International Standard 7065/2

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

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

Traitement de l'information — Échange de données sur cartouches à disquette de 200 mm (8 in) *utilisant un enregistrement à modulation de fréquence modifiée à* 13 262 ftprad, 1,9 tpmm (48 tpi), *sur deux faces — Partie 2: Schéma de piste*

First edition — 1985-03-15

UDC 681.327.63 **Ref. No. ISO 7065/2-1985 (E)**

Descriptors : data processing, information interchange, data recording devices, magnetic disks, flexible disks, track formats, specifications.

Price based on 12 pages

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 7065/2 was prepared by Technical Committee ISO/TC 97, *Information processing systems*.

Printed in Switzerland

Contents

This page intentionally left blank

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

0 Introduction

ISO 7065 specifies the characteristics of 200 mm (8 in) flexible disk cartridges recorded at 13 262 ftprad, 1,9 tpmm (48 tpi), on both sides using modified frequency modulation (MFM) recording.

ISO 7065/1 specifies the dimensional, physical, and magnetic characteristics of the cartridge, so as to provide physical interchangeability between data processing systems.

Together with the labelling scheme specified in ISO 7665, ISO 7065/1 and ISO 7065/2 provide for full data interchange between data processing systems.

1 Scope and field of application

This part of ISO 7065 specifies the magnetic characteristics, the track layout, and a track format to be used on a 200 mm (8 in) flexible disk cartridge, recorded at 13 262 ftprad on both sides using modified frequency modulation recording at a track density of 1,9 tracks per millimetre (tpmm) [48 tracks per inch (tpi)] which is intended for data interchange between data processing systems.

NOTE — Numeric values in the SI and/or Imperial measurement system in this International Standard may have been rounded off and are therefore consistent with, but not exactly equal to, each other. Either system may be used, but the two should be neither intermixed nor reconverted. The original design of this part of ISO 7065 was made using the Imperial measurement system.

2 Conformance

A flexible disk cartridge shall be in conformance with ISO 7065 when it meets all the requirements of parts 1 and 2 of ISO 7065 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 VOL 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 7065/1, *Information processing — Data interchange on 200 mm (8 in) flexible disk cartridge using modified frequency modulation recording at* 13 262 ftprad, 1,9 tpmm (48 tpi), *on both sides — Part 1: Dimensional, physical and magnetic characteristics.*

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 ZERO's.

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 ± 0,085 mm (± 0.003 3 in) of the nominal positions over the range of operating environment specified in ISO 7065/1. This tolerance corresponds to twice the standard deviation.

4.3 Recording offset angle

At the instant of writing or reading a magnetic transition, the transition may have an angle of 0° ± 18′ with the radius. This tolerance corresponds to twice the standard deviation.

4.4 Density of recording

4.4.1 The nominal density of recording shall be 13 262 ftprad. The 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 ± 3 % of the nominal bit cell length.

NOTE — It is recognized that at extremes of supply frequency encountered on computer sites, the deviation may be ± 5 % in exceptional circumstances. Successful data interchange may then still be possible provided that formatting of the cartridge and subsequent writing of data are not carried out at the opposite limits of this range.

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 annex B).

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 on ONE's shall be between 80 % and 120 % of the short-term average bit cell length.

