



Interchange Using Magnetic Media

Pay.UK Standard October 2018

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Copies of this standard are available **exclusively** from:

Industry Standards
Pay.UK Limited
2 Thomas More Square
London E1W 1YN

Telephone: +44 (0)20 3217 8319
E-mail: standards@wearepay.uk

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Background

This standard has been developed to permit the orderly interchange of data by use of magnetically recorded media, as identified in the General Introduction to Part 1.

Scope

This standard specifies in three parts a wide range of technical facilities potentially available to interchange parties in terms of physical and magnetic requirements, file structure and labelling. The extent to which these facilities are used will depend upon the particular applications.

A standard is a facility not a service. Publication of a standard should not be taken to imply its actual availability. Where a service is provided for which a standard has been issued, it can normally be expected to conform to the standard.

Guide to Usage

This standard should be used in conjunction with Standard 29. It is structured to allow information, relevant to a particular application, to be extracted, as required.

Each page indicates whether the content is of general interest or specifically concerned with a particular medium (tape, cassette, cartridge or diskette).

1. Magnetic Media – Physical and Magnetic Requirements

1.1 Introduction

Part 1 of this standard specifies, in separate sections, requirements for the following types of magnetic media:-

12.70mm (0.5 in) magnetic tape (see Section 2)

3.81mm (0.15 in) magnetic tape cassette (see Section 3)

6.30mm (0.25 in) magnetic tape cartridge (see Section 4)

12.70mm (0.5 in) magnetic tape cartridge (see Section 4)

90mm (3.5 in) flexible disk cartridge (see Section 5)

130mm (5.25 in) flexible disk cartridge (see Section 5)

200mm (8 in) flexible disk cartridge (see Section 5)

This covers a wide range of media currently available for data interchange. Each implementation may, however, use all or a selection of these facilities.

1.2 Magnetic Tape - Physical and Magnetic Requirements

1.2.1 Introduction

This standard specifies the physical and magnetic requirements for 9 track 12.7 mm (0.5 in) magnetic tapes. The requirements conform to relevant standards issued by national and international authorities. These standards are as follows:-

ISO 1863: Information processing - 9-track, 12.7 mm (0.5 in) wide magnetic tape for information interchange recorded at 32 rpmm (800 rpi)

ISO 3788: Information processing - 9-track, 12.7 mm (0.5 in) wide magnetic tape for information interchange recorded at 63 rpmm (1600 rpi), phase encoded.

ISO 5652: Specification for 9 track magnetic tape for information interchange: format and recording, using group coding at 245 cpmm (6,250 cpi).

Reference should be made to the appropriate standard for a complete specification.

1.3 Type of Magnetic Tape and Spool

All tape must be splice free, but can be any length from a minimum 61 m (200 ft) up to the maximum that can be accommodated on a spool. "Half-inch" tape bearing Reflective Markers must be used. The spool must be free of damage, such as broken flanges.

1.4 Quality Assurance

It is not possible to ensure that magnetic tape manufactured in accordance with the relevant national

and international standards always remains in such a condition that it would meet the requirements of these standards. For this reason the recording party must ensure that tapes used for data interchange are of reliable quality and should have passed a test within six months prior to interchange against a diagnostic program covering the complete tape length.

Tape must be tested for the relevant track configuration at not less than the pulse packing density to be used and, for 32 rpm (800 rpi) tape at not more than 32 ftpmm, for 63 rpm (1,600 rpi) tape at not more than 126 ftpmm and for 246 rpm (6,250 cpi) at not more than 356 ftpmm.

1.5 Identification, Packaging and Transportation

Each spool must be packed in an undamaged, non-magnetic, dust-proof, self-sealing container in which it is positively supported on a resilient mounting at the hub. Labels/Documents for the purpose of identification and verification of contents are application variable and will be as agreed between interchange parties. For manual labelling it is recommended that the following information should accompany the tape/s.

- a) Date. (Must be identical to the contents of field 3 of the User Header Label.)
- b) Sequence Number and number of reels in the form 1 of 1, 1 of 8, 2 of 8 etc.
- c) Character Format used, e.g., Character Code, Parity, Track and Density.

ISO, Odd, 9 P.E.,	1,600 rpi
ISO, Odd, 9NRZI,	800 rpi
ISO, Odd, 9GCR,	6,250 cpi
- d) Number of records on tape.
- e) Name of sender.
- f) Name of recipient.
- g) Method of return e.g. PO, BR, Collection.
- h) Owner Identification. (Must be identical to the contents of field 6 of the Volume Header Label.)
- i) Volume Serial Number. (Must be identical to the number specified in field 3 of the Volume Header Label.)
- j) Name and address of the owner of the reel.

Prior to despatch the write-enable ring must be removed from the spool and any coupling or damaged portion of the tape removed. Care must be taken to ensure that the beginning of the tape marker is still within $4.6 \text{ m} \pm 0.3 \text{ m}$ ($15 \pm 1 \text{ ft}$) from the beginning of the tape after any coupling or damaged portion of the tape has been removed. The loose end of the tape must be secured by means of a vinyl strip or sponge rubber block to prevent any tendency to unwind.

Responsibility for ensuring that adequate precautions are taken against damage during shipment shall be with the sender. The magnetic tape in its container should be packed in a rigid heat transfer resistant box containing adequate shock absorbent material. The box should have a clean

interior with a lid construction that provides sufficient sealing to prevent the ingress of dirt and water and should be securely strapped so that its contents are held rigidly within it.

The box may contain one or more magnetic tapes and must be labelled with the name and address of both the sender and receiver.

1.6 Format and Recording

This standard refers solely to 9 track magnetic tape recorded as follows:

Recording Method	NRZI	PE	GCR
Physical Recording Density	32 rpmm (800 rpi)	63 rpmm (1,600 rpi)	356 ftpmm (9,042 ftpi)
Data Density	----	----	246 cpmm (6,250 cpi)

Note: Where a tape mark cannot be recorded in accordance with the binary pattern specified in ISO 1863, ISO 3788 and ISO 5652, in order to meet the requirements of Part 2 of this standard an 18 character block (exclusive of padding characters) must be recorded. Each character must be a Unit Separator (IS¹) coded representation 00011111.

Whenever such a block (also known as a software tape mark) is recorded by (i) a word-orientated computer, or (ii) a computer having a file structure requiring fixed length records and it becomes necessary to extend the block to a length appropriate to the computer, the block should be padded out (i) only to the next multiple of the word length of the computer, or (ii) to the fixed record length (or multiple thereof) of the computer (see Part 2, Section 2.3) by use of the United Kingdom 7-bit Data Code padding character (upwards arrow/circumflex) specified in BS 4730 (see Appendix 2).

1.7 Coded Characters

For interchange, data shall be recorded using a subset of the United Kingdom 7-bit Data Code specified in BS 4730 (see Appendix 2).

The bits of the code shall be recorded in tracks and environment positions as shown below.

Track Number	9	8	7	6	5	4	3	2	1
Environment position number (plus parity)	E4	E2	E8	E7	E6	P	E5	E1	E3
Bit number of the 7-bit set (plus parity)	b4	b2	0	b7	b6	P	b5	b1	b3

For tapes recorded using group coding at 6,250 cpi, the bit to track allocation shall be as follows:

Binary weight	2 ⁰	2 ¹	2 ²	2 ³	2 ⁴	2 ⁵	2 ⁶	-	-
Bit Destination	b ₁	b ₂	b ₃	b ₄	b ₅	b ₆	b ₇	-	P

Track	2	8	1	9	3	5	6	7	4
-------	---	---	---	---	---	---	---	---	---

Track 7 shall always be recorded with bit ZERO.

1.8 Magnetic Tape Cassette - Physical and Magnetic Requirements

1.8.1 Introduction

This standard specifies the physical and magnetic requirements for 3.81mm (0.150in) magnetic tape cassettes. The requirements conform to standards issued by national and international authorities. The relevant British Standard is as follows:

BS 5079: Specification for information interchange on 3.81mm (0.150in) magnetic tape cassette at 4 cpmm (100 cpi), phase encoded at 63 ftpmm (1,600 ftpi).

BS 5079 is identical with ISO 3407 published by the International Organisation for Standardisation (ISO).

Reference should be made to BS 5079 for a complete specification.

1.9 Type of Magnetic Tape and Cassette

The cassette must conform to BS 5079 and must be free from damage, such as a cracked casing. The cassette has its two sides distinguished and labelled "A" and "B" respectively, corresponding to tracks No.1 and No.2. Its dimensions shall be those given in BS 5079. The back surface is provided with one slot slightly off-centre. This slot makes it possible to distinguish between the sides A and B, both visually and mechanically.

