — ISO 8-bit code for information interchange — Structure and rules for implementation.*

ISO 6429, *Information processing — ISO 7-bit and 8-bit character sets — Additional control functions for character-imaging devices.*

ISO 7065-2, *Information processing — Data interchange on* 200 mm (8 in) *flexible disk cartridges using modified frequency modulation recording at* 13 262 ftprad, 1,9 tpmm (48 tpi), *on both sides — Part 2: Track format.*

ISO 7665, *Information processing — File structure and labelling of flexible disk cartridges for information interchange.*

4 General requirements

4.1 Mode of recording

4.1.1 Track 00, side 0

The mode of recording shall be two-frequency where the start of every bit cell is a clock flux transition. A ONE is represented by a data flux transition between two clock flux transitions.

Exceptions to this are defined in 4.12.

4.1.2 All tracks excluding track 00, side 0

The mode of recording shall be Modified Frequency Modulation (MFM) for which the conditions are

a) a flux transition shall be written at the centre of each bit cell containing a ONE;

b) a flux transition shall be written at each cell boundary between consecutive bit cells containing ZEROs.

Exceptions to this are defined in 4.12.

4.2 Track location tolerance of the recorded flexible disk cartridge

The centrelines of the recorded tracks shall be within ± 0,042 5 mm (± 0.001 67 in) of the nominal positions, over the range of operating environment specified in ISO 8630-1.

4.3 Recording offset angle

At the instant of writing or reading a magnetic transition, the transition shall have an angle of 0° ± 18′ with the radius.

NOTE — As tracks may be written and overwritten at extremes of the tolerances given in 4.2 and 4.3, a band of old information may be left at one edge of the newly written data and would constitute unwanted noise when reading. It is therefore necessary to trim the edges of the tracks by erasure after writing.

4.4 Density of recording

4.4.1 The nominal density of recording shall be 13 262 ftprad*. The resulting nominal bit cell length for track 00, side 0 is 151 µrad, and for all the other tracks it is 75,5 µrad.

4.4.2 The long-term average bit cell length shall be the average bit cell length measured over a sector. It shall be within ± 2,0 % of the nominal bit cell length.

4.4.3 The short-term average bit cell length, referred to a particular bit cell, shall be the average of the lengths of the preceding eight bit cells. It shall be within ± 8 % of the long-term average bit cell length.

4.5 Flux transition spacing

The instantaneous spacing between flux transitions may be influenced by the reading and writing process, the bit sequence recorded (pulse crowding effects) and other factors.

The locations of the transitions are defined as the locations of the peaks in the signal when reading. Tests should be carried out using a peak-sensing read amplifier (see annexes B and C).

4.5.1 Flux transition spacing for track 00, side 0 (see figure 1)

4.5.1.1 The spacing between two clock flux transitions surrounding a data flux transition or between two data flux transitions surrounding a clock flux transition shall be between 90 % and 140 % of the nominal bit cell length.

4.5.1.2 The spacing between two clock flux transitions not surrounding a data flux transition or between two data flux transitions surrounding a missing clock flux transition shall be between 60 % and 110 % of the nominal bit cell length.

4.5.1.3 The spacing between a data flux transition and the preceding clock flux transition (when not missing) or between a clock flux transition and the preceding data flux transition (when not missing) shall be between 45 % and 70 % of the nominal bit cell length.

4.5.2 Flux transition spacing for all tracks excluding track 00, side 0 (see figure 2)

4.5.2.1 The spacing between the flux transitions in a sequence of ONEs shall be between 80 % and 120 % of the short-term average bit cell length.

