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Information technology — 12,65 mm wide magnetic tape cassette for information interchange — Helical scan recording — DTF-1 format

Technologies de l'information — Cassette de bande magnétique de 12,65 mm *de large pour l'échange d'information — Enregistrement par balayage en spirale — Format DTF-1*

Reference number
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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 15731 was prepared by ECMA (as Standard ECMA-248) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Annexes A, and B form an integral part of this International Standard. Annexes C and D are for information only.

ISO and IEC draw attention to the fact that it is claimed that compliance with this International Standard may involve the use of patents concerning the Master Standard Reference Tape and Secondary Standard Reference Tape given in clause 4.

ISO and IEC take no position concerning the evidence, validity and scope of this patent right.

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Information technology — 12,65 mm wide magnetic tape cassette for information interchange — Helical scan recording — DTF-1 format

Section 1 - General

1 Scope

This International Standard specifies the physical and magnetic characteristics of magnetic tape cassettes, using magnetic tape 12,65 mm wide so as to provide physical interchange of such cassettes between drives. It also specifies the quality of the recorded signals, the recording method and the recorded format, called Digital Tape Format-1 (DTF-1), thereby allowing data interchange between drives by means of such cassettes. The format supports variable length Logical Records, high speed search, and the use of a registered algorithm for data compression.

This International Standard specifies two sizes of cassette. For the purposes of this International Standard the larger cassette is referred to as Type L, and the smaller as Type S.

Together with a standard for volume and file structure, e.g. ISO 1001, this International Standard provides for full data interchange between data processing systems.

2 Conformance

2.1 Magnetic tape cassette

A claim of conformance with this International Standard shall specify the Type of cassette. It shall be in conformance with this International Standard if

- the case meets all the requirements of clause 4 and clauses 6 to 10 for that Type
- the recording on the tape meets the requirements of clauses 11 to 17

2.2 Generating system

A claim of conformance with this International Standard shall specify which Type(s) of cassette is (are) supported. A system generating a magnetic tape cassette for interchange shall be in conformance with this International Standard if all the recordings that it makes, meet the mandatory requirements of this International Standard. A claim of conformance with this International Standard shall state whether or not one, or more, registered algorithm(s) is (are) implemented and, if so, the registered number(s) of (all) the implemented algorithm(s).

2.3 Receiving system

A claim of conformance with this International Standard shall specify which Type(s) of cassette is (are) supported. A system receiving a magnetic tape cassette for interchange shall be in conformance with this International Standard if it is able to handle any recording made on the tape according to this International Standard, and a claim of conformance shall state whether or not one, or more, registered algorithm(s) is (are) implemented and, if so, the registered number(s) of (all) the implemented algorithm(s).

3 Normative references

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

ISO 527 (all parts),	*Plastics — Determination of tensile properties.*
ISO 1001:1986,	*Information processing — File structure and labelling of magnetic tapes for information interchange.*
ISO/IEC 11576:1994,	*Information technology — Procedure for the registration of algorithms for the lossless compression of data.*
IEC 950:1991,	*Safety of information technology equipment.*
JIS-B-7502,	*Characteristics of plastic goods.*
SMPTE timecode:	(C98.12 : time and control code for video and audio tape for 525/60 television system).

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4 Definitions

For the purposes of this International Standard, the following definitions apply.

4.1 Absolute block number: A number N allocated to each block, indicating that the block is the Nth block from the beginning of the Logical volume containing it.

4.2 a.c. erase: A process of erasure utilizing alternating magnetic fields of decaying intensity.

4.3 algorithm: A set of rules for transforming the logical representation of data.

4.4 Append file: A new file added from the End of Data (EOD) of a Logical volume.

4.5 Append volume: A Logical volume added after the last Logical volume recorded on the cassette.

4.6 Average Signal Amplitude (ASA): The average peak-to-peak value of the signal output of a read head measured over a minimum of 1,40 mm of track, exclusive of missing pulses.

4.7 azimuth: The angular deviation, in degrees of arc, of the recorded flux transitions on a track from the line normal to the track centreline.

4.8 back surface: The surface of the tape opposite to the magnetic coating used to record data.

4.9 bit cell: A distance along the track allocated for the recording of a Channel bit.

4.10 block: A unit of data which is sent to the tape controller when a single write command is executed.

4.11 Block Management Table (BMT): A table included in each Track Set to manage blocks contained in that Track Set.

4.12 byte: An ordered set of bits acted upon as a unit.

4.13 cassette: A case containing magnetic tape stored on twin reels.

4.14 compressed data: A representation of host-transmitted data after transformation by a data compression algorithm.

4.15 Control Track: A track used for recording the servo control signals.

4.16 flux transition position: That point along a track on the magnetic tape that exhibits the maximum free-space flux density normal to the tape surface.

4.17 flux transition spacing: The distance along a track between successive flux transitions.

4.18 Logical track set ID: The track set ID assigned to each track set containing data received from the host.

4.19 Logical volume: A data entity received by the generating system from the host.

4.20 magnetic tape: A tape which will accept and retain the magnetic signals intended for input, output, and storage purposes.

4.21 Master Standard Reference Tape (MSRT): A tape selected as the standard for Signal Amplitude, Reference Field, Resolution and Signal to Noise Ratio (S/N).

NOTE - The Master Standard Reference Tape has been established at SONY Corporation.

4.22 physical recording density: The number of recorded flux transitions per unit length of track, specified as flux transitions per millimetre (ftpmm).

4.23 Reference Field (RF): The Typical Field of the MSRT. There are two Reference Fields:

RF1 is that for a helically recorded track
RF2 is that for a longitudinally recorded track.

4.24 Secondary Standard Reference Tape (SSRT): A tape the performance of which is known and stated in relation to that of the MSRT.

NOTE - Secondary Standard Reference Tapes can be ordered under the Part Number SSRT-DTF-1, from the Sony Corporation, Magnetic Product Group, Data Media Sales Division, 6-7-3S Kitashinagawa, Shinagawa-ku, TOKYO 141, Japan. In principle such tapes will be available for a period of 10 years from the publication of the International Standard. However, by agreement between ISO and Sony Corporation, this period may be shortened or extended to take account of demand for such SSRTs.

It is intended that these SSRTs be used for calibrating tertiary reference tapes for use in routine calibration.

4.25 Standard Reference Amplitude (SRA): The Average Signal Amplitude derived from the MSRT, using the appropriate Test Recording Current and the appropriate physical recording density. There are three SRAs: SRA1 is derived

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from a helically recorded track, recorded at 3 201 ftpmm with TRC1. SRA2 is derived from a longitudinally recorded track at 20,75 ftpmm with TRC2. SRA3 is derived from a helically recorded track, recorded at 800,3 ftpmm with TRC1.

Traceability to the SRAs is provided by the calibration factors supplied with each Secondary Standard Reference Tape.

4.26 Standard Reference Current (Ir): The current that produces a Reference Field. There are two Irs:

Ir1 is the current that produces RF1 on a helically recorded track.
Ir2 is the current that produces RF2 on a longitudinally recorded track.

4.27 Tape Reference Edge: The lower edge of the tape when the magnetic coating is facing the observer and the supply reel is to the observer's right.

4.28 Test Recording Current (TRC): The current used to record an SRA. There are two Test Recording Currents:

TRC1 is 1,1 times Ir1
TRC2 is 1,0 times Ir2

4.29 track: A narrow, defined area on the tape along which a series of magnetic transitions may be recorded. A track may be parallel to the Tape Reference Edge or at an angle to it.

4.30 track angle: The angle between the centreline of a helically recorded track and the Tape Reference Edge.

4.31 Track Set: A set of four consecutive helical tracks uniquely identified by a track set identification.

4.32 Typical Field (TF): There are two TFs:

In the plot of the ASA against the recording field:

TF1 is the minimum recording field giving an ASA equal to 90 % of the maximum ASA at the physical recording density of 3 201 ftpmm on a helically recorded track.

TF2 is the value of the recording field for which the increase of ASA resulting from an increase of 1 dB of the recording field falls to 0,5 dB at the physical recording density of 20,75 ftpmm on a longitudinally recorded track.

4.33 Unique Identifier (UID): An unambiguous value uniquely distinct from every other UID.

4.34 word: A group (or set) of four 8-bit bytes, numbered 0 to 3, byte 3 being the most significant.

5 Conventions and notations

5.1 Representation of numbers

- A measured value is rounded off to the least significant digit of the corresponding specified value. It implies that a specified value of 1,26 with a positive tolerance of 0,01, and a negative tolerance of 0,02 allows a range of measured values from 1,235 to 1,275.
- Letters and digits in parentheses represent numbers in hexadecimal notation.
- The setting of a bit is denoted by ZERO or ONE.
- Numbers in binary notation and bit combinations are represented by strings of 0s and 1s. Within such strings, X may be used to indicate that the setting of a bit is not specified within the string.
- Numbers in binary notation and bit combinations are shown as Words with the MSB to the left, and with the msb in each byte to the left.
- Negative values of numbers in binary notion are given in TWOs complement.
- In each field the data is processed so that the MSB is processed first. Within each byte the msb (numbered 7 in an 8-bit byte) is processed first. This order of processing applies also to the data input to the Error Detection and Correction circuits and to their outputs, unless otherwise stated.

5.2 Names

The names of entities, e.g. specific tracks, fields, etc., are given with a capital initial.

6 Acronyms

ASA Average Signal Amplitude

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CRC	Cyclic Redundancy Check
BMT	Block Management Table
BST	Bad Spot Table
DIT	Directory Information Table
DM	Dummy Track
ECC	Error Correcting Code
EOD	End of Data
FIT	File Information Table
LBOT	Logical Beginning of Tape
LEOT	Logical End of Tape
LIDT	Logical ID Table
lsb	Least Significant Bit
LSB	Least Significant Byte
msb	Most Significant Bit
MSB	Most Significant Byte
MSRT	Master Standard Reference Tape
NEOT	Near End of Tape
PBOT	Physical Beginning of Tape
PEOT	Physical End of Tape
SRA	Standard Reference Amplitude
SSRT	Secondary Standard Reference Tape
TF	Typical Field
TPS	Tracking Pilot Signal
TRC	Test Recording Current
TSID	Track Set Identification
UID	Unique Identifier
UT	Update Table
VEOV	Virtual End of Volume
VIT	Volume Information Table
VSIT	Volume Set Information Table

7 Environment and safety

The conditions specified below refer to ambient conditions immediately surrounding the cassette. Cassettes exposed to environments outside these limits may still be able to function usefully; however, such exposure may cause permanent damage.

7.1 Testing environment

Unless otherwise specified, tests and measurements made on the tape to check the requirements of this Standard shall be made under the following conditions.

temperature	23 °C ± 1 °C
relative humidity	48 % to 52 %
conditioning period before use	24 h min.

7.2 Operating environment

Cassettes used for data interchange shall be operated under the following conditions:

temperature	5 °C to 40 °C
relative humidity	20 % to 80 % non-condensing
wet bulb temperature	26 °C max

The cassette shall be conditioned before use in the operating environment for a time at least equal to the period during which it has been out of the operating environment, up to a maximum of 24 h.

NOTE - Rapid variations of temperature should be avoided.

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7.3 Storage environment

The following conditions shall be observed for storage.

temperature: 5 °C to 32 °C

relative humidity: 20 % to 60 %

The stray magnetic field at any point on the tape shall not exceed 4 000 A/m. There shall be no deposit of moisture on or in the cassette.

7.4 Transportation

Recommended limits for the environment to which a cassette may be subjected during transportation, and the precautions to be taken to minimize the possibility of damage, are provided in annex D.

7.5 Safety

The cassette and its components shall satisfy the requirements of ECMA-129 when used in the intended manner or in any foreseeable use in an information processing system.

7.6 Flammability

The tape and the case components shall be made from materials which, when ignited from a match flame, do not continue to burn in a still carbon dioxide atmosphere.

Section 2 - Requirements for the case

8 Dimensional and mechanical characteristics of the case

8.1 General

The case of the cassette shall comprise

- an upper half,
- a lower half,
- a lid pivotally mounted on the upper half
- a latch mechanism for the lid
- two reels for magnetic tape
- a locking mechanism for the reels
- a write-inhibit mechanism
- recognition holes.

In the drawings, embodiments of the cassettes are shown as examples.

For the Type S cassette the dimensions are referred to three orthogonal Reference Planes X, Y, and Z where

- The three datum areas A, B and C in the bottom surface of the case are in Plane Z
- Plane X is perpendicular to Plane Z and intersects the centres of datum holes A and B
- Plane Y is perpendicular to Plane X and Plane Z and intersects the centre of datum hole A.

For the Type L cassette the dimensions are referred to three orthogonal Reference Planes X, Y, and Z where

- The three datum areas E, F and G in the bottom surface of the case are in Plane Z
- Plane X is perpendicular to Plane Z and intersects the centres of datum holes E and F
- Plane Y is perpendicular to Plane X and Plane Z and intersects the centre of datum hole E.

Figures 1 to 19 and sub-clause 8.2 define the dimensions of the case and reels for a Type S cassette.

Figures 20 to 39 and sub-clause 8.3 define the dimensions of the case and reels for a Type L cassette.

8.2 Type S cassette

Figure 1 is a perspective view seen from the top.
Figure 2 is a perspective view seen from the bottom.
Figure 3 shows the top side with the lid closed using third angle projection.
Figure 4 shows the top side holding and label areas.

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Figure 5 shows the bottom side with the lid removed.
Figure 6 shows the bottom side with the lid closed.
Figure 7 shows the details of the recognition holes.
Figure 8 shows the details of the write-inhibit plug.
Figure 9 shows the detail of the lid release insertion channel.
Figure 10 shows the lid unlock force direction.
Figure 11 shows the detail of the lid opening insertion channel.
Figure 12 shows the lid opening force direction.
Figure 13 shows the side view with the lid open.
Figure 14 shows the cassette reel.
Figure 15 shows the height of reels upon rotation.
Figure 16 shows the internal tape path.
Figure 17 shows the tape path to measure the extraction force.
Figure 18 shows the tape path to measure the friction torque of the take-up reel.
Figure 19 shows the tape access cavity requirements.

8.2.1 Overall dimensions (figure 3)

The overall dimensions of the case with the lid in the closed position are defined as follows. The total width of the case shall be

$l_1 = 96{,}0 \text{ mm} \pm 0{,}3 \text{ mm}$

The total length of the case shall be

$l_2 = 156{,}0 \text{ mm} \; {}^{+0{,}2 \text{ mm}}_{-0{,}3 \text{ mm}}$

The distance from the top of the case to the Reference Plane Z shall be

$l_3 = 25{,}0 \text{ mm} \pm 0{,}3 \text{ mm}$

The front-top bevel edge shall start in the top surface at a distance

$l_4 = 3{,}0 \text{ mm} \pm 0{,}5 \text{ mm}$ from the front side and shall terminate in the front side at a distance
$l_5 = 5{,}0 \text{ mm} \pm 0{,}5 \text{ mm}$ from the top surface

The bottom-front edge of the case shall be rounded with a radius

$r_1 = 1{,}0 \text{ mm} \pm 0{,}1 \text{ mm}$

The distance from the rear side to plane X shall be

$l_6 = 9{,}0 \text{ mm} \; {}^{+0{,}2 \text{ mm}}_{-0{,}1 \text{ mm}}$

The distance from the right side to plane Y shall be

$l_7 = 8{,}0 \text{ mm} \; {}^{+0{,}2 \text{ mm}}_{-0{,}1 \text{ mm}}$

8.2.2 Holding areas (figure 4)

The holding areas, shown cross-hatched, lie in Plane Z and shall be the areas along which the cassette shall be held down when inserted into the drive. The left and right edge holding areas shall extend from the rear side a distance of

$l_8 = 69{,}4 \text{ mm min.}$

The width of the holding surface along the rear edge shall be

$l_9 = 10{,}2 \text{ mm min.}$

The width of the left and right holding surfaces shall be

$l_{10} = 5{,}7 \text{ mm min.}$

8.2.3 Window

A window may be provided on the top surface so that a part of the reels is visible. The window, if provided, shall not extend beyond the height of the cassette and shall not extend beyond the inner edge of the holding areas.

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8.2.4 Label areas (figure 4)

A portion of the rear side of the cassette and a portion of the top surface of the cassette may be used for labels. The position and the size of the labels shall not interfere with the operation or clearance requirement of the cassette component parts. The area used for labels on the top surface shall not extend beyond the inner edges of the holding areas.

The position and dimensions of the label area on the rear side are defined as follows.

The distance from the top of the case to the top of the label area, and from the bottom of the label area to Plane Z, shall be

$l_{11} = 3{,}0 \text{ mm} \pm 0{,}3 \text{ mm}$

The distance from both the left and right sides of the case to the edges of the label area shall be

$l_{12} = 7{,}0 \text{ mm} \pm 0{,}3 \text{ mm}$

The depth of the top surface label depression shall be 0,3 mm max.

The depth of the rear side label depression shall be 0,5 mm ± 0,1 mm.

8.2.5 Datum areas and datum holes (figures 5 and 6)

The annular datum areas A, B and C shall lie in plane Z and determine the vertical position of the cassette in the drive.

The annular datum area D shall be parallel to datum plane Z and within 0,3 mm of it.

Each datum area shall have a diameter $d_1 = 10{,}0 \text{ mm} \pm 0{,}1 \text{ mm}$ and be concentric with the respective datum hole.

The centres of datum holes A and B lie in plane X.

The centre of datum hole A shall be at the intersection of planes X and Y.

The distance from the centre of the datum hole B to plane Y shall be

$l_{13} = 140{,}0 \text{ mm} \pm 0{,}3 \text{ mm}$

The distance from the centre of the datum hole C to plane Y shall be

$l_{14} = 120{,}0 \text{ mm} \pm 0{,}3 \text{ mm}$

The distance from the centre of the datum hole D to plane Y shall be

$l_{15} = 20{,}0 \text{ mm} \pm 0{,}2 \text{ mm}$

The distance from the centre of the datum holes C and D to plane X shall be

$l_{16} = 74{,}0 \text{ mm} \pm 0{,}2 \text{ mm}$

The diameter of datum holes A and D shall be

$l_{17} = 5{,}5 \text{ mm} \, {}^{+0{,}1 \text{ mm}}_{-0{,}0 \text{ mm}}$ as shown in section C-C of figure 6

The depth of all four datum holes shall be

$l_{19} = 9 \text{ mm min.}$

The distance across the flats of datum holes B and C shall be l_{17}

The distance of the elongation in datum holes B and C shall be

$l_{18} = 8{,}00 \text{ mm} \pm 0{,}15 \text{ mm}$ as shown in section E-E of figure 6.

8.2.6 Support areas (figure 5)

The cassette support areas are shown cross-hatched, in figure 5. Support areas A, B, C and D shall be coplanar with datum area A, B, C and D, respectively, within ± 0,05 mm.

The areas within 1 mm of the edge of the cassette shall not be included in the support areas and shall be recessed from the support areas.

The dimensions and position of the support areas shall be defined as follows.

The support area surrounding datum hole A shall be defined by

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l_{20} = 9,0 mm ± 0,2 mm
l_{21} = 20,0 mm ± 0,2 mm
l_{22} = 10,00 mm ± 0,15 mm
l_{23} = 0,4 mm ± 0,2 mm

The support area surrounding datum hole B shall be defined by l_{20}, l_{21} and

l_{24} = 130,0 mm ± 0,3 mm
l_{25} = 140,4 mm ± 0,3 mm

The support area surrounding datum hole D shall be defined by

l_{26} = 62,0 mm ± 0,2 mm
l_{27} = 72,3 mm ± 0,3 mm
l_{28} = 80,0 mm ± 0,3 mm
l_{29} = 85,0 mm ± 0,3 mm
l_{30} = 10,00 mm ± 0,15 mm
l_{31} = 40,0 mm ± 0,2 mm

The support area surrounding datum hole C shall be defined by l_{26}, l_{28}, l_{29} and

l_{32} = 68,0 mm $^{+0,2\ mm}_{-0,5\ mm}$
l_{33} = 100,0 mm ± 0,3 mm
l_{34} = 130,0 mm ± 0,3 mm

8.2.7 Guiding grooves (figure 3 and 6)

The cassette shall be provided with four guiding grooves for correct insertion into the drive.

The distance from Plane X to the rear edge of the guiding groove on the top surface shall be

l_{35} = 2,5 mm ± 0,1 mm

The width of top and bottom guiding grooves shall be

l_{36} = 3,0 mm ± 0,1 mm

The distance across the flanged opening at the left and right edges of both the top and bottom guiding grooves shall be

l_{37} = 6,0 mm ± 0,3 mm

The depth of the top and bottom guiding grooves shall be

l_{38} = 1,4 mm min.

The distance from Plane Z to the bottom edge of the right side guiding groove shall be

l_{39} = 11,00 mm $^{+0,15\ mm}_{-0,30\ mm}$

The width of right and left side guiding grooves shall be

l_{40} = 3,0 mm $^{+0,4\ mm}_{-0,1\ mm}$

The distance from Plane Z to the bottom of the right side flanged opening at the front shall be

l_{41} = 9,0 mm ± 0,3 mm

The width of the flanged opening of the right and left guiding grooves at the front shall be

l_{42} = 7,00 mm ± 0,15 mm

The distance from the front along the right and left guiding grooves to the termination of the flanges shall be

l_{43} = 8,00 mm ± 0,15 mm

The depth of the left and right side guiding grooves shall be

l_{44} = 1,1 mm min.

The distance from Plane Z to the bottom of the left flanged opening at the front shall be

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$l_{45} = 14{,}00\ \text{mm}\ {}^{+0{,}15\ \text{mm}}_{-0{,}30\ \text{mm}}$

The distance from Plane Z to the bottom edge of the left side guiding groove shall be

$l_{46} = 12{,}0\ \text{mm} \pm 0{,}3\ \text{mm}$

The distance from the top surface to the extent of chamfer in the bottom of the top guiding groove on the left and right sides shall be

$l_{47} = 1{,}90\ \text{mm} \pm 0{,}15\ \text{mm}$

The angle of the chamfer in the bottom of the top guiding groove at the left and right ends shall be

$a_1 = 30° \pm 3°$

The angle of the flange opening of the top guiding groove at both ends shall be

$a_2 = 30° \pm 3°$

8.2.8 Recognition holes (figure 6 and 7)

There shall be 7 recognition holes numbered 1 to 7.

The position and dimensions of the recognition holes 1 to 6 are as follows.

A line through and locating the centres of holes 6 and 1 shall be

$l_{48} = 70{,}00\ \text{mm} \pm 0{,}15\ \text{mm}$ from Plane Y

The centre of hole 6 shall be located

$l_{49} = 48{,}0\ \text{mm} \pm 0{,}2\ \text{mm}$ from Plane X

The centres of holes 4 and 5 shall be located

$l_{50} = 3{,}40\ \text{mm} \pm 0{,}05\ \text{mm}$ to the left and right of a line through the centres of holes 1 and 6

The location of a line through the centres of hole 4 and 5 shall be a distance

$l_{51} = 3{,}6\ \text{mm} \pm 0{,}1\ \text{mm}$ from the centre of hole 6

Recognition holes 2 and 3 are D shaped with the flats next to hole 1; the flats shall be a distance

$l_{52} = 4{,}00\ \text{mm} \pm 0{,}05\ \text{mm}$ from the centre of hole 1

The distance of a line through the centres of holes 1,2 and 3 from Plane X shall be

$l_{53} = 56{,}0\ \text{mm} \pm 0{,}2\ \text{mm}$

The length of the flat of holes 2 and 3 shall be

$l_{54} = 3{,}4\ \text{mm}\ {}^{+0{,}2\ \text{mm}}_{-0{,}0\ \text{mm}}$

The distance from the centre to the flat of holes 2 and 3 shall be

$l_{55} = 1{,}7\ \text{mm}\ {}^{+0{,}2\ \text{mm}}_{-0{,}0\ \text{mm}}$ with radius l_{55}, located l_{55} from the flat.

Holes 1 and 3 contain a tab as shown in view Q of figure 6 in figure 7.

The distance from the tab surface to the bottom of the cavity behind the tab shall be

l_{56} = 10 mm min. as shown in section F-F in figure 7.

The depth of holes 4, 5 and 6 shall be

l_{57} = 5 mm min. as shown in section G-G of figure 7

The radius of the D holes 2 and 3 shall be

$r_2 = 1{,}7\ \text{mm}\ {}^{+0{,}2\ \text{mm}}_{-0{,}0\ \text{mm}}$

The diameter of holes 1, 4, 5 and 6 shall be

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$d_2 = 3{,}4\ \text{mm}\ ^{+0{,}2\ \text{mm}}_{-0{,}0\ \text{mm}}$

Recognition hole 7 is located in the bottom right side of the case shown in view P of figure 6 in figure 7.

The distance from Plane Y to the surface of hole 7 nearest to the right edge of the case shall be

$l_{58} = 5{,}8\ \text{mm} \pm 0{,}2\ \text{mm}$

The distance from Plane Y to the surface of hole 7 farthest from the right edge of the case shall be

$l_{59} = 1{,}6\ \text{mm} \pm 0{,}1\ \text{mm}$

The distance from Plane X to the surface of hole 7 nearest to the rear edge of the case shall be

$l_{60} = 50{,}0\ \text{mm}\ ^{+0{,}5\ \text{mm}}_{-0{,}2\ \text{mm}}$

The distance from Plane X to the surface of hole 7 farthest from the rear edge of the case shall be

$l_{61} = 57{,}00\ \text{mm}\ ^{+0.35\ \text{mm}}_{-0{,}50\ \text{mm}}$

The surfaces on the case bottom and right side surrounding recognition hole 7 are slightly recessed.

The distance from Plane Y to the edge of the recessed area farthest from the right edge shall be

$l_{62} = 0{,}4\ \text{mm} \pm 0{,}2\ \text{mm}$

The distance from Plane X to the nearest edge of the recessed area along the right edge of the case shall be

$l_{63} = 46{,}0\ \text{mm} \pm 0{,}5\ \text{mm}$

The extent of the recessed area along the right edge of the case shall be

$l_{64} = 15{,}0\ \text{mm} \pm 0{,}5\ \text{mm}$

The inside corners of the recognition hole 7 farthest from the right edge of the case shall have fillets defined by

$l_{65} = 1{,}0\ \text{mm} \pm 0{,}2\ \text{mm}$ as shown in view P of figure 7.

The depth of the recess below the bottom and right side surfaces shall be

$l_{66} = 0{,}5\ \text{mm}$ max.

The depth of recognition hole 7 shall be

$l_{67} = 10\ \text{mm}$ min.

This International Standard prescribes the following states of these recognition holes.

- Recognition hole 1 shall be closed.
- Recognition hole 2 shall be open.
- Recognition hole 3 shall be closed.
- Recognition hole 4 shall be open.
- Recognition hole 5 shall be open.
- Recognition hole 6 shall be open.
- Recognition hole 7 shall be open.

Tabs may be used to close the recognition holes. The dimensions of the tabs, if used, shall be as defined in the section F-F of figure 7. The tabs shall withstand an applied force of 2,0 N max. without being punched out.

The surface of the tabs shall be recessed from the bottom surface a distance

$l_{68} = 0{,}3\ \text{mm}$ max.

The space around the knockout tab in recognition holes 1 and 3, as viewed in section F-F of figure 7, shall be

$l_{69} = 0{,}7\ \text{mm}$ max.

8.2.9 Write-inhibit plug (figure 8)

The write-inhibit plug is located on the left side at the bottom of the case as shown in figure 6, view R.

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The distance in Plane Z from Plane X to the near edge of the write-inhibit plug hole shall be

l_{70} = 52,5 mm ± 0,2 mm

The span of the write-inhibit plug hole shall be

l_{71} = 7,00 mm $^{+0,15\ mm}_{-0,00\ mm}$ as shown in view R of figure 8.

The distance on the left side of the case from Plane X to the near edge of the slider opening shall be

l_{72} = 52,8 mm min.

The distance on the left side of the case from Plane X to the far edge of the slider opening shall be

l_{73} = 58,8 mm max.

The distance in Plane Z from Plane Y to the inner side of the write-inhibit plug hole shall be

l_{74} = 141,60 mm ± 0,15 mm

The distance from the inner side of the write inhibit hole to the slide rail shoulder shall be

l_{75} = 5,00 mm $^{+0,15\ mm}_{-0,00\ mm}$

The distance on the left side from Plane Z to the far edge of the write-inhibit plug detent hole shall be

l_{76} = 9,4 mm max.

The tang on the left side of the body of the write-inhibit plug shall extend

l_{77} = 1,7 mm max.

The surface of the write-inhibit plug, when in the write-enable position, shall be recessed from Plane Z a distance

l_{78} = 0,5 mm max.

When the write-inhibit plug is pushed down, recording on the tape is inhibited.

The distance from Plane Z to the surface of the plug in the write-inhibit position shall be

l_{79} = 4,5 mm min.

The write-inhibit plug shall not be deformed by 0,3 mm or more when a force of 2,0 N is applied to the centre of it. The force required to push down or lift up the write-inhibit plug shall be less than 40 N.

8.2.10 Pre-positioning surface (figures 3 and 5)

The pre-positioning surfaces are parallel to Plane Y in the front of the bottom surface and determine the initial location of the cassette as it is inserted into the drive loading slot.

The distance of the right side pre-position surface from Plane Y shall be

l_{80} = 1,2 mm ± 0,4 mm as shown in figure 5

The distance of the left side pre-position surface from Plane Y shall be

l_{81} = 137,7 mm ± 0,5 mm

The height of the pre-position surfaces above Plane Z shall be

l_{82} = 3,0 mm ± 0,1 mm as shown in figure 3

The distance from Plane X to the front of the left and right pre-position surfaces shall be l_{83} = 87,0 mm $^{+0,1\ mm}_{-0,2\ mm}$

8.2.11 Cassette lid (figures 9, 10, 11, 12 and 13)

The cassette shall include a lid for protection of the tape during handling, storage and transportation. The lid shall be automatically locked when the lid is closed and it shall be unlocked when the release pin in the drive is inserted into the channel shown in figure 9.

The distance from Plane X to the near edge of the lid release insertion channel shall be l_{84} = 75,0 mm $^{+0,0\ mm}_{-0,3\ mm}$

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The distance from Plane Y to the far wall of the lid release insertion channel shall be

l_{85} = 141,8 mm min.

The distance from Plane Z to the near wall of the cavity containing the locking mechanism shall be

l_{86} = 2,4 mm max.

The distance from Plane Z to the far wall of the cavity containing the locking mechanism shall be

l_{87} = 5,85 mm min.

The design of the locking mechanism is not specified by this International Standard except that it shall be operated by the release pin in the drive. The lid release mechanism shall be actuated when the drive release pin is in the cross-hatched area shown in section J-J and defined by l_{87} and

l_{88} = 74,2 mm max.
l_{89} = 75,8 mm min.
l_{90} = 3 mm max.

The force needed to unlock the lid shall be less than 1 N in the direction shown by figure 10.

After the lid is unlocked, the lid shall be open when the lid opening lever in the drive is inserted into the channel shown in figure 11.

The distance from Plane X to the near end of the lid opening channel shall be

l_{91} = 77,3 mm max.

The distance from Plane Y to the relief edge in the front bottom lid surface shall be

l_{92} = 2,4 mm max.

The distance from Plane Y to the right inside wall of the lid shall be

l_{93} = 5 mm min.

The distance from bottom surface of the case to the front bottom edge of the lid shall be

l_{94} = 0,1 mm ± 0,1 mm

The bottom front edge of the lid shall have a flat for the distance defined by

l_{95} = 1,2 mm ± 0,2 mm

The inside corner of the lid shall be rounded with a radius

r_3 = 1,0 mm ± 0,1 mm

The inside front bottom edge of the lid shall be chamfered at an angle defined by

a_3 = 30° ± 3° starting at the flat defined by l_{95}

The force needed to open the lid shall be 1,5 N max. in the direction shown in figure 12.

The lid rotates around an axis defined in figure 13 by dimensions

l_{96} = 69,0 mm ± 0,5 mm and

l_{97} = 18,0 mm ± 0,5 mm

The maximum possible lid opening distance shall be

l_{98} = 29 mm min.

8.2.12 Cassette reel lock (figure 13)

The reels shall be locked when the cassette is removed from the tape drive and shall be unlocked when the cassette is inserted into the drive.

The design of the locking mechanism is not specified by this International Standard except that the reel shall be completely released when the cassette lid is opened a distance from reference plane Z defined by

l_{99} = 23,5 mm max. The minimum distance required to unlock the reels is not specified.

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8.2.13 Reel access holes (figure 6)

The case shall have two circular reel access holes in the bottom of the case which shall allow penetration of the drive spindles.

The centreline of both reel holes shall be the distance from Plane X defined by

$l_{100} = 31{,}0 \text{ mm} \pm 0{,}2 \text{ mm}$

The distance from Plane Y along the line defined by l_{100} to the centre of the right reel hole shall be

$l_{101} = 32{,}0 \text{ mm} \pm 0{,}2 \text{ mm}$

The distance from Plane Y along the line defined by l_{100} to the centre of the left reel hole shall be

$l_{102} = 108{,}0 \text{ mm} \pm 0{,}2 \text{ mm}$

The diameter of both reel holes shall be

$d_3 = 33 \text{ mm min.}$

8.2.14 Reels (figure 14)

The reels have a spindle-receiving cavity extending from the bottom surface, with inward facing gear teeth for transferring drive, and a round upper cylinder to define the axis of rotation precisely.

The diameter of the round upper cylinder in the receiving cavity shall be

$d_4 = 11{,}00 \text{ mm} \; {}^{+0{,}15 \text{ mm}}_{-0{,}00 \text{ mm}}$

The tops of the inside gear teeth shall lie in a cylinder suface with a diameter defined by

$d_5 = 14{,}0 \text{ mm} \; {}^{+0{,}4 \text{ mm}}_{-0{,}2 \text{ mm}}$

The base of the inside gear teeth shall lie in a cylinder suface with a diameter defined by

$d_6 = 18{,}0 \text{ mm} \pm 0{,}2 \text{ mm}$

The base surface of the reel is formed by an annular ring with an inside diameter that shall be

$d_7 = 27{,}6 \text{ mm} \pm 0{,}2 \text{ mm}$ and an outside diameter that shall be

$d_8 = 30{,}0 \text{ mm} \pm 0{,}2 \text{ mm}$

The width of the tops of the inside gear teeth shall be

$l_{103} = 2{,}0 \text{ mm} \pm 0{,}5 \text{ mm}$

The distance from the reel base annular ring to the inside lower flange at the tape hub surface shall be

$l_{104} = 3{,}75 \text{ mm} \; {}^{+0{,}20 \text{ mm}}_{-0{,}10 \text{ mm}}$

The distance between the lower and upper flanges at the tape hub surface shall be

$l_{105} = 13{,}5 \text{ mm} \; {}^{+0{,}2 \text{ mm}}_{-0{,}5 \text{ mm}}$

The distance from the reel base annular ring to the top of the inside gear teeth base cylinder shall be

$l_{106} = 9{,}00 \text{ mm} \pm 0{,}15 \text{ mm}$

The distance from the reel base annular ring to the start of the round upper cylinder shall be

$l_{107} = 10{,}5 \text{ mm} \pm 0{,}3 \text{ mm}$

The distance from the reel base annular ring to the top of the round upper cylinder shall be

$l_{108} = 15{,}0 \text{ mm} \; {}^{+0{,}5 \text{ mm}}_{-0{,}0 \text{ mm}}$

The length of the tops of the gear teeth from the top of the inside gear teeth base cylinder shall be

$l_{109} = 6{,}50 \text{ mm} \pm 0{,}15 \text{ mm}$

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The gear teeth side surfaces extend from the base cylinder to the tops cylinder and shall be at an angle with respect to each other defined by

$a_4 = 60° \pm 5°$

The 6 gear teeth shall be spaced around the base cylinder at an angle defined by

$a_5 = 60° \pm 1°$

The reels assembled in a cassette shall rotate freely under the condition described in figure 15.

The distance from Plane Z to the annular base reel surface which provides free rotation of the reel when the cassette is loaded into a drive shall be

$l_{110} = 2{,}4 \text{ mm } {}^{+0{,}2 \text{ mm}}_{-0{,}6 \text{ mm}}$

The reels assembled in a cassette shall be spring-loaded with a force F of 1,5 N ± 0,5 N as shown in figure 15.

8.2.15 Position of the tape in the case (figure 16)

Four tape guides define the tape path inside the cassette. Two guides on the left side, one close to the front opening of the case and one close to the supply reel. Two guides on the right side, one close to the front opening of the case and one near to the take-up reel.

The distance from Plane X to a line through the centres of the guides close to the reels shall be

$l_{111} = 69{,}0 \text{ mm} \pm 0{,}5 \text{ mm}$

The distance from Plane Y to the centre of the right guide close to the take-up reel shall be

$l_{112} = 12{,}5 \text{ mm} \pm 0{,}5 \text{ mm}$

The distance from Plane Y to the centre of the left guide close to the supply reel shall be

$l_{113} = 128{,}7 \text{ mm} \pm 0{,}5 \text{ mm}$

The distance from Plane X to a line through the centres of the guides close to the front shall be

$l_{114} = 81{,}0 \text{ mm} \pm 0{,}5 \text{ mm}$

The distance from Plane Y to the centre of the right guide close to the front shall be

$l_{115} = 13{,}0 \text{ mm} \pm 0{,}5 \text{ mm}$

The distance from Plane Y to the centre of the left guide close to the front shall be

$l_{116} = 127{,}0 \text{ mm} \pm 0{,}5 \text{ mm}$

The diameter of all four guides shall be

$d_9 = 5{,}0 \text{ mm} \pm 0{,}3 \text{ mm}$

8.2.16 Tape path zone (figure 16)

When the cassette is inserted into the drive, the tape is pulled outside of the case by tape guides. The tape path zone of the case is the zone in which the tape shall be able to move freely.