The width of tape and leader must be 3.81 mm (0.150 in). All tape must be splice free and must be a minimum of 86 metres (282 ft) and a maximum of 90 metres (295 ft) in length.

1.10 Quality Assurance

It is not possible to ensure that magnetic tape manufactured in accordance with the appropriate national and international standards always remains in such a condition that it would meet the requirements of those standards. For this reason the user must ensure that magnetic tape cassettes are of reliable quality and have passed a test within six months prior to submission against a diagnostic program covering the complete tape length. Tape must be tested at 63 ftpmm.

1.11 Identification, Packaging and Transportation

Each cassette must be sealed in an undamaged, non-magnetic, dust proof container. If the container is not provided with the facility to lock the reels of tape in place during transport then an adhesive method must be employed to prevent any tendency to unwind.

Prior to despatch the write-enable device must be positioned/removed from the cassette so that there is no opportunity for the contents of the cassette to be overwritten.

The tape should be positioned at the beginning of track No. 1 prior to delivery such that only the leader tape is exposed to the air.

Labels/Documents for the purpose of identification and verification of content are application variable and will be as agreed between interchange parties. For manual labelling it is recommended that the following information should accompany the cassette/s.

- a) Date. (Must be identical to the contents of field 3 of the User Header Label.)
- b) Sequence number and number of reels in the form of 1 of 1, 1 of 8, 2 of 8 etc.
- c) Number of records on cassette.
- d) Name of sender.
- e) Name of recipient.
- f) Method of return e.g.. PO, BR, Collection.
- g) Owner Identification. (Must be identical to the contents of field 6 of the Volume Header Label).
- h) Volume Serial Number. (Must be identical to the number specified in field 3 of the Volume Header Label).

Responsibility is with the sender for ensuring that adequate precautions are taken against damage during shipment. The magnetic tape cassette in its container should be packed in a rigid heat transfer resistant box containing adequate shock absorbent material. The box should have a clean interior with a lid construction that provides a sufficient sealing to prevent the ingress of dirt and water and should be securely strapped so that its contents are held rigidly within it.

The box may contain one or more magnetic tape cassettes and must be labelled with the name and address of both the sender and receiver.

1.12 Format and Recording

There shall be two tracks. Track No.1 shall be reserved for data interchange use, according to the provisions of this standard.

The method of recording shall be phase encoding.

The density of recording shall be 31.5 bpmm nominal.

Track No.2 may also be used for data interchange according to this standard or it may be used for any other purpose, in which case:-

- (1) agreement is necessary between the sender and the recipient
- (2) the use shall be indicated on the adhesive label

Note: Where a tape mark cannot be recorded in accordance with the binary pattern specified in BS 5079, in order to meet the requirements of Part 2 File Structure an 18 character block (exclusive of padding characters) must be recorded. Each character must be a Unit Separator (IS₁) coded representation 00011111.

Whenever such a block (also known as a software tape mark) is recorded by (i) a word-orientated computer, or (ii) a computer having a file structure requiring fixed length records and it becomes

necessary to extend the block to a length appropriate to the computer, the block should be padded out (i) only to the next multiple of the word length of the computer, or (ii) to the fixed record length (or multiple thereof) of the computer (see Part 2, Section 2.3) by use of the United Kingdom 7-bit Data Code padding character (upwards arrow/circumflex) specified in BS 4730 (see Appendix 2). Padded blocks must not exceed 256 characters.

1.13 Coded Characters

For interchange, data shall be recorded using a subset of the United Kingdom 7-bit Data Code specified in BS 4730 (see Appendix 2)

Each 7-bit coded character is recorded in bit-positions 1 to 7 of a byte; bit-position 8 is recorded with value ZERO. The relationship is as shown below:

Bits of the 7-bit combination:	0	b7	b6	b5	64	b3	b2	b1
Bit-positions in the byte:	8	7	6	5	4	3	2	1

1.14 Magnetic Tape Cartridge - Physical and Magnetic Requirements

1.14.1 Introduction

This standard specifies the physical and magnetic requirements for 6.30mm (0.25in) and 12.70mm magnetic tape cartridges. The requirements conform to standards issued by national and international authorities. The relevant standards are:

ISO 4057: Information processing. Data interchange on 6.30mm (0.25 in) magnetic tape cartridge, 63 bpm (1,600 bpi) phase encoded.

DIS 8063: Information processing - Data interchange on 6.30mm (0.25 in) magnetic tape cartridge recorded at 252 ftpmm (6,400 ftpi).

Part 1 - Physical, magnetic and mechanical properties.

Part 2 - Track layout and method of recording for data interchange in start/stop mode.

ISO 8462: Information processing - Data interchange on 6.30mm (0.25 in) magnetic tape cartridge recorded at 394 ftpmm (10,000 ftpi).

Part 1 - Physical, magnetic and mechanical properties.

Part 2 - Streaming mode.

ISO 9661 Information processing - Data interchange on 12.7mm 18-track magnetic tape cartridges (with data density of 38,000 bytes per inch).

Reference should be made to these standards for a complete specification.

1.15 Type of Cartridge and Magnetic Tape

1.15.1 Type of Cartridge

The cartridge must conform to the appropriate national and international standards and must be free from damage. It shall be of coplanar design with the tape and hubs completely enclosed by

the casing, except for the belt capstan and head opening. The rear surface of the cartridge (i.e. the side opposite the exposed tape) and a portion of the top side of the cartridge may be used for labels. This allows the label to be read when in a stacked or inserted position.

1.15.2 Type of Magnetic Tape

	ISO 4057	ISO 8063/1	ISO 8462/1	ISO 9661
Width	6.30mm	6.30mm	6.30mm	12.70mm
Length (between the load point and early warning marker)	91.4m	137m	137m	not less than 165mm
Overall thickness of tape and coating	30.7 micro m	20 micro m	19 micro m	25.9-33.7 micro m
Maximum coating thickness	6.3 micro m	6.5 micro m	6.5 micro m	23.4 micro m (base material)
Test density	126ftpmm	126 or 252 ftpmm	252 or 394 ftpmm	-

1.16 Quality Assurance

It is not possible to ensure that magnetic tape cartridges manufactured in accordance with the appropriate national and international standards always remain in such a condition that they would meet the requirements of those standards. For this reason the user must ensure that magnetic tape cartridges are of reliable quality and have passed a test within six months prior to submission against a diagnostic program covering the complete tape length.

1.17 Identification, Packaging and Transportation

Each cartridge must be sealed in an undamaged, non-magnetic, dustproof container. If the container is not provided with the facility to lock the reels in place during transport then an alternative method must be employed to prevent any tendency to unwind.

Labels/Documents for the purpose of identification and verification of contents are application variable and will be as agreed between interchange parties. For manual labelling it is recommended that the following information should accompany the cartridge/s.

- a) Date. (Must be identical to the contents of field 3 of the User Header Label).
- b) Sequence number and number of reels in the form of 1 of 1, 1 of 8, 2 of 8 etc.
- c) Number of records on cartridge.
- d) Name of sender.
- e) Name of recipient.
- f) Method of return e.g.. PO, BR, Collection.

- g) Owner Identification. (Must be identical to the contents of field 6 of the Volume Header Label)
- h) Volume Serial Number. (Must be identical to the number specified in field 3 of the Volume Header Label)

Prior to despatch, the rotatable plug shall be positioned so that there is no opportunity for the contents of the cartridge to be overwritten.

Responsibility is with the sender for ensuring that adequate precautions are taken against damage during shipment. The magnetic tape cartridge in its container should be packed in a rigid heat resistant box containing adequate shock absorbent material. The box should have a clean interior with a lid construction that provides sufficient sealing to prevent the ingress of dirt and water and should be securely strapped so that its contents are held rigidly within it.

The box may contain one or more magnetic tape cartridges and must be labelled with the name and address of both the sender and receiver.

1.18 Format and Recording

	ISO 4057	ISO 8063/2	ISO8462/2	ISO 9661
No of Available Data Tracks	4	4	4 or 9	18
Recording Method	Phase encoding	IMFM	GCR	IFM
Physical Recording Density	63 bpmm nominal	252 ftpmm	394 ftpmm	Ftpmm All zeros 1944 All ones 972

Note: Where a tape mark cannot be recorded in accordance with the binary pattern specified in BS 6003, in order to meet the requirements of Part 2 File Structure, an 18 character block (exclusive of padding characters) must be recorded. Each character must be a Unit Separator (IS₁), coded representation 00011111.

