

Revised

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 1863

9-TRACK 32 RPmm (800 RPI) MAGNETIC TAPE
FOR INFORMATION INTERCHANGE

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 1863, *9 track 32 RPmm (800 RPI) magnetic tape for information interchange*, was drawn up by Technical Committee ISO/TC 97, *Computers and information processing*, the Secretariat of which is held by the American National Standards Institute (ANSI).

Work on this question led to the adoption of Draft ISO Recommendation No. 1863, which was circulated to all the ISO Member Bodies for enquiry in December 1969. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Italy	Switzerland
Belgium	Japan	Turkey
Brazil	Netherlands	U.A.R.
Czechoslovakia	New Zealand	U.S.A.
France	Portugal	U.S.S.R.
Greece	Spain	
Israel	Sweden	

The following Member Bodies opposed the approval of the Draft :

Germany
United Kingdom

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

FOREWORD

- I. This ISO Recommendation presents the standard technique for recording the ISO 6 and 7-bit coded character sets for information precessing interchange on 9-track magnetic tape at 32 rows per millimetre (RPmm) [800 rows per inch (RPI)] using the "non-return to zero" (NRZI) recording technique. It is one of a series of ISO Recommendations implementing the ISO 6 and 7-bit codes in media.

In the development of this ISO Recommendation, careful consideration was given to current practices, existing equipment and supplies, and the broadest possible acceptance while providing a basis for future improvement in the use of the medium.

- II. In previous standards for the interchange of data on magnetic tape, the problems encountered due to packing density of 8 rows per millimetre (RPmm) [200 rows per inch (RPI)] have not created any serious difficulty with respect to the definitions or the quantitative values assigned to the various parameters.

Some of the difficulties and technical shortcomings which had to be faced in the preparation of this ISO Recommendation are listed below.

- (a) The positioning of the data on the tape is very dependent on the particular guidance geometry of the tape transport.
- (b) The coating thickness of the tape has an appreciable effect on the position of bits due to the pulse crowding factor on the tape as specified.
- (c) The characteristics of the head and in particular the crosstalk factor.
- (d) The initial transient conditions as the tape is started from rest.
- (e) The problem of defining and utilizing the reference edge.
- (f) Speed variations at the time of writing and reading which could also include different nominal speeds.
- (g) Timing constraints due to coding and pattern sensitivity.

It is important to recognize, in the light of these difficulties, that the write-check by the control device is the most practical method of measuring the quality of the written tape. This ISO Recommendation therefore includes certain definitions and quantitative values which represent the most meaningful checks that can be provided at the present time.

When magnetic tape is read by the recipient, certain additional factors of tape dynamics will have to be considered.



9-TRACK 32 RPmm (800 RPI) MAGNETIC TAPE FOR INFORMATION INTERCHANGE

1. SCOPE

This ISO Recommendation gives specifications relating to format and recording for 9-track 12.7 mm (1/2 in) wide magnetic tape and reels to be used for information interchange among information processing systems, communication systems, and associated equipment utilizing the 7-bit coded character set specified in ISO Recommendation R 646.

NOTES

1. Certain other aspects of coding requirements, such as significance of binary digits, sequence of characters, filling of unused positions and magnetic labelling for use on magnetic tape, are the subject of the following ISO Recommendations :
 - ISO/R 962, *Implementation of the 7-bit coded character set on 9-track 12.7 mm (1/2 in.) magnetic tape*;
 - ISO/R 1001, *Magnetic tape labelling and file structure for information interchange*.
2. Details of unrecorded tape and reels are specified in the complementary ISO Recommendation, R 1864, *Unrecorded magnetic tape for information interchange — 8 and 32 RPmm (200 and 800 RPI), NRZI, and 63 RPmm (1600 RPI), phase-encoded*.

2. DEFINITIONS OF TERMS

NOTE. — The material contained in this section is taken from ISO Recommendation R 1864 for unrecorded magnetic tape.