The distance from Plane X to the furthest points defining the zone limit on the left and right in front of the case shall be

$l_{117} = 100{,}0 \text{ mm} \pm 0{,}2 \text{ mm}$

The distance from Plane Y to the right front point defining the zone limit shall be

$l_{118} = 7 \text{ mm min.}$

The distance from Plane Y to the left front point defining the zone limit shall be

$l_{119} = 132 \text{ mm min.}$

With a holdback torque of 0,001 N·m applied to a nearly empty reel under the condition described in figure 17, the force required to pull the tape out from the reel (see figure 17) shall not exceed 0,17 N. This specification shall be applied to both the supply and take-up reels.

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With a holdback tension of 0,3 N applied to the take-up reel nearly full of the tape under the condition described in figure 18, the torque required to wind the tape shall not exceed 0,015 N·m.

8.2.17 Tape access cavity (figure 19)

When the cassette is inserted into the drive, tape guides in the drive pull the tape out into the drive tape path. The shape and dimensions of the access cavity for these tape guides shall be defined as follows.

The inside shape of the lid is not specified by this International Standard except that clearance shown cross-hatched shall be provided for drive tape threading mechanisms when the lid is opened.

The distance from Plane Y to the edge in the bottom surface which defines the right extent of the tape access cavity shall be

l_{120} = 14,5 mm ± 0,3 mm

The distance from Plane X to the starting point for the right rear surface of the access cavity shall be

l_{121} = 86,0 mm $^{+0,2\ mm}_{-0,5\ mm}$

The distance from Plane Y to the extent of the right rear surface of the access cavity shall be

l_{122} = 27,75 mm max.

The distance from Plane X to the curved surface defining the rear extent of the tape access cavity shall be

l_{123} = 70,6 mm max.

The distance from Plane X to the surface defining the rear extent of the tape access cavity shall be

l_{124} = 62,1 mm max.

The distance from Plane Y to the extent of the left rear surface of the access cavity shall be

l_{125} = 112,25 mm min.

The distance from Plane Y to the left-most edge of the tape access cavity in the bottom surface shall be

l_{126} = 125,5 mm ± 0,3 mm

The width at the end of the centre tape position limit post shall be

l_{127} = 8,7 mm max.

The width at the base of the centre tape position limit post shall be

l_{128} = 14,7 mm max.

The width of the rearmost surface of the tape access cavity shall be

l_{129} = 26,5 mm min.

The distance from Plane X to the inside surface of the centre tape position limit post shall be

l_{130} = 82,5 mm min.

The distance from Plane Z to the inside surface of the support for the centre tape position limit post shall be

l_{131} = 19 mm min.

The distance from Plane Z to the top inside surface of the support for the centre tape position limit post shall be

l_{132} = 20,8 mm min.

The distance from Plane Z to the edge in the top surface of the case which defines the lid case interface shall be

l_{133} = 77 mm max.

The distance from Plane Z to the inside of the case top surface shall be

l_{134} = 23 mm min.

The distance from Plane Z in the lid area representing the depth of the access cavity shall be

l_{135} = 24 mm min.

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The distance from Plane Z to the lid edge when the lid is opened shall be

$l_{136} = 27{,}5 \text{ mm } ^{+1{,}5 \text{ mm}}_{-0{,}0 \text{ mm}}$ and shall provide clear entrance to the above defined tape access cavity

The angle of the fillet at the inside and outside of the corner of the centre tape position limit post shall be

$a_6 = 35°$ max.

The curvature of the rear tape access cavity surfaces shall have a radius defined by

$r_4 = 39{,}6$ mm max. and centred at the reel centres.

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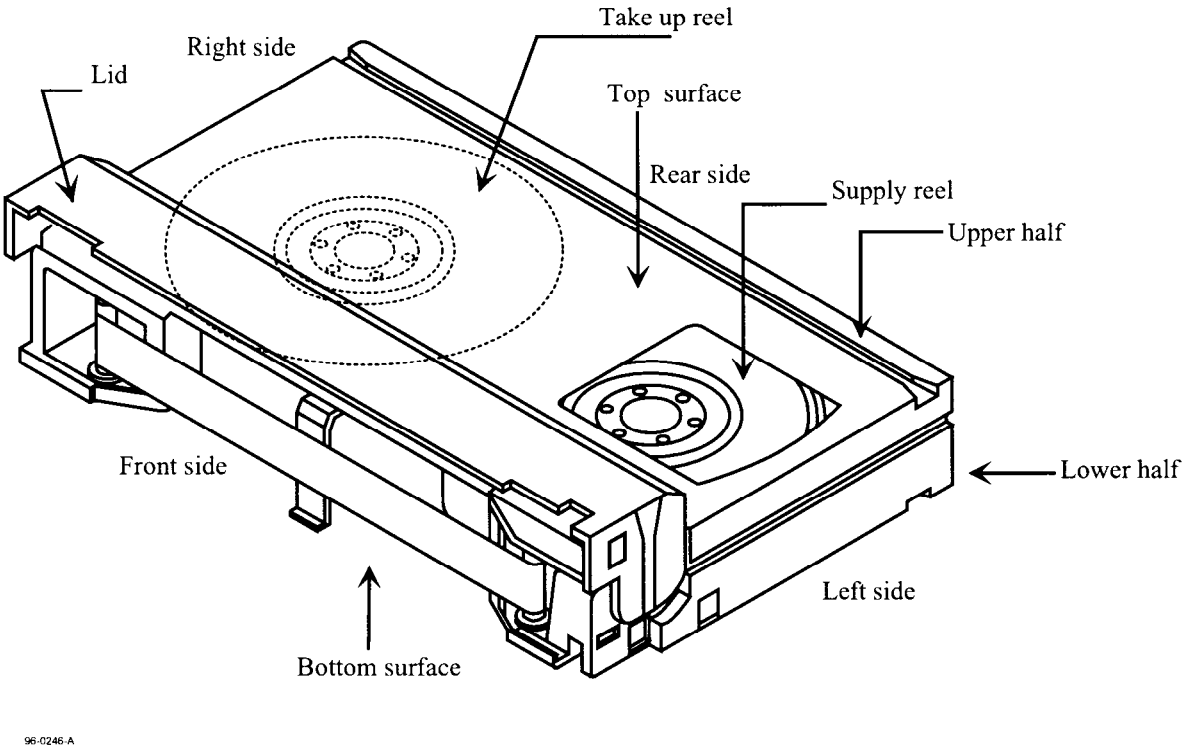


Figure 1 - Type S cassette top view (lid open)

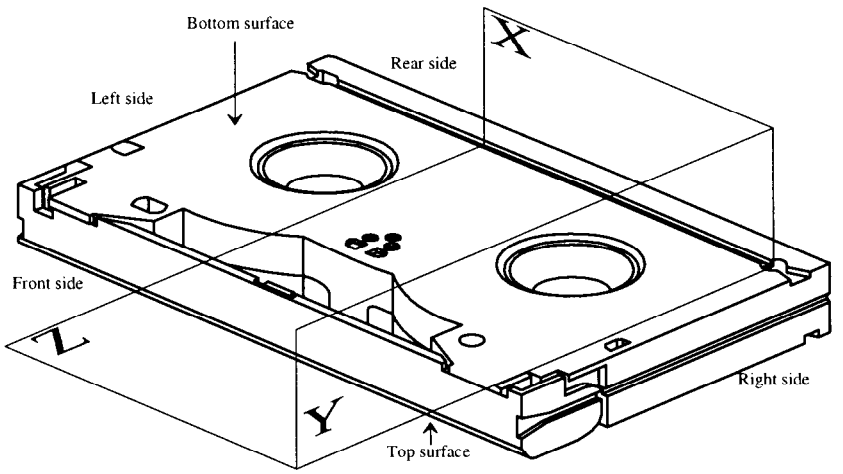


Figure 2 - Type S cassette bottom view (lid closed)

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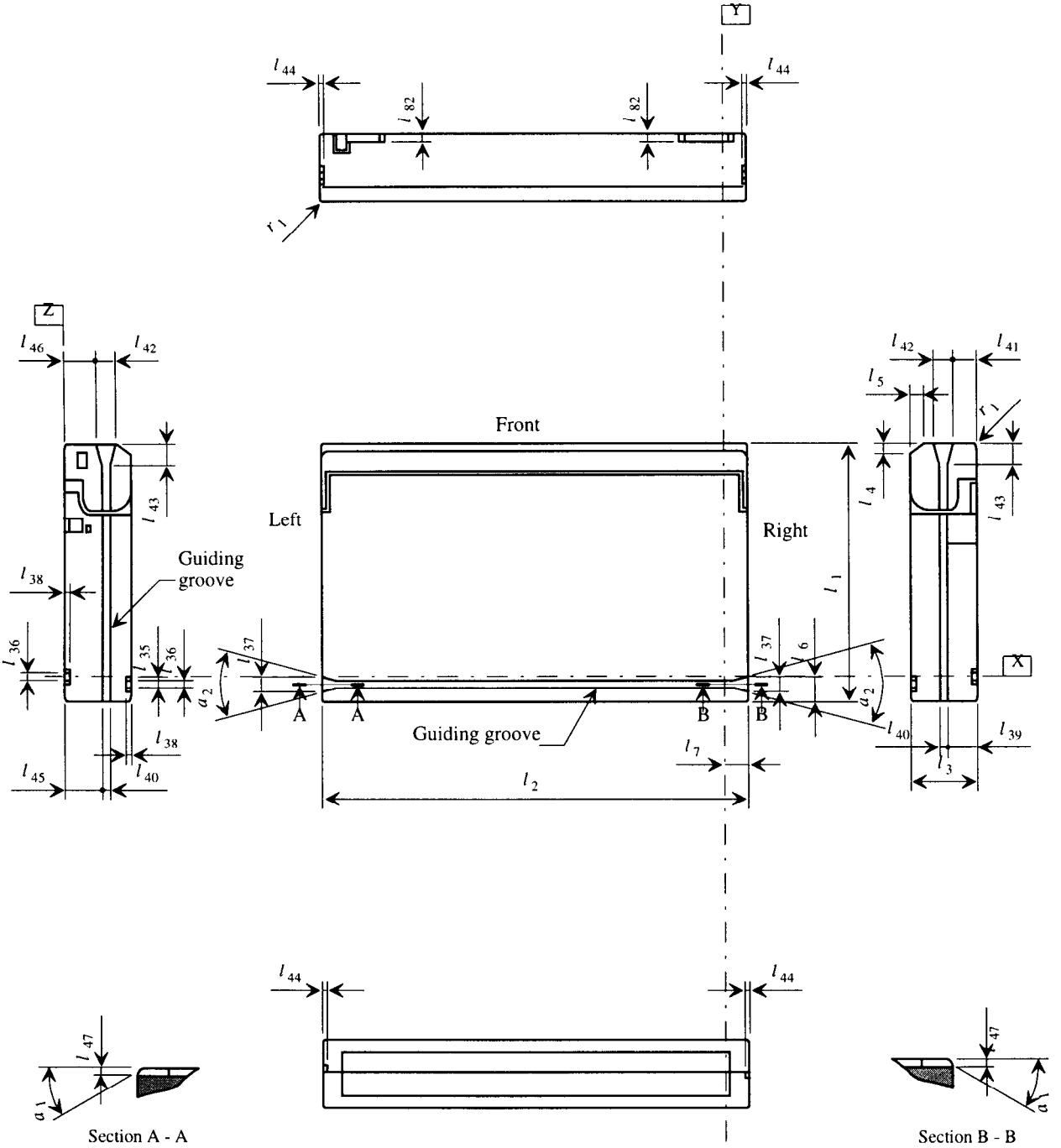


Figure 3 - Top side of Type S cassette (lid closed)

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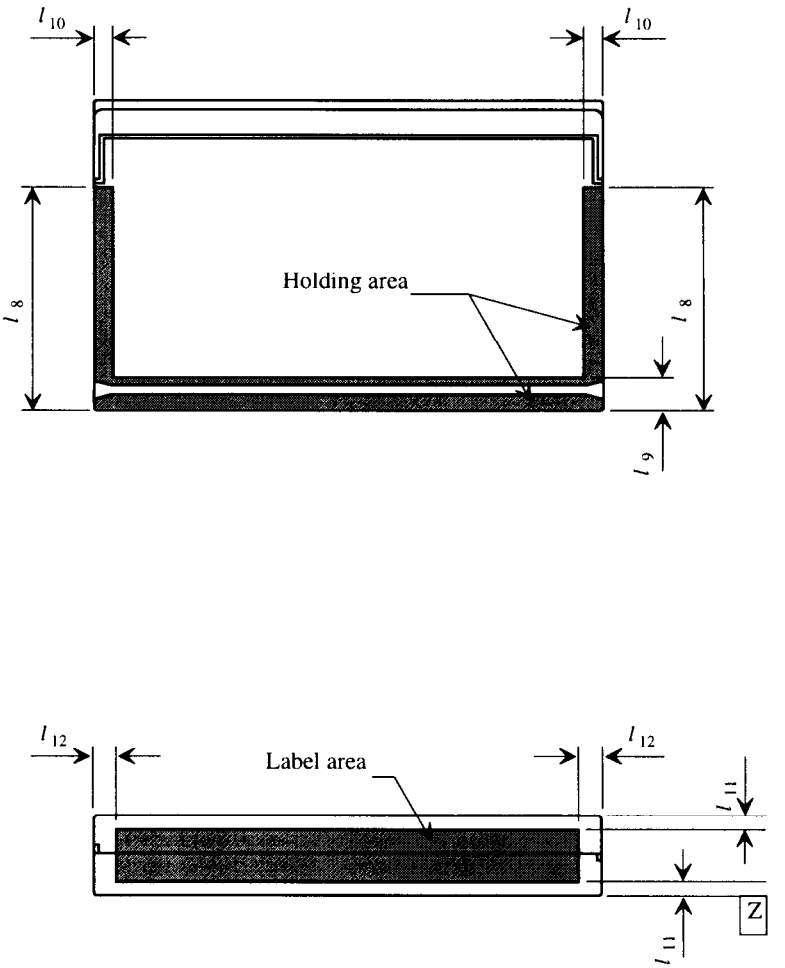


Figure 4 - Top side of Type S cassette, holding and label areas.

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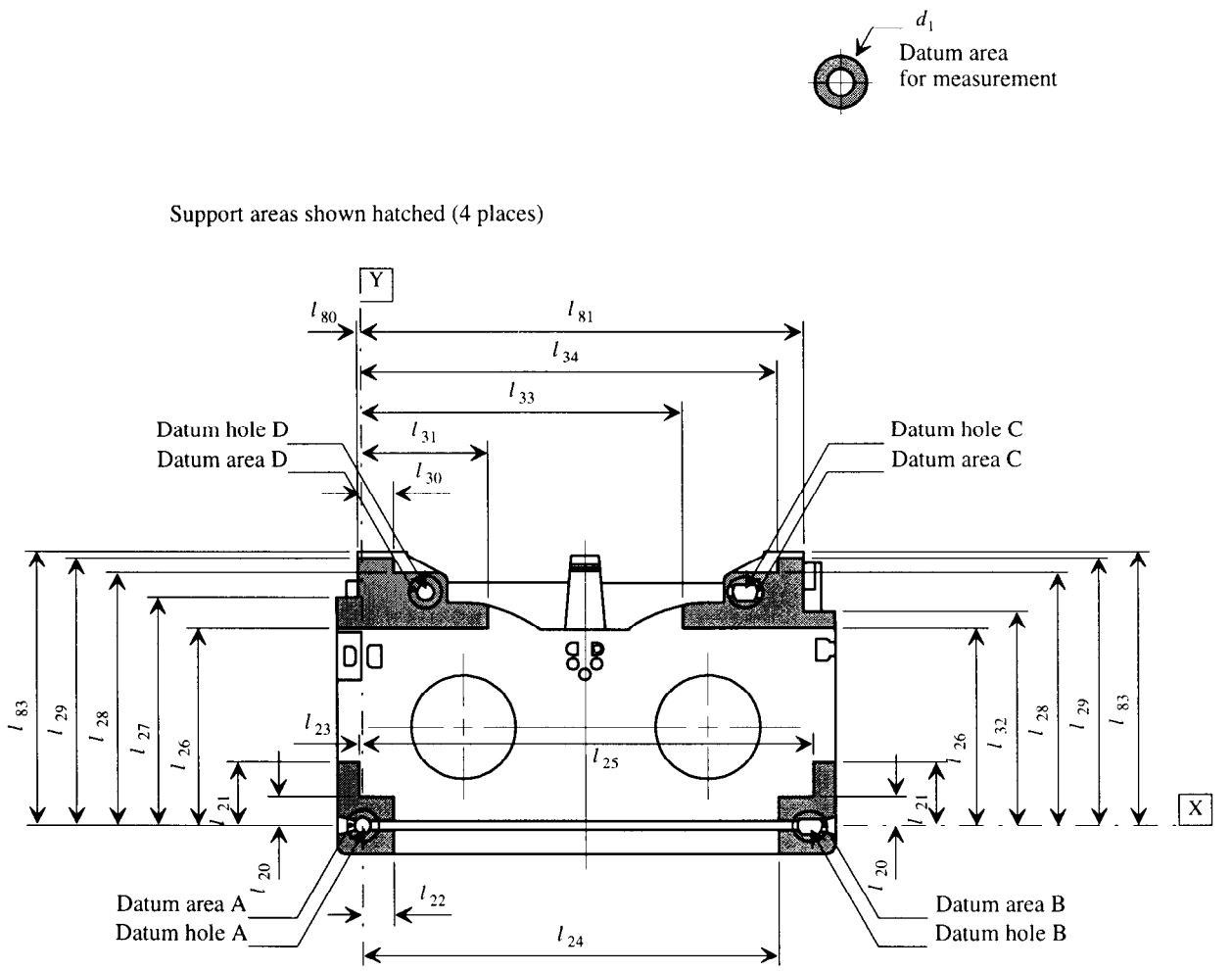


Figure 5 - Bottom side of Type S cassette (lid removed)

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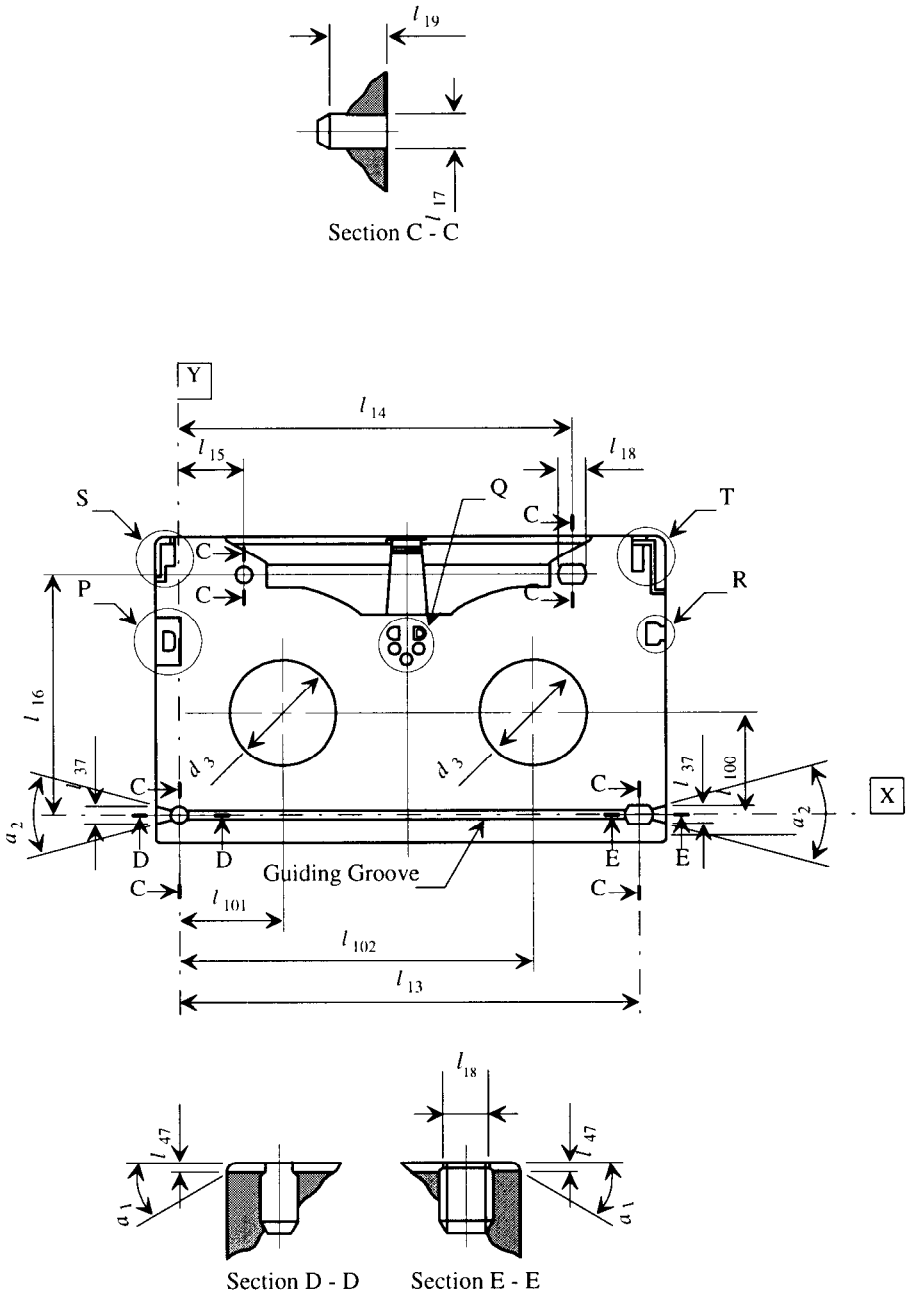


Figure 6 - Bottom side of Type S cassette (lid closed)

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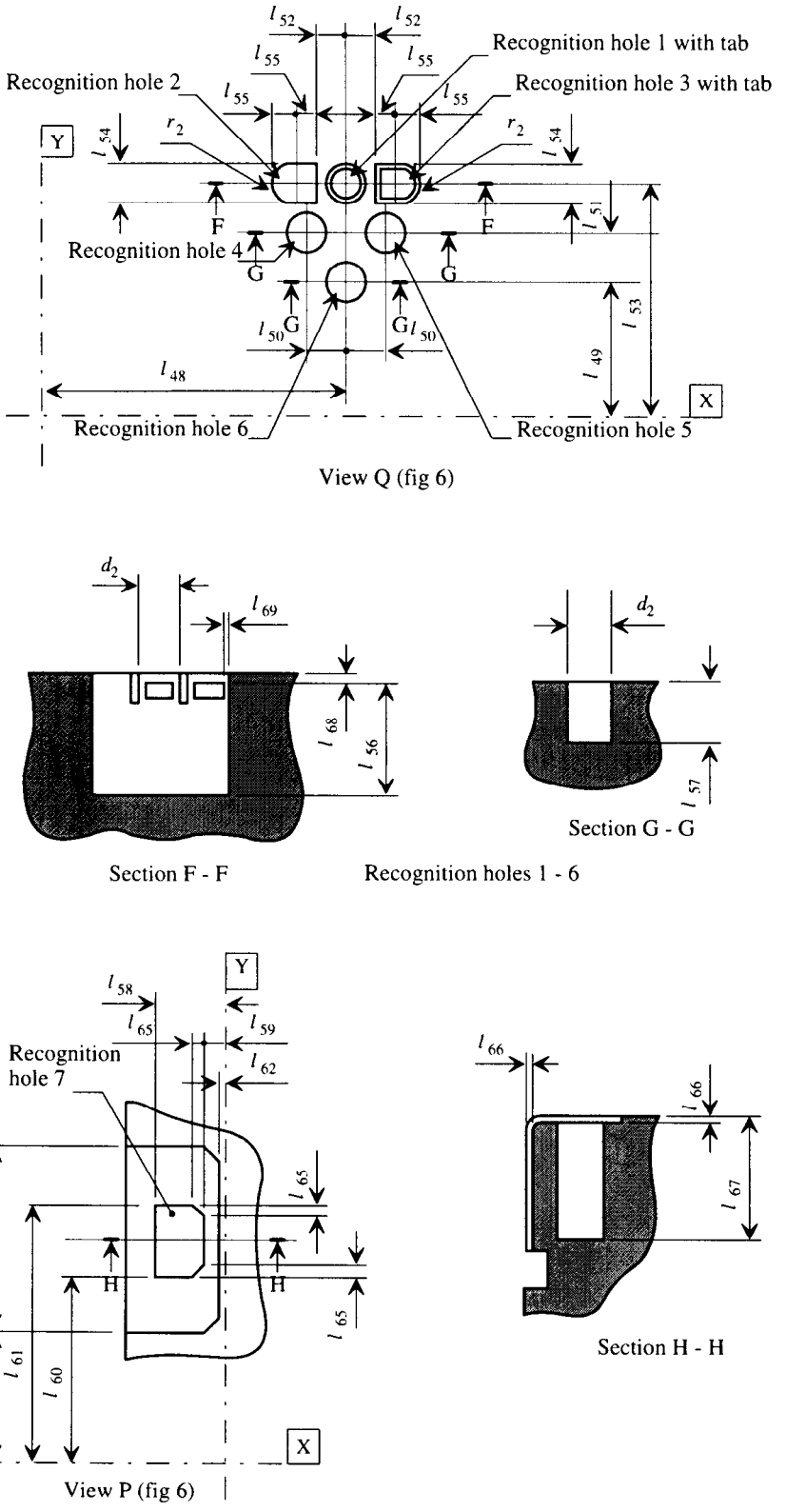
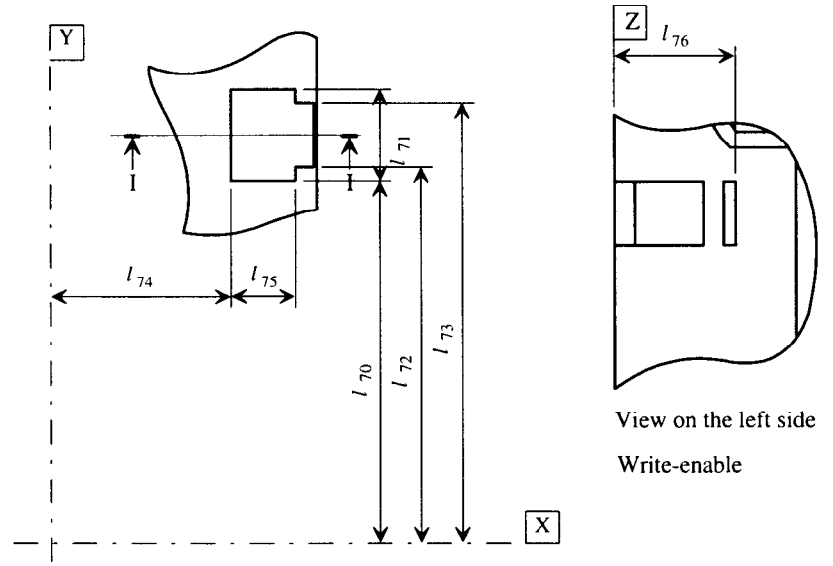
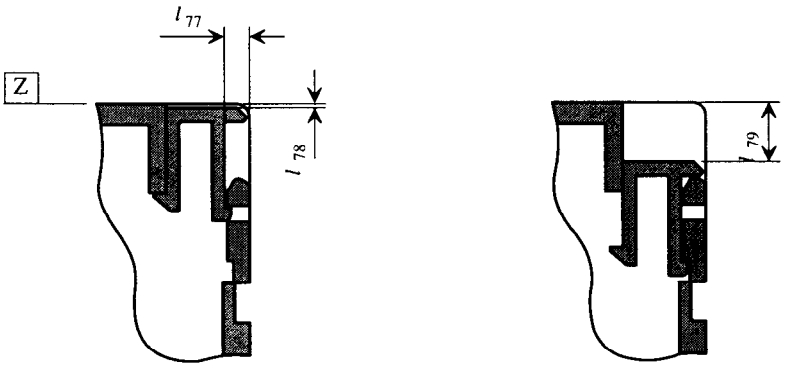


Figure 7 - Details of recognition holes of Type S cassette

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View R (fig 6)



Sections I - I

Figure 8 - Details of write - inhibit plug of Type S cassette

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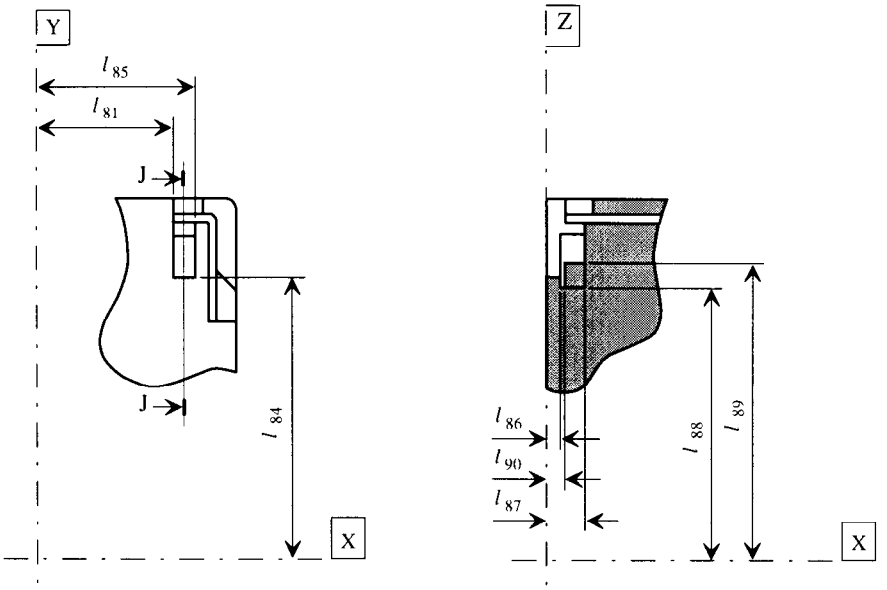


Figure 9 - Lid release insertion channel of Type S cassette

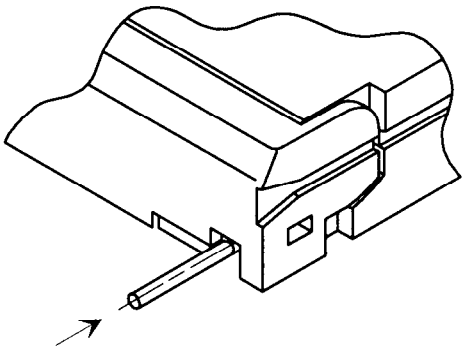


Figure 10 - Direction of force required to unlock the lid with Type S cassette

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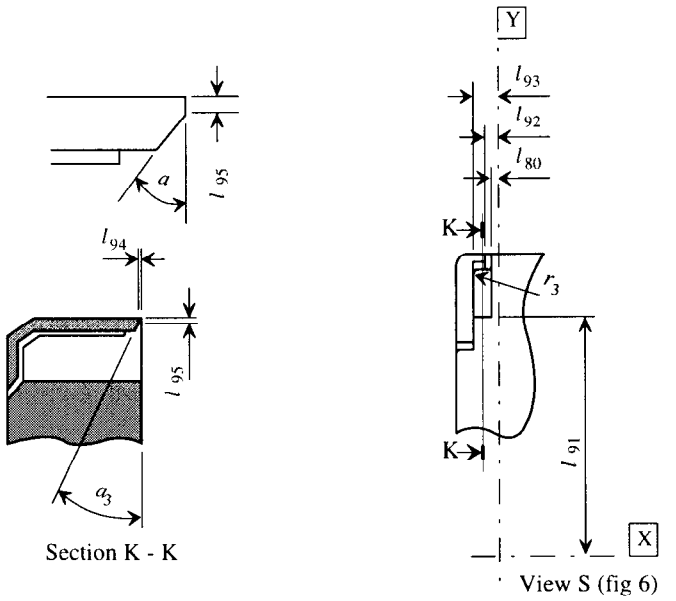


Figure 11 - Lid opening insertion channel of Type S cassette

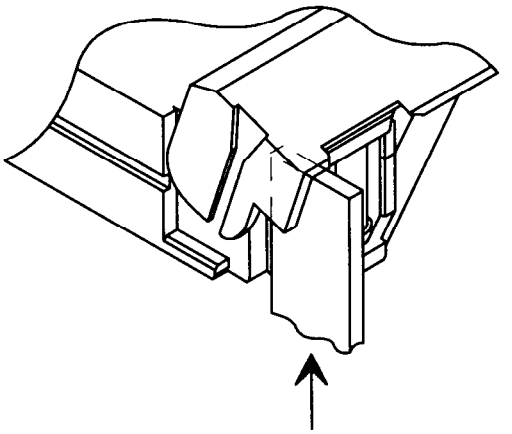


Figure 12 - Direction of force required to open the lid with Type S cassette

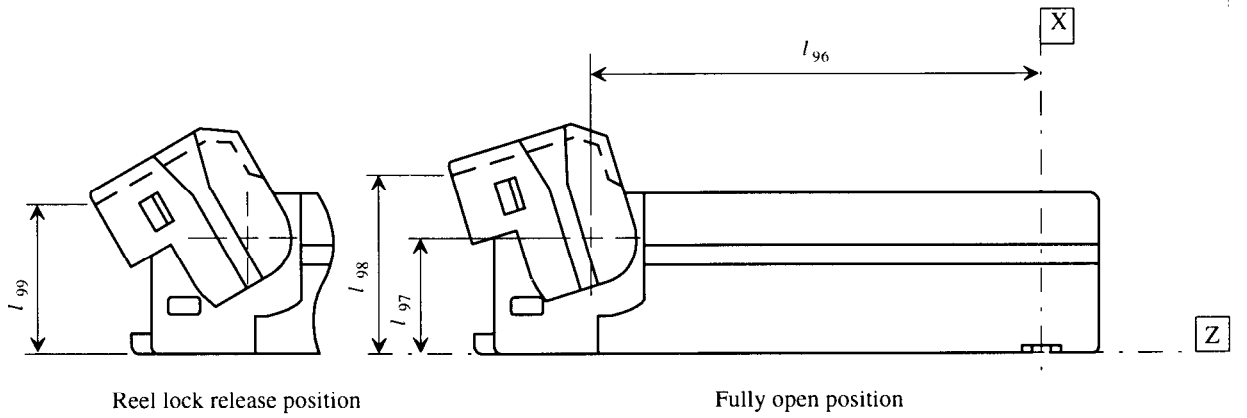


Figure 13 - Side view of Type S cassette (lid open)

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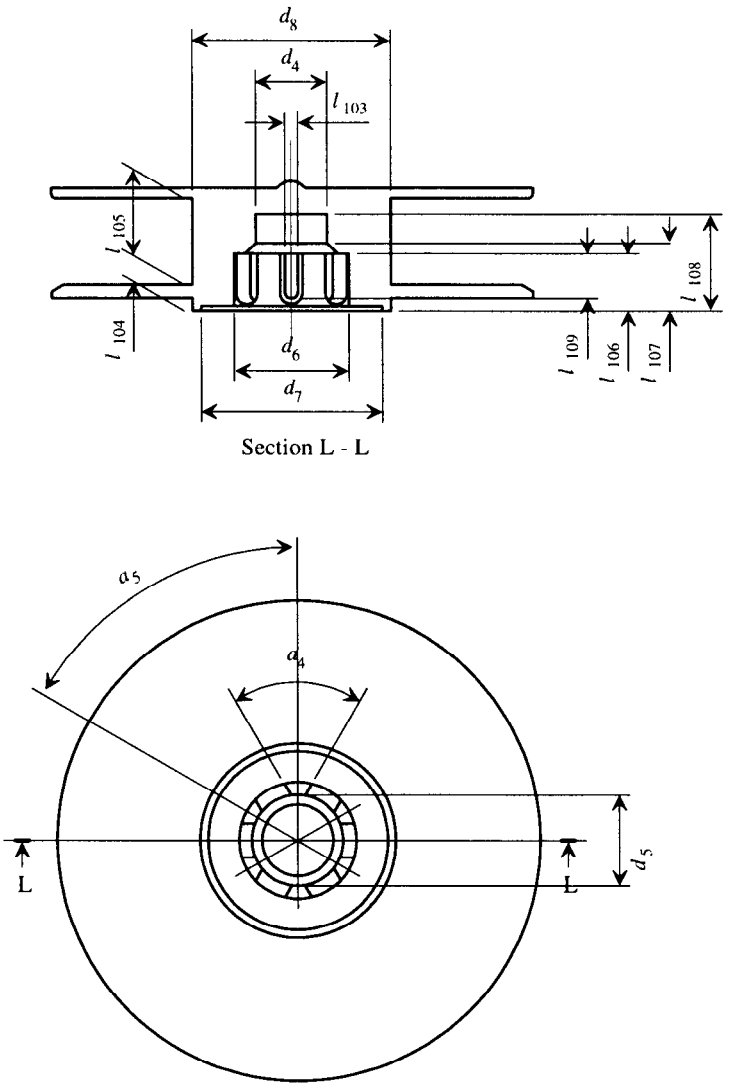