Whenever such a block (also known as a software tape mark) is recorded by (i) a word-orientated computer, or (ii) a computer having a file structure requiring fixed length records and it becomes necessary to extend the block to a length appropriate to the computer, the block should be padded out (i) only to the next multiple of the word length of the computer, or (ii) to the fixed record length (or multiple thereof) of the computer (see Part 2, Section 2.3) by use of the United Kingdom 7-bit Data Code padding character (upwards arrow/circumflex) specified in BS 4730 (see Appendix 2). Padded blocks must not exceed 256 characters.

1.19 Coded Characters

For interchange, data shall be recorded using a subset of the United Kingdom 7-bit Data Code specified in BS 4730 (see Appendix 2).

Each 7-bit coded character is recorded in bit-positions 1 to 7 of a byte; bit-position 8 is recorded with value ZERO. The relationship shall be as follows:

Bits of the 7-bit combination:	0	b7	b6	b5	64	b3	b2	b1
Bit-positions in the byte:	8	7	6	5	4	3	2	1

1.20 Flexible Disk Cartridge (Diskette) - Physical and Magnetic Requirements

1.20.1 Introduction

This standard specifies the physical and magnetic requirements for 90mm (3.5 in) flexible micro disks, 130mm (5.25 in) and 200mm (8 in) flexible disk cartridges (diskettes). The requirements conform to relevant standards issued by national and international authorities. The relevant standards are as follows:

DIS 8860: Specification for data interchange on 90mm (3.5 in) flexible disk cartridges using modified frequency modulation recording at 7958 ftprad on both sides 5.3 tracks per mm (135tpi)

Part 1 - Dimensional, physical and magnetic characteristics.

Part 2 - Track format.

ISO 6596: Specification for 130mm (5.25 in) flexible disk cartridges for data interchange using two-frequency recording at 7,958 ftprad on one side.

Part 1 - Dimensional, physical and magnetic characteristics.

Part 2 - Track format.

ISO 7487: Specification for 130mm (5.25 in) flexible disk cartridges for data interchange using modified frequency modulation recording at 7,958 ftprad on two sides.

Part 1 - Dimensional, physical and magnetic characteristics.

Part 2 - Track format.

ECMA 70: Specification for data interchange on 130mm (5.25 in) flexible disk cartridges using modified frequency modulation recording at 7858 ftprad on 40 tracks on each side.

Section I - General description.

Section II - Mechanical and physical characteristics.

Section III - Magnetic characteristics of the unrecorded disk cartridge.

Section V - Track Format No.2.

ECMA 78: Specification for 130mm (5.25 in) flexible disk cartridges for data exchange using modified frequency modulation recording at 7958 ftprad on both sides, 3.8 tracks per mm.

Section I - General description.

Section II - Mechanical and physical characteristics.

Section III - Magnetic characteristics of the unrecorded disk cartridge.

Section V - Track Format No.2.

ECMA 99: Specification for 130mm (5.25 in) flexible disk cartridges for data interchange using modified frequency modulation recording at 13262 ftprad on both sides, 3.8 tracks per mm.

Section I - General description.

Section II - Mechanical and physical characteristics.

Section III - Magnetic characteristics of the unrecorded disk cartridge.

Section V - Track Format No.2.

ISO 5654: Specification for 200mm (8 in) flexible disk cartridges for data interchange using two-frequency recording at 13,262 ftprad on one side.

Part 1 - Dimensional, physical and magnetic characteristics.

Part 2 - Track format.

Part 2 - Track format.

Reference should be made to these standards for a complete specification.

Throughout this section whenever the word track has been used it should be recognised that for a double sided diskette the appropriate side identifier is used to distinguish between the identically numbered tracks on each side of the diskette.

1.21 Type of Diskette to be used

This standard covers the following types of 90mm (3.5 in), 130mm (5.25 in) and 200mm (8 in) diskette:

- 90mm (3.5 in), double-sided, double density (DIS 8860)
- 130mm (5.25 in), single-sided, single density (ISO 6596)
- 130mm (5.25 in), double-sided, double density (ISO 7487)
- 130mm (5.25 in), double-sided double density (ECMA 70 - Track Format No.2)
- 130mm, double sided, quad density (ECMA 78 - Track Format No.2)
- 130mm (5.25 in), double sided, high coercivity (ECMA 99 - Track Format No.2)
- 200mm (8 in), single-sided, single density (ISO 5654)
- 200mm (8 in), double-sided, double density (ISO 7065)

The diskette must conform to the appropriate national and international standards and must be free from damage.

1.22 Quality Assurance

It is not possible to ensure that diskettes manufactured in accordance with the appropriate national and international standards always remain in such a condition that they would meet the requirements of those standards. For this reason the user must ensure that diskettes are of reliable quality and have passed a test within six months prior to submission against a diagnostic program.

1.23 Identification, Packaging and Transportation

Each diskette must be sealed in an undamaged non-magnetic container.

Labels/Documents for the purpose of identification and verification of contents are application variable and will be as agreed between interchange parties. For manual labelling it is recommended that the following information should accompany the diskette/s.

-
- a) Date. (Must be identical to the contents of field 3 of the User Header Label.)
 - b) Sequence number and number of diskettes in the form of 1 of 1, 1 of 8, 2 of 8 etc.
 - c) Number of records on diskette.
 - d) Name of sender.
 - e) Name of recipient.
 - f) Method of return e.g.. PO, BR, Collection.
 - g) Owner Identification. (Must be identical to the contents of field 6 of the Volume Header Label.)
 - h) Volume Serial Number. (Must be identical to the number specified in field 3 of the Volume Header Label.)
 - i) Recording Medium. (Must include machine, operating system and recording density e.g. Computer XYZ, OS 123.)

A self-adhesive label is not required to appear on the diskette container.

Responsibility is with the sender for ensuring that adequate precautions are taken against damage during shipment. The diskette in its container should be packed in a rigid protective box containing adequate shock absorbent material. The box should have a clean interior with a lid construction that provides sufficient sealing to prevent the ingress of dirt and water and should be securely strapped so that its contents are held rigidly within it.

The box may contain one or more diskettes and must be labelled with the name and address of both the sender and receiver.

1.24 Format and Recording

1.24.1 Format - 90mm Diskette

Diskettes shall be soft sectored, the number of sectors per track and bytes per sector will be dependent on the initialisation of the diskette.

- 90mm diskettes conforming to DIS 8860 shall have two recorded surface defined as side 0 and side 1, with no more than 80 concentric tracks on each recorded surface.

The track number shall be a two-digit decimal number (from 00 to 79) for each side which identifies the tracks consecutively, starting at the outermost track (00).

The mode of recording for all tracks shall be modified frequency modulation recording at 7958 ftprad on both sides, 5.3 tracks per mm.

All tracks shall be divided into 9 sectors of 512 bytes. On each track the sectors shall be numbered 01 for the first sector to 09 for the last sector. The sectors shall be recorded in the natural order.

Each sector on a diskette shall be identified by a Logical Sector Number. There shall be a one-to-one correspondence between Physical Address and Logical Sector Number. The Logical Sector Numbers shall be assigned in an ascending sequence, beginning with 0,

starting at sector 1, track 00, side 0, continuing onto track 00, side 1 and then to track 01, side 0, and so forth.

1.24.2 *Format - 130mm Diskette*

Diskettes shall be soft sectored, the number of sectors per track and bytes per sector will be dependent on the initialisation of the diskette.

- 130mm diskettes conforming to ISO 6596 shall have one recorded surface, defined as side 0. There shall be 40 discrete concentric tracks in the recording area. The track number shall be a two digit decimal number (00 to 39) which identifies the tracks consecutively, starting at the outermost track (00).

The mode of recording for all tracks shall be two-frequency recording at 7958 ftprad.

Track 00 shall be divided into 16 sectors. All other tracks shall be divided into 9 sectors. The data capacity of track 00 shall be 2048 bytes. The data capacity of all other tracks shall be 2304 bytes.

On track 00, sectors shall be numbered 01 for the first sector to 16 for the last sector.

On tracks 01 to 39 sectors shall be numbered 01 for the first sector to 09 for the last sector.

The sectors shall be recorded in the natural order.

- 130mm diskettes conforming to ISO 7487 shall have two recorded surfaces, defined as side 0 and side 1. There shall be 35 discrete concentric tracks in each recording area for data interchange. The track number shall be a two digit decimal number (00 to 34) which identifies the tracks consecutively starting at the outermost track (00).

The mode of recording for track 00, side 0 shall be two-frequency recording at 7958 ftprad. The mode of recording for all tracks other than track 00, side 0 shall be modified frequency modulation recording at 7958 ftprad on both sides, 1.9 tracks per mm.