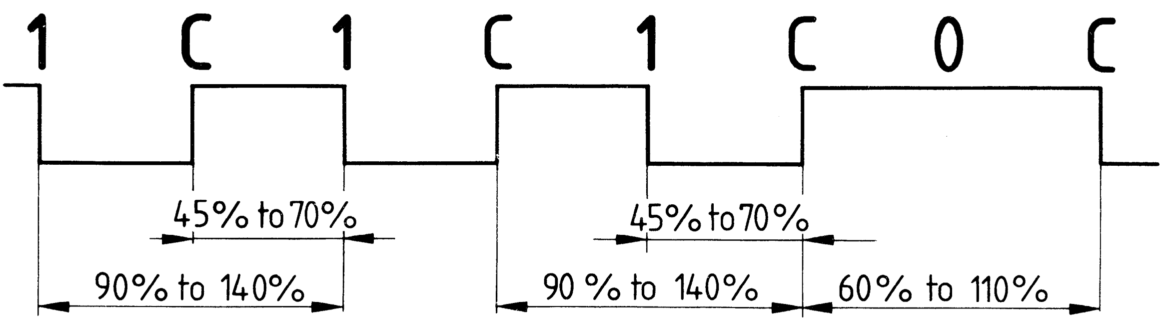

Figure 1

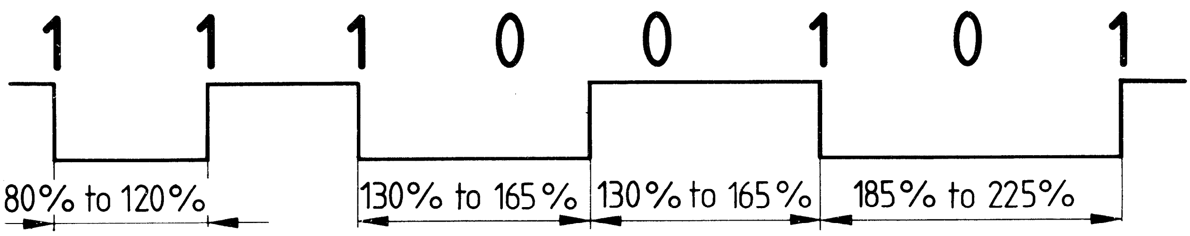

Figure 2

4.5.2.2 The spacing between the flux transition for a ONE and that between two ZERO's 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

The average signal amplitude on any non-defective track 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 the 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 shall be 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 track 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 shall be used 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 for 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 polynominal:

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

(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.

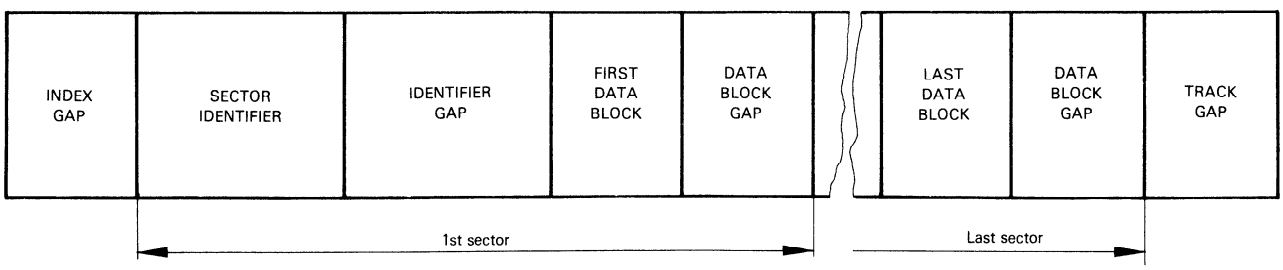

Figure 3

5.1 Index gap

This field shall comprise 73 bytes nominally

40 (FF)-bytes
6 (00)-bytes
1 (FC)*-bytes
26 (FF)-bytes

Writing the index gap is started when the index hole is detected. Any of the first 20 bytes may be 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				
6 bytes (00)	1 byte (FE)*	C 1 byte (00)	Side 1 byte (00)	S 1 byte	1 byte (00)	EDC 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 1st 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 always be 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

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

5.4 Data block

This field shall be as given in table 3.

Table 3

Data mark		Data field	EDC
6 bytes (00)	1 byte (FB)*	128 bytes	2 bytes

5.4.1 Data mark

This field shall comprise

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 shall 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 excluding 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

80 (4E)-bytes
12 (00)-bytes
3 (C2)*-bytes
1 (FC)-byte
50 (4E)-bytes

Writing the index gap is started when the index hole is detected. Any of the first 40 bytes may be 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 1st 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.

Table 4

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

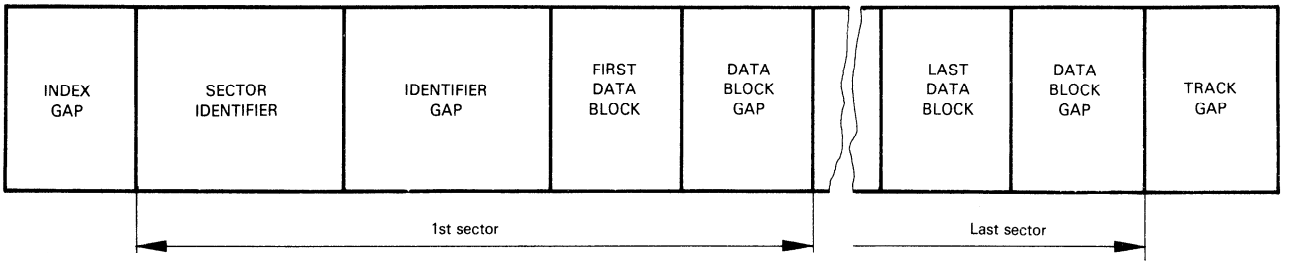

Figure 4