Figure 14 - Cassette reel of Type S cassette

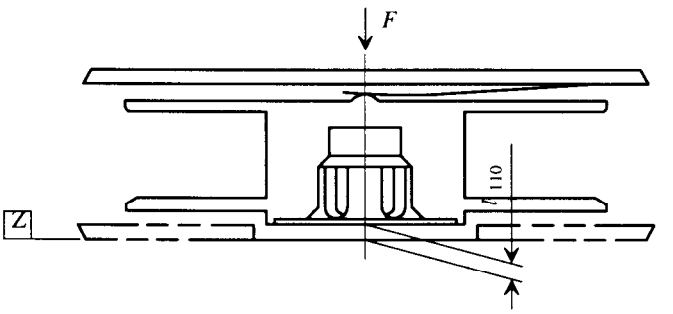


Figure 15 - Height of the reels of Type S cassette when loaded

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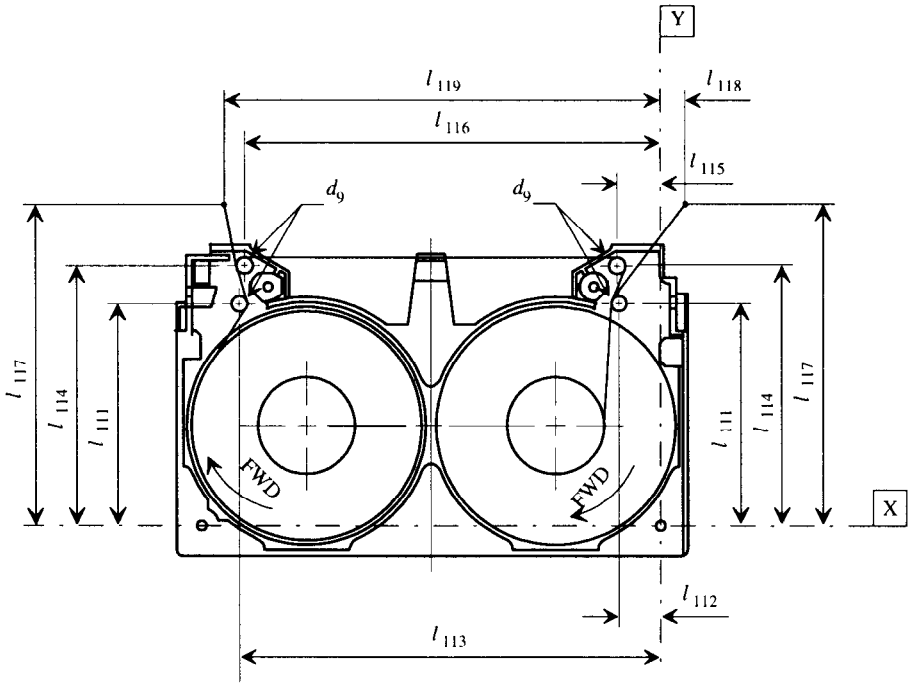


Figure 16 - Internal tape path of Type S cassette

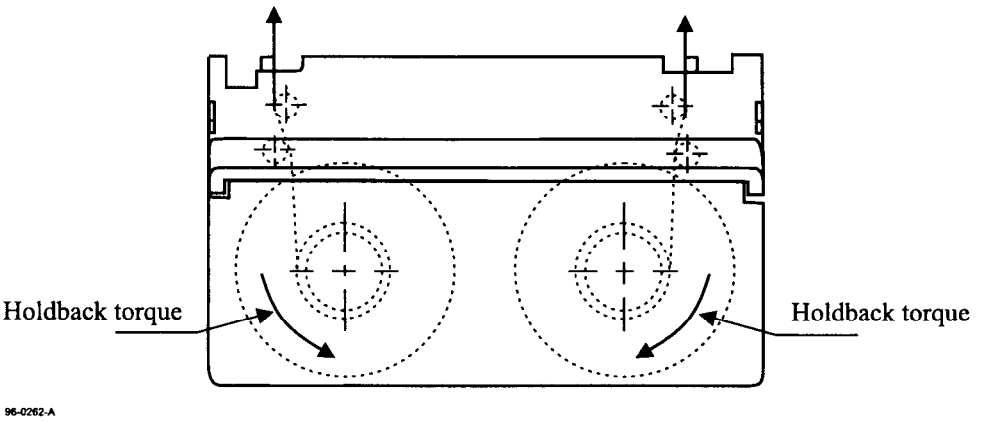


Figure 17 - Tape path to measure the extraction force of Type S cassette

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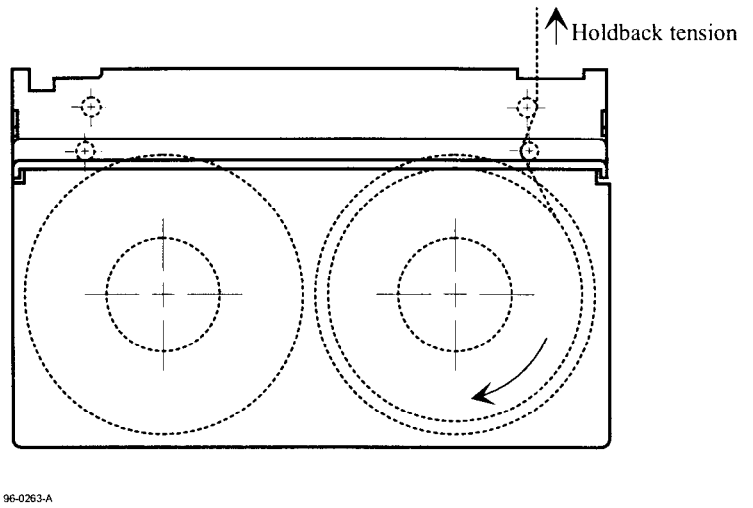


Figure 18 - Tape path to measure the frictional torque of the take-up reel of Type S cassette

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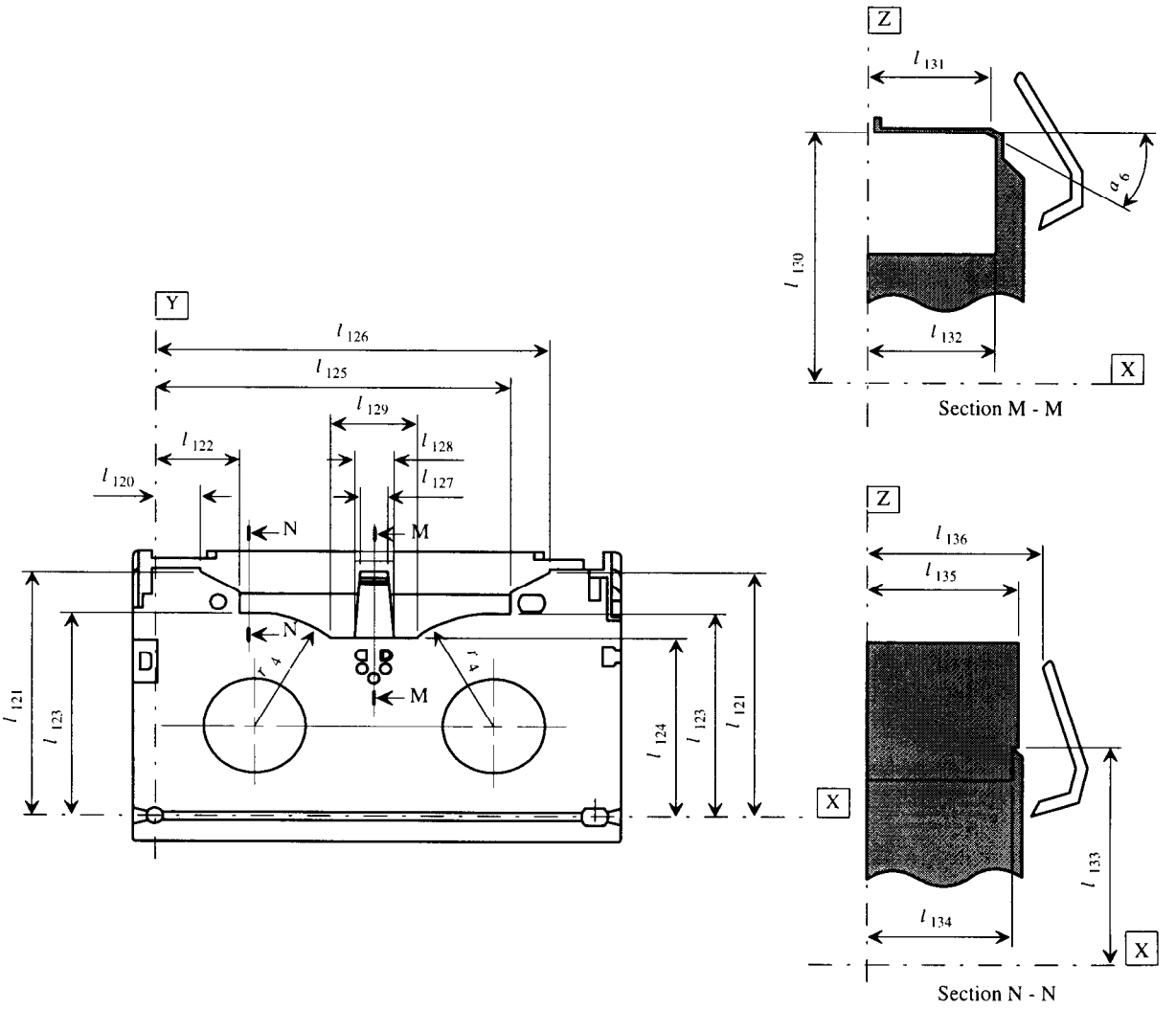


Figure 19 - Tape access cavity of Type S cassette

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8.3 Type L cassette

Figure 20 is a perspective view seen from the top.
Figure 21 is a perspective view seen from the bottom.
Figure 22 shows the top side with the lid closed using third angle projection.
Figure 23 shows the top side holding and label areas.
Figure 24 shows the bottom side with the lid removed.
Figure 25 shows the bottom side with the lid closed.
Figure 26 shows the details of the recognition holes.
Figure 27 shows the details of the write-inhibit plug.
Figure 28 shows the detail of the lid release insertion channel.
Figure 29 shows the lid unlock force direction.
Figure 30 shows the detail of the lid opening insertion channel.
Figure 31 shows the lid opening force direction.
Figure 32 shows the side view with the lid open.
Figure 33 shows the cassette reel.
Figure 34 shows the height of reels upon rotation.
Figure 35 shows the internal tape path.
Figure 36 shows the tape path to measure the extraction force.
Figure 37 shows the tape path to measure the friction torque of the take-up reel.
Figure 38 shows the tape access cavity requirements.
Figure 39 shows the cavity for compatibility.

8.3.1 Overall dimensions (figure 22)

The overall dimensions of the case with the lid closed are as follows.

The total width of the case shall be l_{201} = 145,0 mm ±0,4 mm

The total length of the case shall be l_{202} = 254,0 mm $^{+0,3\ mm}_{-0,5\ mm}$

The distance from the top of the case to the Reference Plane Z shall be

$l_{203} = l_3$ = 25,0 mm ± 0,3 mm

The front-top bevel edge shall start in the top surface at a distance

$l_{204} = l_4$ = 3,0 mm ± 0,5 mm from the front side and shall terminate in the front side at a distance
$l_{205} = l_5$ = 5,0 mm ± 0,5 mm from the top surface

The bottom-front edge of the case shall be rounded with a radius $r_{11} = r_1$ = 1,0 mm ± 0,1 mm

The distance from the back side to plane X shall be

$l_{206} = l_6$ = 9,0 mm $^{+0,2\ mm}_{-0,1\ mm}$

The distance from the right side to plane Y shall be

l_{207} = 8,5 mm $^{+0,2\ mm}_{-0,1\ mm}$

8.3.2 Holding areas (figure 23)

The holding areas, shown cross-hatched, in figure 23 shall be the areas along which the cassette shall be held down when inserted in the drive. The left and right edge holding areas shall extend from the rear side a distance of l_{208} = 118,3 mm min.

The width of the holding surface along the rear edge from the left and right sides a distance l_{212} and shall be

l_{209} = 19,7 mm min.

The width of the holding surface along the remainder of the rear edge shall be

l_{210} = 10 mm min.

The width of the left and right holding surfaces shall be

l_{211} = 10,7 mm min.

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The distance along the rear edge from both left and right sides where the holding area is l_{209} wide shall be

l_{212} = 77 mm min.

8.3.3 Window

A window may be provided on the top surface so that a part of the reels is visible. The window, if provided, shall not extend beyond the height of the cassette and shall not extend beyond the inner edge of the holding areas.

8.3.4 Label areas (figure 23)

A portion of the rear side of the cassette and a portion of the top surface of the cassette may be used for labels. The position and the size of the labels shall not interfere with the operation or clearance requirement of the cassette component parts. The area used for labels on the top surface shall not extend beyond the inner edge of the holding areas.

The position and dimensions of the label area on the rear side are defined as follows.

The distance from the top surface of the case to the top of the label area, and from the bottom of the label area to Plane Z, shall be

$l_{213} = l_{11}$ = 3,0 mm ± 0,3 mm

The distance from both the left and right sides of the case to the edges of the label area shall be

l_{214} = 56,0 mm ± 0,3 mm

The depth of the top surface label depression shall be 0,3 mm max.

The depth of the rear side label depression shall be 0,5 mm ± 0,1 mm.

8.3.5 Datum areas and datum holes (figures 24 and 25)

The annular datum areas E, F and G shall lie in plane Z. They determine the vertical position of the cassette in the drive. The annular datum area H shall be parallel to datum plane Z and within 0,3 mm of it. Each datum area shall have a diameter d_1 equal to 10,0 mm ± 0,1mm and be concentric with the respective datum hole.

The centres of datum holes E and F lie in plane X.

The centre of datum hole E shall be at the intersection of planes X and Y.

The distance from the centre of the datum hole F to plane Y shall be

l_{215} = 237,00 mm ± 0,15 mm

The distance from the centre of the datum hole G to plane Y shall be

l_{216} = 168,5 mm ± 0,3 mm

The distance from the centre of the datum hole H to plane Y shall be

l_{217} = 68,5 mm ± 0,2 mm

The distance from the centre of the datum holes G and H to plane X shall be

l_{218} = 123,0 mm ± 0,2 mm

The diameter of datum holes E, F and H shall be

$d_{11} = 5{,}5\ \text{mm}\ ^{+0,1\ \text{mm}}_{-0,0\ \text{mm}}$ as shown in section C-C of figure 25

The depth of all four datum holes shall be

$l_{221} = l_{19}$ = 9 mm min.

The distance across the flats of datum hole G shall be

$l_{219} = l_{17} = 5{,}5\ \text{mm}\ ^{+0,1\ \text{mm}}_{-0,0\ \text{mm}}$ as shown in section C'- C' of figure 25

The distance of the elongation in datum hole G shall be

$l_{220} = l_{18}$ = 8,00 mm ± 0,15 mm

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8.3.6 Support areas (figure 24)

The cassette support areas are shown cross-hatched in figure 24. Support areas E, F, G and H shall be coplanar with datum areas E, F, G and H, respectively, within ± 0,05 mm.

The areas within 1 mm of the edge of the cassette shall not be included in the support areas and shall be recessed from the support areas.

The dimensions and positions of the support areas shall be defined as follows.

The support area surrounding datum hole E shall be defined by

l_{222} = 21,0 mm ± 0,2 mm
l_{223} = 21,5 mm ± 0,2 mm

The support area surrounding datum hole F shall be defined by l_{222} and

l_{224} = 215,5 mm ± 0,3 mm

The support area surrounding datum hole H shall be defined by

l_{225} = 111,0 mm ± 0,3 mm
l_{226} = 129,0 mm ± 0,3 mm
l_{227} = 134,0 mm ± 0,3 mm
l_{228} = 58,5 mm ± 0,3 mm
l_{229} = 74,5 mm ± 0,3 mm

The support area surrounding datum hole G shall be defined by l_{225}, l_{226}, l_{227} and

l_{230} = 162,5 mm ± 0,3 mm
l_{231} = 178,5 mm ± 0,3 mm

8.3.7 Guiding grooves (figure 25)

The cassette shall be provided with three guiding grooves for correct insertion into the drive.

The width of the bottom rear guiding groove shall be

$l_{232} = 4{,}0\ \text{mm}\ {}^{+\ 0{,}2\ \text{mm}}_{-\ 0{,}0\ \text{mm}}$

The distance across the flanged opening at the left and right edges of the bottom rear guiding groove shall be

l_{233} = 7,0 mm ± 0,3 mm

The depth of the groove at the flanged opening on the left and right sides of the bottom rear guiding groove shall be

l_{234} = 3,0 mm ± 0,1 mm

The depth of the bottom rear groove between the slanted left and right end areas shall be

$l_{235} = 2{,}0\ \text{mm}\ {}^{+\ 0{,}1\ \text{mm}}_{-\ 0{,}0\ \text{mm}}$

The distance from Plane Y to the end of the slant in the bottom of groove at the right side end shall be

l_{236} = 16,0 mm ± 0,5 mm

The distance from Plane Y to beginning of slant in the bottom of groove at the left side end shall be

l_{237} = 221,0 mm ± 0,5 mm.

The location of the guiding grooves in the bottom surface extending from the front on the right and left side shall be defined by

l_{238} = 65,0 mm ± 0,4 mm
l_{239} = 10,0 mm ± 0,2 mm
l_{240} = 40,5 mm ± 0,1 mm
$l_{241} = 156{,}0\ \text{mm}\ {}^{+\ 0{,}0\ \text{mm}}_{-\ 0{,}3\ \text{mm}}$
l_{242} = 12,00 mm ± 0,15 mm

The depth of these two grooves from Plane Z shall be

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l_{272} = 3,5 mm min. as shown in the front view of figure 25.

The angle of the flange opening of the bottom rear guiding groove at both ends shall be

$a_{11} = 30° \pm 3°$

8.3.8 Recognition holes (figure 26)

There shall be 7 recognition holes numbered 1 to 7 as shown in figure 26.

The position and dimensions of the recognition holes 1 to 6 are as follows.

A line through and locating the centres of holes 6 and 1 shall be

l_{243} = 118,50 mm ± 0,15 mm from plane Y

The centre of hole 6 shall be located

l_{244} = 97,0 mm ± 0,2 mm from Plane X

The centres of holes 4 and 5 shall be located

$l_{245} = l_{50}$ = 3,40 mm ± 0,05 mm to the left and right of a line through the centres of holes 1 and 6

The location of a line through the centres of holes 4 and 5 shall be a distance

$l_{246} = l_{51}$ = 3,6 mm ± 0,1 mm from the centre of hole 6

Recognition holes 2 and 3 are D shaped with the flats next to hole 1; the flats shall be a distance

$l_{247} = l_{52}$ = 4,00 mm ± 0,05 mm from the centre of hole 1

The distance of a line through the centres of holes 1,2 and 3 from Plane X shall be

l_{248} = 105,0 mm ± 0,2 mm

The length of the flat of holes 2 and 3 shall be

$l_{249} = l_{54}$ = 3,4 mm $^{+0,2\ mm}_{-0,0\ mm}$

The distance from the centre to the flat of holes 2 and 3 shall be

$l_{250} = l_{55}$ = 1,7 mm $^{+0,2\ mm}_{-0,0\ mm}$

Holes 1 and 3 contain a tab as shown in view Q of figure 6.

The distance from the tab surface to the bottom of the cavity behind the tab shall be

$l_{251} = l_{56}$ = 10 mm min. as shown in section F-F in figure 26.

The depth of hole 4, 5 and 6 shall be

$l_{252} = l_{57}$ = 5 mm min.

The radius of the D holes 2 and 3 shall be

$r_{12} = r_2$ = 1,7 mm $^{+0,2\ mm}_{-0,0\ mm}$

The diameter of holes 1, 4, 5 and 6 shall be

$d_{12} = d_2$ = 3,4 mm $^{+0,2\ mm}_{-0,0\ mm}$

Recognition hole 7 is located in the bottom right side of the case shown in figure 25, view P. The distance from the Plane X to the edge of recognition hole 7 nearest to the rear side of the case shall be

l_{253} = 99,0 mm $^{+0,3\ mm}_{-0,5\ mm}$

The length of the recognition hole 7 shall be

l_{254} = 7,0 mm $^{+0,5\ mm}_{-0,0\ mm}$

The distance from the Plane Y to the edge of recognition hole 7 farthest from the right side of the case shall be

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$$l_{255} = 1{,}9 \text{ mm } {}^{+0{,}1 \text{ mm}}_{-0{,}3 \text{ mm}}$$

The width of recognition hole 7 shall be

$$l_{256} = 5{,}0 \text{ mm } {}^{+0{,}5 \text{ mm}}_{-0{,}0 \text{ mm}}$$

The depth of recognition hole 7 shall be

$$l_{257} = 4{,}5 \text{ mm min.}$$

This International Standard prescribes the following states of these recognition holes.

- Recognition hole 1 shall be closed.
- Recognition hole 2 shall be open.
- Recognition hole 3 shall be closed.
- Recognition hole 4 shall be open.
- Recognition hole 5 shall be open.
- Recognition hole 6 shall be open.
- Recognition hole 7 shall be open.

Tabs may be used to close the recognition holes,. The dimensions of the tabs, if used, shall be as defined in the section F-F of figure 26. The tabs shall withstand an applied force of 2,0 N max. without being punched out.

The surface of the tabs shall be recessed from the bottom surface of the case a distance

$$l_{258} = l_{68} = 0{,}3 \text{ mm max.}$$

The space around the knockout tab in recognition holes 1 and 3, as viewed in section F-F of figure 26, shall be

$$l_{259} = l_{69} = 0{,}7 \text{ mm max.}$$

8.3.9 Write-inhibit plug (figure 27)

The write-inhibit plug is located on the right side at the bottom of the case as shown in figure 25, view R.

The distance in Plane Z from Plane X to the near edge of the write-inhibit plug hole shall be

$$l_{260} = 85{,}0 \text{ mm} \pm 0{,}3 \text{ mm}$$

The span of the write-inhibit plug hole shall be

$$l_{261} = l_{71} = 7{,}00 \text{ mm } {}^{+0{,}15 \text{ mm}}_{-0{,}00 \text{ mm}}$$ as shown in view R of figure 25.

The distance on the right side of the case from Plane X to the near edge of the slider opening shall be

$$l_{262} = 85{,}3 \text{ mm min.}$$

The distance on the right side of the case from Plane X to the far edge of the slider opening shall be

$$l_{263} = 91{,}3 \text{ mm max.}$$

The distance from Plane Y to the inner side of the write-inhibit plug hole shall be

$$l_{264} = 141{,}60 \text{ mm} \pm 0{,}15 \text{ mm}$$

The distance from the inner side of the write-inhibit hole to the slide rail shoulder shall be

$$l_{265} = l_{75} = 5{,}00 \text{ mm } {}^{+0{,}15 \text{ mm}}_{-0{,}00 \text{ mm}}$$

The distance on the left side from Plane Z to the far edge of the write-inhibit plug detent hole shall be

$$l_{266} = l_{76} = 9{,}4 \text{ mm max.}$$

The tang on the left side of the body of the write-inhibit plug shall extend

$$l_{267} = l_{77} = 1{,}7 \text{ mm max.}$$

The surface of the write-inhibit plug, when in the write-enable position, shall be recessed from Plane Z a distance

$$l_{268} = l_{78} = 0{,}5 \text{ mm max.}$$

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When the write-inhibit plug is pushed down, recording on the tape is inhibited.

The distance from Plane Z to the surface of the plug in the write-inhibit position shall be

$l_{269} = l_{79} = 4{,}5$ mm min.

The write-inhibit plug shall not be deformed by 0,3 mm or more when a force of 2,0 N is applied to the centre of it. The force required to push down or lift up the write-inhibit plug shall be less than 40 N.

8.3.10 Pre-positioning surface (figures 24 and 25)

The pre-positioning surfaces are parallel to Plane Y in the front of the bottom surface and determine the initial location of the cassette as it is inserted into the drive loading slot.

The height of the pre-position surfaces above Plane Z shall be

$l_{270} = 3{,}5$ mm ± 0,1 mm as shown in the front view in figure 25.

The distance from Plane X to the front of the left and right pre-position surfaces shall be

$l_{271} = 136{,}0$ mm $^{+\,0{,}2\text{ mm}}_{-\,0{,}0\text{ mm}}$ as shown in figure 24.

The distance of the right side pre-position surface from Plane Y shall be

$l_{272} = 3{,}5$ mm min.

The distance of the left side pre-position surface from Plane Y shall be

$l_{273} = 233{,}5$ mm max.

8.3.11 Cassette lid (figures 28, 29, 30, 31 and 32)

The cassette shall include a lid for protection of the tape during handling, storage and transportation. The lid shall be automatically locked when the lid is closed and it shall be unlocked when the release pins in the drive are inserted into both of the left and right bottom front channels shown in figure 28.

The distance from Plane Y to the farthest edge of the left side lid release insertion channel shall be

$l_{274} = 237{,}5$ mm max.

The distance from Plane Y to the inside edge of the right side lid release insertion channel shall be

$l_{275} = 3{,}5$ mm min.

The distance from Plane Y to the outside edge of the right side lid release insertion channel shall be

$l_{276} = 0{,}5$ mm min.

The distance from Plane X to the near edge of both lid release insertion channels shall be

$l_{277} = 124{,}0$ mm $^{+\,0{,}0\text{ mm}}_{-\,0{,}3\text{ mm}}$

The distance from Plane Z to the near wall of the cavities containing the locking mechanisms shall be

$l_{278} = l_{86} = 2{,}4$ mm max.

The distance from Plane Z to the far wall of the cavity containing the locking mechanism shall be

$l_{279} = l_{87} = 5{,}85$ mm min.

The design of the locking mechanism is not specified by this International Standard except that it shall be operated by the release pin in the drive. The lid release mechanisms shall be actuated when the drive release pins are in the cross-hatched area shown in sections J'-J' and J-J of figure 28 and defined by l_{279} and

$l_{280} = 123{,}2$ mm max.
$l_{281} = 124{,}8$ mm min.
$l_{282} = l_{90} = 3$ mm max.

The force needed to unlock the lid shall be less than 1 N in the directions shown by figure 29.

After the lid is unlocked, the lid shall be open when the lid opening lever in the drive is inserted into the channel shown in figure 30.

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The distance from Plane X to the near end of the lid opening channel shall be

l_{283} = 126,3 mm max.

The distance from Plane Y to the right inside wall of the lid opening channel shall be

l_{284} = 42,1 mm ± 0,2 mm

The distance across the lid opening channel shall be

l_{285} = 5,20 mm± 0,15 mm

The distance from bottom surface of the case to the front bottom edge of the lid shall be

$l_{286} = l_{94}$ = 0,1 mm ± 0,1 mm

The bottom front edge of the lid shall have a flat for the distance defined by

$l_{287} = l_{95}$ = 1,2 mm ± 0,2 mm

The depth of the lid opening channel in the front surface of the main case shall be

l_{288} = 19,5 mm min.

The inside front bottom edge of the lid shall be chamfered at an angle defined by

$a_{12} = a_3$ = 30° ± 3° starting at the flat defined by l_{287}

The force needed to open the lid shall be 1,5 N max.in the direction shown in figure 31.

The lid rotates around the axis defined in figure 32 by dimensions

l_{289} = 118,0 mm ± 0,5 mm
l_{290} = 18,0 mm ± 0,5 mm

The maximum possible lid opening distance shall be

l_{291} = 29 mm min.

8.3.12 Cassette reel lock (figure 32)

The reels shall be locked when the cassette is removed from the tape drive and shall be unlocked when the cassette is inserted into the drive.

The design of the locking mechanism is not specified by this International Standard except that the reel shall be completely released when the cassette lid is opened from reference plane Z defined by

l_{292} = 23,5 mm max. The minimum distance required to unlock the reels is not specified.

8.3.13 Reel access holes (figure 25)

The case shall have two circular reel access holes which shall allow penetration of the drive spindles. The dimension and positions of the access holes shall be

The centreline of both reel holes shall be the distance from Plane X defined by

l_{293} = 55,5 mm ± 0,2 mm

The distance from Plane Y along the line defined by l_{293} to the centre of the right reel hole shall be

l_{294} = 56,0 mm ± 0,2 mm

The distance from Plane Y along the line defined by l_{293} to the centre of the left reel hole shall be

l_{295} = 181,0 mm ± 0,2 mm

The diameter of both reel holes shall be

d_{13} = 42,5 mm ± 0,2 mm

8.3.14 Reels (figure 33)

The reels have a spindle-receiving cavity extending from the bottom surface, with inward facing gear teeth for transferring drive and a round upper cylinder to define the axis of rotation precisely.

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The diameter of the round upper cylinder in the receiving cavity shall be

$$d_{14} = d_4 = 11{,}00 \text{ mm } {}^{+0{,}15 \text{ mm}}_{-0{,}00 \text{ mm}}$$

The tops of the inside gear teeth shall lie in a cylinder suface with a diameter defined by

$$d_{15} = d_5 = 14{,}0 \text{ mm } {}^{+0{,}4 \text{ mm}}_{-0{,}2 \text{ mm}}$$

The base of the inside gear teeth shall lie in a cylinder suface with a diameter defined by

$$d_{16} = d_6 = 18{,}0 \text{ mm} \pm 0{,}2 \text{ mm}$$

The base surface of the reel are formed by two concentric annular rings.

The smaller ring inside diameter shall be

$d_{17} = d_7 = 27{,}6$ mm ± 0,2 mm and the outside diameter shall be
$d_{18} = d_8 = 30{,}0$ mm ± 0,2 mm

The larger ring inside diameter shall be

$d_{19} = 37{,}6$ mm ± 0,2 mm and the outside diameter shall be
$d_{20} = 40{,}0$ mm ± 0,2 mm

The width of the tops of the inside gear teeth shall be

$$l_{296} = l_{103} = 2{,}0 \text{ mm} \pm 0{,}5 \text{ mm}$$

The distance from the reel base annular ring to the inside lower flange at the tape hub surface shall be

$$l_{297} = l_{104} = 3{,}75 \text{ mm } {}^{+0{,}20 \text{ mm}}_{-0{,}10 \text{ mm}}$$

The distance between the lower and upper flanges at the tape hub surface shall be

$$l_{298} = l_{105} = 13{,}5 \text{ mm } {}^{+0{,}2 \text{ mm}}_{-0{,}5 \text{ mm}}$$

The distance from the reel base annular ring to the top of the inside gear teeth base cylinder shall be

$$l_{299} = l_{106} = 9{,}00 \text{ mm} \pm 0{,}15 \text{ mm}$$

The distance from the reel base annular ring to the start of the round upper cylinder shall be

$$l_{300} = l_{107} = 10{,}5 \text{ mm} \pm 0{,}3 \text{ mm}$$

The distance from the reel base annular ring to the top of the round upper cylinder shall be

$$l_{301} = l_{108} = 15{,}0 \text{ mm } {}^{+0{,}5 \text{ mm}}_{-0{,}0 \text{ mm}}$$

The length of the tops of the gear teeth from the top of the inside gear teeth base cylinder shall be

$$l_{302} = l_{109} = 6{,}50 \text{ mm} \pm 0{,}15 \text{ mm}$$

The gear teeth side surfaces extend from the base cylinder to the tops cylinder and shall be at an angle with respect to each other defined by

$$a_{13} = a_4 = 60° \pm 5°$$

The 6 gear teeth shall be spaced around the base cylinder at an angle defined by

$$a_{14} = a_5 = 60° \pm 1°$$

The reels assembled in a cassette shall rotate freely under the condition described in figure 34.

The distance from Plane Z to the annular base reel surface which provides free rotation of the reel when the cassette is loaded into a drive shall be

$$l_{303} = 2{,}4 \text{ mm} \pm 0{,}2 \text{ mm}$$

The reels assembled in a cassette shall be spring loaded with a force F of 3,5 N ± 0,5 N as shown in figure 34.

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When the cassette is inserted into the drive, the parts which are pressed to the reels shall extend beyond the height of the cassette. The parts shall not rotate with the reels. Their dimensions and position shall be defined by

d_{21} = 10 mm min. and
l_{304} = 1,5 mm max.

8.3.15 Position of the tape in the case (figure 35)

Four tape guides define the tape path inside the cassette. Two guides on the left side, one close to the front opening of the case and one close to the supply reel. Two guides on the right side, one close to the front opening of the case and one near to the take-up reel.

The distance from Plane X to a line through the centres of the guides close to the reels shall be

l_{305} = 122,0 mm ± 0,5 mm

The distance from Plane Y to the center of right guide close to the take-up reel shall be

l_{306} = 56,0 mm ± 0,5 mm

The distance from Plane Y to the centre of the left guide close to the supply reel shall be

l_{307} = 181,0 mm ± 0,5 mm

The distance from Plane X to a line through the centres of the guides close to the front side of the case shall be

l_{308} = 130,0 mm ± 0,5 mm

The distance from Plane Y to the centre of the right guide close to the front side of the case shall be

l_{309} = 61,5 mm ± 0,5 mm

The distance from Plane Y to the centre of the left guide close to the front side of the case shall be

l_{310} = 175,5 mm ± 0,5 mm

The diameter of the two front-most guides shall be

$d_{22} = d_9$ = 5,0 mm ± 0,3 mm

The diameter of the two guides closer to the reels shall be

d_{23} = 6,0 mm ± 0,3 mm

8.3.16 Tape path zone (figure 35)

When the cassette is inserted into the drive, the tape is pulled outside of the case by tape guides. The tape path zone of the case is the zone in which the tape shall be able to move freely.

The distance from Plane X to the furthest points defining the zone limit on the left and right in front of the case shall be

l_{311} = 149,0 mm ± 0,2 mm

The distance from Plane Y to the right front point defining the zone limit shall be

l_{312} = 41,5 mm min.

The distance from Plane Y to the left front point defining the zone limit shall be

l_{313} = 180,5 mm min.

With a holdback torque of 0,001 N·m applied to a nearly empty reel under the condition described in figure 36, the force required to pull the tape out from the reel shall not exceed 0,17 N. This specification shall be applied to both the supply and take-up reels.

With a holdback tension of 0,3 N applied to the take-up reel nearly full of the tape under the condition described in figure 37, the torque required to wind the tape not exceed 0,03 N·m.

8.3.17 Tape access cavity (figure 38)

When the cassette is inserted into the drive, tape guides in the drive pull out the tape into the drive tape path. The shape and dimensions of the access cavity for these tape guides shall be defined as follows.

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The inside shape of the lid is not specified by this International Standard except that clearance shown cross-hatched shall be provided for drive tape threading mechanisms when the lid is opened l_{330} from datum plane Z.

The distance from Plane Y to the starting point for the right rear surface of the access cavity shall be

$l_{314} = 63{,}0 \text{ mm} \pm 0{,}3 \text{ mm}$

The distance from Plane X to the starting point for the right rear surface of the access cavity shall be

$l_{315} = 135{,}0 \text{ mm} \, {}^{+0{,}2 \text{ mm}}_{-0{,}5 \text{ mm}}$

The distance from Plane Y to the extent of the right rear surface of the access cavity shall be

$l_{316} = 76{,}25 \text{ mm max.}$

The distance from Plane X to start of the radiused surface which defines the rear-most extent of the tape access cavity shall be

$l_{317} = 119{,}7 \text{ mm max.}$

The distance from Plane X to the surface defining the rear-most extent of the tape access cavity shall be

$l_{318} = 111{,}1 \text{ mm max.}$

The distance from Plane Y to the extent of the left rear surface of the access cavity shall be

$l_{319} = 160{,}75 \text{ mm min.}$

The distance from Plane Y to the edge in the bottom surface which defines the left-most extent of the tape access cavity shall be

$l_{320} = 174{,}0 \text{ mm} \pm 0{,}3 \text{ mm}$

The width at the end of the centre tape position limit arm shall be

$l_{321} = l_{127} = 8{,}7 \text{ mm max.}$

The width at the base of the centre tape position limit arm shall be

$l_{322} = l_{128} = 14{,}7 \text{ mm max.}$

The width of the rearmost surface of the tape access cavity shall be

$l_{323} = l_{129} = 26{,}5 \text{ mm min.}$

The distance from Plane X to the inside surface of the centre tape position limit post shall be

$l_{324} = 131{,}5 \text{ mm min.}$

The distance from Plane Z to the inside surface of the support for the centre tape position limit post shall be

$l_{325} = l_{131} = 19 \text{ mm min.}$

The distance from Plane Z to the top inside surface of the support for the centre tape position limit post shall be

$l_{326} = l_{132} = 20{,}8 \text{ mm min.}$

The distance from Plane Z to the edge in the top surface of the case which defines the lid case interface shall be

$l_{327} = 126 \text{ mm max.}$

The distance from Plane Z to the inside of the case top surface shall be

$l_{328} = l_{134} = 23 \text{ mm min.}$

The distance from Plane Z in the lid area representing the depth of the access cavity shall be

$l_{329} = l_{135} = 24 \text{ mm min.}$

The distance from Plane Z to the lid edge which when the lid is opened shall provide the above defined tape access cavity shall be

$l_{330} = l_{136} = 27{,}5 \text{ mm} \, {}^{+1{,}5 \text{ mm}}_{-0{,}0 \text{ mm}}$

The angle of the fillet at the inside and outside of the corner of the centre tape position limit post shall be

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$a_{15} = a_6 = 35°$ max.

The curvature of the rear tape access cavity surfaces shall have a radius defined by

$r_{13} = r_4 = 39{,}6$ mm max. and centred at the reel centres.

The centre points for generating the two radiused surfaces shall be defined by

$l_{331} = 80{,}0$ mm ± 0,3 mm
$l_{332} = 80{,}5$ mm ± 0,3 mm
$l_{333} = 156{,}5$ mm ± 0,3 mm as shown in figure 38.