All tracks shall be divided into 16 sectors. The data capacity of track 00, side 0 shall be 2048 bytes. The data capacity of all tracks other than track 00, side 0 shall be 4096 bytes.

On each track the sectors shall be numbered 01 for the first sector to 16 for the last sector.

The sectors shall be recorded in the natural order.

- 130mm diskettes conforming to ECMA 70 (track format 2) shall have two recorded surfaces, defined as side 0 and side 1. There shall be 40 discrete concentric tracks in each recording area. The track number shall be a two digit decimal number (00 to 39) which identifies the tracks consecutively starting at the outermost track (track 00).

The mode of recording for all tracks shall be modified frequency modulation recording at 7958 ftprad on both sides, 1.9 tracks per mm.

All tracks shall be divided into 9 sectors of 512 bytes. On each track the sectors shall be numbered 01 for the first sector to 09 for the last sector. The sectors shall be recorded in the natural order.

Each sector on a diskette shall be identified by a Logical Sector Number. There shall be a one-to-one correspondence between Physical Address and Logical Sector Number. The Logical Sector Numbers shall be assigned in an ascending sequence, beginning with 0, starting at sector 1, track 00, side 0, continuing onto track 00, side 1 and then to track 01, side 0, and so forth.

- 130mm diskettes conforming to ECMA 78 (track format 2) shall have two recorded surfaces, defined as side 0 and side 1. There shall be 80 discrete concentric tracks in each recording area. The track number shall be a two digit decimal number (00 to 79) which identifies the tracks consecutively starting at the outermost track (track 00).

The mode of recording for all tracks shall be modified frequency modulation recording at 7958 ftprad on both sides, 3.8 tracks per mm.

All tracks shall be divided into 9 sectors of 512 bytes. On each track the sectors shall be numbered 01 for the first sector to 09 for the last sector. The sectors shall be recorded in the natural order.

Each sector on a diskette shall be identified by a Logical Sector Number. There shall be a one-to-one correspondence between Physical Address and Logical Sector Number. The Logical Sector Numbers shall be assigned in an ascending sequence, beginning with 0, starting at sector 1, track 00, side 0, continuing onto track 00, side 1 and then to track 01, side 0, and so forth.

- 130mm diskettes conforming to ECMA 99 (track format 2) shall have two recorded surfaces defined as side 0 and side 1. There shall be 80 discrete concentric tracks in each recording area. The track number shall be a two digit decimal number (00 to 79) which identifies the tracks consecutively starting at the outermost track (00).

The mode of recording for all tracks shall be modified frequency modulation recording at 13262 ftprad on both sides, 3.8 tracks per mm.

All tracks shall be divided into 15 sections of 512 bytes. On each track the sectors shall be numbered 01 for the first sector to 15 for the last sector. The sectors shall be recorded in the natural order.

Each sector on a diskette shall be identified by a Logical Sector Number. There shall be a one-to-one correspondence between Physical Address and Logical Sector Number. The Logical Sector Numbers shall be assigned in an ascending sequence, beginning with 0, starting at sector 1, track 00, side 0, continuing onto track 00, side 1 (if the FDC is recordable on both sides) and then to track 01, side 0, and so forth.

Diskettes shall be soft sectored, the number of sectors for track and bytes per sector will be dependent on the initialisation of the diskette.

- 200mm diskettes conforming to ISO 5654 shall have one recorded surface defined as side 0. There shall be 77 discrete concentric tracks in the recording area. The track number shall be a two-digit decimal number (00 to 76) which identifies the track consecutively, starting at the outermost track (track 00). Track 00 shall be used for labels only. Of the remaining 76 tracks, only 74 may be used for the recording of data, leaving the possibility of one or two defective tracks. If there is no bad track, the track address is equal to the track number. If there are one or two bad tracks, the track address(es) of the bad track(s) is skipped, and the track address numbering continues sequentially with the next good track.

The mode of recording shall be two-frequency recording at 13262 ftprad on one side.

Each track shall be divided into 26 sectors, with a data capacity of 128 bytes per sector. On each track the sectors shall be numbered 01 for the first sector to 26 for the last sector. The sectors shall be recorded in the natural order.

- 200m diskettes conforming to ISO 7065 shall have two recorded surfaces defined as side 0 and side 1. There shall be 77 discrete concentric tracks in each recording area. The track numbers shall be a two-digit decimal number (00 to 77) for each side which identifies the track consecutively, starting at the outermost track (track 00). Track 00 shall be used for labels only. Of the remaining 76 tracks, only 74 may be used for the recording of data, leaving the possibility of one or two defective tracks. If there is no bad track, the track address is equal to the track number. If there are one or two bad tracks, the track address(es) of the bad track(s) is skipped, and the track address numbering continues sequentially with the next good track.

The mode of recording for track 00, side 0 shall be two-frequency recording at 13626 ftprad. The mode of recording for all tracks other than track 00, side 0 shall be modified frequency modulation recording at 1362 ftprad on both sides.

The tracks of cylinder 00 shall be divided into 26 sectors. All other tracks of the diskette shall have the same numbers of sectors, which can be 8, 15 or 26.

The data capacity of track 00, side 0 shall be 3328 bytes.

The data capacity of track 00, side 1 shall be 6656 bytes.

The data capacity of all other tracks shall be as follows:

Sectors	Data bytes per sector	Data capacity per track
26	256	6656
15	512	7680
8	1024	8192

1.25 Coded Characters

1.25.1 United Kingdom 7-bit Data Code

For data interchange on diskette data shall be recorded using a subset of the United Kingdom 7-bit Data Code (see Appendix 2).

Each 7-bit coded character representation must be recorded in bit-positions 1 to 7 of a byte with b8 most significant and recorded first; bit-position 8 is recorded with value ZERO.

The relationship shall be as follows:

Bits of the 7-bit combination:	0	b7	b6	b5	64	b3	b2	b1
Bit-positions in the byte:	8	7	6	5	4	3	2	1

1.25.2 Other Interchange Character Sets

For data interchange on 90mm and 130mm diskettes, other interchange character sets may be used as agreed between interchange parties.

2. File Structure

2.1 Introduction

Part 2 of this standard specifies, in separate sections, file structures

for data interchange on magnetic media. Data record standards, which are independent of the magnetic media type, are also specified.

The requirements conform with relevant standards issued by national and international authorities. These standards are as follows:-

BS 4732: Specification for magnetic tape labelling and file structure for data interchange.

BS 5769: Specification for magnetic tape cassette and cartridge labelling and file structure for information interchange.

BS 6542: Specification for file structure and labelling of flexible disk cartridge for information interchange.

DIS 9293: Volume and file structure of flexible disk cartridges for information interchange.

BS 4732 is identical with ISO 1001. BS 5769 is identical with ISO 4341.

BS 6542 is identical with ISO 7665.

Reference should be made to the appropriate standard for a complete specification.

2.2 Definitions and Characteristics

2.2.1 *File*

A named collection of records. It may be recorded in all, or part of, a volume; or over more than one volume.

2.2.2 *Volume*

A dismountable physical unit of storage medium. It may contain one or more complete files or file sections. In the case of Magnetic Tape cassettes and cartridges, a volume is equivalent to a single track only.

A magnetic tape cassette shall consist of a single track (number 1, side A) used serially for data interchange, with the use of track number 2, side B defined by agreement between interchange parties.

A magnetic tape cartridge shall consist of a single track (number 1, side A) used serially for data interchange, with the use of tracks 2, 3 and 4 defined by agreement between interchange parties.

2.2.3 *Block*

A group of characters written or read as a unit. It may contain one or more complete records. The length of a block shall be the number of characters in the block.

For magnetic tape, a block shall accommodate a minimum of 18 bytes and a maximum of 2048 bytes inclusive of padding (where applicable). However, larger blocks may be used by agreement between interchange parties.

For magnetic tape cassette and cartridge, a block should not exceed 256 bytes inclusive of padding (where applicable). However, larger blocks may be used by agreement between interchange parties.

The maximum length of a block that may be assigned on a diskette shall be equal to the total length of all physical records of a data track i.e. to its data capacity (see 2.5).

For magnetic tape, magnetic tape cassette and magnetic tape cartridge each label must be written as an 80 byte block (exclusive of padding). For diskettes a label record may be written in all or part of a block.

2.2.4 *Record*

Related data treated as a unit of information having the following characteristics:

- a record may be recorded on all or part of a block.
- within each block the data shall be considered to be grouped into consecutive records.
- each record shall end in the block in which it begins i.e. all records shall be unspanned.
- incomplete blocks may be padded to complete block lengths.
- the length of a record is the number of data characters of this record.