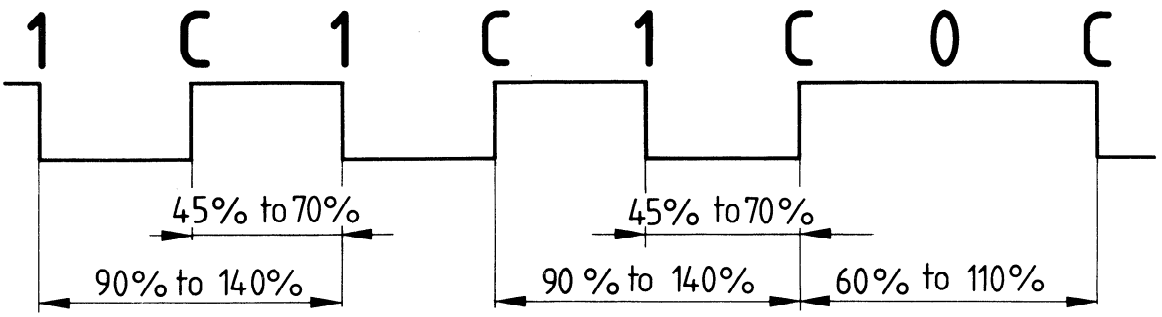

Figure 1

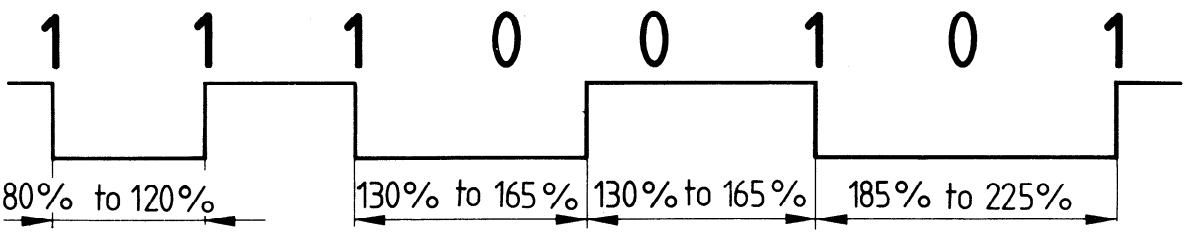

Figure 2

* Flux transitions per radian

4.5.2.2 The spacing between the flux transition for a ONE and that between two ZEROs preceding or following it shall be between 130 % and 165 % of the short-term average bit cell length.

4.5.2.3 The spacing between the two ONE flux transitions surrounding a ZERO bit cell shall lie between 185 % and 225 % of the short-term average bit cell length.

4.6 Average Signal Amplitude

For each side the Average Signal Amplitude on any non-defective track (see ISO 8630-1) of the interchanged flexible disk cartridge shall be less than 160 % of SRA_{1f} and more than 40 % of SRA_{2f}.

4.7 Byte

A byte is a group of eight bit-positions, identified B1 to B8, with B8 most significant and recorded first.

The bit in each position is a ZERO or a ONE.

4.8 Sector

Track 00, side 0 and side 1 is divided into 26 sectors. All other tracks of the flexible disk cartridge shall have the same number of sectors, which can be 8, 15 or 26.

4.9 Cylinder

A pair of tracks, one on each side of the disk, having the same track number.

4.10 Cylinder Number

The Cylinder Number shall be a two-digit number identical with the track number of the tracks of the cylinder.

4.11 Data capacity of a track

The data capacity of track 00, side 0 shall be 3 328 bytes.

The data capacity of track 00, side 1 shall be 6 656 bytes.

The data capacity of all other tracks shall be as shown in table 1.

Table 1

Number of sectors	Number of data bytes in the sector	Data capacity of a track
26	256	6 656 bytes
15	512	7 680 bytes
8	1 024	8 192 bytes

4.12 Hexadecimal notation

Hexadecimal notation is used hereafter to denote the following bytes:

(00) for (B8 to B1) = 00000000
(01) for (B8 to B1) = 00000001
(02) for (B8 to B1) = 00000010
(03) for (B8 to B1) = 00000011
(FF) for (B8 to B1) = 11111111
(FC)* for (B8 to B1) = 11111100
where the clock transitions of B6 and B4 are missing
(FE)* for (B8 to B1) = 11111110
where the clock transitions of B6, B5 and B4 are missing
(FB)* for (B8 to B1) = 11111011
where the clock transitions of B6, B5 and B4 are missing
(F8)* for (B8 to B1) = 11111000
where the clock transitions of B6, B5 and B4 are missing
(4E) for (B8 to B1) = 01001110
(FC) for (B8 to B1) = 11111100
(FE) for (B8 to B1) = 11111110
(FB) for (B8 to B1) = 11111011
(F8) for (B8 to B1) = 11111000
(A1)* for (B8 to B1) = 10100001
where the boundary transition between B3 and B4 is missing
(C2)* for (B8 to B1) = 11000010
where the boundary transition between B4 and B5 is missing