8.3.18 Cavity for compatibility with Type S cassette (figure 39)

The Type L cassette shall have the cavities for the cassette support guides, the lid opening lever, and the lid unlocking pin provided for Type S cassette. Their positions and dimensions shall be defined as follows.

The relief in the bottom surface near the right side shall be defined by

$l_{334} = 14{,}5$ mm ± 0,2 mm
$l_{335} = 31{,}0$ mm ± 0,3 mm
$l_{336} = 45{,}5$ mm ± 0,3 mm
$l_{337} = 15{,}5$ mm ± 0,2 mm
$l_{338} = 25{,}0$ mm ± 0,3 mm
$l_{339} = 35{,}0$ mm ± 0,3 mm

The relief in the bottom surface near the left side shall be defined by

l_{334}, l_{335}, l_{336} and
$l_{340} = 202{,}0$ mm ± 0,4 mm
$l_{341} = 212{,}0$ mm ± 0,4 mm
$l_{342} = 221{,}5$ mm ± 0,4 mm

The distance from Plane X to the edge of the lid opening lever cavity shall be

$l_{343} = 120{,}0\ ^{+0{,}0\ \text{mm}}_{-0{,}3\ \text{mm}}$

The distance from Plane Y to the right edge of the lid opening lever cavity shall be

$l_{344} = 186{,}7$ mm max.

The distance from Plane X to the left edge of the lid opening lever cavity shall be

$l_{345} = 190{,}3$ min.

The depth of the lid opening lever cavity shall be

$l_{346} = 6$ mm min.

The depth of the cavities for the cassette support guides for Type L cassette shall be 0,5 mm ± 0,2 mm.

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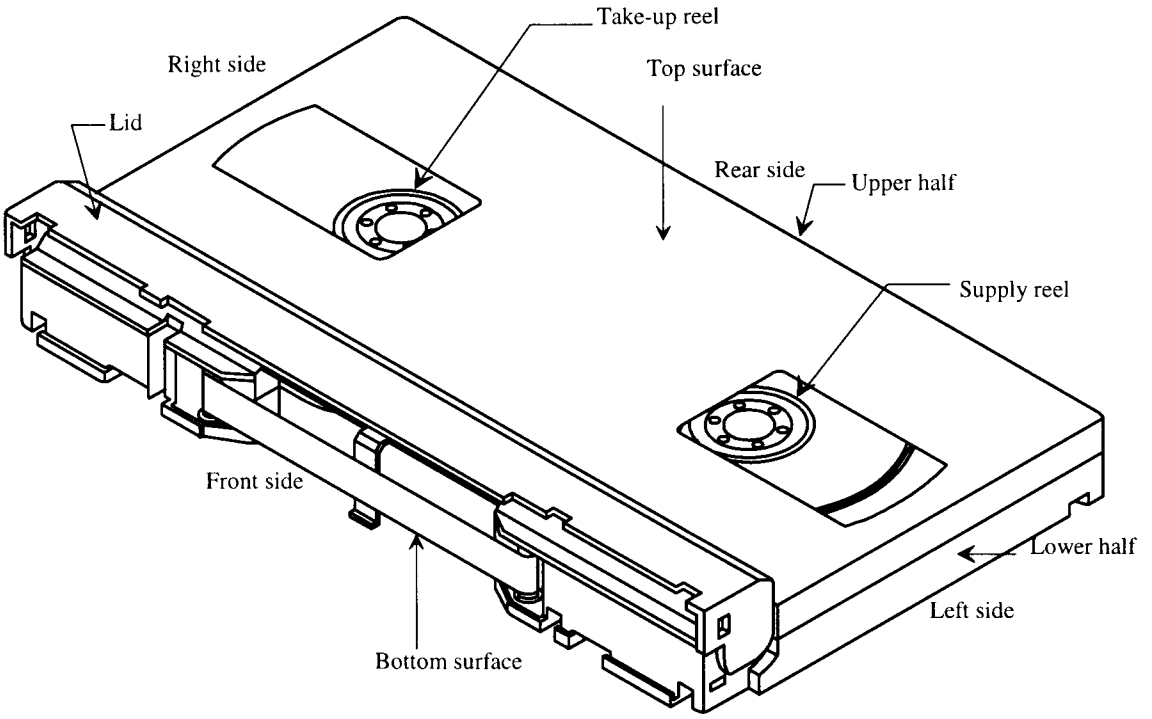


Figure 20 - Type L cassette top view (lid open)

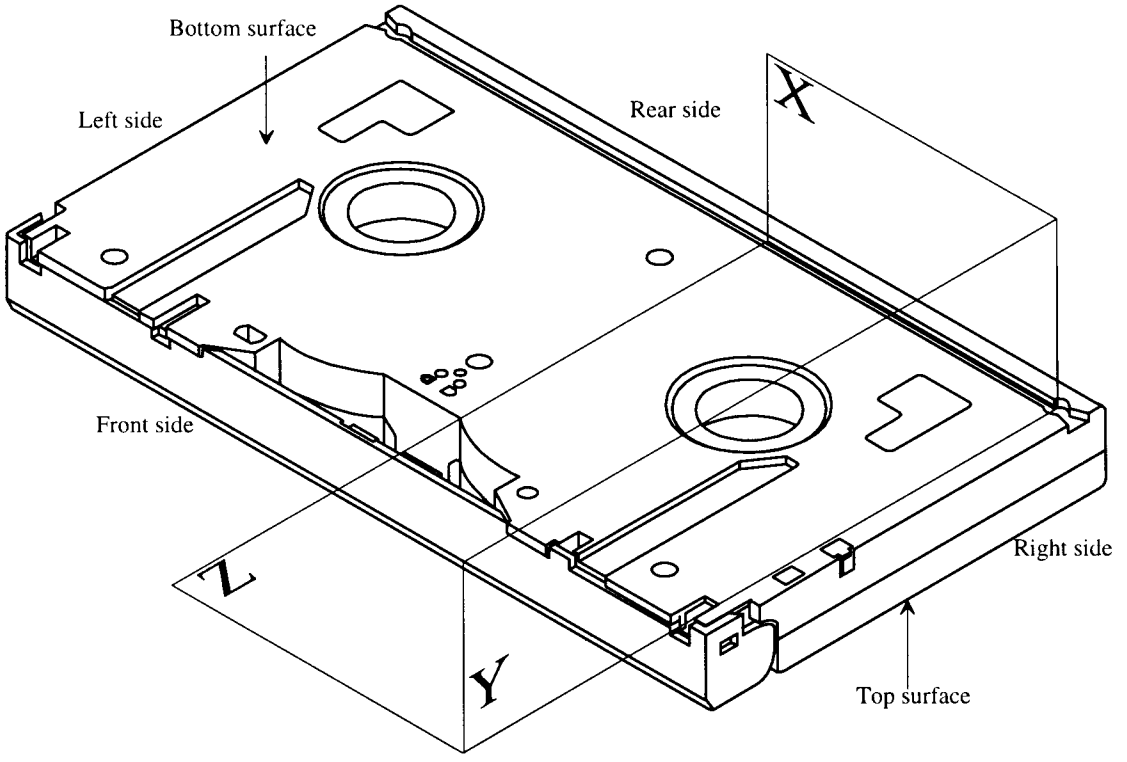


Figure 21 - Type L cassette bottom view (lid closed)

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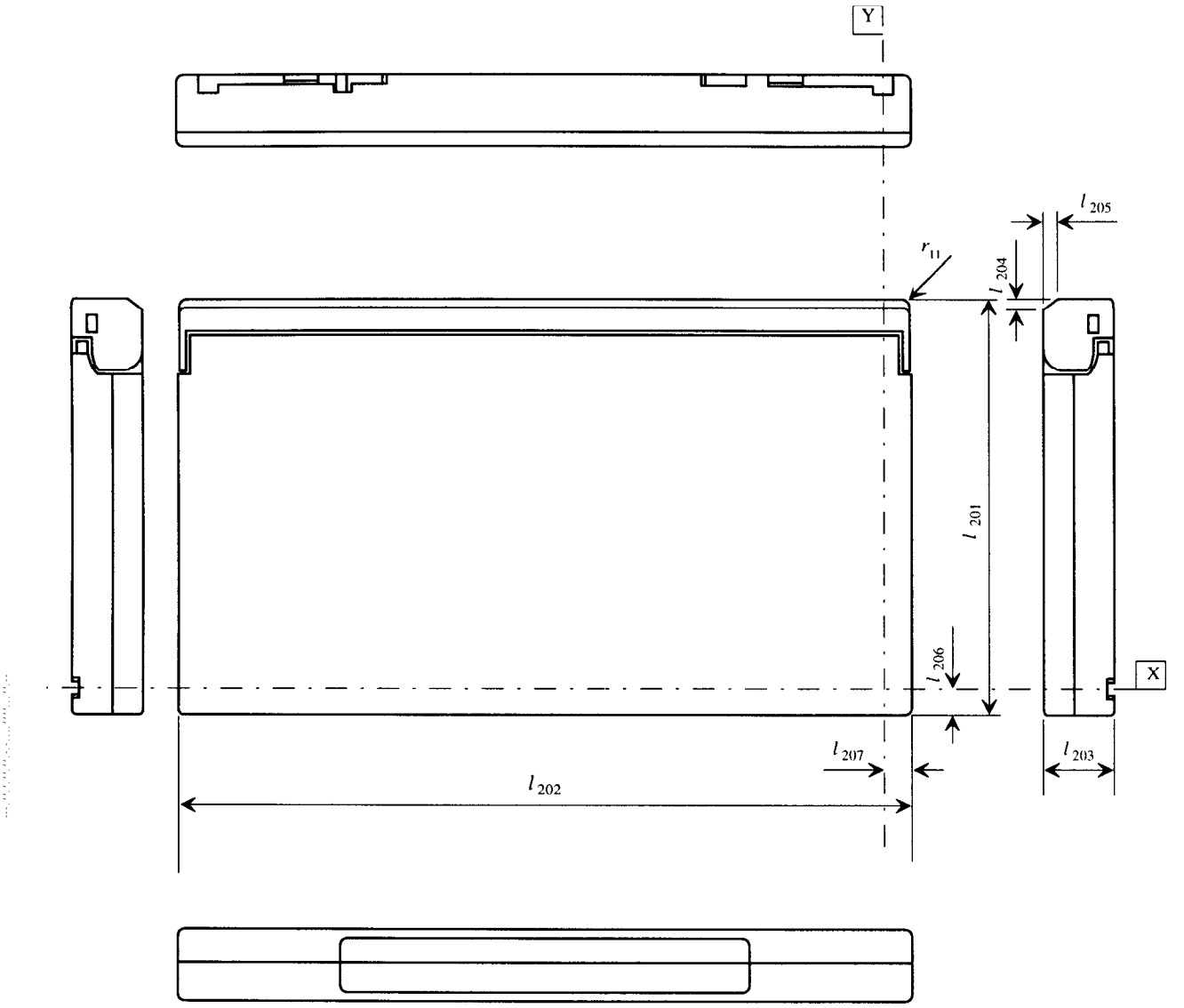


Figure 22 - Top side of Type L cassette (lid closed)

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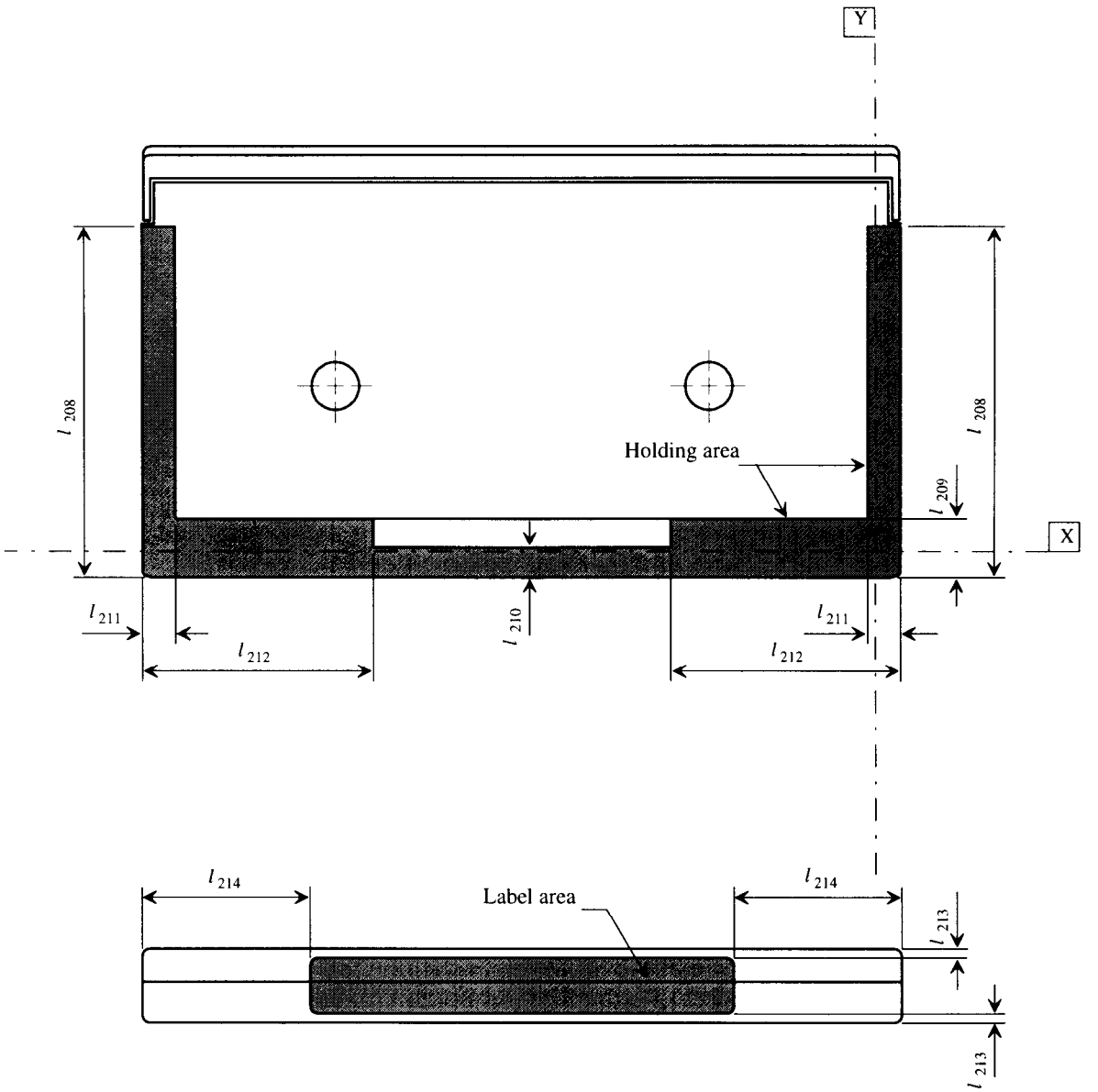


Figure 23 - Top side of Type L cassette, holding and label areas

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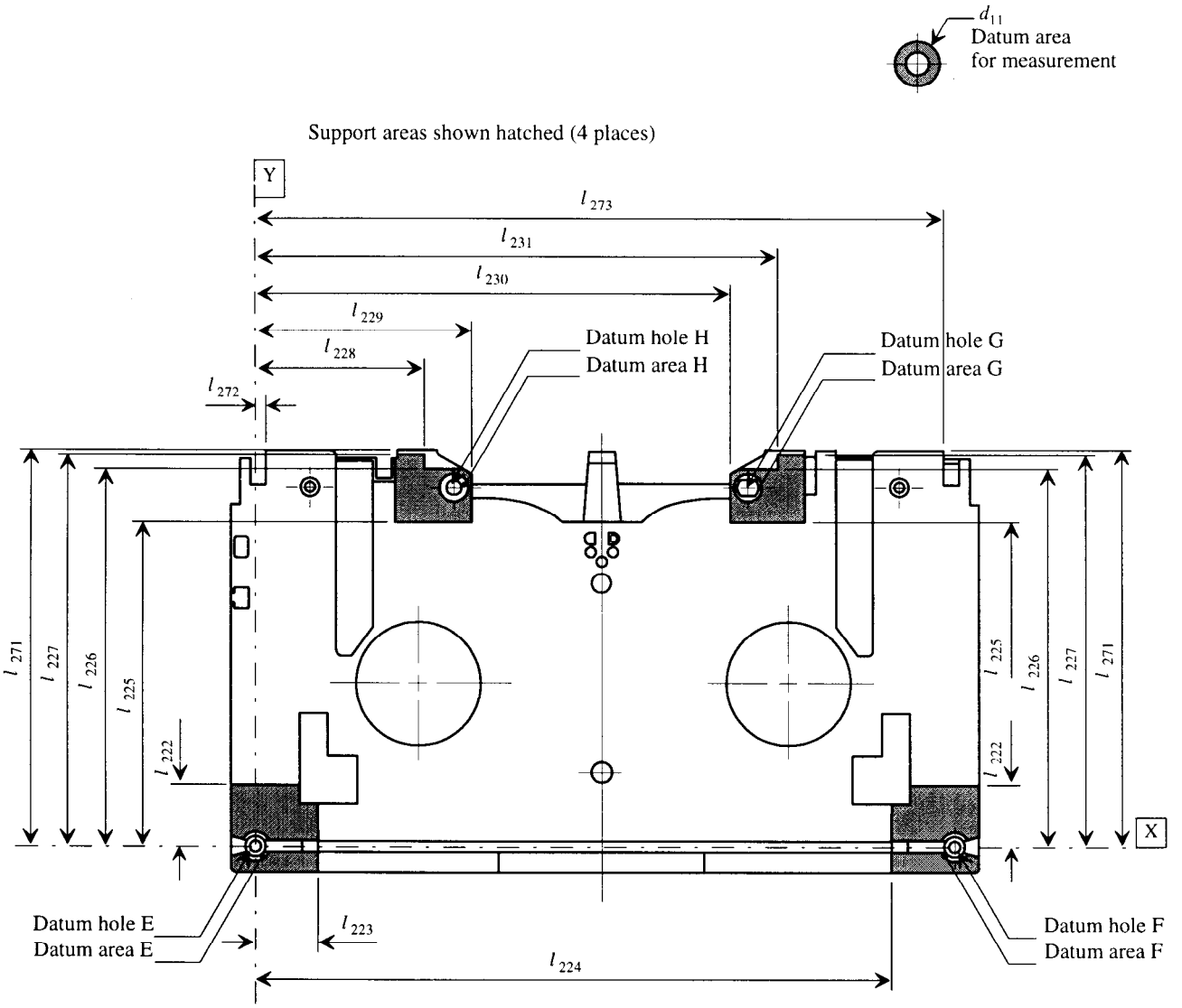


Figure 24 - Bottom side of Type L cassette (lid removed)

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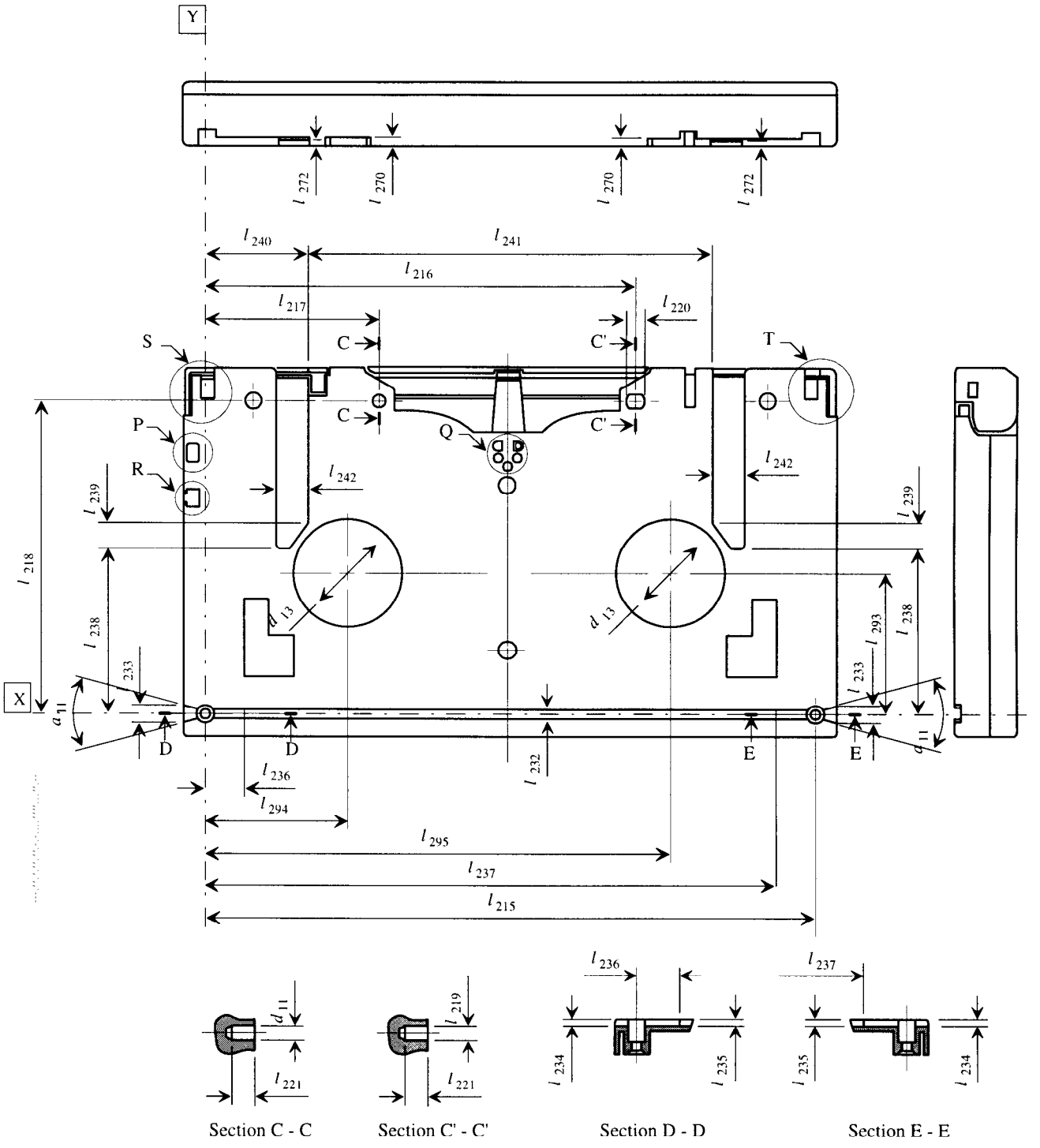
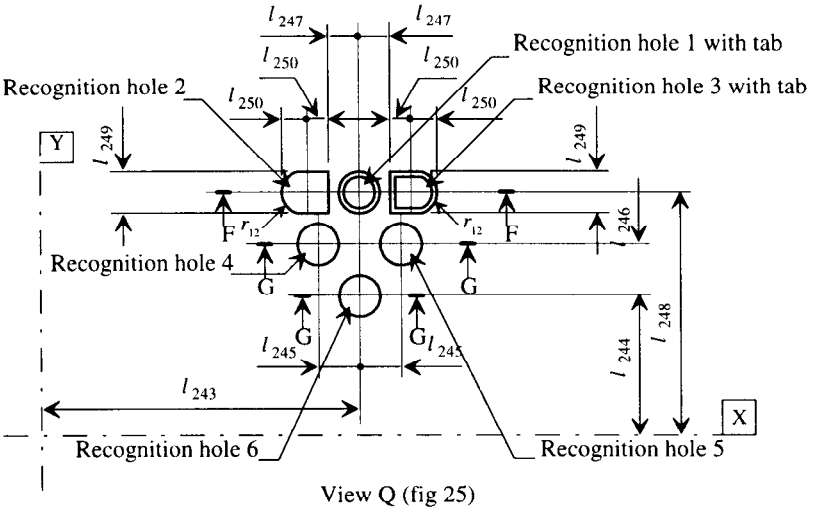
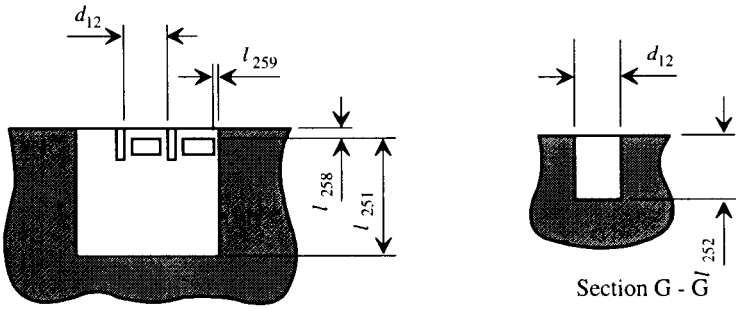


Figure 25 - Bottom side of Type L cassette (lid closed)

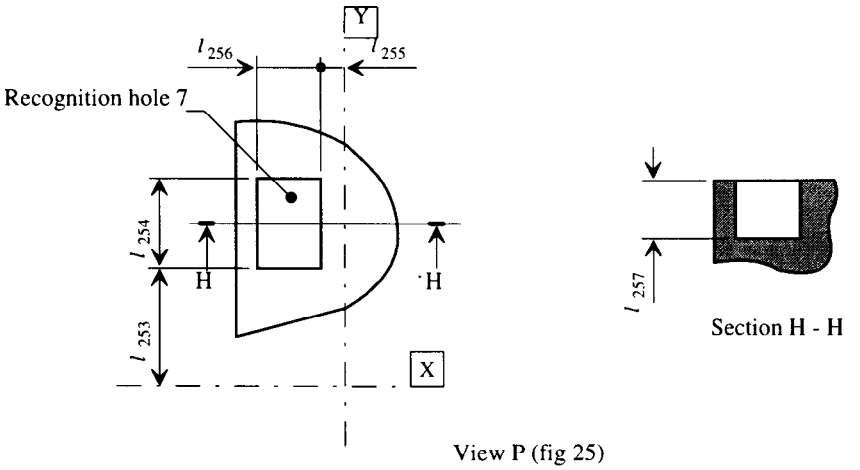
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View Q (fig 25)



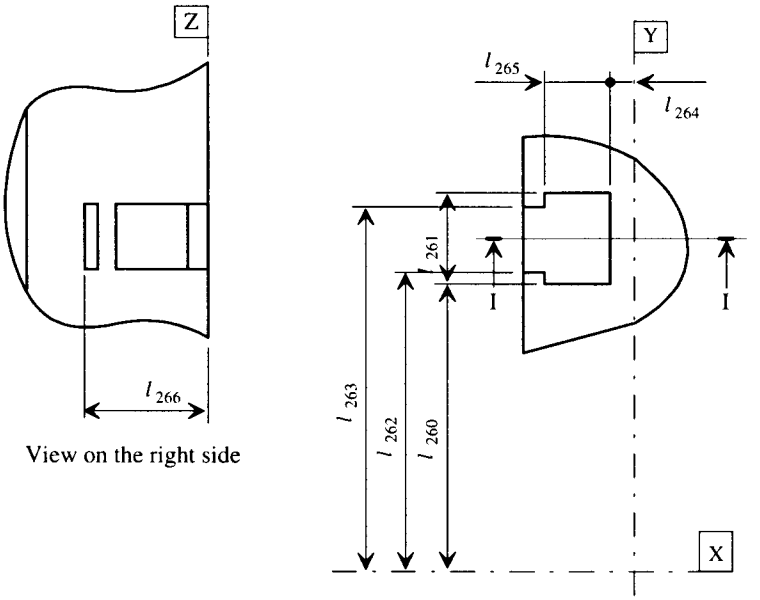
Recognition holes 1 - 6



View P (fig 25)

Figure 26 - Details of recognition holes of Type L cassette

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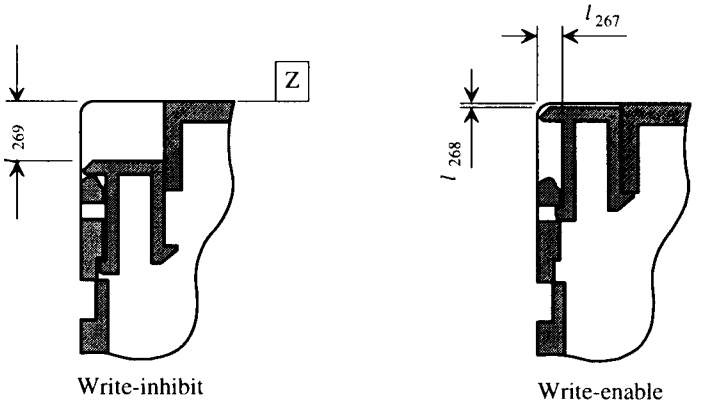


Figure 27 - Details of write-inhibit plug of Type L cassette

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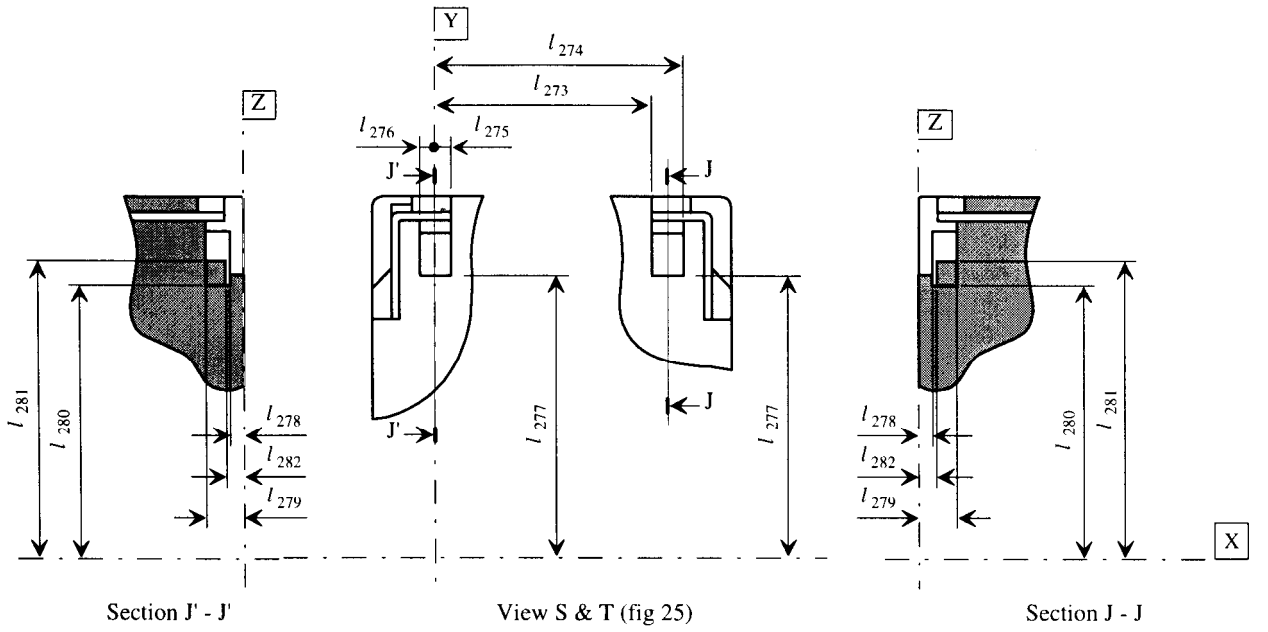


Figure 28 - Lid release insertion channel of Type L cassette

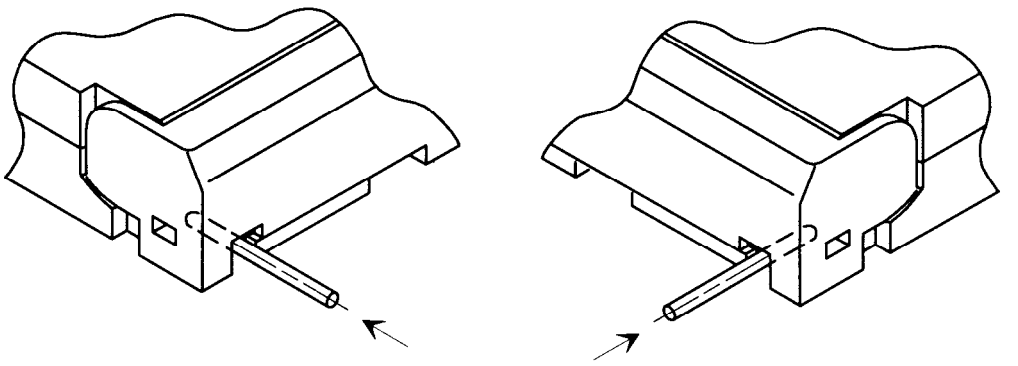


Figure 29 - Direction of force needed to unlock the lid with Type L cassette

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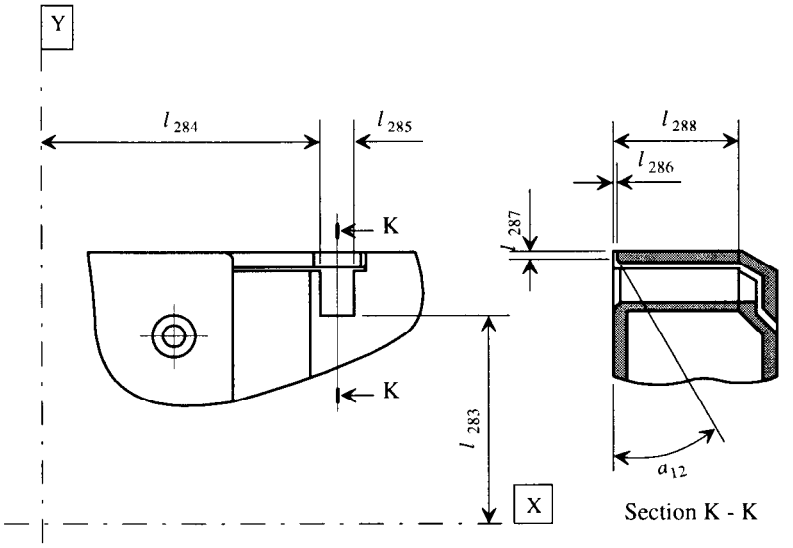


Figure 30 - Lid opening insertion channel of Type L cassette

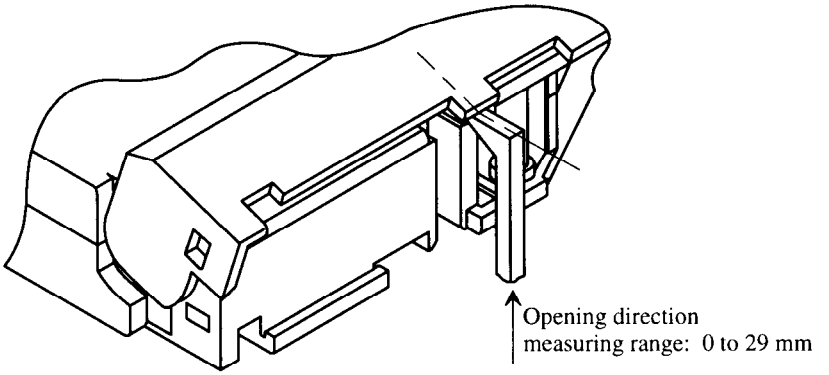


Figure 31 - Direction of force needed to open the lid with Type L cassette

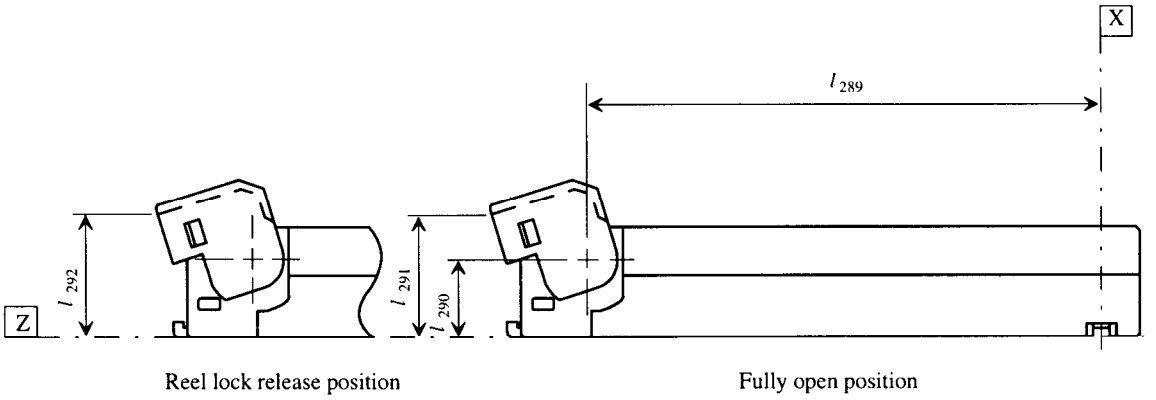


Figure 32 - Side view of Type L cassette (lid open)