2.2.4.1 *Fixed-Length Record*

A record contained in a file which is assigned to contain records which all have the same length.

2.2.4.2 *Unblocked Fixed-Length Record*

A record contained in a file in which each block contains only one record.

2.2.4.3 *Blocked Fixed-Length Record*

A record contained in a file in which each block, except possibly the last one, will contain more than one record, the block length being an integer multiple, greater than one, of the record length. If the last block contains fewer than the maximum number of records then either padding will be used to extend the block to the full length or a short block will be written. In the latter case, the block length must nevertheless be a multiple of the record length.

2.2.5 *Variable-Length Record*

A record contained in a file which is assigned to contain records which may have different lengths.

The assigned maximum record length shall not be greater than the block length. The length of any record in the file shall not exceed this assigned value.

The record length shall be expressed as a four-digit decimal number recorded as the first four characters of the record. These four characters shall be counted as part of the record length.

The minimum length of a variable-length record shall be 5 characters.

2.2.5.1 *Unblocked Variable-Length Record*

A record contained in a file in which each block contains only one record.

2.2.5.2 *Blocked Variable-Length Record*

A record contained in a file in which a block may contain more than one record.

2.3 **Other (Diskette Only)**

2.3.1 *Disk-File*

A named collection of information.

2.3.2 *Sector*

That part of a track on a diskette that can be accessed by the magnetic heads in the course of predetermined angular displacements of the diskette.

2.3.3 *Physical Record*

A fixed length field containing the data of a sector.

A block shall be recorded in all or part of a physical record or over several physical records, the addresses of which form a consecutive ascending sequence.

A block shall begin at the first byte of a physical record.

2.3.4 *Extent*

A set of physical records, the addresses of which form a continuous ascending sequence.

Within each extent the data within consecutive physical records excluding defective physical records, shall be considered to be grouped into consecutive blocks.

The first block of an extent shall begin at the first byte of the first non-defective physical record in the extent. A block shall be completely contained in one extent only.

2.4 **Structure of Files**

2.4.1 *File Structure For Data Interchange On Magnetic Tape*

Label sets and tape marks are used to establish the file structure. The various configurations of files specified by this standard are shown below. The required labels are indicated by their identifiers and numbers. Tape marks are represented by asterisks (*).

Single-Volume File	
Tape 1:	VOL1 HDR1 HDR2 UHL1 * Data Blocks
	* EOF1 EOF2 UTL1 **

Multi-Volume File	
Tape 1 :	VOL1 HDR1 HDR2 UHL1 * First Data Blocks * EOVS1 EOVS2 UTL1 **
Tape 2 :	VOL1 HDR1 HDR2 UHL1 * Last Data Blocks * EOF1 EOF2 UTL1 **
Single-Volume Multi-File	
Tape 1 :	VOL1 HDR1 HDR2 UHL1 * Data Blocks A * EOF1 EOF2 UTL1 * HDR1 HDR2 UHL1 * Data Blocks B * EOF1 EOF2 UTL1 **
Multi-Volume Multi-File	
Tape 1 :	VOL1 HDR1 HDR2 UHL1 * Data Blocks A * EOF1 EOF2 UTL1 * HDR1 HDR2 UHL1 * Data Blocks B * EOVS1 EOVS2 UTL1 **
Tape 2 :	VOL1 HDR1 HDR2 UHL1 * Continuation Data Blocks B * EOVS1 EOVS2 UTL1 **
Tape 3 :	VOL1 HDR1 HDR2 UHL1 * End Data Blocks B * EOF1 EOF2 UTL1 * HDR1 HDR2 UHL1 * Data Blocks C * EOF1 EOF2 UTL1 **

Whenever end of Volume and end of File coincide the labelling configuration must be one of the following:

Format 1

Tape 1 : Data Blocks A * EOVS1 EOVS2 UTL1 **

Tape 2 : VOL1 HDR1 HDR2 UHL1 ** EOF1 EOF2 UTL1
(re Data Blocks A) (re Data Blocks A)

* HDR1 HDR2 UHL1 * Data Blocks B
(re Data Blocks B)

Format 2

Tape 1 : Data Blocks A * EOF1 EOF2 UTL1
(re Data Blocks A)

* HDR1 HDR2 UHL1 ** EOVL1 EOVL2 UTL1 **
(re Data Blocks B)

Tape 2 : VOL1 HDR1 HDR2 UHL1 * Data Blocks B
(re Data Blocks B)

In general the pattern shown in Format 1 will occur when the end-of-tape warning mark is reached while writing the last block of a file. Usually the Operating System will not yet know that this is the last and the EOVL label group will be recorded at this time.

On the other hand, the pattern shown in Format 2 will occur when the warning mark is reached after the EOF label group has been started.

Note: Single-Volume Multi-File and Multi-Volume Multi-File structures may only be used with prior agreement between the interchange parties.

2.4.2 *File Structure for Data Interchange on Magnetic Tape Cassette and Cartridge*

To provide for the range of sophistication in equipment and application, three systems are specified.

- The basic system, employing only hardware-defined separators to structure the files.
- The compact system, employing special data blocks with labels, which are capable of being recorded using only numeric equipment.
- The extended system, employing the magnetic tape labelling system described in BS 4732 together with certain additional features to control the transition from track to track within the volume.

The preferred system for data interchange is the extended system. The various configurations of files specified by this system are identical to those in 3.1.

Whenever end of track and end of file coincide, the labelling configurations must be as specified in BS 5769.

2.4.3 File Structure for Data Interchange in 200mm (8 In) Diskette

On 200mm flexible diskettes the file and its related labels are recorded in physically separate areas. File labels (with the exception of User Labels which are recorded as data records) are recorded in the Index Cylinder (cylinder 00) as shown below:

SIDE	SECTOR	USE
0	01-04	reserved for system use
0	05	reserved for Error Map Label (ERMAP)
0	06	reserved for future standardisation
0	07	reserved for Volume Label (VOL1)
0	08/26	reserved for File Labels (HDR1)
1	01/26	reserved for File Labels (HDR1)

A file label shall be recorded within the first or only 128 character positions of the physical record.

File labels may be recorded anywhere among the sectors reserved for them.

File data is recorded within the file extent specified in the File Header Label (Begin/End Extent).

Within a sequential file, if the records are unblocked, then no record shall appear in a block, unless the previous block contains a record. If the records are blocked, then no record shall appear in a block unless the preceding block contains insufficient space to accommodate the next record. This does not apply to the first record of the file.

Levels of interchange (basic, extended interchange (E1) and extended interchange (E2) as given in BS 6542) are provided for in this standard.

2.4.4 File Structure for Data Interchange On 90mm (3.5 In) And 130mm (5.25 In) Diskettes

On 90mm and 130mm diskettes each volume shall contain one disk-file, detail of the physical location of the disk-file is contained in the disk directory and associated file allocation table, both of which are controlled via the relevant disk operating system.

There will be two types of disk-file which are as follows:

- Single Volume File - VOL1 HDR1 UHL1 Data Records UTL1
- Single Volume Multi-File - VOL1 HDR1 UHL1 Data Records UTL1 HDR1 UHL1 Data Records UTL1. et seq.

The disk-file name shall be as agreed between the interchange parties.

Volumes must not contain any other disk-file, it is therefore recommended that volumes are reformatted before data is recorded.

Multi Volume Files are not permitted.

2.5 Data Records Standards

2.5.1 General

Data record standards are determined by the content of the Record Format character contained in Field 3 of the Second File Header (magnetic tape)

or Field 10 of the File Header (diskette).

2.5.2 Record Format Character = F (Fixed)

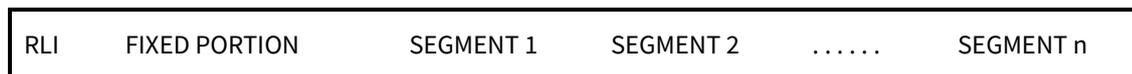
All records must be of the same length. If the file consists of records of different types, the field which distinguishes one type from another must be in the same position in each record.

2.5.3 Record Format Character = D or V (Variable)

D for magnetic tape, cassette and cartridge.

V for diskette.

The general structure of a variable length record is shown in the illustration below.



RLI Record Length Indicator

4 characters decimal showing the total length of the record in characters including the RLI.

Fixed Portion

This must be of fixed length for any one record type. Where a record

type can have segments, this portion must contain a COUNT field indicating the number of occurrences of the segments.

Where a record type cannot have segments, no COUNT field is necessary.