4.13 Error Detection Characters (EDC)

The two EDC-bytes are hardware generated by shifting serially the relevant bits, specified later for each part of the track, through a 16-bit shift register described by the generator polynomial:

$$X^{16} + X^{12} + X^5 + 1$$

(See also annex A.)

5 Track layout after the first formatting for track 00, side 0

After the first formatting there shall be 26 usable sectors on the track. The layout of the track shall be as shown in figure 3.

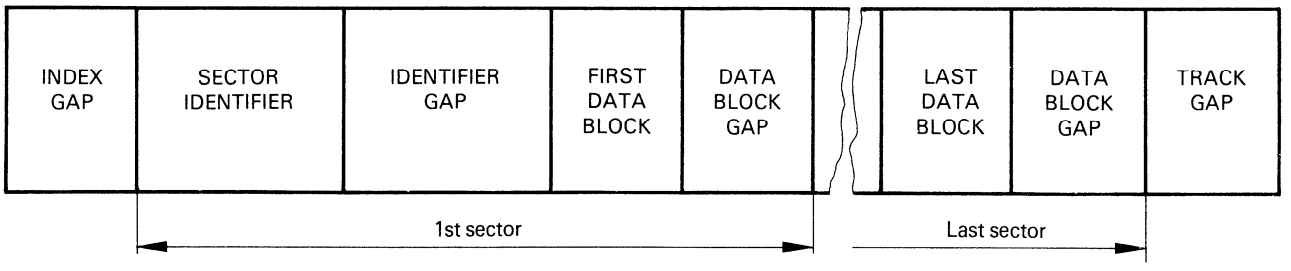

Figure 3

5.1 Index Gap

This field shall comprise 73 bytes nominally.

The content is not specified except that it shall not contain any (FE)*-bytes.

Writing the Index Gap is started when the index hole is detected. Any of the first 20 bytes may become ill-defined due to subsequent overwriting.

5.2 Sector Identifier

This field shall be as given in table 2.

Table 2

Identifier Mark		Address Identifier				
		Track Address		S		EDC
6 bytes (00)	1 byte (FE)*	C 1 byte (00)	Side 1 byte (00)	1 byte	1 byte (00)	2 bytes

5.2.1 Identifier Mark

This field shall comprise 7 bytes:

6 (00)-bytes

1 (FE)*-byte

5.2.2 Address Identifier

This field shall comprise 6 bytes.

5.2.2.1 Track Address

This field shall comprise 2 bytes:

a) Cylinder Address (C)

This field shall specify in binary notation the Cylinder Address. It shall be (00) for all sectors.

b) Side Number (Side)

This field shall specify the side of the disk. It shall be (00) for all sectors.

5.2.2.2 Sector Number (S)

The 3rd byte shall specify in binary notation the Sector Number from 01 for the first sector to 26 for the last sector.

The 26 sectors shall be recorded in the natural order:

1, 2, 3, . . ., 25, 26

5.2.2.3 4th byte of the Sector Address

The 4th byte shall be always a (00)-byte.

5.2.2.4 EDC

These two bytes shall be generated as defined in 4.13 using the bytes of the Sector Identifier starting with the (FE)*-byte (see 5.2.1) of the Identifier Mark and ending with the 4th byte (see 5.2.2.3) of the Sector Address.

5.3 Identifier Gap

This field shall comprise 11 initially recorded (FF)-bytes.

5.4 Data Block

The layout of this field shall be as given in table 3.