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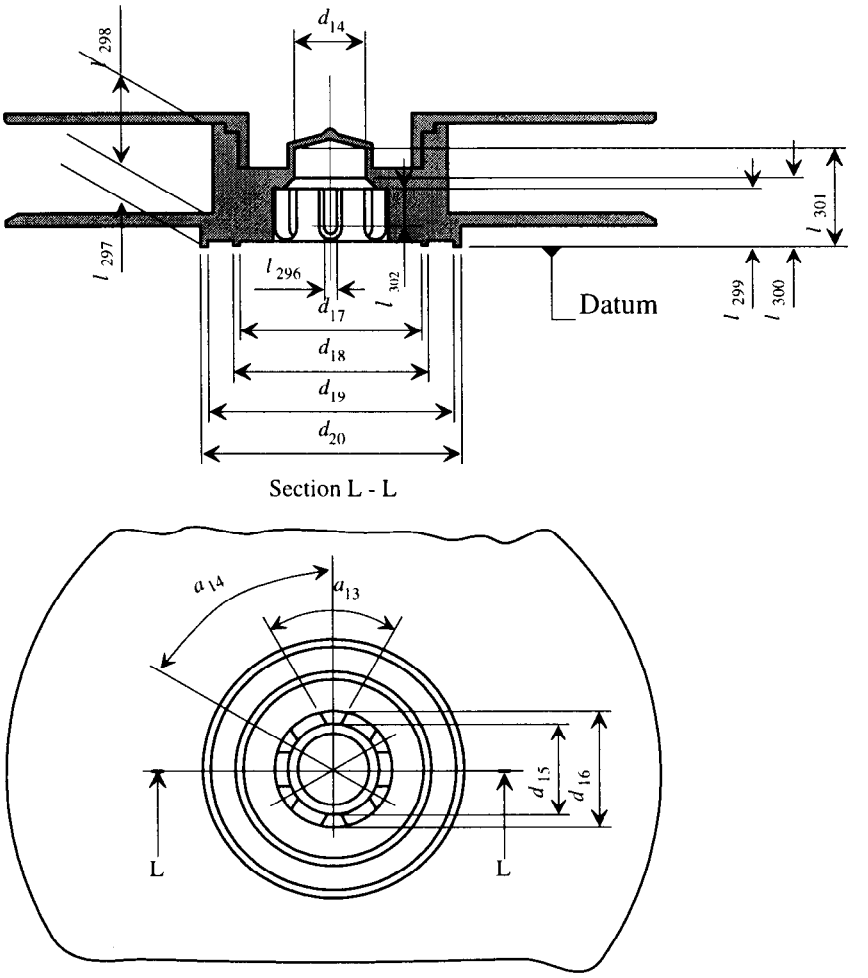


Figure 33 - Cassette reel of Type L cassette

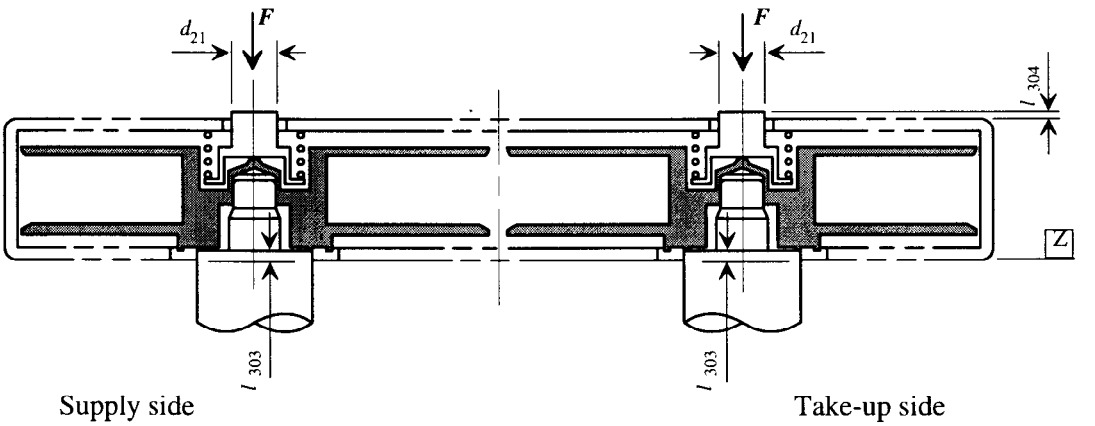


Figure 34 - Height of the reels of Type L cassette when loaded

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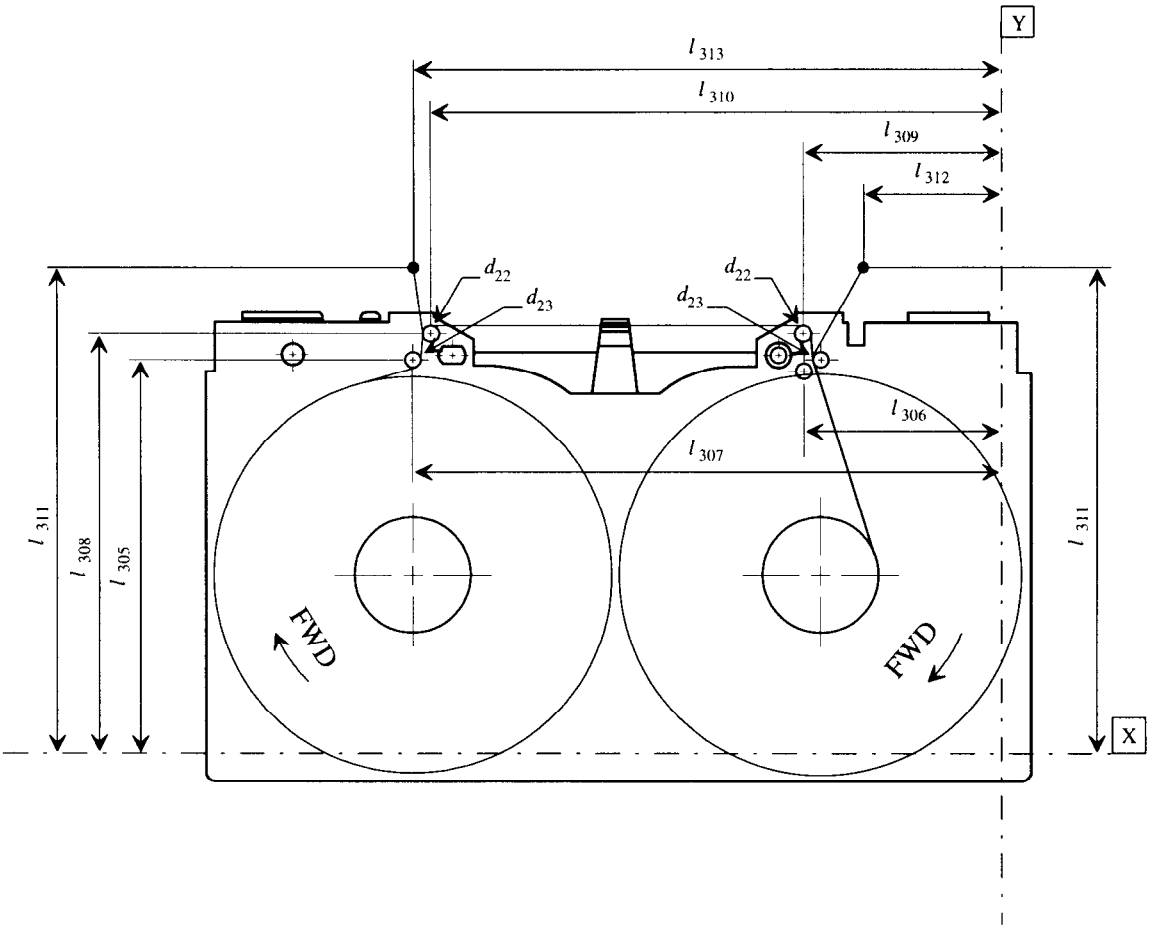
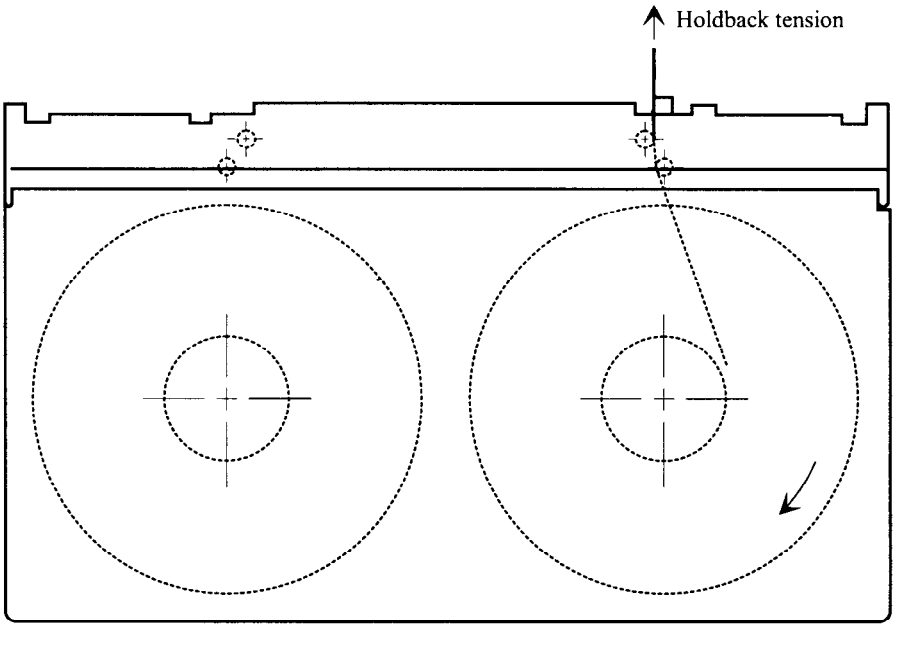


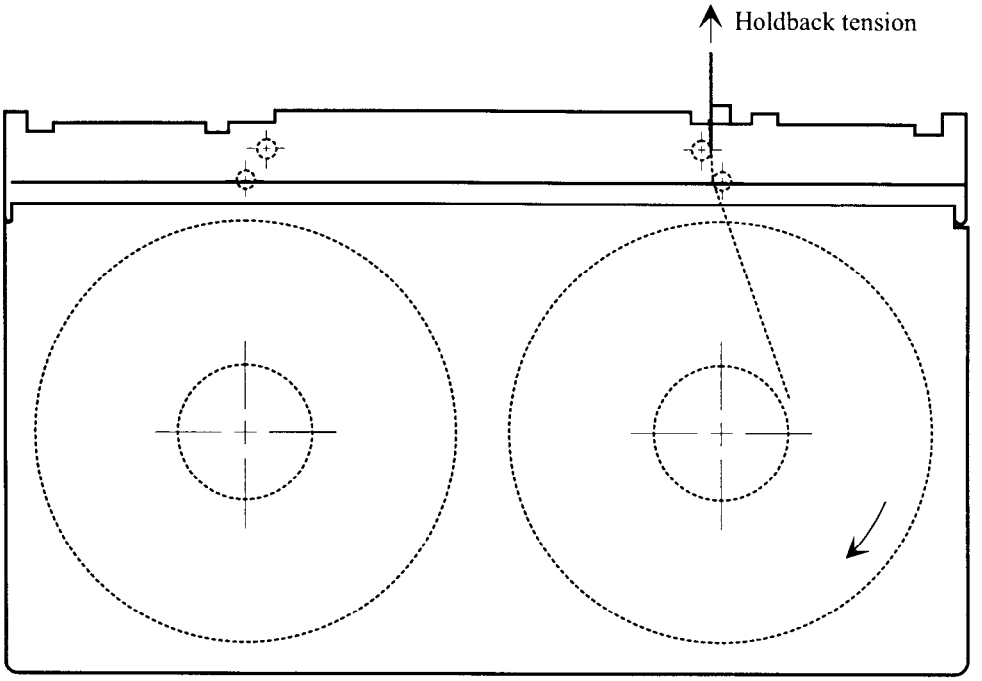
Figure 35 - Internal tape path of Type L cassette



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Figure 36 - Tape path to measure the extraction force of Type L cassette

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Figure 37 - Tape path to measure the frictional torque of the take-up reel of Type L cassette

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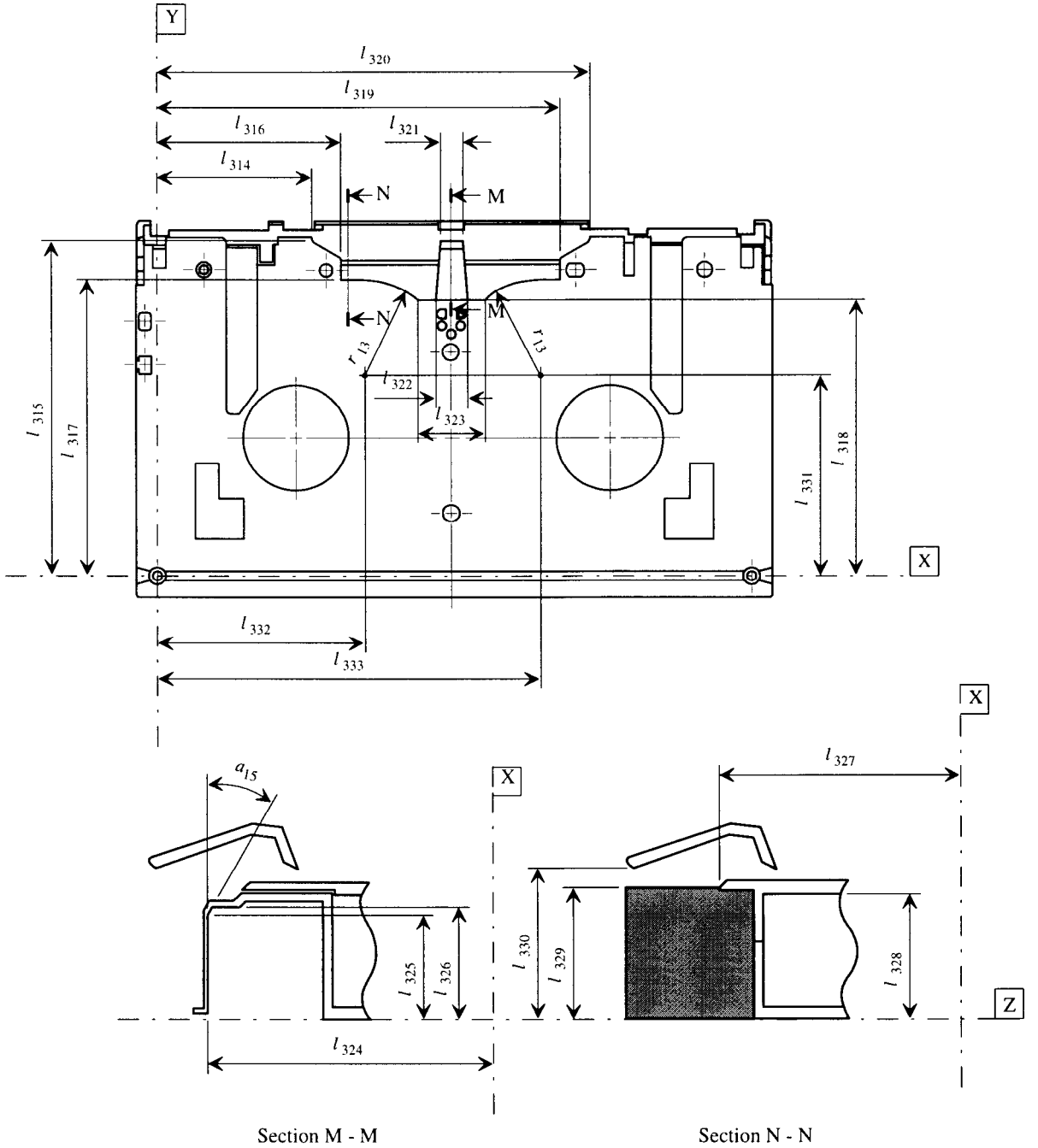


Figure 38 - Tape access cavity of Type L cassette

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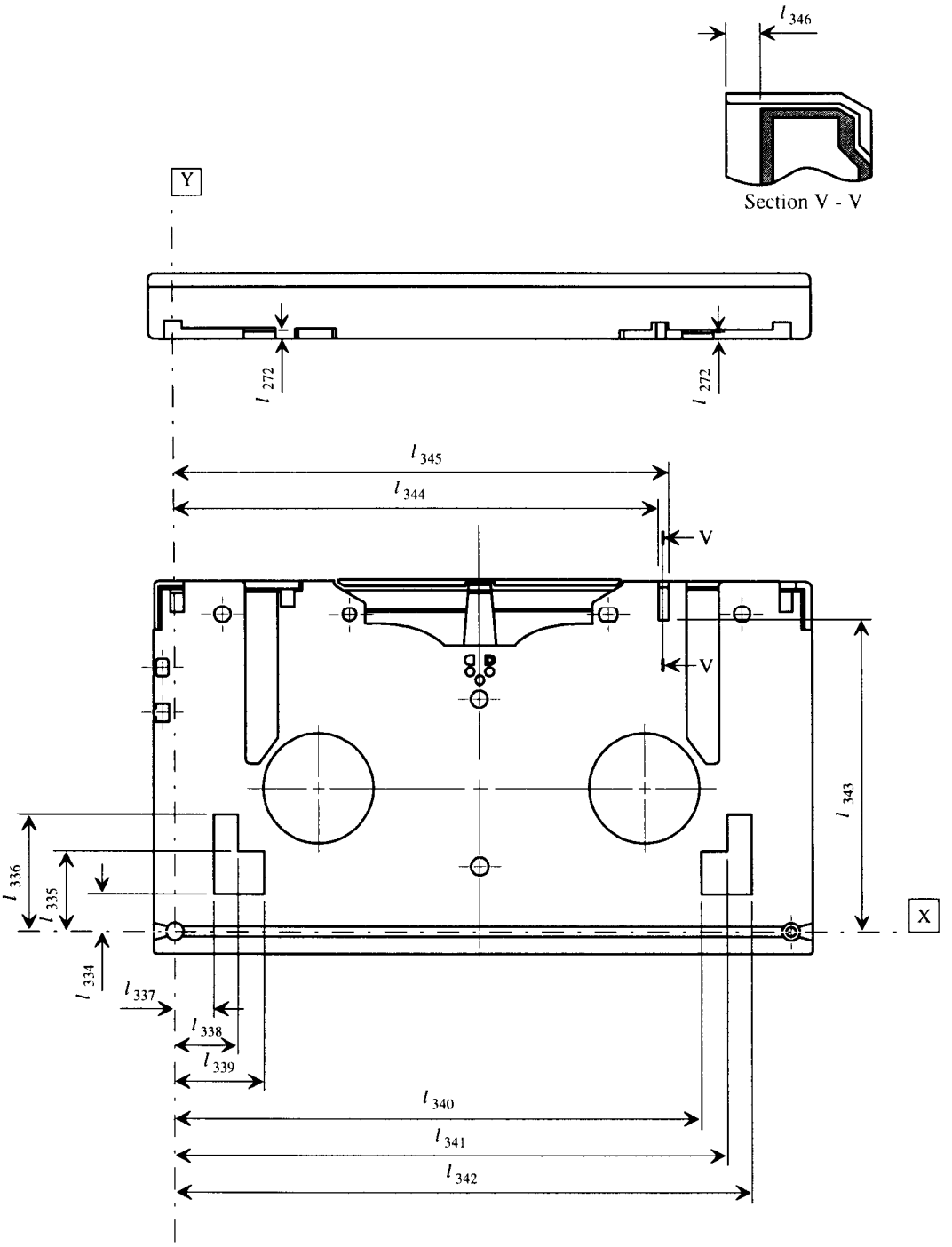


Figure 39 - Bottom side of Type L cassette (lid closed)

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Section 3 - Requirements for the unrecorded tape

9 Mechanical, physical and dimensional characteristics of the tape

9.1 Materials

The recordable area of the tape shall consist of a polyethylene terephthalate base material (or equivalent) coated on one side with a strong yet flexible layer of ferromagnetic material dispersed in a suitable binder. The back surface may be coated.

The leader tape and trailer tape shall contain a metal foil providing more than 200 S conductivity per square so that the magnetic tape motion can be stopped when the foil is detected.

9.2 Tape length

The length of magnetic tape between PBOT and PEOT shall be in the range

For Type S : 241 m and 243 m
For Type L : 732 m and 734 m

The lengths of leader and trailer tapes shall be the lengths between the splice points and the outside of the case when attached to the hubs.

Leader tape length shall be in the range

For Type S : between 220 mm and 280 mm
For Type L : between 260 mm and 300 mm

Trailer tape length shall be in the range

For Type S : between 50 mm and 80 mm
For Type L : between 70 mm and 100 mm

9.3 Tape width

The width of the magnetic tape shall be 12,650 mm ± 0,005 mm, l_{347} in figure 52.

The width of the leader tape and trailer tape shall be 12,65 mm ± 0,03 mm.

Procedure for measuring the width of tape.

1) Cover a section of the tape with a glass microscope slide
2) Measure the width with no tension applied to the tape, using a calibrated microscope, profile projector, or equivalent, having an accuracy of at least 1 µm.
3) Repeat the measurement at five or more different points along a length of tape of 1 m min.
4) The tape width is the average of the widths measured.

9.4 Width and position of splicing tape

The width of the splicing tape and its position across the width of the leader/trailer and magnetic tapes shall be such that the bottom edge of the splicing tape shall be no more than 0,60 mm from the bottom edge of the other tapes and the top edge of the splicing tape shall be no more than 0,60 mm from the top edge. Neither edge of the splicing tape shall extend beyond the edges of the leader/trailer and magnetic tapes.

9.5 Discontinuity

There shall be no discontinuities in the tape between the PBOT and PEOT, such as those produced by tape splicing or perforations.

9.6 Tape thickness

The total thickness of the magnetic tape shall be between 12,5 µm and 13,8 µm.

The thickness of the leader and trailer tapes shall be 45 µm max.

9.7 Longitudinal curvature

The radius of curvature of the edge of the magnetic tape shall not be less than 50 m.

Procedure for measuring the longitudinal curvature of tape.

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1) Allow a 1 m length of the tape to unroll and assume its natural curvature on a flat smooth surface.
2) Measure the deviation from a 1 m chord.

The deviation shall not be greater than 2,5 mm. This deviation corresponds to the minimum radius of curvature of 50 m if measured over an arc of a circle.

9.8 Out-of-plane distortions

All visual evidence of out-of-plane distortion shall be removed when the magnetic tape is subjected to a uniform tension of 0,31 N ± 0,05 N.

Out-of-plane distortions are local deformation which cause portions of the tape to deviate from the plane of the surface of the tape. They are most readily observed when the tape is lying on a flat surface and under no tension.

9.9 Coating adhesion

The force required to peel any part of the coating from the tape base material shall not be less than 0,1 N.

Procedure

1) Take a test piece of the tape approximately 380 mm long and scribe a line through the recording coating across the width of the tape 125 mm from one end.
2) Using a double-sided pressure sensitive tape, attach the full width of the test piece to a smooth metal plate, with the recording surface facing the plate, as shown in figure 40.
3) Fold the test piece over 180°, attach the metal plate and the free end of the test piece to the jaws of a universal testing machine and set the speed of jaw separation to 254 mm/min.
4) Note the force at which any part of the coating first separates from the base material. If this is less than 0,1 N, the tape has failed the test. If the test piece peels away from the double-sided pressure sensitive tape before the force exceeds 0,1 N, an alternative type of double-sided pressure sensitive tape shall be used.
5) If the back surface of the tape is coated, repeat 1) to 4) for the back coating.

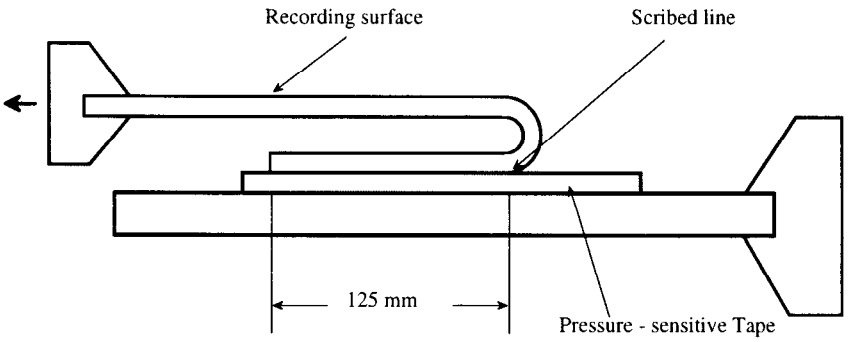


Figure 40 - Measurement of coating adhesion.

9.10 Layer-to-layer adhesion

There shall be no tendency for the test piece to stick or for the coating to peel.

Procedure

1) Attach one end of a test piece of magnetic tape of length 1 m to the surface of a glass tube of external diameter 36 mm.
2) Wind the test piece on to the tube at a tension of 0,9 N.
3) Store the wound test piece in a temperature of 45 °C ± 3 °C and a relative humidity of 80% for 4 h.
4) Store for a further 24 h in the Testing Environment.
5) Apply a force of 0,1 N to the free end of the test piece and allow it to unwind slowly.

9.11 Tensile strength

The measurements shall be made in accordance with ISO/R 527. The length of the test piece shall be 200 mm. The rate of elongation for all tensile tests shall be 100 mm/min - ISO/R 527, rate D.

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9.11.1 Breaking strength

Load the test piece until the breaking point of the test piece is reached. The force required to reach that point is the breaking strength of the tape.

The breaking strength of magnetic tape shall be 38 N min.

The breaking strength of leader and trailer tapes shall be 50 N min.

9.11.2 Yield strength

The tensile yield force shall be taken as the force required to elongate the sample by 5%.

The tensile yield strength of the magnetic tape shall be 20 N min.

The tensile yield strength of the leader and trailer tapes shall be 30 N min.

9.11.3 Strength of Splice

The spliced portion of the magnetic tape and the leader and trailer tapes shall withstand a tension of 15 N min.

9.12 Residual elongation

The residual elongation, expressed as a percentage of the original length, shall be 0,1 % max.

Measure the initial length of a test piece of approximately 1 m with an applied tensile force of 0,2 N max.

For 10 minutes, apply an additional force of 10 N.

Remove the additional force and measure the length after a further 10 minutes.

9.13 Electrical resistance of the coated surfaces

The electrical resistance of the recording surface of the magnetic tape, measured on any square area of tape, shall be less than

$5 \times 10^{11}\ \Omega$ for a non-back-coated tape
$1 \times 10^{12}\ \Omega$ for a back-coated tape

The electrical resistance of the back-coating, if present, measured on any square area of tape, shall be less than

$5 \times 10^{7}\ \Omega$.

Procedure (see figure 41)

1) Condition a test piece of tape in the Test environment for 24 h.
2) Position the test piece over two 24-carat gold-plated, semicircular electrodes having a radius $r = 25{,}4$ mm and a finish of at least N4, so that the recording surface is in contact with each electrode. The electrodes shall be placed parallel to the ground and parallel to each other at a distance $d = 12{,}65$ mm between their centres.
3) Apply the force of 1,62 N to each end of the test piece.
4) Apply a DC voltage of 500 V ± 10 V across the electrodes and measure the resulting current flow. From this value, determine the electrical resistance.
5) Repeat for a total of five positions along the test piece and average the five resistance readings.

For back-coated tape repeat the procedure with the back-coating in contact with the electrodes.

When mounting the test piece ensure that no conducting paths exist between the electrode except that through the coating under test.

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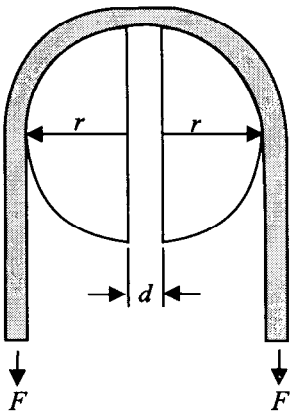


Figure 41 - Measurement of electrical resistance

9.14 Tape wind

The magnetic recording surface of the tape shall face outward from the case and reels.

10 Magnetic recording characteristics

The requirements for the helically recorded tracks are more demanding than those for the longitudinal tracks; it is deemed to be sufficient to carry out tests on the helically recorded tracks only.

The magnetic recording performance is defined by the testing requirements given in the following clauses.

The positive azimuth tracks shall be used: tracks A and C.

When performing the tests, the head output or the resultant signal shall be measured on the same relative pass for both a tape calibrated to the MSRT and the tape under test (read-while-write, or on equipment without read-while-write capability, on the first forward pass) on the same equipment.

The following conditions shall apply to all tests of magnetic recording performance, unless otherwise stated:

- tape condition : a.c. erased to 2 % or less of the SRA
- head/tape speed : 26,40 m/s ± 0,05 m/s
- head width (write) : 35 µm ± 2 µm
  (read) : 50 µm ± 2 µm
- gap azimuth (write) : +15,000 ° ± 0,217 °
  (read) : +15,000 ° ± 0,217 °
- gap length (write) : 0,55 µm ± 0,05 µm
  (read) : 0,28 µm ± 0,05 µm
- tape tension : 0,333 N ± 0,029 N
- recording current : TRC1

10.1 Typical Field TF1

TF1 shall be between 80 % and 120 % of RF1.

Traceability to the RF1 is provided by the calibration factors supplied with each SSRT.

10.2 Average Signal Amplitude(ASA)

The ASA at the physical recording density of 3 201 ftpmm shall be between 80 % and 120 % of SRA1.

Traceability to SRA1 is provided by the calibration factors supplied with each SSRT.

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10.3 Resolution

The ratio of the ASA at the physical recording density of 3 201 ftpmm to that at the physical recording density of 800,3 ftpmm shall be between 80 % and 120 % of the same ratio for the MSRT.

Traceability to the resolution of the MSRT is provided by the calibration factors supplied with each SSRT.

10.4 Signal-to-noise ratio (S/N)

The Signal-to-noise ratio is the average rms read signal amplitude divided by the average integrated rms noise amplitude, expressed in decibels.

$$S/N = 20 \log \frac{\text{Average rms read signal amplitude}}{\text{Average integrated rms noise amplitude}} \text{ dB}$$

Requirement

The S/N for the tape under test (S/N_{tape}) shall be better than -2 dB relative to the S/N for the MSRT (S/N_{MSRT}) when measured according to the procedure defined in annex A.

Traceability to the (S/N_{MSRT}) is provided by the calibration factors supplied with each SSRT.

10.5 Ease of erasure

When a tape has been recorded at 800,3 ftpmm with TRC1 and passed through a longitudinal steady erasing field of 320 000 A/m, any remaining signal shall not exceed 2 % of SRA3.

10.6 Tape quality

10.6.1 Missing pulses

A missing pulse is a loss of read signal amplitude.

A missing pulse exists when the base-to-peak amplitude is 25 %, or less, of half the ASA for the physical recording density of 3 201 ftpmm on the same tape.

10.6.2 Missing pulse zone

A missing pulse zone commences with 7 consecutive missing pulses and ends when 28 consecutive flux transitions are read or when a length of 0,038 mm of track has been measured. If a missing pulse zone continues beyond 0,038 mm a further missing pulse zone shall be counted.

A missing pulse zone does not continue from one track to another.

Requirement:

The average missing pulse zone rate shall be less than one missing pulse zone for each 5×10^6 flux transitions recorded at the physical recording density of 3 201 ftpmm.

The average missing pulse zone rate is the total number of missing pulse zones divided by the total number of flux transitions recorded on the tape.

10.7 Inhibitor tape

This International Standard does not specify parameters for assessing whether or not a tape is an inhibitor tape.

However, annex D gives further information on inhibitor tapes.

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Section 4 - Requirements for an interchanged tape

11 Format for helical tracks

11.1 General description of the write data path (see figure 42)

The host system, operating under one of several directory file system structures, views the tape drive system as a logical storage system. The host expects the logical storage system to support the following capabilities

- data blocks as a minimum unit of data transfer
- data file as a concatenation of data blocks
- file demarcation
- directory of file locations in a volume
- management information of files
- multiple volumes
- fast search and retrieval of data blocks and files
- high degree of data protection
- and restoration of a failed directory.

This format provides a generic set of placeholder tables and track types to contain such information with specific definitions of their usage and location. All track types provided by this format are processed into a Track Set comprising four helical tracks, uniquely identified by a TSID, represent the minimum recorded and retrieved unit of information.

The processing of information preparatory to recording begins with the identification of the type of Logical Track Set to be created and proceeds through the following processes

- generation of a Logical Track Set
- data protection processing within product code array buffers
- formation of the contents of a helical track.

11.2 Formation of a Logical Track Set

11.2.1 Types of information track sets

There are 11 types of information track sets.

1. Volume Set Information Table (VSIT) track set
2. Volume Information Table (VIT) track set
3. Badspot Table (BST) track set
4. Logical ID Table (LIDT) track set
5. File Information Table (FIT) track set
6. Update Table (UT) track set
7. User Data track set
8. File Mark track set
9. Set Mark track set
10. Dummy (DM) track set
11. End of Data (EOD) track set

This tape format supports multiple logical volumes within one physical volume.

A VSIT at the beginning of the tape contains information to manage one or more logical volumes on this tape. The VSIT has location information for each logical volume on the tape.

A logical volume consists of a DIT followed by the User Data area.

The DIT contains information to locate and manage files within the logical volume and comprises the VIT, BST, LIDT, FIT and UT.

The demarcation of files may be defined by the host to be either a File Mark or a Set Mark and for some purposes of this International Standard may be collectively referred to as a Tape Mark (TM).

EOD tracks identify the end of recorded data area in a logical volume as indicated by the host.

DM tracks identify fill areas on the tape where continuous control track signals are required and are transparent to the host.

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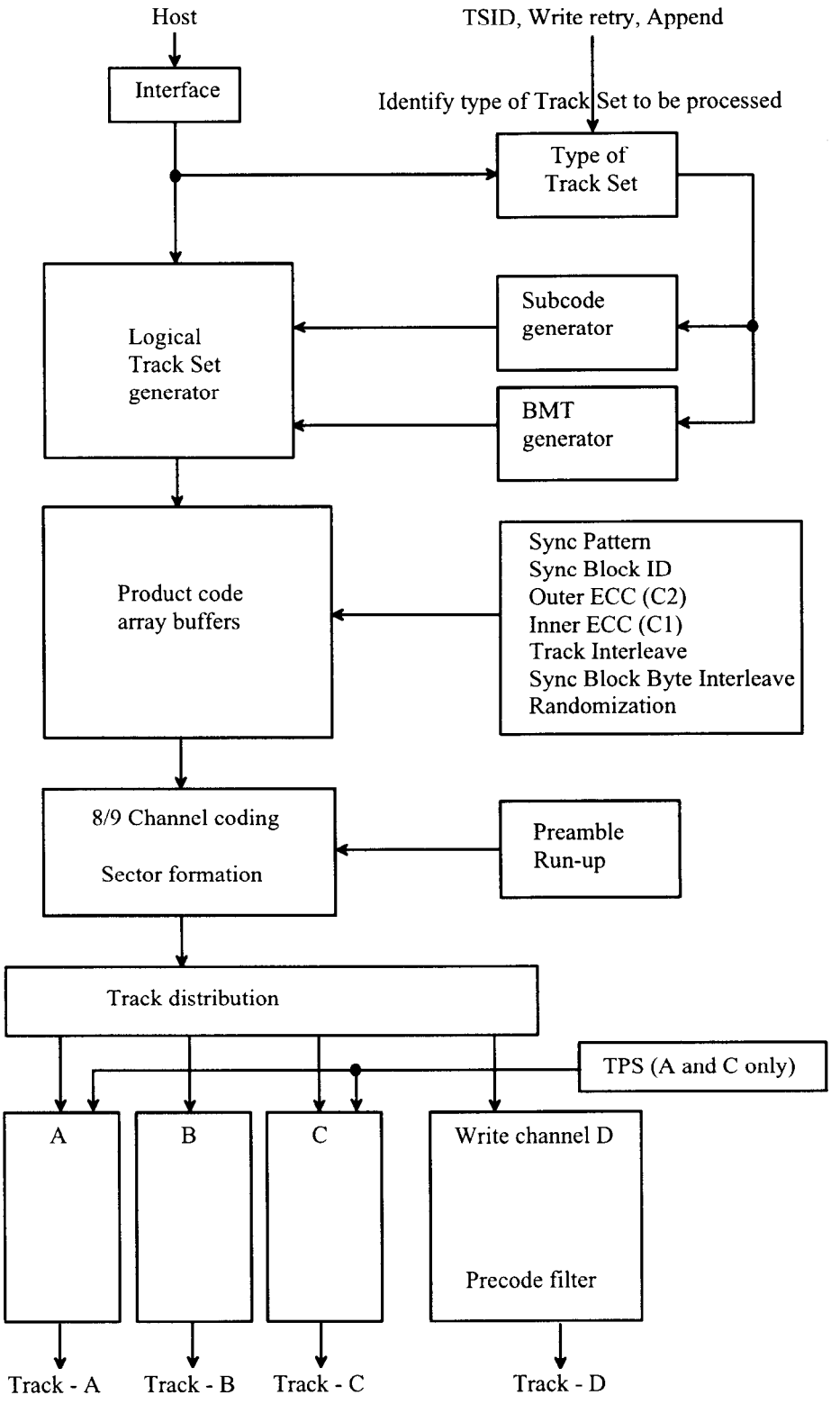


Figure 42 - Dataflow of record information processing

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11.2.2 Generation of a Logical Track Set

The structure of the Logical Track Set is shown in figure 43. One Logical Track Set shall contain all of the elements destined for 4 helical tracks and occupy 117 040 bytes (29 260 words). Logical Track Set Words will be used for the following field definitions.

The Logical Track Set comprises

Word 0 - A tape format identifier which shall be set to (FFFF0000), the format of this International Standard.
Words 1 to 34 - A Subcode data field containing administrative information associated with this track set
Words 35 to 29 255 - An Information field and Block Management Table (BMT).
The BMT contains the data block information for the contents of the Information Field.
The BMT is located within the Information Field.

The Logical Track Set is terminated with

Words 29 256 to 29 258 - Reserved bytes (for this International Standard shall be set to all ZEROs).
Word 29 259 - An end code of 4 bytes which shall be set to (0F0F0F0F).

The information in a Logical Track Set is processed in 8 product code arrays.