If a file consists of records of different types, the field which distinguishes one type from another must be in the Fixed Portion and in the same relative position in each record.

Segment

This must be of fixed length for any one record type and the number of occurrences in a particular record is indicated in the COUNT field within the Fixed Portion.

Separators

If, within the segmented part of a variable length record, there is a variable length field that is split into a specified number of sub-fields (which themselves may be either fixed or variable in length) requiring the use of a separator character to distinguish these sub-fields (e.g. lines of an address), then separators shall be used as specified in para 5.4 of BS 4730.

Normally all such sub-fields, whether containing data or not, must be terminated by a separator. The only exception is where the sub-fields containing no data comprise the final characters of the whole record: in these circumstances the separators terminating these sub-fields may be omitted at the option of the recording party.

Example

An address field consists of a maximum of four lines of address, each line forming a sub-field and terminating in a separator character. This can be represented as $A^*B^*C^*D^*$ where A, B, C, D are sub-fields and * are the separator characters.

If the address field is the final field of the whole record and (say) address lines C and D are blank, the recording party may write either A^*B^*

or A^*B^{***} .

If the address field is not the last field of the record, the recording party must write A^*B^{***} in the same circumstances.

If (say) only line C were blank, the recording party would have to write $A^*B^{**}D^*$ whatever the position of the address field.

3. Labelling Requirements

3.1 Introduction

Part 3 of this standard specifies the recorded labels to identify files and volumes of magnetic media. User labels are also specified.

The label standards for magnetic tape apply also to cassette and cartridge when the extended system of labelling and file structure is used for data interchange (see Part 2, Section 3.2).

Label variables, particular to specific applications, are indicated in Standard 29.

The requirements conform to relevant standards issued by national and international authorities. These are the same as those listed in Part 2, Section 1.

Characters Used in a Label - Only a subset of the characters of the United Kingdom 7-bit Data Code (see Appendix 2) can be used in labels. The prohibited characters are as follows:

- £ - currency symbol £
- \$ - currency symbol \$
- @ - commercial 'at'
- \ - reverse slash
-] - right (square) bracket
- ↑ - upwards arrow circumflex
- ___ - underline

3.2 Label Standards for Magnetic Tape, Cassette and Cartridge

3.2.1 Volume Header Label

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - VOL
2	1	+3	LABEL NUMBER - 1
3	6	+4	VOLUME IDENTIFIER - Permanently assigned by the owner to identify this volume. May be alpha-numeric containing spaces or zeros but must be unique to this volume. Complete space or zero filling of this field is not permitted.
4	1	+10	VOLUME ACCESSIBILITY - A space means unlimited access, any other character means special handling, in a manner agreed between the interchange parties.
5	26	+11	Reserved for future standardisation; space filled.
FIELD			

			FIELD NAME AND CONTENTS
No	Size	Pos'n	
6	14	+37	OWNER IDENTIFICATION - Application variable.
7	28	+51	Reserved for future standardisation; space filled.
8	1	+79	<p>LABEL STANDARD VERSION</p> <p>1 signifies either</p> <ul style="list-style-type: none"> - cassette and cartridges conforming to BS5769 (ISO 4341) - magnetic tapes conforming to BS 4732 Part 1 (1971) i.e. ISO 1001 (1971) <p>3 signifies magnetic tapes conforming to</p> <ul style="list-style-type: none"> - BS4732 Part 2 (1979) - ISO 1001 (1979) - ANSI X3.27 (1978) Level 4, as implemented by IBM
<p>Note: A new version of ISO 1001 is being prepared. This will be LABEL STANDARD VERSION - 4</p>			

3.2.2 First File Header Label

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - HDR
2	1	+3	LABEL NUMBER - 1
3	17	+4	FILE IDENTIFIER - Application variable.
4	6	+21	<p>FILE SET IDENTIFICATION - Volume Serial Number on the first or only reel of tape in a Single or Multi-Volume Set.</p> <ul style="list-style-type: none"> - Same as Volume Header Label field 3 in a Single Volume File or Single-Volume Multi-File. - Same as Volume Header Label field 3 in the first volume on a Multi-volume File or Multi-Volume Multi-File.
5	4R	+27	<p>FILE SECTION NUMBER - The File Section Number of the first Header Label on each file is 0001. This applies to the first or only file on a volume and to subsequent files on a Single-Volume Multi-File. This field is incremented by one on each subsequent volume of the file. In a Multi-Volume Multi-File the file section number must only be incremented on the subsequent Header Labels of those files which extend over more than one volume.</p>
6	4R	+31	<p>FILE SEQUENCE NUMBER - Four numeric characters denoting the sequence of files within the volume or set of volumes. In all the labels for a given file this field must contain the same number. Files must be numbers in ascending sequence (0001, 0002, etc) on a Single-Volume Multi-File or Multi-Volume Multi-File.</p>

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
7	4R	+35	<p>GENERATION NUMBER - Any four numeric characters denoting the current stage in the succession of one file generation by the next, at option of recording party.</p> <p>If not used</p> <ul style="list-style-type: none"> - and the label standard version is 1 - space filled - and the label standard version is 3 - set at 0001 <p>When a file is first created, its generation number is 0001.</p>
8	2R	+39	<p>GENERATION VERSION NUMBER - Any two numeric characters distinguishing successive iterations of the generation at the option of the recording party.</p> <p>If not used</p> <ul style="list-style-type: none"> - and the label standard version is 1 - space filled - and the label standard version is 3 - set at 01 <p>The Generation Version Number of the first attempt to produce a file is 00.</p>
9	6	+41	CREATION DATE - Application variable.
10	6	+47	EXPIRATION DATE - Application variable.
11	1	+53	FILE ACCESSIBILITY - A space means unlimited access; any other character means special handling, in a manner agreed between the interchange parties.
12	6	+54	BLOCK COUNT - Zero filled.
13	13	+60	SYSTEM CODE - May contain any valid characters in the coded character set at the option of the recording party; if not used must be space filled.
14	7	+73	Reserved for future standardisation; space filled.

3.2.3 *Header Label*

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - HDR
2	1	+3	LABEL NUMBER - 2
3	1	+4	RECORD FORMAT: F - Fixed Length D - Variable Length
4	5R	+5	BLOCK LENGTH - Five numeric characters specifying the maximum number of characters per block. (see Part 2, Section 2.3).
5	5	+10	RECORD LENGTH - Application variable.
6	35	+15	Reserved for operating systems; may contain any valid characters in the coded character set, at the option of the recording party; if not used must be spaced filled.
7	2	+50	OFFSET LENGTH - Not used, zero filled.
8	28	+52	Reserved for future standardisation; space filled.

3.2.4 *First End Of File/Volume Label*

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - EOF/EOV
2	1	+3	LABEL NUMBER -1
3-11	50	+4	Same as corresponding fields in FIRST FILE HEADER LABEL.
12	6R	+54	BLOCK COUNT - Six numeric characters denoting the number of data blocks (exclusive of labels and tape marks) since preceding HDR group of labels.
13-14	20	+60	Same as corresponding fields in FIRST FILE HEADER LABEL.

3.2.5 *Second End Of File/Volume Label*

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - EOF/EOV
2	1	+3	LABEL NUMBER - 2
3-8	76	+4	Same as corresponding fields in SECOND FILE HEADER LABEL.

3.3 200mm (8 in) Diskette

3.3.1 Volume Header Label

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - VOL
2	1	+3	LABEL NUMBER - 1
3	6	+4	VOLUME IDENTIFIER - Permanently assigned by the owner to identify this volume. May be alpha-numeric containing spaces or zeros but must be unique to this volume. Complete space or zero filling of this field is not permitted.
4	1	+10	ACCESSIBILITY - A space means unlimited access; any other character means special handling, in a manner agreed between the interchange parties.
5	26	+11	Reserved for future standardisation; space filled.
6	14	+37	OWNER IDENTIFICATION - Application variable.
7	20	+51	Reserved for future standardisation; space filled.
8	1	+71	RECORDING TYPE INDICATOR - This field shall specify the data interchange standard to which the volume conforms, from among the set of standards which are applicable to diskettes having the same physical dimensions. Space or 1 means that this volume conforms to one of the data interchange standards for which the value of the parameter recording type is 1 (1 = ISO 5654). Any other character means that this volume conforms to one of the data interchange standards for which the value of the parameter recording type is the same as this character (2 = ECMA 59, M = ISO 7065).
9	3	+72	Reserved for future standardisation; space filled.
10	1	+75	PHYSICAL RECORD LENGTH IDENTIFIER - Space means that the length of all physical records is 128 character positions. 1 means that the length of all physical records is 256 character positions. 2 means that the length of all physical records is 512 character positions. 3 means that the length of all physical records is 1024 character positions.
11	2	+76	SECTOR SEQUENCE INDICATOR - Spaces or 01 means that the sectors are in the natural order. 02 to 13 means that the sectors are in one of the other 02 orders specified by ISO 5654.
12	1	+78	Reserved for future standardisation; space filled.
13	1	+79	LABEL STANDARD VERSION - 3
14	48	+80	Reserved for future standardisation; space filled.