Table 3

Data Block			
Data Mark		Data Field	EDC
6 bytes (00)	1 byte (FB)*	128 bytes	2 bytes

5.4.1 Data Mark

This field shall comprise 7 bytes:

6 (00)-bytes

1 (FB)*-byte

5.4.2 Data Field

This field shall comprise 128 bytes. No requirements are implied beyond the correct EDC for the content of this field (see also 7.4.2.4.2).

5.4.3 EDC

These two bytes shall be generated as defined in 4.13 using the bytes of the Data Block starting with the 7th byte of the Data Mark (see 5.4.1) and ending with the last byte of the Data Field (see 5.4.2).

5.5 Data Block Gap

This field shall comprise 27 initially recorded (FF)-bytes. It is recorded after each Data Block and it precedes the following Sector Identifier. After the last data block it precedes the Track Gap.

5.6 Track Gap

This field shall follow the Data Block Gap of the 26th sector. At nominal density it should comprise 247 (FF)-bytes. Writing of the Track Gap takes place until the index hole is detected, unless it has been detected during writing of the last Data Block Gap, in which case there shall be no Track Gap.

6 Track layout after the first formatting for all tracks other than track 00, side 0

After the first formatting there shall be a number of sectors with the number determined by the sector length byte (see 6.2.2.3) of the Sector Address. The layout of each track shall be as shown in figure 4.

NOTE — Track 00, side 1 is always recorded with 26 sectors (see 4.8).

6.1 Index Gap

This field shall comprise 146 bytes nominally.

The content is not specified except that it shall not contain an (A1)*-byte.

Writing the Index Gap is started when the index hole is detected. Any of the first 40 bytes may become ill-defined due to subsequent overwriting.

6.2 Sector Identifier

This field shall be as given in table 4.

6.2.1 Identifier Mark

This field shall comprise 16 bytes:

12 (00)-bytes

3 (A1)*-bytes

1 (FE)-byte

6.2.2 Address Identifier

This field shall comprise 6 bytes.

6.2.2.1 Track Address

This field shall comprise 2 bytes:

a) Cylinder Address (C)

This field shall specify in binary notation the Cylinder Address from 00 for the outermost cylinder to 74 for the innermost cylinder.

b) Side Number (Side)

This field shall specify the side of the disk. On side 0 it shall be (00) on all tracks. On side 1 it shall be (01) on all tracks.

6.2.2.2 Sector Number (S)

The 3rd byte shall specify in binary notation the Sector Number from 01 for the first sector to the number of the last sector (8, 15 or 26).

The sectors shall be recorded in the natural order:

1, 2, 3, . . .,

up to the last sector.

6.2.2.3 Sector Length (SL)

This field shall have one of the three values (see table 5) which defines the number of bytes of the data field and consequently

Table 4

Identifier Mark			Address Identifier				
			Track Address		S	SL	EDC
12 bytes (00)	3 bytes (A1)*	1 byte (FE)	C 1 byte	Side 1 byte (00) or (01)	1 byte	1 byte	2 bytes

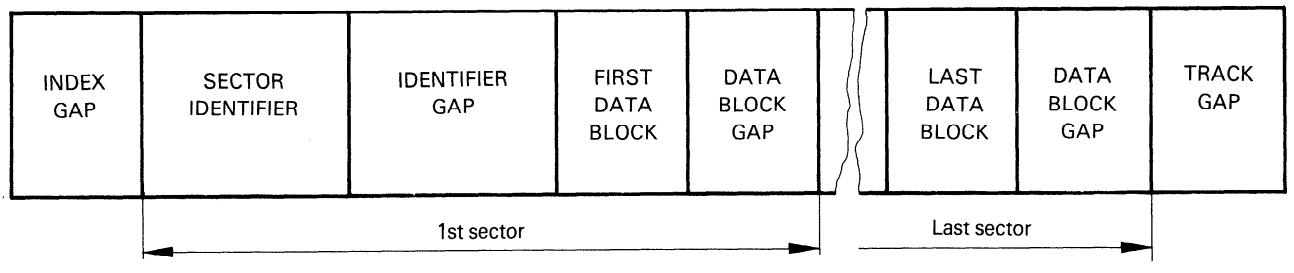

Figure 4