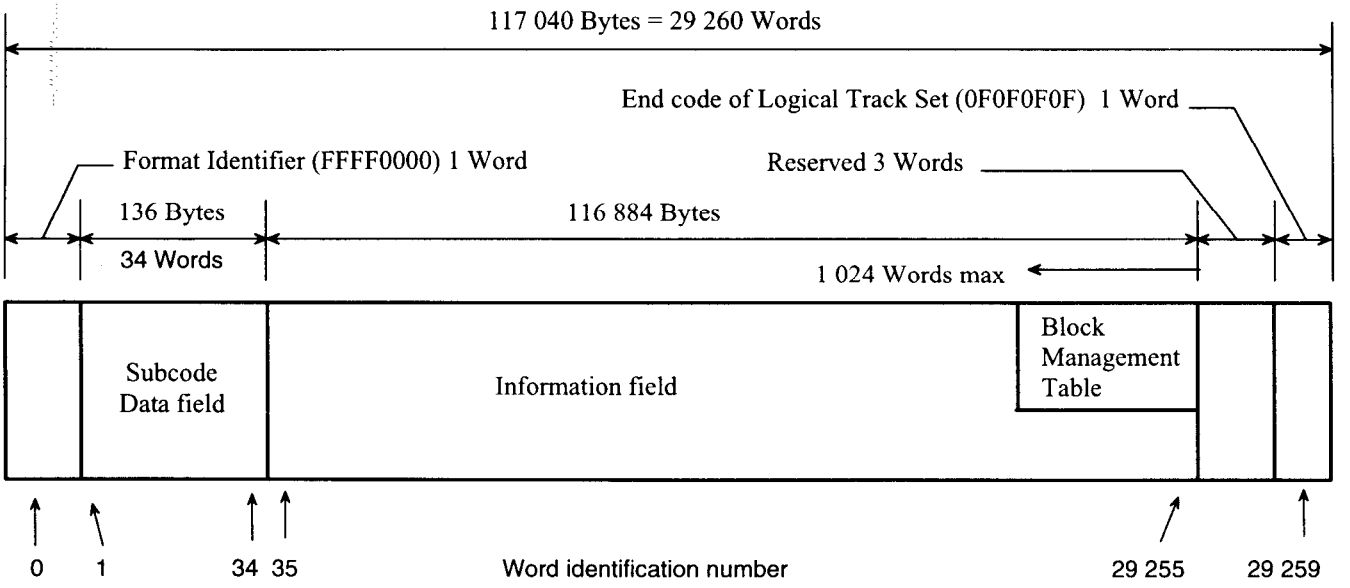


Figure 43 - The Logical Track Set

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Table 1 - Word definition summary of Subcode data fields

ID / Word / Contents	VSIT	DIT					USER	TM		DM	EOD
		VIT	BST	LIDT	FIT	UT		File Mark	Set Mark	Dummy	
1 Identification	(00FFFFFF)	(00FFFF00)	(FF00FF00)	(FFFF0000)	(00FF00FF)	(00FF0000)	(0000FFFF)	(0000FF00)	(FF00FFFF)	(00000000)	(000000FF)
2 Logical TSID	Increment by one for each track set and append file flag 'A'.									Not incremented	
3 File number	(FFFFFFFF)						File number			(FFFFFFFF)	
4 Number of BMT entries	(00000001)						Block number	(00000001)			
5 Initialization UID volume number	(00000000)						Initialization UID of this logical volume				
6 Overwrite count for volume	(00000000)						Overwrite count of this logical volume				
7 Write retry count	Incremented write retry count and write retry flag 'W'.										
8 Vendor UID 0-3	Drive vendor UID 0 - 3										
9 Vendor UID 4-7	Drive vendor UID 4 - 7										
10-14 Logical volume number	Undefined (00000000)										
15 Initialized UID. of tape	UID at initialization of this cassette										
16 Overwrite count	Overwrite count of this cassette										
17 LIDT use flag	In conformance with this International Standard set to (FFFFFFFF) / other wise (00000000)										
18 Block operation type	(FFFFFFFF) / (00000000)										
19 Format type	(00000001)										
20 Creation time	(00000000)										
21 Number of mounts	Incremented mount count										
22 Number of read retries	Incremented read retry count										
23 Number of recoveries	Incremented recovery count										
24 Recovery failed flag	True set to (FFFFFFFF) / otherwise (00000000)										
25-34 Reserved	(00000000)										

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11.2.3 Subcode data field

The Subcode data field shall contain the following information associated with this Logical Track Set

The Subcode shall consist of 34 Words, and contain the following information.

Word 1 Identification

Word 1 shall be set to the Track Set type identification as follows

VSIT	(00FFFFFF)
VIT	(00FFFF00)
BST	(FF00FF00)
LIDT	(FFFF0000)
FIT	(00FF00FF)
UT	(00FF0000)
User	(0000FFFF)
File Mark	(0000FF00)
Set Mark	(FF00FFFF)
DM	(00000000)
EOD	(000000FF)

Word 2 Logical ID

Word 2 shall contain the Logical TSID count incremented from the LBOT, starting with 1, on all track set types except DM and EOD.

The most significant bit (msb) of Word 2 is the append file flag ('A').
The first track set of appended data shall have this flag set to ONE.
In all other cases, the flag shall be set to ZERO. See sub-clause 18.2 and figure 58.

Word 3 File number

Word 3 shall contain the incremented file number in this logical volume. The first file is number 1.

Word 4 Block count

Word 4 shall contain the number of data blocks entered into this User track set type (the number of BMT entries).
Word 4 of all other track set types shall be set to (00000001).

Word 5 Initialization number for this logical volume

Word 5 shall contain the unique identifier (UID) for this logical volume, assigned at the time of initialization, in each of the User, TM, DM and EOD track set types.
Word 5 in all other track set types shall be set to all ZEROs.

Word 6 Overwrite counter for volume

Word 6 shall contain the count of the number of times this logical volume has been overwritten in each of the User, TM, DM and EOD track set types. All other track set types shall be set to all ZEROs.

Word 7 Write retry counter

Word 7 shall contain the incremented count of write retries while recording in this logical volume.
The msb of Word 7 is the write retry flag ('W'). The first track set of rewritten data shall have this flag set to ONE. In all other cases, the flag shall be set to ZERO.

Words 8 and 9 Drive vendor unique information

Word 8 and 9 shall contain the UID for the tape drive and tape drive vendor.
Word 8 shall contain the UID bytes 0 to 3. Word 9 shall contain the UID bytes 4 to 7.
The format of this information is not defined by this International Standard and are a matter for agreement between interchange parties.

Words 10 to 14 Logical volume number

The contents of these words are a matter for agreement between interchange parties.

Word 15 Initialization UID of the tape

Word 15 shall contain the UID for this logical volume, assigned at initialization.
The format of this information is not defined by this International Standard and are a matter for agreement between interchange parties.

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Word 16 Overwrite counter of this tape

The format of this information is not defined by this International Standard and are a matter for agreement between interchange parties.

Word 17 LIDT available flag

Word 17 shall contain the indication that an LIDT has been generated. The LIDT available flag shall be set to (FFFFFFFF) if true, otherwise set to all ZEROs.

Word 18 Block operation flag

Word 18 shall contain the indication that use of the BMT for block search operations would be effective. The BMT flag shall be set to (FFFFFFFF) if true, otherwise set to all ZEROs.

Word 19 Format type

Word 19 shall be set to (00000001) indicating that the format of this tape is compliant with this ECMA Standard. Any other content is reserved for future use.

Word 20 Creation time

The format of this information is not defined by this International Standard and are a matter for agreement between interchange parties, else shall be set to all ZEROs.

Word 21 Number of mounts

Word 21 shall contain the incremented mount count for this cassette.

Word 22 Number of read retries counter

Word 22 shall contain the incremented count of read retries for this logical volume.

Word 23 Number of recoveries counter

Word 23 shall contain the incremented count of recoveries for this logical volume.

Word 24 Recovery failure flag

Word 24 shall contain the indication of a recovery failure. The recovery failure flag shall be set to (FFFFFFFF) if true, otherwise set to all ZEROs.

Words 25 to 34 Reserved

These words shall be set to all ZEROs.

11.2.4 BMT

The blocks of a Logical Volume, as defined by the host, are numbered sequentially from the beginning of the volume. The Logical Volume block number is termed the absolute block number. The block sizes of user data may be small enough that many blocks may be contained in a Logical Track Set or large enough that they occupy many Logical Track Sets. The BMT provides the essential information necessary to locate and retrieve entire data blocks. The BMT of the User data Logical Track Set type shall be capable of managing the information of 1 to 256 blocks. All other Logical Track Set types shall be defined as 1 block.

The BMT shall contain 4 words of information for managing each data block in the following order

1) The absolute block number of the data block in this Logical volume

2) The starting address of the data block. The number of bytes from the beginning of the data field.

3) The number of bytes of the data block in this Logical Track Set.

This data word contains 2 flag bits

Bit 31 is defined as the Link bit('L') and shall be set to ONE when the data block extends to the next Track Set, otherwise set to ZERO.

Bit 30 is defined as the Start bit('S') and shall be set to ONE when the beginning of the data block is in this Track Set, otherwise set to ZERO.

4) The total number of bytes of the data block.

The BMT shall be built from the end of the Data field towards the beginning with the 1st data block management information being placed in words 29 252 to 29 255.

11.2.4.1 BMT for VSIT, VIT, BST, LIDT, FIT, UT, TM, DM and EOD

Word 29 252 shall contain the absolute block number of the data block.

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Word 29 253	shall contain the start address of the data block and shall be set to all ZEROs.
Word 29 254	shall contain the number of bytes in the data block in this Track Set. This data word shall contain 2 flag bits, bit 31 ('L') and bit 30 ('S').
Word 29 255	shall contain the total number of bytes in the data block.

11.2.4.2 BMT for the User data Track Set type

Words 28 232 to 28 235	shall contain the management information for the 256th data block, if present.
Words 28 236 to 29 251	shall contain the management information for 2nd to 255th data blocks, if present.
Word 29 252	shall contain the absolute block number of the 1st data block in user data field of this Track Set.
Word 29 253	shall contain the start address (number of bytes from beginning of User data field) of the 1st data block in User data field of this Track Set. In the case of this 1st data block, the content of this word shall be set to all ZEROs.
Word 29 254	shall contain the number of data bytes in the 1st data block which is included in this Track Set. This data word shall contain 2 flag bits, bit 31 ('L') and bit 30 ('S').
Word 29 255	shall contain the total number of data bytes in the 1st data block.

11.2.5 Data and information field definitions

The contents of the Information Field for Track Sets in the User Data Area are transmitted by the host. This applies to the User Data, File Mark, Set Mark, DM and EOD Track Set types.

The content of the Information Field is defined in VSIT, VIT, BST, LIDT, FIT and UT Track Set types as follows. The Directory Information Table (DIT) includes the following 5 tables VIT, BST, LIDT, FIT and UT.

11.2.5.1 VSIT

The structure of Volume Set Information Table (VSIT) area on tape is as follows

1) The VSIT contains the logical volume set information for a physical volume.
2) The physical Track Set of the VSIT area shall be incremented starting at the TSID representing ZERO for a physical volume.
3) A VSIT area consists of 1 track set recorded 10 times.
4) A VSIT contains information of one or more logical volumes.

Words 35 to 79	shall be reserved, set to all ZEROs.
Word 80	shall contain the starting TSID of this tape.
Word 81	shall contain the physical TSID of last data block on this tape.
Words 82 to 97	shall contain the count of Logical Volumes on this tape.
Word 98	shall be reserved, set to all ZEROs.
Word 99	shall contain the starting physical TSID of the 1st Logical Volume.
Word 100	shall contain the last physical TSID of the 1st Logical Volume.
Word 101	shall contain the starting physical TSID of the 2nd Logical Volume if present, otherwise set to all ZEROs.
Word 102	shall contain the last physical TSID of the 2nd Logical Volume if present, otherwise set to all ZEROs.

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Words 103 to 2 144	shall contain the starting and last physical TSIDs of the 3rd to 1 023rd Logical Volumes if present, otherwise set to all ZEROs.
Word 2 145	shall contain the starting physical TSID of the 1 024th Logical Volume if present, otherwise set to all ZEROs.
Word 2 146	shall contain the last physical TSID of the 1 024th Logical Volume if present, otherwise set to all ZEROs.
Word 2 147	shall contain the UID number of this tape issued at the time of initialization.
Word 2 148	shall contain the count of overwrites incurred by this tape.
Words 2 149 to 29 216	shall be reserved, set to all ZEROs
Words 29 217 to 29 220	shall contain the BMT for this VSIT Track Set.

11.2.5.2 VIT

The Volume Information Table (VIT) is structured as follows

Words 35 to 38	shall be reserved, set to all ZEROs.
Words 39 to 78	shall contain the Volume Label, 160 bytes.
Word 79	shall contain the starting physical TSID of the 1st data block in this Logical Volume.
Word 80	shall contain the last physical TSID of the EOD in the last data block in this Logical Volume.

Word 81 shall contain the last block number in the BMT for the track set containing the last data block.

Words 82 to 289	shall be reserved, set to all ZEROs.
Word 290	shall contain the UID number of this volume issued at the time of initialization.
Word 291	shall contain the count of overwrites of this Logical Volume.
Word 292	shall contain the LIDT flag which when set to (FFFFFFFF) indicates that LIDT may be used, otherwise set to all ZEROs.
Word 293	shall contain the block operation flag set to (FFFFFFFF) if available, otherwise set to all ZEROs.
Word 294	shall be set to (00000001), identifying the Format Type compliant with this International Standard.
Word 295	shall be reserved, set to (00000002).
Word 296	The content of this word is a matter of agreement between interchange parties.
Words 297 to 8 226	shall be reserved, set to all ZEROs.
Words 8 227 to 8 250	shall contain Mount Information as follows 8 227: Mount count 8 228 - 8 230: reserved 8 231 - 8 250: information regarding the last five mounts (date/Controller ROM version /Drive vendor UID Information - 20 words). The format of this information is a matter of agreement between interchange parties.
Words 8 251 to 16 418	shall be reserved, set to all ZEROs.
Word 16 419	shall contain the count of read retries accumulated in this Logical Volume.
Word 16 420	shall contain the number of recoveries incurred by this Logical Volume.

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Word 16 21	shall contain the Recovery failed flag, set to (FFFFFFFF) if true, otherwise set to all ZEROs.
Words 16 422 to 29 216	shall be reserved, set to all ZEROs.
Words 29 217 and 29 220	shall contain the BMT for this VIT Track Set.

11.2.5.3 BST

The Bad Spot Table (BST) shall contain the location information of "logically invalid" data. Logically invalid data occupies an area of tape which has been identified as flawed and that source data has been rewritten and validated with the same Logical TSID at some following point. (See figure 44. 'Data A' is logically invalid data.)

The write retry process creates a logically invalid data location on the tape. Logically invalid data is also called a "Bad spot". The beginning of a Bad spot is the 1st physical TSID and the end is the last physical TSID.

The BST shall contain the following information to identify the type and location of a Bad spot

- Error type flag 'E', the msb of byte 3 of beginning location word, set to ONE for data error, otherwise set to ZERO
- The beginning of the Bad spot, identified by the 1st physical TSID, shall occupy the least significant bytes of the beginning location word
- The end of the Bad spot, identified by the last physical TSID, shall occupy the least sighificant bytes of the end location word.

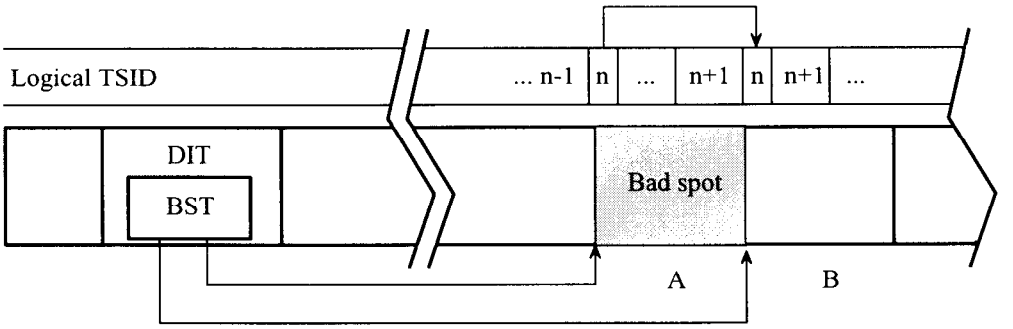


Figure 44 - Badspot table data function

The BST shall be constructed as follows

Words 35 and 36	the msb of byte 3 shall be the 'E' Error type flag, the 1st physical TSID of the 1st badspot shall occupy the least significant bytes of Word 35. The last physical TSID of the 1st badspot shall occupy the least significant bytes of Word 36.
Words 37 to 29 213	shall contain the information for the 2nd to 14 607th bad spots, as required, otherwise set to ZERO.
Words 29 214 and 29 215	shall contain the information of the last bad spot, 14 608th, in this BST, if required, otherwise set to ZERO.
Word 29 216	shall be set to all ZEROs.
Words 29 217 and 29 220	shall contain the BMT for this BST Track Set.

11.2.5.4 LIDT

The Logical ID Table (LIDT) data table may be used for fast block space and locate operations.

The LIDT shall contain pointers as defined by the following information

- the Logical TSID count incremented from the LBOT, starting with 1, on all track set types except DM and EOD
- the physical TSID

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- the incremented file number in this logical volume, starting with 1
- the block number in the BMT of the physical Track Set, which is the 1st block of this pointer.

This LIDT shall be constructed as follows, otherwise set to ZERO.

Words 35 to 38	shall contain the information for the 1st pointer Word 35 - the logical TSID Word 36 - the physical TSID Word 37 - the file number Word 38 - the block number in the BMT which is the 1st block of the 1st pointer.
Words 39 to 42	shall contain the information for the 2nd pointer.
Words 43 to 29 211	shall contain the information for the 3rd to 7 303rd pointers.
Words 29212 to 29 215	shall contain the information for the 7 304th pointer.
Word 29 216	shall be set to all ZEROs.
Words 29 217 and 29 220	shall contain the BMT for this LIDT Track Set.

11.2.5.5 FIT

The File Information Table (FIT) shall contain pairs of two types of data which locate a Tape Mark (TM).
The *n*th data pair corresponds to the *n*th TM from the beginning of the volume.

- W(35+((*n*-1)x2)) the nth TM physical TSID

  The Set Mark bit ('S' in W(35+((*n*-1)x2)) bit 31 of the *n*th TM physical TSID) shall be set to ONE, when the Nth TM is a Set Mark and set to ZERO, when the Nth TM is a File Mark.

- W(35+((*n*-1)x2+1)) Absolute block number of the *n*th TM.

The FIT shall be constructed as follows, otherwise set to ZERO

Words 35 and 36	shall contain the physical TSID of the 1st TM. The 'S' Set Mark bit in Word 35 shall be set as defined above. Word 36 - shall contain the block number in the BMT of the 1st TM.
Words 37 to 29 213	shall contain the information for the 2nd to 14 607th TMs.
Words 29 214 and 29 215	shall contain the information for the 14 608th TM.
Word 29 216	shall be set to all ZEROs.
Words 29 217 and 29 218	shall contain the BMT for this FIT Track Set.

11.2.5.6 UT

The Update Table (UT) shall be used for indication of update status. This UT shall be checked by the receiving system to assure proper correspondance of directories to data file locations in this volume.

Word 35	shall be set to (FFFFFFFF) when updating this volume is in process and set to all ZEROs for update complete and ready for system export and data interchange.
Words 36 to 29 216	shall be set to all ZEROs.
Words 29 217 and 29 218	shall contain the BMT for this UT Track Set.

11.3 Track Set information

The Track Set information is placed sequentially into eight Product Code Arrays. All subsequent record processing of Track Set information uses the location information defined as follows.Each array shall contain 104 horizontal rows each of 192 bytes. The position of each byte in the array has an address of the form (W:X:Y).

Array locator W shall identify one of eight arrays with a value

0 for the first array

7 for the last array.

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Column locator X shall identify the column in the array as one of 192 values

0	for the first and left-most column which contains indentifier ID0
1	for the second column, which is reserved for indentifier ID1, etc.
191	for the last and right-most column
4	columns are added at the left side to contain the sync pattern.
12	columns are added at the right side to contain the Inner ECC C1 Parity.

Row locator Y shall identify one row of 104 rows in the array

0	for the first and top-most row
1	for the second row, etc.
103	for the last and bottom-most row

Columns 2 to 191 contain Logical Track Set data in rows 0 to 76 and Outer ECC C2 Parity in rows 77 to 103.

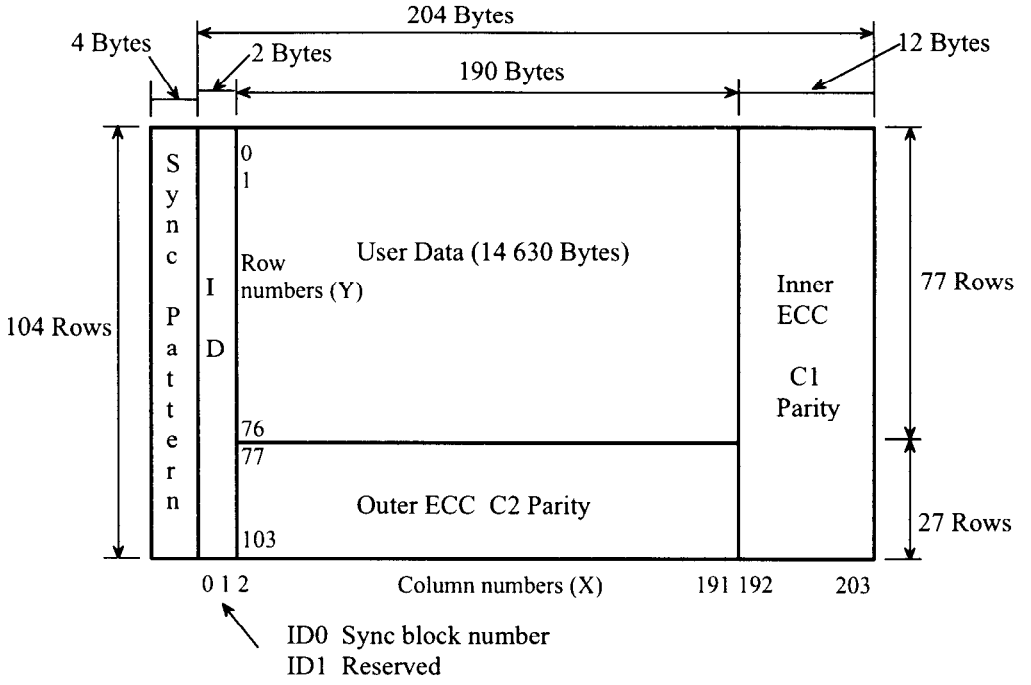
The 104 rows are divided into 4 groups of 26 rows each. Each group is assigned to one of four tracks in a Track Set, see figure 45. The identification number of the Sync Blocks and Sector numbers (defined in clause 11.4.5) are assigned in the following location information, see figures 46, 48 and 49.

11.3.1 Loading the Product Code Arrays

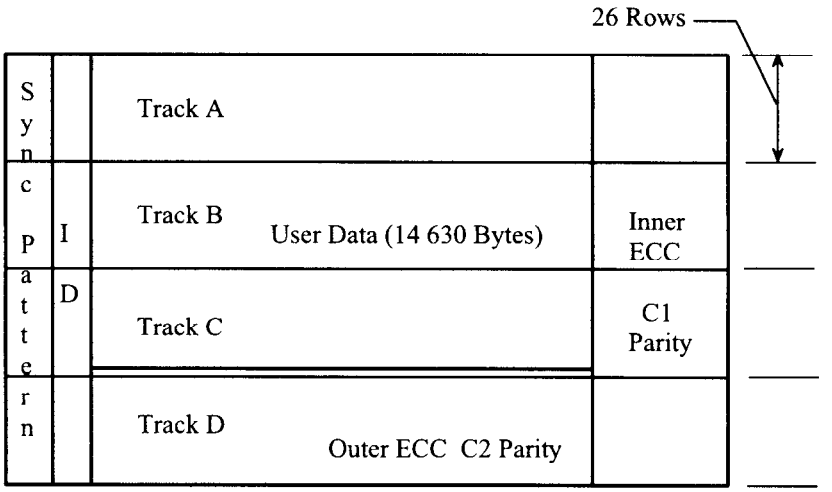
Information data shall be loaded into the Product Code Arrays starting with Array 0, Row 0, Column 2 sequentially filling the rows of one array before proceeding to the next until all arrays are full.

Array 0, Row 0	(0:2:0) (0:3:0)	....	(0:191:0)
Array 0, Row 1	(0:2:1) (0:3:1)	....	(0:191:1)
		....	
Array 7, Row 103	(7:2:103) (7:3:103)	....	(7:191:103)

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(a) Contents of a Product Code Array



(b) Track assignment of a Product Code Array

Figure 45 - ECC Block Data (Processor)

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11.4 Product code array processing

Information is sequentially loaded into the user data area of 8 product code arrays. Sync blocks are formed comprising sync pattern, identification bytes, C2 Parity and C1 Parity. Sync block bytes are interleaved and randomized to form a channel sync block.

11.4.1 Error correction method

The C2 Parity shall consist of 27 bytes derived from the 77 bytes in rows 0 to 76 of a column in the Product Code Array.

Bytes in Column 2 (0:2:0) to (0:2:76) are processed with RS (104,77) to produce 27 bytes to be placed in the same column from (0:2:77) to (0:2:103).

The C1 Parity shall consist of 12 bytes derived from the 192 bytes of each row for the 104 rows of the ID and Source Information.

Bytes in Row 0 (0:0:0) to (0:191:0) are processed with RS (204,192) to produce 12 bytes to be placed in the same row from (0:192:0) to (0:203:0)

11.4.1.1 Error correction coding for C2 Parity

The Outer ECC is a Reed-Solomon code denoted RS(104,77)

The Galois Field shall be GF(2^8)

Field Generator Polynomial shall be $p(x) = x^8 + x^4 + x^3 + x^2 + x^0$

where x^n are place-keeping variables in GF(2^1), binary field

The Code Generator Polynomial shall be

$$G(x) = (x+1)(x+a)(x+a^2)(x+a^3)(x+a^4)(x+a^5)(x+a^6)(x+a^7)$$
$$(x+a^8)(x+a^9)(x+a^{10})(x+a^{11})\cdots(x+a^{25})(x+a^{26})$$

where a is given by (02) in GF(2^8)

Outer error code parity

$$K_{26}, K_{25}, \cdots K_{10}, K_9, K_8, K_7, K_6, K_5, K_4, K_3, K_2, K_1, K_0,$$
$$\text{in } K_{26}x^{26} + K_{25}x^{25} + \cdots + K_1x^1 + K_0x^0$$

are obtained as the remainder after dividing

$$x^{27}D(x) \text{ by } G(x)$$

where $D(x) = B_{76}x^{76} + B_{75}x^{75} + \cdots + B_1x + B_0$

The polynomial of the full code is

$$B_{76}x^{103} + B_{75}x^{102} + \cdots + B_1x^{28} + B_0x^{27} + K_{26}x^{26} + K_{25}x^{25} + \cdots + K_1x + K_0$$

where:

B_{76} to B_0 represent the 77 bytes of user data in rows 0 to 76 of the Product Code Arrays and K_{26} to K_0 represent the 27 bytes of outer error code.
The 27 bytes K_{26} to K_0 shall be placed in rows 77 to 103 of the Product Code Arrays.

Order of Use

The left-most term in all the above equations is the most significant and is the first written to tape.

11.4.2 Error correction coding for C1 Parity

The Inner ECC is a Reed-Solomon code denoted RS(204,192).

The Galois Field shall be GF(2^8).

Field Generator Polynomial shall be $p(x) = x^8 + x^4 + x^3 + x^2 + x^0$
where x^n are place-keeping variables in GF(2^1), binary field.

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The left-most term is "oldest" in time computationally and the first written on tape.

The Code Generator Polynomial shall bc

$$G(x) = (x+1)(x+a)(x+a^2)(x+a^3)(x+a^4)(x+a^5)(x+a^6)(x+a^7)$$
$$(x+a^8)(x+a^9)(x+a^{10})(x+a^{11})$$

where a is given by (02) in GF(2^8)

Inner error code parity

$$K_{11}, K_{10}, K_9, K_8, K_7, K_6, K_5, K_4, K_3, K_2, K_1, K_0$$

in $K_{11}x^{11} + K_{10}x^{10} + \cdots + K_1x + K_0$

are obtained as the remainder after dividing

$$x^{12}D(x) \text{ by } G(x)$$

where $D(x) = I_0x^{191} + I_1x^{190} + B_{189}x^{189} + \cdots + B_1x + B_0$

The polynomial of the full code is

$$I_0x^{203} + I_1x^{202} + B_{189}x^{201} + \cdots + B_0x^{12} + K_{11}x^{11} + K_{10}x^{10} + \cdots + K_1x + K_0$$

where:

I_0 and I_1 represent the 2 bytes of sync full code block identification
B_{189} to B_0 represent the 190 bytes of sync block source information
and K_{11} to K_0 represent the 12 bytes of inner error code parity

Order of Use

The left-most term in all the above equations is the most significant and is the first written to tape.

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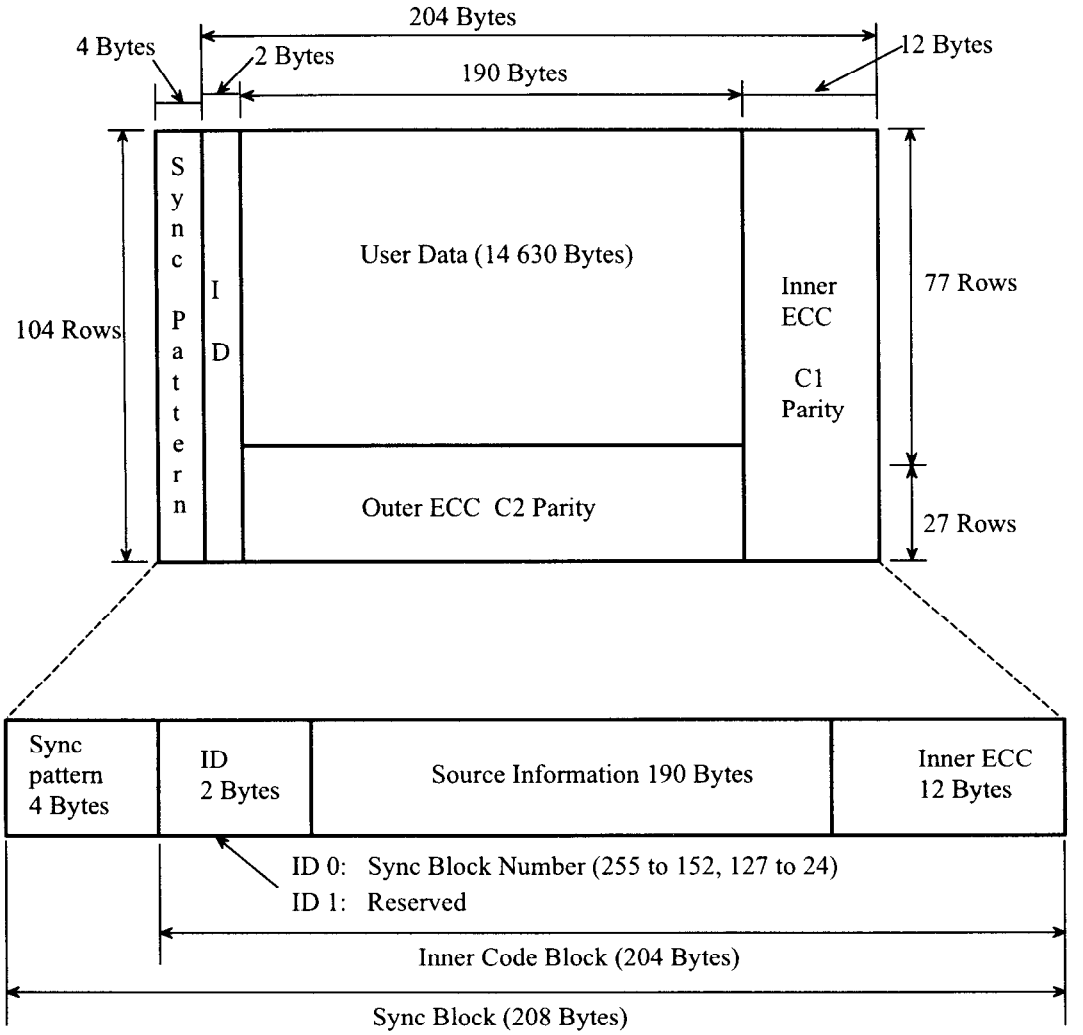


Figure 46 - Sync Block

11.5 Track assignments

A Logical Track Set shall occupy 4 tracks on tape identified as Track A, Track B, Track C and Track D. Each track shall comprise 2 Sectors.

11.5.1 Sectors

There are 8 Sectors in a Track Set, numbered from 0 to 7, and each shall comprise the following elements a Preamble and 104 Sync Blocks.

Sector number 0 and 1 shall be assigned to Track A
Sector number 2 and 3 shall be assigned to Track B
Sector number 4 and 5 shall be assigned to Track C
Sector number 6 and 7 shall be assigned to Track D.

11.5.2 Sync Blocks (figure 46)

Each Sync Block shall comprise 208 Bytes arranged in the following elements

Sync Pattern of 4 Bytes and the Inner Code Block.

The Inner Code Block shall comprise 204 Bytes arranged in the following elements

Sync Block ID of 2 Bytes
Source Information field of 190 Bytes and

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Inner ECC of 12 Bytes.

The Sync Block ID and Source Information are identified in the 8 product code arrays. The Sync Pattern is not indentified in the product code arrays and is not included in the error proctection process.

11.5.3 Track interleave (figure 47)

The interleave of data shall be accomplished across the 4 helical tracks of a Track Set. The Sync Blocks (832 blocks) of the 4 helical tracks are identified in the eight Product Code Arrays (0 to 7).

Each Product Code Array shall be divided into four areas (see figure 45(b)), equal to the content of four helical tracks. The arrangement of Sync Blocks in the two sectors of each track are sequentially assigned from each of the eight Product Code Arrays (0 to 7). A recorded track shall begin with the following product code array assignment.

Track A	Product Code Array 0
Track B	Product Code Array 6
Track C	Product Code Array 4
Track D	Product Code Array 2

NOTE - This track interleave operation together with C2 ECC provides the possiblity of correcting the data in error of one entire track.