3.3.2 File Header Label

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - HDR
2	1	+3	LABEL NUMBER - 1
3	1	+4	Reserved for future standardisation; space filled.
4	17	+5	FILE IDENTIFIER - Application variable.
5	5	+22	BLOCK LENGTH - Five numeric characters specifying the number of characters per block. (see Part 2, Section 2.4).
6	1	+27	Reserved for future standardisation; space filled.
7		+28	BEGIN EXTENT - This field specifies the address of the first physical record of the extent.
7.1	2		Track address (01 to Track limit) (see Part 1, Section 5.5.3).
7.2	1		Side number (0 or 1).
7.3	2		Sector number (01 to sector limit).
8	1	+33	Reserved for future standardisation; space filled.
9		+34	END EXTENT - This field specifies the address of the last physical record of the extent.
9.1	2		Track address (01 to Track limit) (see Part 1, Section 5.5.3).
9.2	1		Side number (0 or 1).
9.3	2		Sector number (01 to sector limit).
10	1	+39	RECORD FORMAT Space or F means that all records are fixed length records. V means that all records are variable length records.
11	1	+40	BYPASS INDICATOR Space means that the file is intended for interchange. B means that the file is not intended for interchange.
12	1	+41	ACCESSIBILITY Space means unlimited access; any other character means special handling, in a manner agreed between the interchange parties.
13	1	+42	WRITE PROTECT Space means that the file is unprotected. P means that the file is protected.

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
14	1	+43	<p>INTERCHANGE TYPE</p> <p>Space means that the file is a basic interchange file.</p> <p>1 means that the file is an extended interchange level 1 (E1) file.</p> <p>2 means that the file is an extended interchange level 2 (E2) file.</p> <p>Any capital letter means that the file does not conform to any interchange level specified by BS 6542.</p>
15	1	+44	<p>MULTI-VOLUME INDICATOR</p> <p>Space means that the file is entirely contained in the volume.</p> <p>C means that the file continues on another volume.</p> <p>L means that the file ends, but does not begin, in the volume.</p>
16	2	+45	<p>FILE SECTION NUMBER - The File Section Number of the first Header Label of each file is 01. This applies to the first or only file on a volume and to subsequent files on the Single-Volume Multi-File. This field is incremented by one on each subsequent volume of the file.</p> <p>In a Multi-Volume Multi-File the file section number must only be incremented on the subsequent Header Labels of those files which extend over more than one volume.</p>
17	6	+47	CREATION DATE - Application variable.
18	4	+53	RECORD LENGTH - Four numeric characters specifying the actual length for fixed length records or the maximum record length, including record length indicator for variable length records. (see Part 2, Section 2.4).
19	5	+57	<p>UNUSED POSITIONS COUNT</p> <p>Space means that there are no unused positions in the last block.</p> <p>Digits specify the number of unused positions in the last block.</p> <p>With unblocked records, this field shall be space filled.</p>
20	1	+62	<p>RECORD ATTRIBUTE</p> <p>Space means that the records are unblocked.</p> <p>B means that the records are blocked.</p>
21	1	+63	FILE ORGANISATION - Space or S means that the file is organised sequentially.
22	2	+64	Reserved for future standardisation; space filled.
23	6	+66	EXPIRATION DATE - Application variable.
24	1	+72	VERIFY/COPY INDICATOR - Space means that the file has not been verified or copied.
25	1	+73	Reserved for future standardisation; space filled.

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
26		+74	END OF DATA - Specifies the address of the physical record containing the beginning of the next available unused block in the extent, if such a block exists.
26.1	2		Track address (01 to Track limit) (see Part 1, Section 5.5.3).
26.2	1		Side number (0 or 1).
26.3	2		Sector number (01 to sector limit).
27	49	+79	Reserved for future standardisation; space filled.

3.3.3 Error Map Label

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	5	0	LABEL IDENTIFIER - ERMAL
2	1	+5	Reserved for future standardisation; space filled.
3	3	+6	DEFECTIVE TRACK IDENTIFICATION (1) Spaces means that no defective track has been encountered during formatting. The first two digits specify the track number (01 to track Limit) of the first defective track. The third digit is always zero.
4	1	+9	Reserved for future standardisation; space filled.
5	3	+10	DEFECTIVE TRACK IDENTIFICATION (2) Spaces means that there are not two defective track on the volume (there may be one, if specified within field 3). The first two digits specifies the track number (02 to track limit plus 1) of the second defective track. The third digit is always zero.
6	115	+13	Reserved for future standardisation; space filled.

3.4 Label Standards for 90mm (3.5 in) and 130mm (5.25 in) Diskettes

3.4.1 Volume Header Label

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - VOL
2	1	+3	LABEL NUMBER - 1
3	6	+4	VOLUME IDENTIFIER - Permanently assigned by the owner to identify this volume. May be alpha-numeric containing spaces or zeros but must be unique to this volume. Complete space or zero filling of this field is not permitted.
4	1	+10	ACCESSIBILITY - A space means unlimited access; any other character means special handling, in a manner agreed between the interchange parties.
5	26	+11	Reserved for future standardisation; space filled.
6	14	+37	OWNER IDENTIFICATION - Application variable.
7	20	+51	Reserved for future standardisation; space filled.
8	1	+71	Not applicable - space filled.
9	3	+72	Reserved for future standardisation; space filled.
10	1	+75	PHYSICAL RECORD LENGTH IDENTIFIER - Space means that the length of all physical records is 128 character positions. 1 means that the length of all physical records is 256 character positions. 2 means that the length of all physical records is 512 character positions. 3 means that the length of all physical records is 1024 character positions.
11	2	+76	Not applicable - Space filled.
12	1	+78	Reserved for future standardisation; space filled.
13	1	+79	LABEL STANDARD VERSION - 3

3.4.2 File Header Label

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - HDR
2	1	+3	LABEL NUMBER - 1
3	1	+4	Reserved for future standardisation; space filled.
4	17	+5	FILE IDENTIFIER - Application Variable
5-9	17	+22	Not applicable - space filled.
10	1	+39	RECORD FORMAT Space or F means that all records are fixed length records. V means that all records are variable length records.
11-15	5	+40	Not applicable - Space filled.
16	2	+45	FILE SECTION NUMBER - The File Section Number shall be 01.
17	6	+47	CREATION DATE - Application variable.
18-22	13	+53	Not applicable - Space filled.
23	6	+66	EXPIRATION DATE - Application variable.
24	1	+72	VERIFY/COPY INDICATOR - Space means that the file has not been verified or copied.
25-27	7	+73	Not applicable - Space filled.

3.5 User Labels

3.5.1 Label

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - UHL
2	1	+3	LABEL NUMBER - 1
3	6	+4	<p>PROCESSING DATE - Format bYYDDD</p> <p>This date must be the same for all files in a Single-Volume Multi-File or a Multi-Volume Multi-File, unless otherwise stipulated by prior agreement between the interchange parties (see File Header Labels).</p> <p>(i) Where the data records following this Header Label are value items this is the earliest date on which the file is to be processed by the receiving party.</p> <p>(ii) Where the data records following this Header Label are for advice only, as in the case of a bank giving details to the account holder, of data records received for a particular account, the date of this field must be the latest date to which any record in the file may relate.</p>
4	10	+10	IDENTIFYING NUMBER OF RECEIVING PARTY - Application variable.
5	3	+20	CURRENCY CODE - If there is a need to identify the currency, the ISO 3-alpha currency code (see ISO 4217) should be used. Otherwise the field must contain spaces or zeros.
6	5	+23	Reserved for future standardisation; zero filled.
7	9	+28	WORK CODE - This field indicates the type of work being exchanged, but is only to be used by agreement between the interchange parties. If not used must be space filled.
8	3R	+37	FILE NUMBER - Three numeric characters denoting the number of this file, right justified, zero filled. All files from the SAME user will have identical contents in the first 7 characters of field 3 of the FIRST FILE HEADER LABEL. Both the original and duplicate of any one file must have an identical file number. If not used must be zero filled.
9	14	+40	Reserved for future standardisation; space filled.
10	26	+54	Use of recording party. May contain any valid characters in the coded character set excluding padding at option of the recording party. If not used must be space filled.