For the purpose of this ISO Recommendation the following definitions apply :

- 2.1 *Magnetic tape*. Tape which will accept and retain magnetic signals intended for input, output and storage purposes on computers and associated equipment.
- 2.2 *Reference tape*. A tape which has been selected for given properties for use in calibration.
- 2.3 *Secondary reference tape*. A tape intended for routine calibrating purposes, whose performance is known and is stated in relation to that of a reference tape.
- 2.4 *Reference field*. For any specified packing density, the minimum field applied to the reference tape which causes an output signal equal to 95 % of the maximum output.
- 2.5 *Reference signal level*. The signal level which is obtained from a reference tape.
- 2.6 *In contact*. An operating condition in which the oxide side of a tape is in contact with a magnetic head.
- 2.7 *Track*. A longitudinal area on the tape along which a series of magnetic signals may be recorded.
- 2.8 *Packing density*. The number of bits of recorded information per unit length of track.
- 2.9 *Reference edge*. The edge farthest from an observer, or nearest the top of a page, when a tape is lying flat with the oxide side uppermost and the direction of movement for recording from left to right. (See Figures 1 and 2.)

3. REFLECTIVE MARKERS (See Figure 3)

NOTE. — The material contained in this section is taken from ISO Recommendation R 1864 for unrecorded magnetic tape.

Each reel of tape shall be furnished with two photo-reflective markers, each consisting of, or equivalent to, a transparent plastic base with a metallic (e.g. vaporized aluminium) coating sandwiched between the base and a thin layer of low cold flow thermal setting adhesive.

Reflective markers shall be placed on the side of the tape which does not carry the oxide coating, and they shall be on opposite edges of the tape with the beginning-of-tape reflective marker (BOT) on the reference edge.

The width of the markers shall be 4.8 ± 0.5 mm (0.19 ± 0.02 in).

The length of the markers shall be 28 ± 5 mm (1.1 ± 0.2 in).

The thickness of the markers measured after their application to the tape shall be not greater than 0.020 mm (0.0008 in).

The beginning-of-tape reflective marker (BOT) shall be placed 4.6 ± 0.3 m (15 ± 1 ft) from the beginning of the tape and the end-of-tape marker (EOT) shall be placed $7.6^{+1.5}_0$ m (25^{+5}_0 ft) from the end of the tape.

The distance from the outer edge of a marker to the adjacent edge of the tape shall be 0.8 mm (0.03 in) maximum, and the marker shall not protrude beyond the edge of the tape.

The markers shall be free of wrinkles and excessive adhesive. The surface of the reflective markers shall be non-conductive.

NOTE. — It is desirable to employ the thinnest markers which perform satisfactorily to minimize the distortion of layers of tape adjacent to them.

4. DIRECTION OF WIND (See Figure 4)

On a reel of tape used for data interchange, the tape shall be wound with the oxide coating innermost and the reference edge towards the front, i.e. away from the write-enable ring.

NOTE. — This means that the tape will be wound in a clockwise direction from the end (nearest the hub) to the start (outer end) if the reel is viewed from the front.

5. WIND TENSION

For interchange purposes, a tape shall be wound at a tension not less than 1.5 N and not greater than 3 N (5 to 10 ozf approximately).

6. REFERENCE EDGE

The reference edge shall be used for determining the position of the tracks and rows on tape, within the requirements of this ISO Recommendation.

7. TRACK IDENTIFICATION

NOTE. — The contents of this section are in accordance with ISO Recommendation R 962, *Implementation of the 7-bit coded character set on 9-track 12.7 mm (1/2 in) magnetic tape*.

Tracks shall be numbered consecutively, beginning at the reference edge with track No. 1, and shall be assigned as follows :

MT track	1	2	3	4	5	6	7	8	9
Environment bit	E ₃	E ₁	E ₅	P	E ₆	E ₇	E ₈	E ₂	E ₄
Binary value	2 ²	2 ⁰	2 ⁴	P	2 ⁵	2 ⁶	2 ⁷	2 ¹	2 ³

Bit "P" is the parity bit. Row parity is odd.