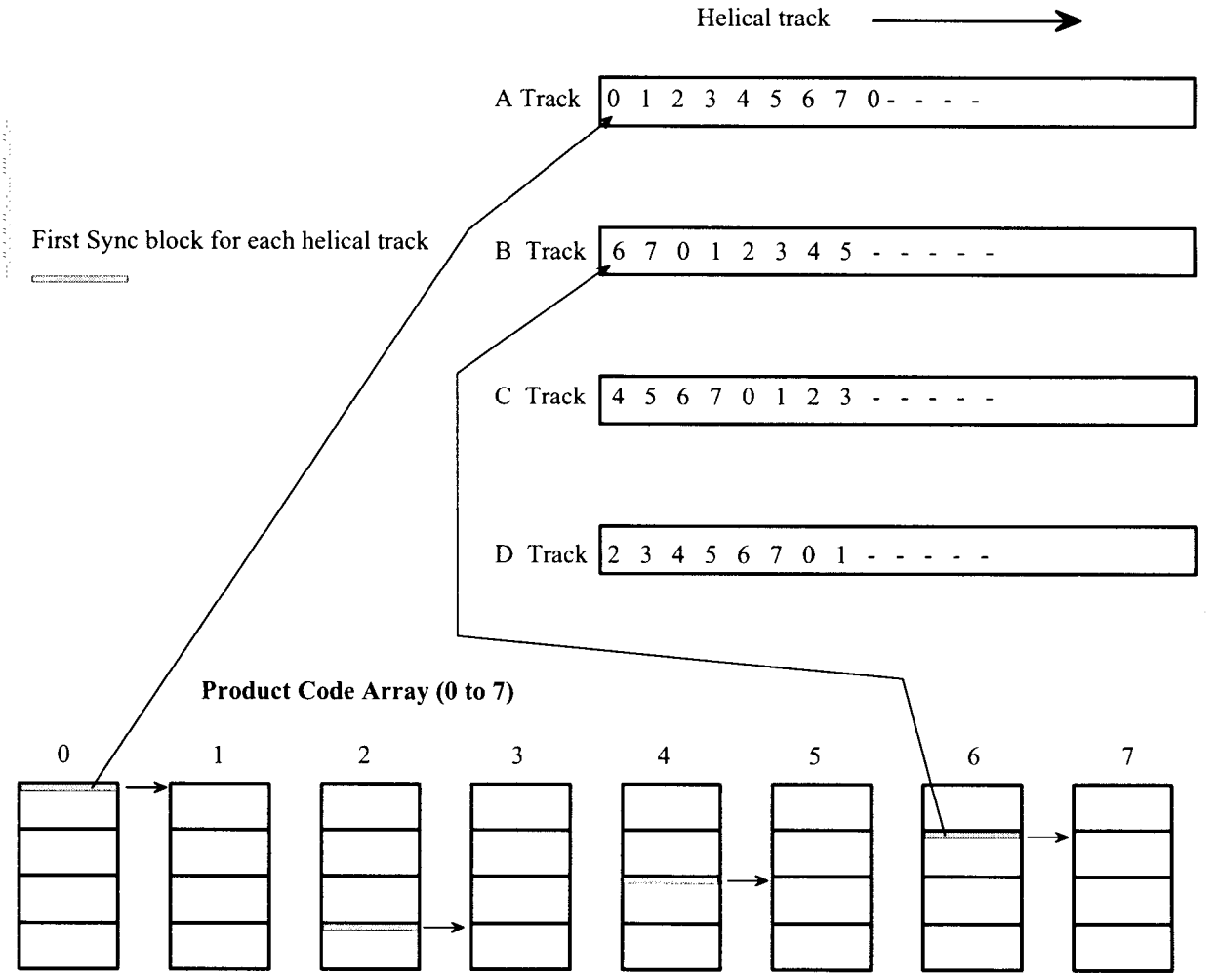


Figure 47 - Track Interleave

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11.5.4 Track Sync Blocks

Track A- Sync Blocks

Sector No.	Sync Block No.	Byte address (W:X:Y)
0	255	(0:0:0) (0:1:0) (0:2:0) ..... (0:190:0) (0:191:0)
0	254	(1:0:0) (1:1:0) (1:2:0) ..... (1:190:0) (1:191:0)
0	253	(2:0:0) (2:1:0) (2:2:0) ..... (2:190:0) (2:191:0)
		.....
0	248	(7:0:0) (7:1:0) (7:2:0) ..... (7:190:0) (7:191:0)
0	247	(0:0:1) (0:1:1) (0:2:1) ..... (0:190:1) (0:191:1)
0	246	(1:0:1) (1:1:1) (1:2:1) ..... (1:190:1) (1:191:1)
		.....
0	152	(7:0:12)(7:1:12)(7:2:12) ..... (7:190:12)(7:191:12)
1	127	(0:0:13)(0:1:13)(0:2:13) ..... (0:190:13)(0:191:13)
		.....
1	24	(7:0:25)(7:1:25)(7:2:25) ..... (7:190:25)(7:191:25)

Track B- Sync Blocks

Sector No.	Sync Block No.	Byte marker (W:X:Y)
2	255	(6:0:26)(6:1:26)(6:2:26) ..... (6:190:26)(6:191:26)
2	254	(7:0:26)(7:1:26)(7:2:26) ..... (7:190:26)(7:191:26)
2	253	(0:0:26)(0:1:26)(0:2:26) ..... (0:190:26)(0:191:26)
		.....
2	248	(5:0:26)(5:1:26)(5:2:26) ..... (5:190:26)(5:191:26)
2	247	(6:0:27)(6:1:27)(6:2:27) ..... (6:190:27)(6:191:27)
2	246	(7:0:27)(7:1:27)(7:2:27) ..... (7:190:27)(7:191:27)
		.....
2	152	(5:0:38)(5:1:38)(5:2:38) ..... (5:190:38)(5:191:38)
3	127	(6:0:37)(6:1:39)(6:2:39) ..... (6:190:39)(6:191:39)
		.....
3	24	(5:0:51)(5:1:51)(5:2:51) ..... (5:190:25)(5:191:51)

Track C- Sync Blocks

Sector No.	Sync Block No.	Byte marker (W:X:Y)
4	255	(4:0:52)(4:1:52)(4:2:52) ..... (4:190:52)(4:191:52)
4	254	(5:0:52)(5:1:52)(5:2:52) ..... (5:190:52)(5:191:52)
4	253	(6:0:52)(6:1:52)(6:2:52) ..... (6:190:52)(6:191:52)
		.....
4	248	(3:0:52)(3:1:52)(3:2:52) ..... (3:190:52)(3:191:52)
4	247	(4:0:53)(4:1:53)(4:2:53) ..... (4:190:53)(4:191:53)
4	246	(5:0:53)(5:1:53)(5:2:53) ..... (5:190:53)(5:191:53)
		.....
4	152	(3:0:64)(3:1:64)(3:2:64) ..... (3:190:64)(3:191:64)
5	127	(4:0:13)(4:1:65)(4:2:65) ..... (4:190:65)(4:191:65)
		.....
5	24	(3:0:77)(3:1:77)(3:2:77) ..... (3:190:77)(3:191:77)

Track D- Sync Blocks

Sector No.	Sync Block No.	Byte marker (W:X:Y)
6	255	(2:0:78)(2:1:78)(2:2:78) ..... (2:190:78)(2:191:78)
6	254	(3:0:78)(3:1:78)(3:2:78) ..... (3:190:78)(3:191:78)
6	253	(4:0:78)(4:1:78)(4:2:78) ..... (4:190:78)(4:191:78)
		.....
6	248	(1:0:78)(1:1:78)(1:2:78) ..... (1:190:78)(1:191:78)
6	247	(2:0:79)(2:1:79)(2:2:79) ..... (2:190:79)(2:191:79)
6	246	(3:0:79)(3:1:79)(3:2:79) ..... (3:190:79)(3:191:79)
		.....
6	152	(1:0:90)(1:1:90)(1:2:90) ..... (1:190:90)(1:191:90)
7	127	(2:0:91)(2:1:91)(2:2:91) ..... (2:190:91)(2:191:91)
		.....
7	24	(1:0:103)(1:1:103)(1:2:103) .... (1:190:103)(1:191:103)

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11.5.5 Byte interleave across Sync Blocks (figure 48)

Byte interleave shall be accomplished on the data of the Inner Code Block as follows:

The Track A, Sync Block 255 (0:0:0) (0:1:0) (0:2:0) .....
Sync Block 254 (1:0:0) (1:1:0) (1:2:0) .....
Sync Block 253 (2:0:0) (2:1:0) (2:2:0) .....
Sync Block 252 (3:0:0) (3:1:0) (3:2:0) ..... , etc.

are byte interleaved into

The Track A, Sync Block 255' (0:0:0) (1:1:0) (2:2:0) .....
Sync Block 254' (1:0:0) (2:1:0) (3:2:0) .....
Sync Block 253' (2:0:0) (3:1:0) (0:2:0) .....
Sync Block 252' (3:0:0) (0:1:0) (1:2:0) ..... , etc.

4 sync blocks of 1 product code array are interleaved by 1 byte unit except in the Sync pattern.

NOTE - Byte interleave together with C1 ECC provides the possibility of correcting a continuous data in error of up to 24 bytes per four sync blocks.

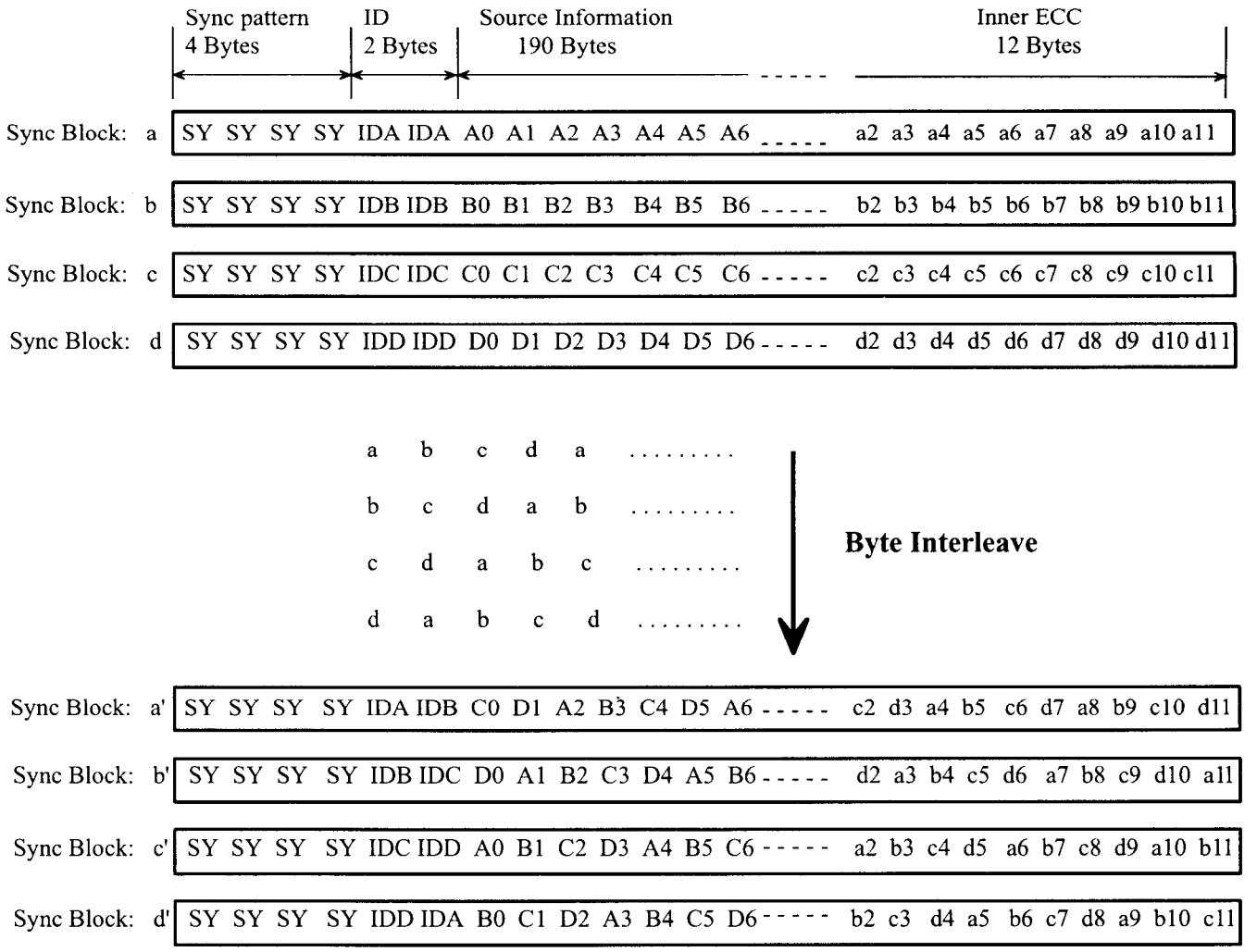


Figure 48 - Byte Interleave across Sync Blocks

11.5.6 Randomization

The Inner Code Block (ID, Source information, inner code) of each sector shall be randomized to average the 1/0 distribution. The Preamble and Sync Pattern are not randomized.

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Randomization shall be accomplished by XORing the serial byte stream to be recorded with the serial byte stream to be generated by the following polynomial equation.

$G(x)=x^8+x^4+x^3+x^2+x^0$ (in GF(2))

The left-most term shall enter the division computation first. The polynomial shall be preset to (80) at the end of every Sync Pattern.

NOTE - With the data stream set to all ZEROs the computation will generate a byte sequence beginning with (80), (38), (D2), (81), (49) and so on.

11.6 Formation of the contents of a helical track (figure 49)

Channel sync blocks are interleaved across the 4 assigned areas of the 8 arrays to form channels A,B,C and D. These channels are then 8/9 encoded to form the Channel bits. The contents of a track comprises 2 sectors formed from the Channel sync blocks, with each preceded by a preamble. A Tracking Pilot Signal (TPS) is added between the sectors of Tracks A and C. The Channel bits are then subjected to a precode filter process prior to being applied to the write heads.

Each helical track shall comprise two Sectors each containing 104 Sync Blocks preceeded by a preamble.

A TPS shall be inserted into the write channel for Tracks A and C.

Byte translation shall be performed using 8/9 channel coding followed by track interleave before each channel is precode filtered and directed to the write head.

11.6.1 Sector details (figure 50)

The Sector shall contain a Preamble, 104 Sync Blocks, resulting in 195 768 Channel bits.
The 8 Sectors of a Track Set shall be numbered as follows

Track A - 0 for the 1st sector and 1 for the 2nd sector
Track B - 2 for the 1st sector and 3 for the 2nd sector
Track C - 4 for the 1st sector and 5 for the 2nd sector
Track D - 6 for the 1st sector and 7 for the 2nd sector

11.6.1.1 Preamble

The Preamble comprises 120 times 9 Channel bits and shall be all ONEs.

11.6.1.2 Sync Blocks

Sync Blocks comprise a Sync Pattern of 4 times 9 Channel bits and a Data Field of 204 times 9 Channel bits.

The Sync Pattern symbols are not found in the 8/9 coding table of annex B. These symbols shall provide a magnetization pattern which is distinctly different than all other data. The order of recording the Sync Pattern shall be

lsb 100010101 000000001 011100100 000001011 msb

The Data Field comprise 2 bytes of Sync Block ID followed by 190 bytes of source information derived according to "Source information of Sync Block"(figure 46), both protected by 12 bytes of inner error code, all of which are processed as defined in 11.7.

The Sync Block ID byte 0 shall indicate the Sync Block and Sector position within the track set. Refer to figure 49, "Sector details". The Sync Block ID byte 1 shall be reserved and set to all ZEROs.

The 104 Sync Blocks of the 1st sector shall be numbered sequentially starting with 255 and ending with 152 in all four tracks of a track set.

The 104 Sync Blocks of the 2nd sector shall be numbered sequentially starting with 127 and ending with 24 in all four tracks of a track set.

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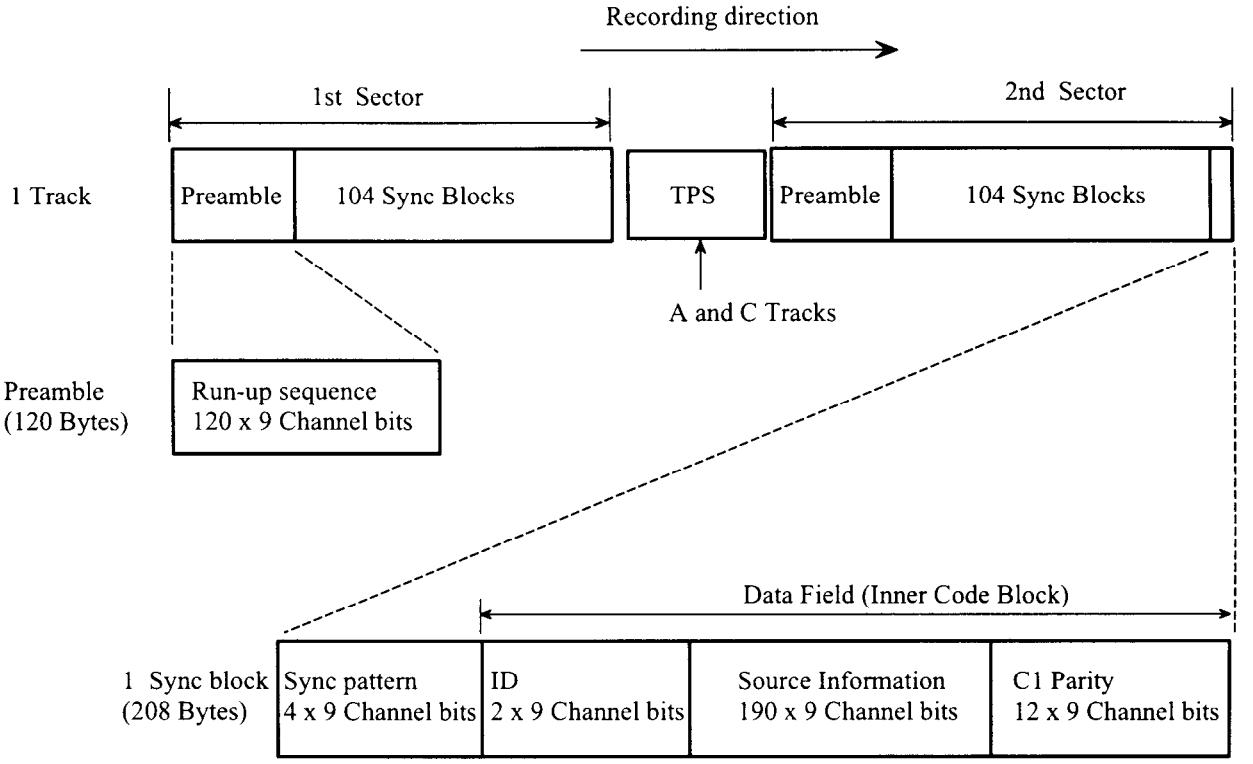


Figure 49 - Contents of a Helical Track

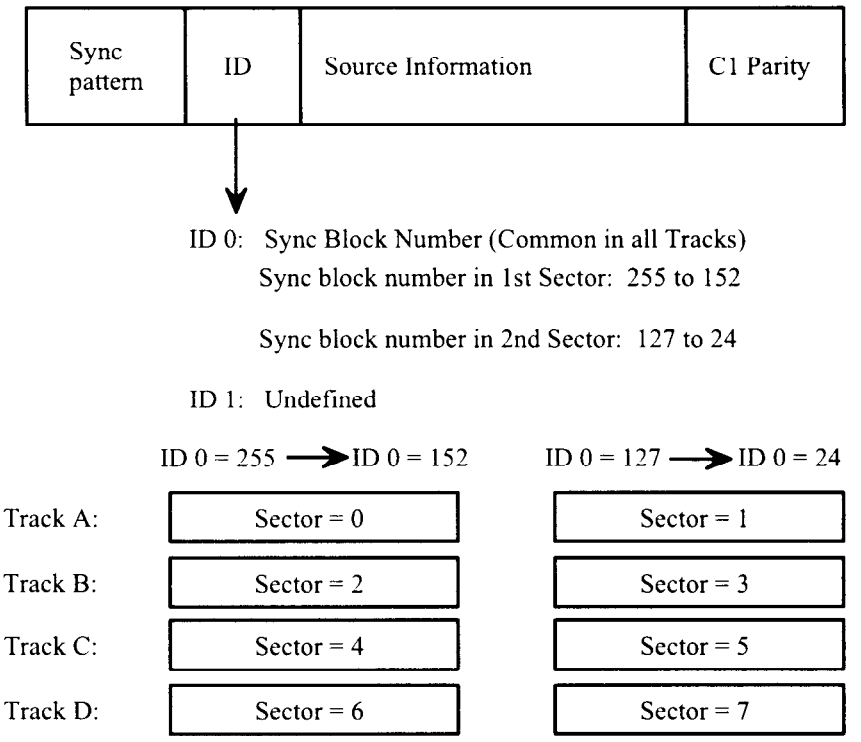


Figure 50 - Sector Details

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11.7 Channel bit coding (annex B)

11.7.1 General

8/9 coding includes the mapping of the randomized serial 8 bit byte streams into a 9-bit byte stream in such a manner that after the NRZ1 modulation of this 9-bit Channel Bit stream, a run length limited d.c.-free recording waveform is obtained. The Channel bit stream is recorded to the tape at a maximum physical recording density of 3 201 ftpmm.

NOTE - This coding is designed such that the continuous code is reversed within 5 channel bit cell periods after precode of NRZ1.

11.7.2 Interleaved-NRZ1 (figure 51)

8/9 coded data shall be processed with a precode circuit to generate Interleaved-NRZ1.

The 9-bit Channel bit stream shall be subjected to the following precode filtering.

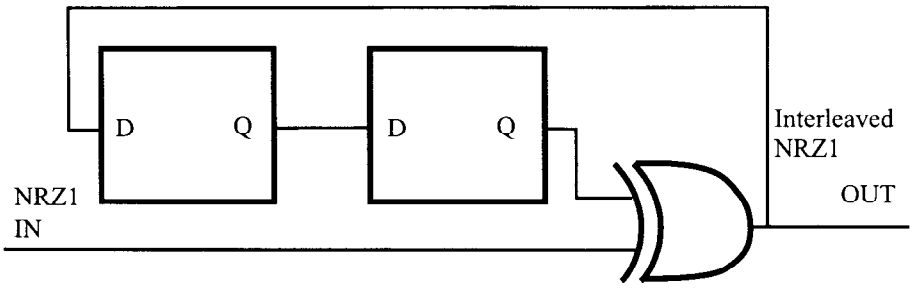


Figure 51 - Precode circuit

Data out of the precode circuit shall be recorded to the tape.

12 Track geometry

12.1 General

Two types of track shall be recorded on the tape, helically recorded tracks and longitudinally recorded tracks. Helically recorded tracks contain user data. The longitudinally recorded Control Track provides accurate positioning information to the drive servo. The longitudinally recorded Time Code Track provides unique identification of the longitudinal position on tape, and thus enables fast searches to be carried out. The configuration of the tracks is shown in figure 52.

12.2 Helically recorded tracks

Each track shall comprise two sectors with a tracking pilot signal included on tracks A and C.

12.2.1 Location of the tracks

The distance from the lower edge of the helical tracks to the Tape Reference Edge shall be

l_{348} = 1,218 mm ± 0,010 mm

The distance from the upper edge of the helical tracks to the Tape Reference Edge shall be

l_{349} = 11,444 mm ± 0,010 mm

The effective width of the helically recorded area shall be the distance between two lines parallel to the Tape Reference Edge, one passing through the centreline of, and at the end of, the helical track, and the other passing through the centreline at the beginning of the Preamble at the start of the helically recorded area, and shall be

l_{350} = 10,155 mm nominal

The distance from the lower edge of the helically recorded area to the Tape Reference Edge shall be

l_{351} = 1,237 mm ± 0,010 mm

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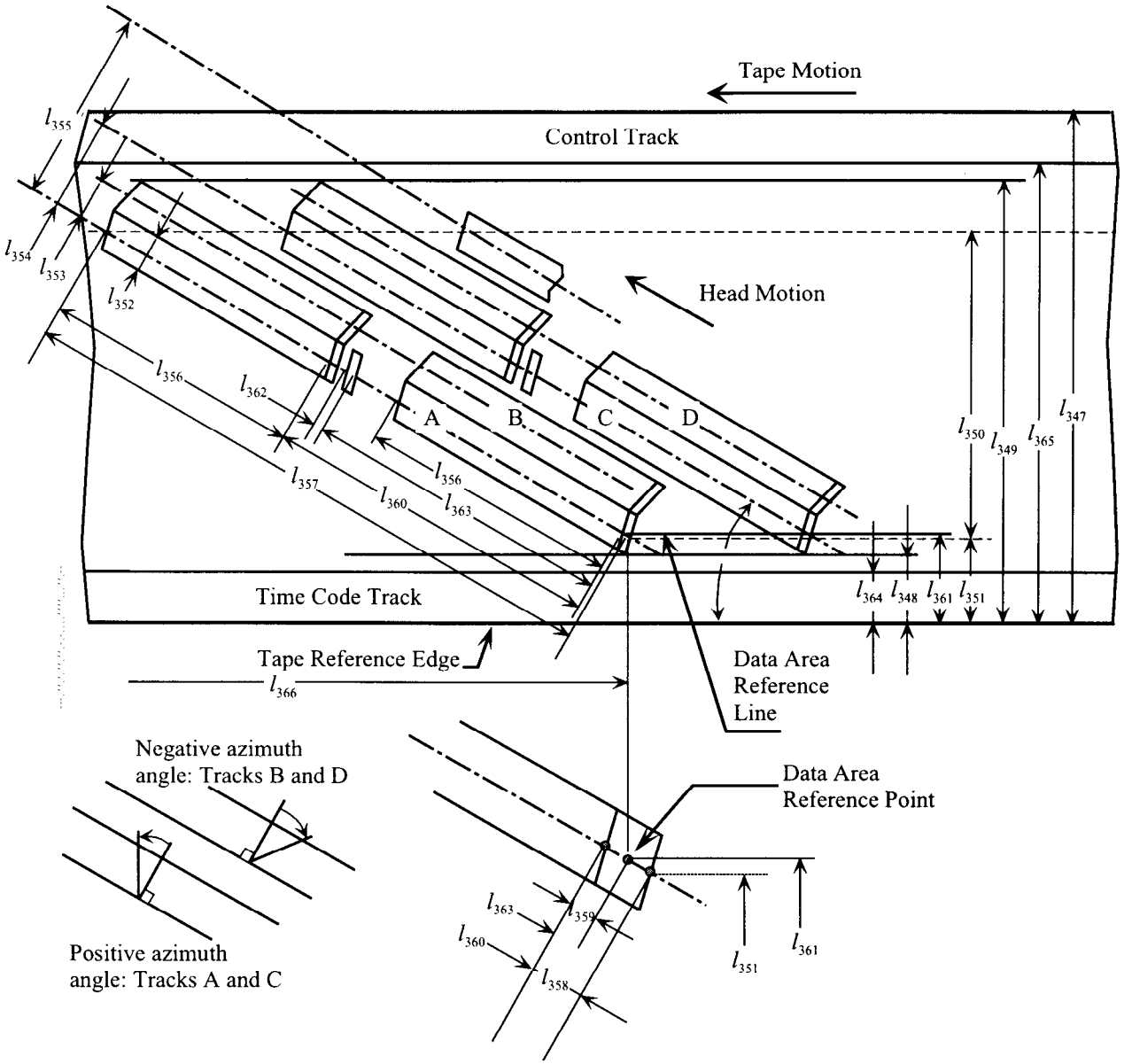


Figure 52 - Location and dimensions of recorded tracks

12.2.2 Track width

The width of each helical track shall be

$$l_{352} = 0{,}035 \text{ mm } {}^{+0{,}002\,\text{mm}}_{-0{,}003\,\text{mm}}$$

12.2.3 Track angle

The angle of each track relative to the Tape Reference Edge shall be

$$\theta = 4{,}64195°$$

12.2.4 Track pitch

The distance between the centrelines of adjacent tracks A and B (C and D), measured perpendicular to the track centreline shall be

$$l_{353} = 0{,}035 \text{ mm} \pm 0{,}002 \text{ mm}$$

The distance between the centrelines of tracks A and C, measured perpendicular to the track centreline shall be

$$l_{354} = 0{,}078 \text{ mm} \pm 0{,}006 \text{ mm}$$

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The distance between the centreline of track A in Track Set n to the centreline of track A in Track Set n+1 shall be

l_{355} = 0.156 mm nominal

12.2.5 Location of elements in the helical track

The length of each sector shall be

l_{356} = 60.820 mm nominal

The total length of helical track shall be

l_{357} = 125.485 mm nominal

The distance from the Preamble pattern to the start of the Sector at the start of a helical track shall be

l_{358} = 0.337 mm ± 0.085 mm

The distance from the start of the first Sector of a helical track to the Data Area Reference Point shall be

l_{359} = 0.000 mm ± 0.085 mm

The distance from the start of the first Sector to the start of the second Sector of a helical track shall be

l_{360} = 64.328 mm ± 0.085 mm

12.2.6 Location of the Data Area Reference Point

The Data Area Reference Line shall be a line parallel to the Tape Reference Edge and spaced

l_{361} = 1.264 mm (nominal) from it.

The Data Area Reference point for track A of a Track Set is at the intersection of the Data Area Reference Line and the centreline of the track.

12.2.7 Straightness of tracks

The centreline of a recorded track shall be contained within two parallel straight lines 6 µm apart.

12.2.8 Azimuth angles

The recorded bit positive azimuth angle for tracks A and C shall be +15,035° ± 0,217 °

The recorded bit negative azimuth angle for tracks B and D shall be -14,965° ± 0,217 °

These values of the azimuth angles result from the bits having been recorded with the tape in motion longitudinally with helical recording heads which have a basic physical azimuth of plus and minus 15°.

12.2.9 Tracking Pilot Signal (TPS)

The TPS shall be a nominal 5 MHz signal (800.3 ftpmm) recorded on tracks A and C. The TPS shall be read by the write heads, providing a control signal to the servo system for tracing the helical tracks precisely.

The length of the TPS in tracks A and C shall be

l_{362} = 0,887 mm

The distance from the start of first Sector to the start of the TPS in tracks A and C shall be

l_{363} = 62,866 mm ± 0,085 mm

12.2.10 Amplitude of servo signals

The Tracking Pilot Signal signal amplitude averaged over any TPS shall be between 80 % and 120 % of SRA3.

12.3 Longitudinal tracks geometry

12.3.1 Control Track

The distance from the lower edge of the Control Track to the Tape Reference Edge shall be

l_{365} = 12,05 mm ± 0,08 mm

The distance between the Control Track flux transition as defined in 14.2 and the Data Area Reference Point of the first helical track of the Track Set to which it belongs shall be

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l_{366} = 175,79 mm ± 0,10 mm

12.3.2 Time Code Track signals recording position

The distance from the upper edge of the Time Code Track to the Tape Reference Edge shall be

l_{364} = 0,60 mm ± 0,09 mm

The distance between the leading edge of bit 0 of the Time Code and the Data Area Reference Point of the first helical track of the Track Set to which it refers shall be l_{366}.

13 Method of recording helical tracks

The method of recording shall be

- a ONE is represented by a flux transition at the centre of a bit cell.
- a ZERO is represented by the absence of flux transitions in the bit cell.

NOTE - The first flux transition on the helical tracks may be of either polarity.

13.1 Physical recording density

The maximum physical recording density shall be 3 201 ftpmm. The resulting nominal bit cell length is 0,31 µm.

13.2 Record current optimization

The record current shall be optimized such that the read signal amplitude averaged over a minimum of 2 560 flux transitions at 3 201 ftpmm, exclusive of missing pulses, shall be between 84 % and 120 % of SRA1.

13.3 Efficiency of erasure

In all erased areas the full width of the tape shall be a.c. erased in the direction of tape motion. After erasure, the read signal amplitude shall be no greater than 2% of the average signal amplitude recorded at the physical recording density of 800,3 ftpmm (SRA3) on the same tape.

14 Method of recording longitudinal tracks

14.1 Overview

The Control Track provides accurate positioning information to the drive servo. The Time Code Track provides unique identification of the longitudinal position on tape and thus enables fast search capability.

14.2 Control Track

14.2.1 Signal

The Control Track shall be recorded with a series of constant flux levels alternating in polarity at each Track Set, and completing one cycle in two Track Sets.The flux transitions provide the control timing reference points. The transitions shall be aligned with the helical track Data Area Reference Point as shown in figures 52 and 53.

14.2.2 Polarity of magnetisation (figure 53)

The polarity of the flux during time interval E shall be such that the south poles of the magnetic domain should point in the direction of normal tape travel and, similarly, during time interval F the north pole shall be thus oriented.

14.2.3 Alignment

Transitions from south poles (interval E) to north poles (interval F) of the magnetic domains shall be such that they occur at the even Track Set Data Area Reference Points of the A- Track. Similarly, transitions from north to south poles occur at odd Track Set Data Area Reference Points of the A-Track.

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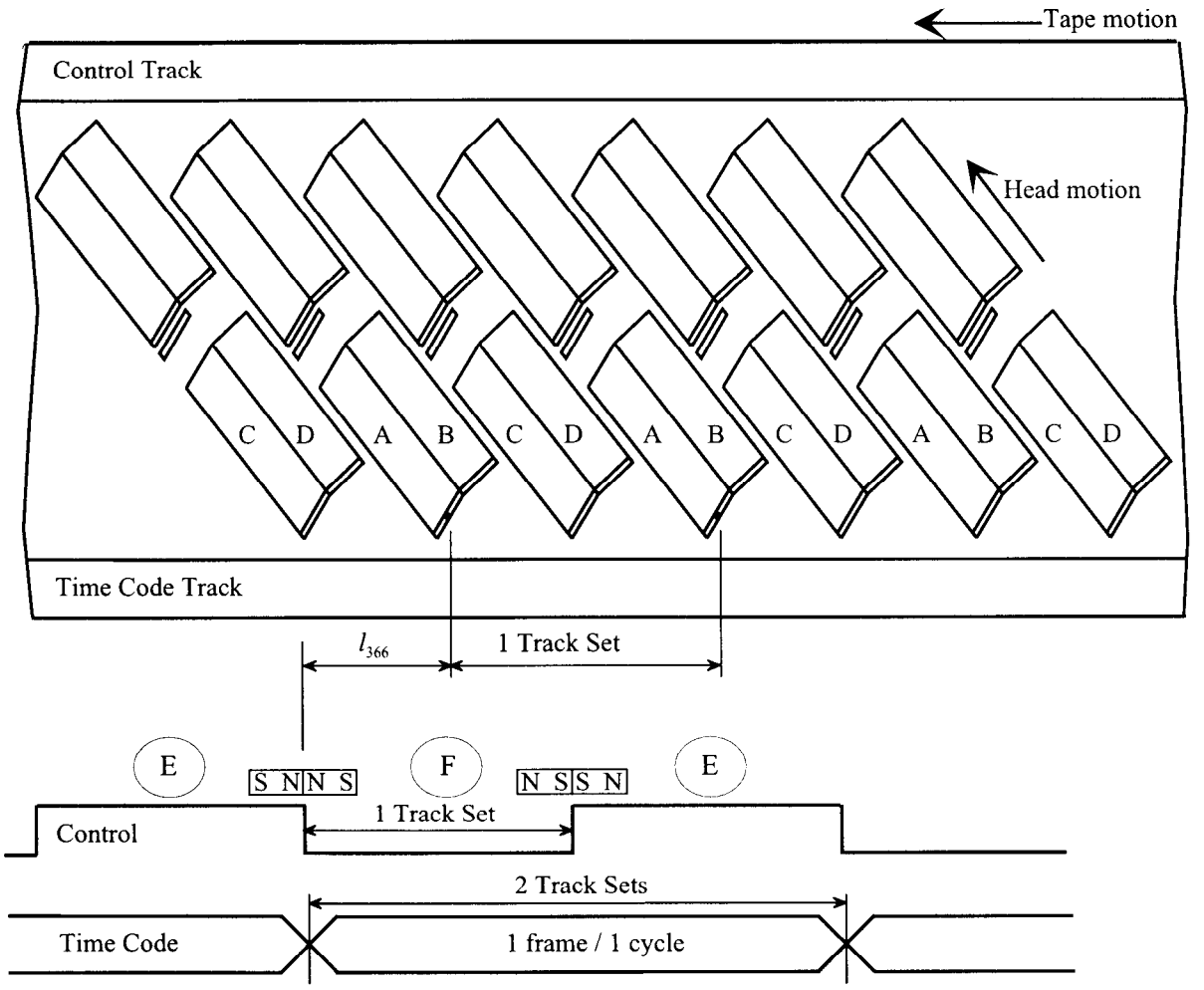


Figure 53 - Longitudinal Tracks

14.2.4 Read signal amplitude

The average read signal amplitude, taken over 200 flux transitions, exclusive of missing pulses, shall be between 80 % and 130 % of SRA2. A missing pulse is defined as one read as 50% or less of SRA2.

14.2.5 Quality of the Control Track

A missing pulse zone begins with a missing pulse and ends when 4 consecutive flux transitions, which are not missing pulses, have been detected. The length of a missing pulse zone shall not exceed 30mm.

14.3 Time Code Track

14.3.1 Method of recording the Time Code Track

The method of recording on the tape shall be

- a ZERO is represented by a flux transistion at the beginning of a bit cell
- a ONE is represented by a flux transition at the beginning of a bit cell followed by a transition at the centre of the bit cell.

14.3.2 Physical recording density

The nominal maximum physical recording density shall be 20,75 ftpmm. The resulting bit cell length is 48,19 µm.

14.3.3 Bit shift

The maximum displacement of any ONEs zero crossing, exclusive of missing pulses, from its expected position as defined by the nominal bit cell length, shall not exceed 25%.

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14.3.4 Read signal amplitude

The average read signal amplitude, taken over 800 flux transitions, exclusive of missing pulses, shall be between 80 % and 130 % of SRA2.

14.3.5 Quality of the Time Code Track

In any group of 8 Time Codes, at least 6 shall not have been corrupted by missing pulses or bit shift.

14.4 Format for the Time Code Track

The Time Code Track shall contain a unique Time Code for each Track Set pair. Each Time Code shall comprise 80 bits.

The occurrence of 30 Track Set pairs shall increment the units of seconds count.

14.4.1 Count bits

The count of Track Set pairs shall be contained in eight groups of count bits.

Bits 0 to 3	shall express, in binary notation, a count of units of Track Set pairs, in the range 0 to 9
Bits 8 and 9	shall express, in binary notation, a count of tens of Track Set pairs, in the range 0 to 2
Bits 10 and 11	shall be set to ZERO.
Bits 16 to 19	shall express, in binary notation, a count of units of seconds, in the range 0 to 9
Bits 24 to 26	shall express, in binary notation, a count of tens of seconds, in the range 0 to 5
Bits 32 to 35	shall express, in binary notation, a count of units of minutes, in the range 0 to 9
Bits 40 to 42	shall express, in binary notation, a count of tens of minutes, in the range 0 to 5
Bits 48 to 51	shall express, in binary not ation, a count of units of hours, in the range 0 to 9
Bits 56 and 57	shall express, in binary notation, a count of tens of hours, in the range 0 to 3

14.4.2 Phase bit

Bit 27 shall be set such that there is an even number of ZEROs in the 80-bit Time Code.

The first Track Set pair of VSIT shall have all count bits set to ZERO.

14.4.3 Synchronizing pattern

Bits 64 to 79 shall be set to the synchronizing pattern 0011111111111101

14.4.4 Supplemental Data

The eight groups of Supplemental Data, bits 4 to 7, 12 to 15, 20 to 23, 28 to 31, 36 to 39, 44 to 47, 52 to 55 and 60 to 63 shall be set all ZERO's.

14.4.5 Extent of Time Code

Time Code shall be recorded continuously over the range of n-142 to n+26 with reference to Helical Track Set ID(n) as a minimum. Negative time is represented as occurring in the previous 24 h.

Section 5 - Requirements for recorded information

15 Recorded information

15.1 Recording area (figure 54)

The recording area shall be defined as the area between the Logical Beginning of Tape (LBOT) and the Logical End of Tape (LEOT).

The distance from the physical BOT (PBOT) to LBOT shall be

l_{367} = 10,0 m ± 0,5 m.

The distance from the physical EOT(PEOT) to LEOT shall be

l_{368} = 15 m max.

The leader tape shall be joined to the magnetic tape at the PBOT.

The trailer tape shall be joined to the magnetic tape at the PEOT.

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15.2 Magnetic tape layout (figure 55)

There are Valid data areas and Invalid data areas in the recording area.