3.5.2 User Trailer Label

FIELD			FIELD NAME AND CONTENTS
No	Size	Pos'n	
1	3	0	LABEL IDENTIFIER - UTL
2	1	3	LABEL NUMBER - 1
3	76	+4	AUDIT TOTALS - Application variable.

Appendix A

A.1 Glossary of Abbreviations

ANSI	- American National Standards Institute
bpi	- bits per inch
bpmm	- bits per millimetre
BS	- British Standard
cpi	- characters per inch
cpmm	- characters per millimetre
DIS	- Draft International Standard
ECMA	- European Computer Manufacturers Association
EOF	- End of File (Label)
EOV	- End of Volume (Label)
ERMAP	- Error Map (Label)
ftpi	- flux transitions per inch
ftpmm	- flux transitions per millimetre
ftprad	- flux transitions per radian
GCR	- Group code recording
HDR	- Header (Label)
ISO	- International Organization for Standardization
MFM	- modified frequency modulation (see DIS 8063/2)
NRZI	- Non-return-to-zero
PE	- Phase encoded
RLI	- record length indicator
rpi	- rows per inch
rpmm	- rows per millimetre
tpi	- tracks per inch
UHL	- User Header Label
UTL	- User Trailer Label
VOL	- Volume (Label)

Appendix B

B.1 Character Codes

Data must be recorded using a subset of the United Kingdom 7-bit Data Code Set (ISO-7-UK) shown below and defined in BS 4730.

For 90mm (3.5 in) and 130mm (5.25 in) Diskettes other interchange character sets may be used as agreed between interchange parties.

- (1) The information given overleaf is the actual coded representation of each character. The relationship between the bits and the tracks on tape is specified in Part 1, Sections 2.6, 3.6, 4.6 and 5.6. It must be noted, however, that the specification does not take account of any hardware track inversion which must be allowed for by the recording party.
- (2) Only a subset of the UK 7-bit Data Code may be used in labels (see Part 3 Section 1 Page 1).

ISO-7-UK		ISO-7-UK	
Character		Character	
blank space	0100000	@	1000000
!	0100001	A	1000001
"	0100010	B	1000010
£	0100011	C	1000011
\$	0100100	D	1000100
%	0100101	E	1000101
&	0100110	F	1000110
'	0100111	G	1000111
(0101000	H	1001000
)	0101001	I	1001001
*	0101010	J	1001010
+	0101011	K	1001011
,	0101100	L	1001100
-	0101101	M	1001101
.	0101110	N	1001110
/	0101111	O	1001111
0	0110000	P	1010000
1	0110001	Q	1010001
2	0110010	R	1010010
3	0110011	S	1010011
4	0110100	T	1010100
5	0110101	U	1010101
6	0110110	V	1010110
7	0110111	W	1010111
8	0111000	X	1011000
9	0111001	Y	1011001
:	0111010	Z	1011010
;	0111011	[1011011
<	0111100	Reverse slash	1011100
=	0111101]	1011101
>	0111110	Upwards Arrow Circumflex	1011110
?	0111111	Underline	1011111

Appendix C

C.1 Key to Data Formats

- R - Right Justified
The data in this field must be right justified. If the field is numeric, insignificant leading digits must be zero filled; if it is alpha or alphanumeric, insignificant leading characters must be space filled
- L - Left Justified
Applies to alpha or alphanumeric fields only. The data in this field must be left justified. Insignificant trailing characters must be space filled
- N - Numeric (0-9)
- A - Alpha (Character set as specified in Appendix 2)

Appendix D

D.1 List of Standards referred to in this Standards

D.1.1 Introduction

The standards referenced in this document are listed below. The priority sequence on which cross-references are made is as follows:

- (i) British Standard (issued by BSI)
- (ii) International Standard (issued by ISO)
- (iii) Draft International Standard (DIS)
- (iv) European Computer Manufacturers Association Standard (ECMA)
- (v) American National Standards Institute (ANSI)

D.1.2 Magnetic Tape

- BS 4503: Specification for 9 track magnetic tape for data interchange
Part 1 1977 - Tape recorded at 31.5 rows per millimetre (800 rows per inch), NRZI
Part 2 1977 - Tape recorded at 63 rows per millimetre (1,600 rows per inch), phase encoded
- ISO 5652: Specification for 9 track magnetic tape for information interchange: format and recording, using group coding at 245 cpmm. (6,250 cpi)
- BS 4732: Specification for magnetic tape labelling and file structure for data interchange
Part 1 1971 - Label standard version 1 (published as ISO 1001: 1971).
Part 2 1979 - Label standard version 3 (published as ISO 1001: 1979 and as ANSI X3.27: 1978)

D.1.3 Magnetic Tape Cassette and Cartridge

- BS 5079: 1981 Specification for information interchange on 3.81mm (0.150 in) magnetic tape cassette at 4 cpmm (100 cpi), phase encoded at 63 ftpmm (1,600 ftpi)
- ISO 4057: Information processing. Data interchange on 6.30mm (0.25 in) magnetic tape cartridge, 63 bpmm (1,600 bpi) phase encoded
- DIS 8063: Information processing - Data interchange on 6.30mm (0.25 in) magnetic tape cartridge recorded at 252 ftpmm (6,400 ftpi)
Part 1 - Physical, magnetic and mechanical properties.
Part 2 - Track layout and method of recording for data interchange in start/stop mode

ISO 8462: Information processing - Data interchange on 6.30mm (0.25 in) magnetic tape cartridge recorded at 394 ftpmm (10,000 ftpi)

Part 1 - Physical, magnetic and mechanical properties.

Part 2 - Streaming mode

ISO 9661 Information processing - Data interchange on 12.7mm 18-track magnetic tape cartridges

BS 5769: Specification for magnetic tape cassette and cartridge labelling and file structure for information interchange

Part 1 1979 - Label standard version 1

D.1.4 Diskette

DIS 8860: Specification for data interchange on 90mm (3.50 in) flexible disk cartridges using modified frequency modulation recording at 7958 ftprd on both sides 5.3 tracks per mm (135tpi)

Part 1 - Dimensional, physical and magnetic characteristics.

Part 2 - Track format

ISO 6596: Specification for 130mm (5.25 in) flexible disk cartridges for data interchange using two-frequency recording at 7,958 ftprad on one side

Part 1 - Dimensional, physical and magnetic characteristics.

Part 2 - Track format

ISO 7487: Specification for 130mm (5.25 in) flexible disk cartridges for data interchange using modified frequency modulation recording at 7,958 ftprad on two sides

Part 1 - Dimensional, physical and magnetic characteristics.

Part 2 - Track format

ISO 5654: Specification for 200mm (8 in) flexible disk cartridges, for data interchange using two-frequency recording at 13,262 ftprad on one side

Part 1 - Dimensional, physical and magnetic characteristics.

Part 2 - Track format

ISO 7065: Specification for 200mm (8 in) flexible disk cartridges for data interchange using modified frequency modulation recording at 13,262 ftprad on two sides

Part 1 - Dimensional, physical and magnetic characteristics.

Part 2 - Track format

BS 6542: Specification for file structure and labelling of flexible disk cartridges for information interchange

DIS 9293: Volume and file structure of flexible disc cartridges for information exchange

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- ECMA 70: Specification for data interchange on 130mm (5.25 in) flexible disk cartridges using MFM recording at 7858 ftprad on 40 tracks on each side
- Section I - General description
 - Section II - Mechanical and physical characteristics
 - Section III - Magnetic characteristics of the unrecord disk cartridge
 - Section V - Track Format No.2
- ECMA 78: Specification for 130mm (5.25 in) flexible disk cartridges for data exchange using modified frequency modulation recording at 7958 ftprad on both sides, 3.8 tracks per mm
- Section I - General description
 - Section II - Mechanical and physical characteristics
 - Section III - Magnetic characteristics of the unrecord disk cartridge
 - Section V - Track Format No.2
- ECMA 99: Specification for 130mm (5.25 in) flexible disk cartridges for data interchange using two-frequency modified frequency modulation recording at 13262 ftprad on both sides, 3.8 tracks per mm
- Section I - General description
 - Section II - Mechanical and physical characteristics
 - Section III - Magnetic characteristics of the unrecord disk cartridge
 - Section V - Track Format No.2

D.1.5 Other

- BS 4730:1974 Specification for the United Kingdom 7-bit Data Code (ISO-7-UK) (Confirmed 1980)
- ISO 4217: Codes for the representation of currencies and funds