15.2.1 Valid data areas

There are five kinds of Valid data areas as follows.

Run-up areas, VSIT area, DIT area, Data area and Virtual End of Volume (VEOV) area.

The Run-Up area shall be that distance during which the scanner servo stabilizes.

The length of Run-Up Area shall be

$$l_{369} = 0{,}80 \text{ m} \pm 0{,}05 \text{ m}.$$

The VSIT area shall contain 10 Track Sets as defined in 11.2.5.1.

A Run-Up Area shall preceed a VSIT.
The starting Physical TSID of VSIT shall be 0
An area reserved for Write Retries shall be within the VSIT and contain 90 Track Sets min and shall be

$$l_{370} = 0{,}2 \text{ m min}.$$

The DIT area shall contain 40 Track Sets as defined in 15.3.2.

A Run-Up Area shall preceed a DIT.

The Data area shall be defined as that area after the Position Tolerance Band (see 15.2.2) and the Run-Up Area following the DIT, and before Near EOT (NEOT). The NEOT position is implemention dependent.

The VEOV area shall be defined as that area between NEOT and LEOT.

The VEOV area shall be for recording user data, and any necessary processing which requires recordingdata on the magnetic tape. The recording session shall be terminated within this VEOV area.

15.2.2 Invalid data areas

The data in an Invalid area (i.e. helical track data, control data) shall be ignored in interchange.

Invalid areas are those between PBOT and LBOT, and those between LEOT and PEOT.

The Position Tolerance Band is an invalid data area and shall be used to provide the positioning tolerance for the protection of the valid data from erasure when updating the management tables (VSIT and DIT).

The size of a Position Tolerance Band shall be

$$l_{371} = 0{,}35 \text{ m} \pm 0{,}05 \text{ m}.$$

15.3 Physical TSID

The Physical TSID Time Code signal recorded in the Time Code track shall be converted into hexadecimal data. Each recorded Time Code spans the distance of two Physical Track Sets. A ZERO or ONE shall be appended to the Time Code before the conversion to identify the first and second Physical Track Sets respectively.

The Time Code value for the first Physical TSID of the VSIT shall be "00:00:00:00-0".

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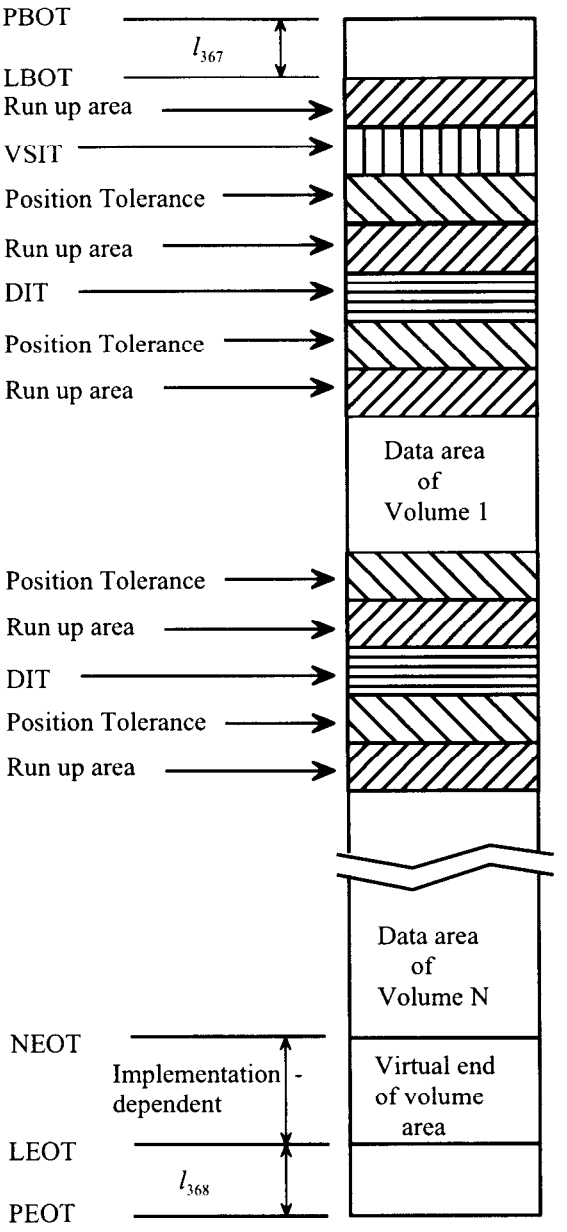


Figure 54 - Magnetic tape layout in multiple volumes

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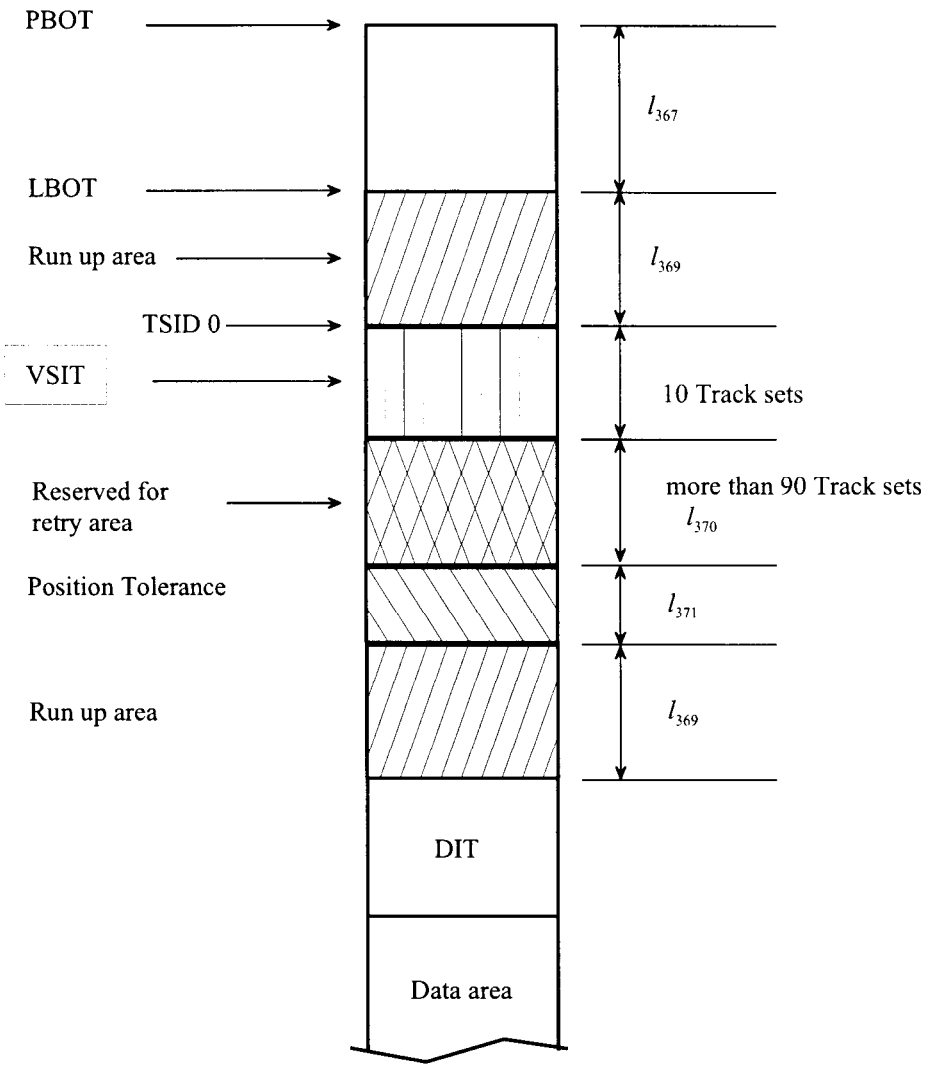


Figure 55 - Allocation of VSIT

15.3.1 Structure surrounding the VSIT area

The structure of areas containg the VSIT shall comprise the following

a Run-up area
the VSIT
a reserved area for Write Retries
a Position Tolerance Band
and a Run-up area for the following DIT.

15.3.2 Structure of the DIT area (figure 56)

The DIT contains volume and file information in this volume.

The DIT shall include following five tables.

VIT - Volume Information Table
BST - Bad spot table
LIDT - Logical ID table
FIT - File information table
UT - Update table

A DIT area shall comprise 40 track sets.

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A DIT shall be recorded at least 3 times at most 7 times.

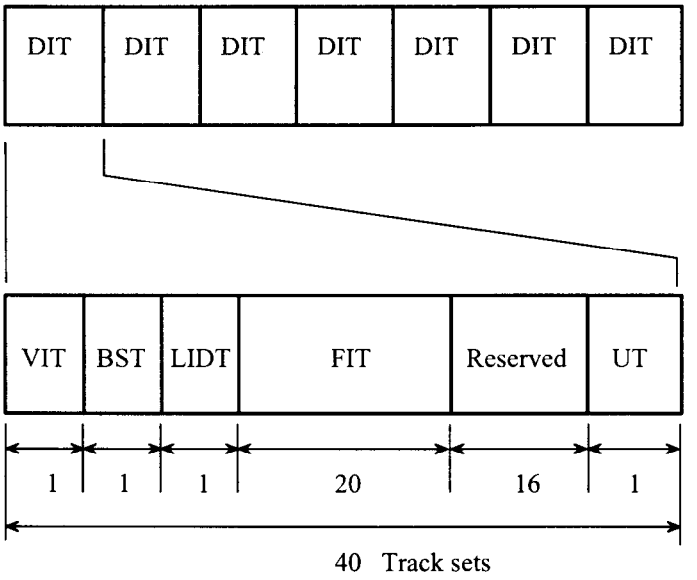


Figure 56 - Strucure of the DIT area

15.3.3 Structure of the User Data Area

The User Data Area consists of

User Data Track Sets
TM Track Set, identified as either a File Mark or Set Mark Track Set
TM Track Set shall be preceeded and followed by a DM Track Set
EOD Track Sets.
Dummy Track Sets

Dummy track sets shall be used to fill areas where continuous recording of the control track is required.

The end of the recorded data shall be indicated by writing 16 or more EOD track sets consecutively on the tape.

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Section 6 - Write operations

16 Write retry sequence (figure 57)

To ensure that the quality of recording is sufficient for successful recovery, the write retry sequence may be applied in the recording process.

The information (data, subcode) of a failed Track Set and of following Track Sets may be rewritten into a new physical track location.

If a failed Track Set and following Track Sets are subjected to the write retry process, they shall be rewritten without erasing the original Track Sets.

The start TSID and the ending TSID of the original recorded Track Sets shall be registered into the BST as logically invalid Track Sets.

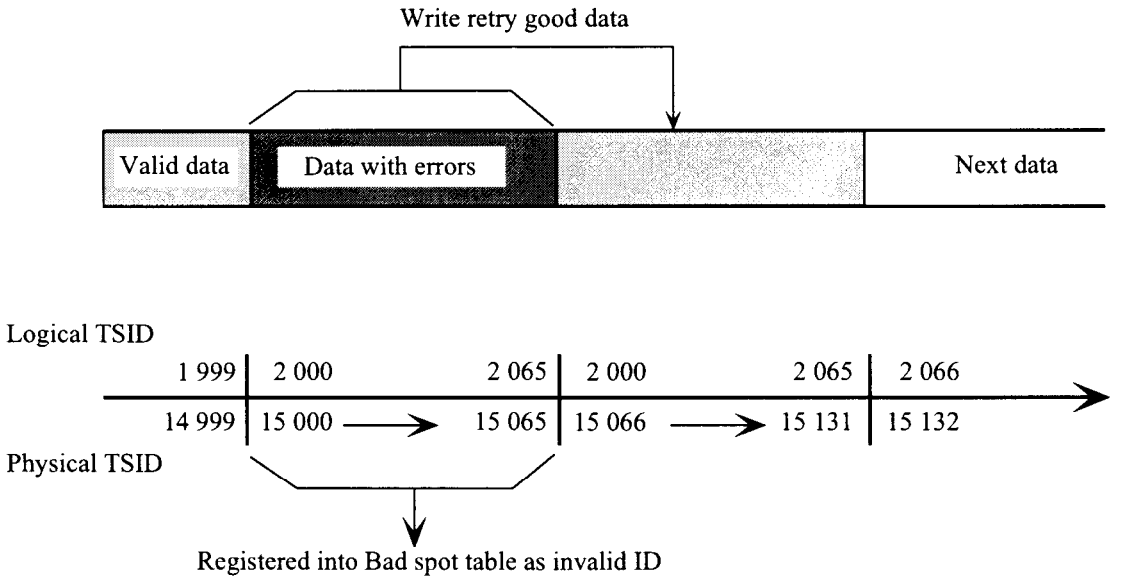


Figure 57 - Write retry sequence

17 Append file operation (figure 58)

There are four ways to write a new file on the recorded tape.

17.1 Append volume

A new DIT and Logical Volume may be constructed following the last Logical Volume recorded on the tape as follows

- A Run-Up Area shall be recorded after EOD of the last Logical Volume on the tape.
- The new DIT and Logical Volume shall be written following the Run-Up Area.
- The start Physical TSID of the new VIT and the last Physical TSID of the volume shall be registered in VSIT.

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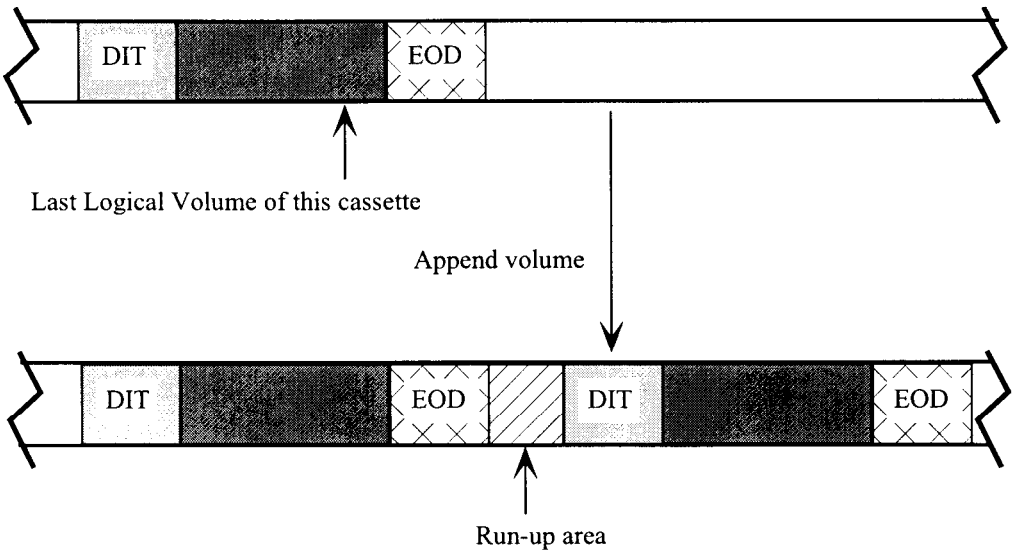


Figure 58 - Append volume

17.2 Append write (figure 59)

A new file may be appended to the current Logical Volume as follows

- The file shall be written starting from the end of the first Track Set of the previously recorded 16 or more EOD Track Sets.
- The 'A' bit of the Subcode data field of the first Logical Track Set of the appended file shall be set to ONE.
- The data of LIDT and FIT shall be updated.

The append operation shall be inhibited if the appending of a file would result in the overwriting of a following Logical Volume.

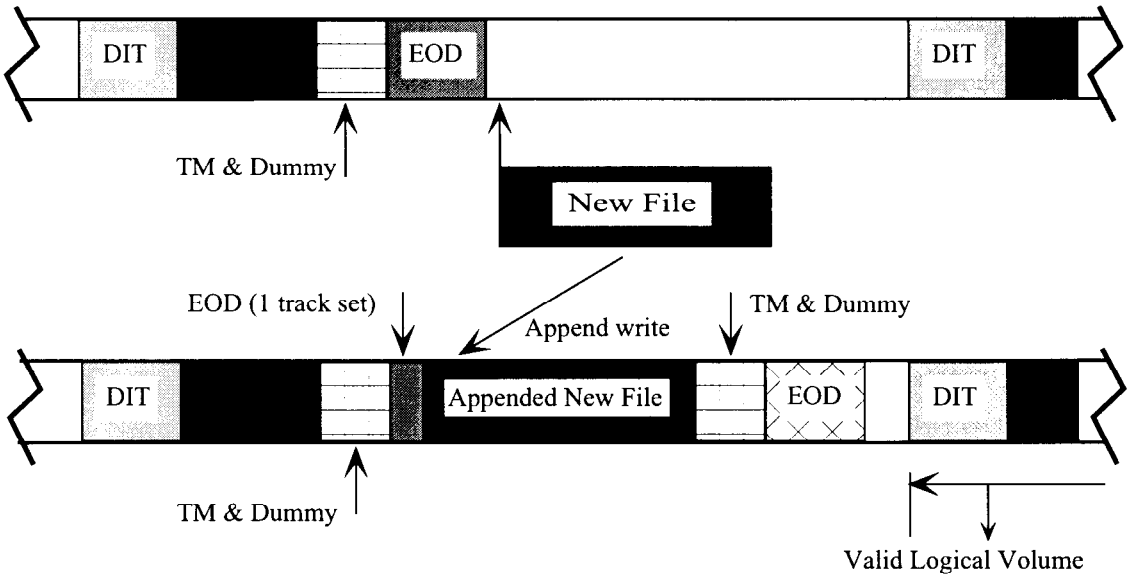


Figure 59 - Append write

17.3 Overwrite (figure 60)

A new file may be written over a previously recorded file as follows

- The file shall be written following one DM Track Set at the end of the original recorded TM.
- The Overwrite counter shall be incremented by 1 in the Subcode data fields of User data, TM, EOD and DM Track Sets of the newly recorded file.

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– The data in LIDT and FIT shall be updated.

When the newly recorded file is shorter than the overwritten original recorded data, the remaining data shall become invalid data and ignored in interchange.

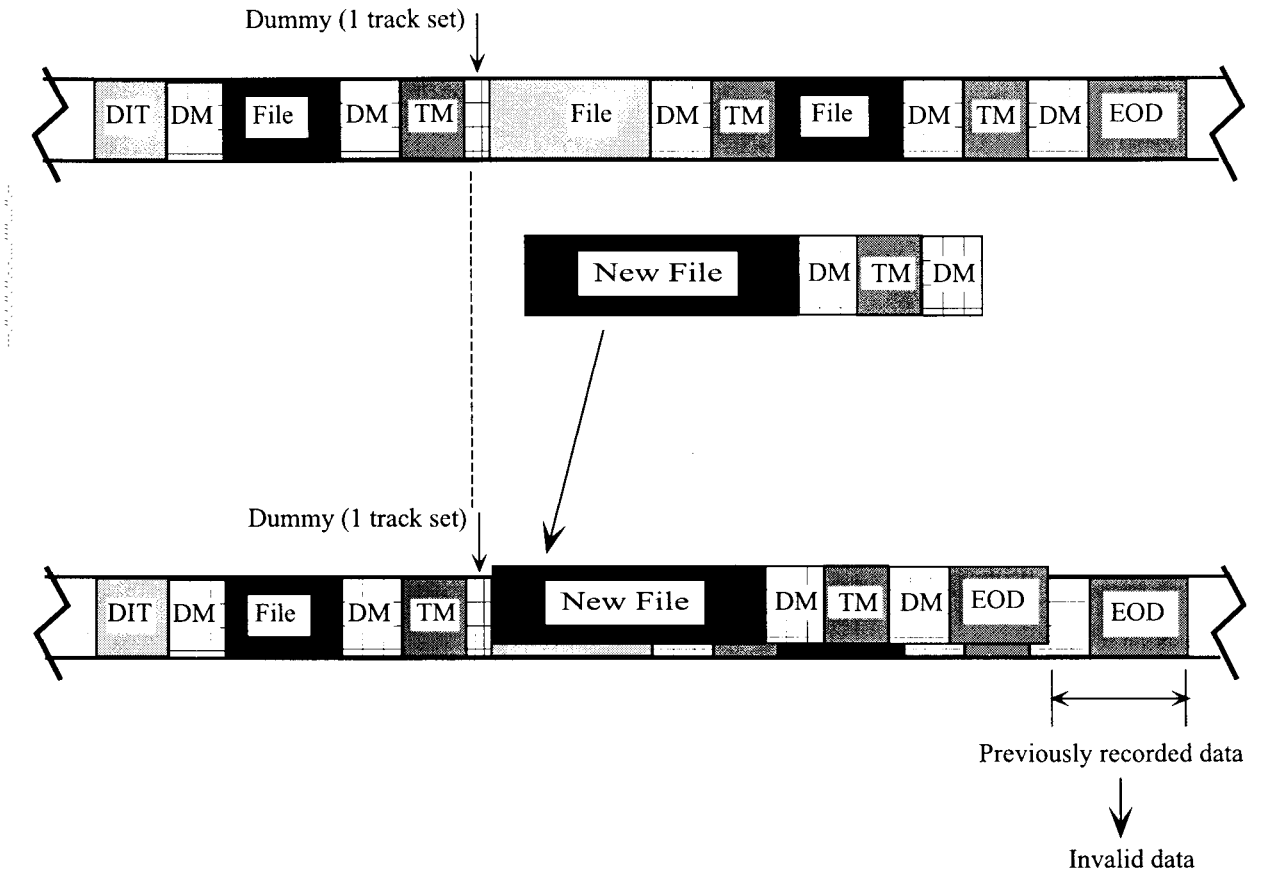


Figure 60 - Overwrite

17.4 File extension (figure 61)

– A file may be recorded as an extension to the current Logical Volume as follows

– The file shall be written following one DM Track Set at the end of the previously recorded data, overwriting the previously recorded TM.

– The Overwrite counter shall be incremented by 1 in the Subcode data fields of User data, TM, EOD and DM Track Sets of the newly recorded file.

– The data in LIDT and FIT shall be updated.

When the newly recorded file is shorter than the overwritten original recorded data, the remaining data shall become invalid data and ignored in interchange.

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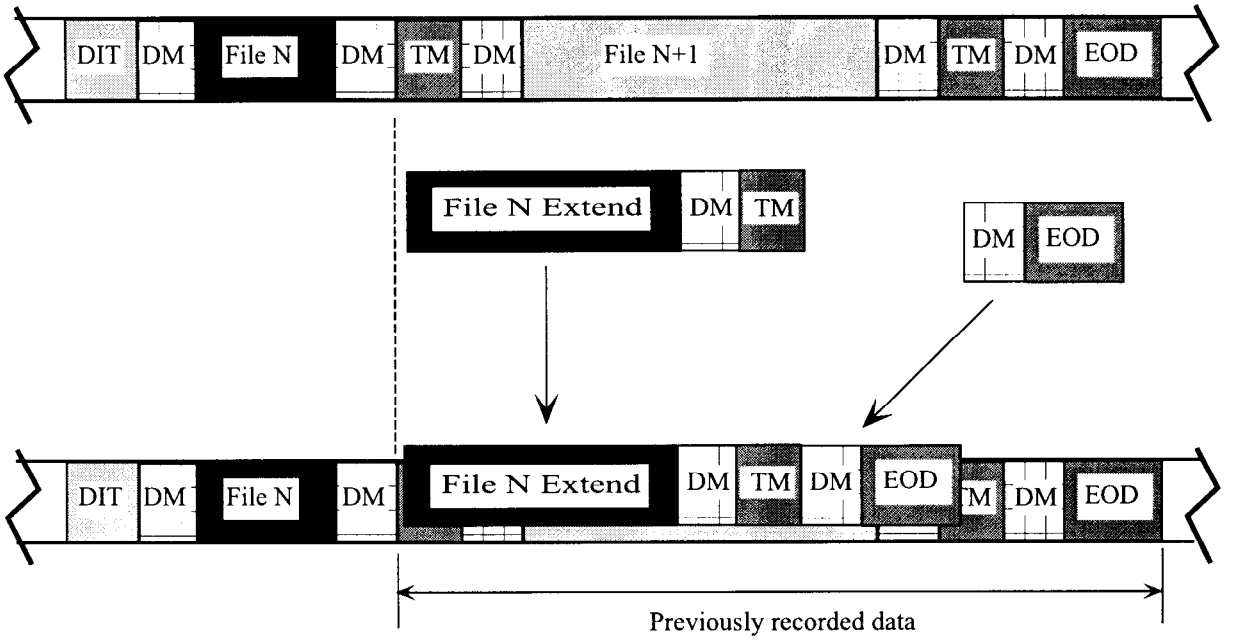


Figure 61 - Extend file

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Annex A

(normative)

Measurement of Signal-to-Noise Ratio

Unless otherwise stated, the test condition are those defined in clause 10.

A.1 Procedure

The Signal-to-Noise Ratio shall be measured using a spectrum analyzer with a resolution bandwidth of 10 kHz.

1) erase prior to testing.
2) Record the tape at 3 201 ftpmm
3) Measure the Average Signal Amplitude (S_{tape}) on the next pass (read only).
4) Measure the total noise level (N_{total}) at 41,3 MHz.
5) Measure the read channel noise level (N_{amp}) at 41,3 MHz without a tape loaded but with the motor running.

Tape Noise: $N_{TAPE} = \sqrt{N_{TOTAL}^{\ 2} - N_{AMP}^{\ 2}}$

$\frac{N_{AMP}}{N_{TAPE}}$ shall be less than 70 %.

The Signal-to-Noise Ratio is $S/N_{TAPE} = 20\log\frac{S_{tape}}{N_{tape}}(dB)$.

6) Take the average of at least 64 successive tests to determine the Signal-to-Noise Ratio for the tape (S/N_{tape})
7) Repeat 1 to 6 for the Secondary Standard Reference Tape, to give S/N_{MSRT}.

The Signal-to-Noise Ratio characteristic is

(S/N_{tape}) - (S/N_{MSRT}) dB

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Annex B

(normative)

Representation 8/9 coding patterns

Decimal	(Hex)	8-bit Bytes MSB LSB	9-bit Bytes MSB LSB
0	(00)	00000000	011000100
1	(01)	00000001	111000100
2	(02)	00000010	100100100
3	(03)	00000011	010100100
4	(04)	00000100	110100100
5	(05)	00000101	101100100
6	(06)	00000110	011100100
7	(07)	00000111	111100100
8	(08)	00001000	010010100
9	(09)	00001001	110010100
10	(0A)	00001010	011010100
11	(0B)	00001011	111010100
12	(0C)	00001100	100110100
13	(0D)	00001101	010110100
14	(0E)	00001110	110110100
15	(0F)	00001111	101110100
16	(10)	00010000	011110100
17	(11)	00010001	111110100
18	(12)	00010010	010001100
19	(13)	00010011	110001100
20	(14)	00010100	101001100
21	(15)	00010101	011001100
22	(16)	00010110	111001100
23	(17)	00010111	100101100
24	(18)	00011000	010101100
25	(19)	00011001	110101100
26	(1A)	00011010	101101100
27	(1B)	00011011	011101100
28	(1C)	00011100	111101100
29	(1D)	00011101	100011100
30	(1E)	00011110	010011100
31	(1F)	00011111	110011100
32	(20)	00100000	101011100
33	(21)	00100001	011011100
34	(22)	00100010	111011100
35	(23)	00100011	100111100
36	(24)	00100100	010111100
37	(25)	00100101	110111100
38	(26)	00100110	101111100
39	(27)	00100111	011111100
40	(28)	00101000	111111100
41	(29)	00101001	100100010
42	(2A)	00101010	101100010
43	(2B)	00101011	011100010
44	(2C)	00101100	010010010
45	(2D)	00101101	110010010
46	(2E)	00101110	011010010
47	(2F)	00101111	111010010
48	(30)	00110000	100110010
49	(31)	00110001	010110010
50	(32)	00110010	110110010
51	(33)	00110011	101110010
52	(34)	00110100	011110010
53	(35)	00110101	111110010
54	(36)	00110110	110001010
55	(37)	00110111	101001010
56	(38)	00111000	011001010
57	(39)	00111001	111001010
58	(3A)	00111010	100101010
59	(3B)	00111011	110101010
60	(3C)	00111100	101101010
61	(3D)	00111101	011101010
62	(3E)	00111110	111101010
63	(3F)	00111111	100011010
64	(40)	01000000	010011010
65	(41)	01000001	110011010
66	(42)	01000010	101011010
67	(43)	01000011	011011010

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Decimal	(Hex)	8-bit Bytes MSB LSB	9-bit Bytes MSB LSB
68	(44)	01000100	111011010
69	(45)	01000101	100111010
70	(46)	01000110	010111010
71	(47)	01000111	110111010
72	(48)	01001000	101111010
73	(49)	01001001	011111010
74	(4A)	01001010	111111010
75	(4B)	01001011	011000110
76	(4C)	01001100	111000110
77	(4D)	01001101	100100110
78	(4E)	01001110	010100110
79	(4F)	01001111	110100110
80	(50)	01010000	101100110
81	(51)	01010001	011100110
82	(52)	01010010	111100110
83	(53)	01010011	010010110
84	(54)	01010100	110010110
85	(55)	01010101	011010110
86	(56)	01010110	111010110
87	(57)	01010111	100110110
88	(58)	01011000	010110110
89	(59)	01011001	110110110
90	(5A)	01011010	101110110
91	(5B)	01011011	011110110
92	(5C)	01011100	111110110
93	(5D)	01011101	010001110
94	(5E)	01011110	110001110
95	(5F)	01011111	101001110
96	(60)	01100000	011001110
97	(61)	01100001	111001110
98	(62)	01100010	100101110
99	(63)	01100011	010101110
100	(64)	01100100	110101110
101	(65)	01100101	101101110
102	(66)	01100110	011101110
103	(67)	01100111	111101110
104	(68)	01101000	100011110
105	(69)	01101001	010011110
106	(6A)	01101010	110011110
107	(6B)	01101011	101011110
108	(6C)	01101100	011011110
109	(6D)	01101101	111011110
110	(6E)	01101110	100111110
111	(6F)	01101111	010111110
112	(70)	01110000	110111110
113	(71)	01110001	101111110
114	(72)	01110010	011111110
115	(73)	01110011	111111110
116	(74)	01110100	010010001
117	(75)	01110101	110010001
118	(76)	01110110	111010001
119	(77)	01110111	100110001
120	(78)	01111000	010110001
121	(79)	01111001	110110001
122	(7A)	01111010	101110001
123	(7B)	01111011	111110001
124	(7C)	01111100	110001001
125	(7D)	01111101	101001001
126	(7E)	01111110	011001001
127	(7F)	01111111	111001001
128	(80)	10000000	100101001
129	(81)	10000001	110101001
130	(82)	10000010	101101001
131	(83)	10000011	011101001
132	(84)	10000100	111101001
133	(85)	10000101	100011001
134	(86)	11000110	010011001
135	(87)	11000111	110011001
136	(88)	10001000	101011001
137	(89)	10001001	011011001
138	(8A)	10001010	111011001
139	(8B)	10001011	100111001

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Decimal	(Hex)	8-bit Bytes MSB LSB	9-bit Bytes MSB LSB
140	(8C)	10001100	010111001
141	(8D)	10001101	110111001
142	(8E)	10001110	101111001
143	(8F)	10001111	011111001
144	(90)	10010000	111111001
145	(91)	10010001	011000101
146	(92)	10010010	111000101
147	(93)	10010011	100100101
148	(94)	10010100	010100101
149	(95)	10010101	110100101
150	(96)	10010110	101100101
151	(97)	10010111	011100101
152	(98)	10011000	111100101
153	(99)	10011001	010010101
154	(9A)	10011010	110010101
155	(9B)	10011011	011010101
156	(9C)	10011100	111010101
157	(9D)	10011101	100110101
158	(9E)	10011110	010110101
159	(9F)	10011111	110110101
160	(A0)	10100000	101110101
161	(A1)	10100001	011110101
162	(A2)	10100010	111110101
163	(A3)	10100011	010001101
164	(A4)	10100100	110001101
165	(A5)	10100101	101001101
166	(A6)	10100110	011001101
167	(A7)	10100111	111001101
168	(A8)	10101000	100101101
169	(A9)	10101001	010101101
170	(AA)	10101010	110101101
171	(AB)	10101011	101101101
172	(AC)	10101100	011101101
173	(AD)	10101101	111101101
174	(AE)	10101110	100011101
175	(AF)	10101111	010011101
176	(B0)	10110000	110011101
177	(B1)	10110001	101011101
178	(B2)	10110010	011011101
179	(B3)	10110011	111011101
180	(B4)	10110100	100111101
181	(B5)	10110101	010111101
182	(B6)	10110110	110111101
183	(B7)	10110111	101111101
184	(B8)	10111000	011111101
185	(B9)	10111001	111111101
186	(BA)	10111010	100100011
187	(BB)	10111011	101100011
188	(BC)	10111100	011100011
189	(BD)	10111101	010010011
190	(BE)	10111110	110010011
191	(BF)	10111111	011010011
192	(C0)	11000000	111010011
193	(C1)	11000001	100110011
194	(C2)	11000010	010110011
195	(C3)	11000011	110110011
196	(C4)	11000100	101110011
197	(C5)	11000101	011110011
198	(C6)	11000110	111110011
199	(C7)	11000111	110001011
200	(C8)	11001000	101001011
201	(C9)	11001001	011001011
202	(CA)	11001010	111001011
203	(CB)	11001011	100101011
204	(CC)	11001100	110101011
205	(CD)	11001101	101101011
206	(CE)	11001110	011101011
207	(CF)	11001111	111101011
208	(D0)	11010000	100011011
209	(D1)	11010001	010011011
210	(D2)	11010010	110011011
211	(D3)	11010011	101011011

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Decimal	(Hex)	8-bit Bytes MSB LSB	9-bit Bytes MSB LSB
212	(D4)	11010100	011011011
213	(D5)	11010101	111011011
214	(D6)	11010110	100111011
215	(D7)	11010111	010111011
216	(D8)	11011000	110111011
217	(D9)	11011001	101111011
218	(DA)	11011010	011111011
219	(DB)	11011011	111111011
220	(DC)	11011100	011000111
221	(DD)	11011101	111000111
222	(DE)	11011110	100100111
223	(DF)	11011111	010100111
224	(E0)	11100000	110100111
225	(E1)	11100001	101100111
226	(E2)	11100010	011100111
227	(E3)	11100011	111100111
228	(E4)	11100100	010010111
229	(E5)	11100101	110010111
230	(E6)	11100110	011010111
231	(E7)	11100111	111010111
232	(E8)	11101000	100110111
233	(E9)	11101001	010110111
234	(EA)	11101010	110110111
235	(EB)	11101011	101110111
236	(EC)	11101100	011110111
237	(ED)	11101101	111110111
238	(EE)	11101110	010001111
239	(EF)	11101111	110001111
240	(F0)	11110000	101001111
241	(F1)	11110001	011001111
242	(F2)	11110010	111001111
243	(F3)	11110011	100101111
244	(F4)	11110100	010101111
245	(F5)	11110101	110101111
246	(F6)	11110110	101101111
247	(F7)	11110111	011101111
248	(F8)	11111000	111101111
249	(F9)	11111001	100011111
250	(FA)	11111010	010011111
251	(FB)	11111011	110011111
252	(FC)	11111100	101011111
253	(FD)	11111101	011011111
254	(FE)	11111110	111011111
255	(FF)	11111111	100111111

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Annex C
(informative)

Recommendations for Transportation

C.1 Environment

It is recommended that during transportation the cassettes are kept within the following conditions:

Temperature: -40 °C to 45 °C

Relative humidity: 5 % to 80 %

Maximum wet bulb temperature: 26 °C

There should be no condensation in or on the cassette.

C.2 Hazards

Transportation of tape cassettes involves three basic potential hazards.

C.2.1 Impact loads and vibrations

The following recommendations should minimize damage to tape cassettes during transportation.

Avoid mechanical loads that would distort the cassette shape.

Avoid dropping the cassette more than 1 m.

Cassettes should be fitted into a rigid box containing adequate shock-absorbent material.

The final box should have a clean interior and a construction that provides sealing to prevent the ingress of dirt and water.

The orientation of the cassettes inside the final box should be such that the axes of the tape reels are horizontal.

The final box should be clearly marked to indicate its correct orientation.

C.2.2 Extremes of temperature and humidity

Extreme changes in temperature and humidity should be avoided whenever possible. Whenever a cassette is received it should be conditioned in the operating environment for a period of at least 24 h.

C.2.3 Effects of Stray Magnetic Fields

A normal spacing of not less than 80 mm should exist between the cassette and the outer surface of the shipping container to minimize the risk of corruption.

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Annex D
(informative)

Inhibitor Tape

An inhibitor tape is any tape that degrades the performance of the tape drive or other tapes. Certain tape characteristics can contribute to poor tape drive performance. Tapes that exhibit these characteristics may not give satisfactory performance, can result in excessive errors and can interfere with the subsequent performances of other tapes. Tapes to be used in this cassette should not be inhibitor tapes.

D.1 Inhibitor characteristics

These characteristics include:

- High abrasivity.
- High friction to tape path components.
- Poor edge conditions.
- Excessive tape wear residual products.
- Electrostatic charge build-up to the tape or tape path components.
- Interlayer slippage.
- Transfer of recording surface coating to the back of the next tape layer.
- Separation of tape constituents causing deposits that may lead to tape sticking or poor performance of other tapes.

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ICS 35.220.20

Descriptors: data processing, information interchange, data recording, magnetic recording, helical scan recording, data recording devices, magnetic tapes, half-inch magnetic tapes, cassettes for magnetic tapes, specifications, dimensions, physical properties, mechanical properties, recording characteristics, recording tracks, track formats, interchangeability.

Price based on 100 pages

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