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ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 1058

PUNCHED TAPE VARIABLE BLOCK FORMAT
FOR POSITIONING AND STRAIGHT-CUT
NUMERICALLY CONTROLLED MACHINES

1st EDITION

April 1969

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BRIEF HISTORY

The ISO Recommendation R 1058, *Punched tape variable block format for positioning and straight-cut numerically controlled machines*, 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 a Draft ISO Recommendation.

In August 1967, this Draft ISO Recommendation (No. 1318) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Israel	Sweden
Belgium	Japan	Switzerland
Czechoslovakia	Netherlands	Turkey
Denmark	New Zealand	U.A.R.
France	Poland	United Kingdom
Germany	Portugal	U.S.A.
Iran	Spain	

One Member Body opposed the approval of the Draft :

Italy

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in April 1969, to accept it as an ISO RECOMMENDATION.

PUNCHED TAPE VARIABLE BLOCK FORMAT FOR POSITIONING AND STRAIGHT-CUT NUMERICALLY CONTROLLED MACHINES

INTRODUCTION

The preparation of this ISO Recommendation has revealed the availability of a wide range of formats. Providing full interchangeability would lead, in many instances, to unwarranted and expensive equipment.

Accordingly, it was found better to draft two ISO Recommendations, namely :

- this ISO Recommendation, specifying the rules providing a minimum of uniformity in the manufacture of input media;
- ISO Recommendation R 1057, *Interchangeable punched tape variable block format for positioning and straight-cut numerically controlled machines*, which is consistent with this ISO Recommendation, and which provides for interchangeability of input media for machines with compatible characteristics.

NOTE. – The degree of interchangeability will depend upon the conformity of the machines with respect to function, capacity, range, horsepower, geometric relationship of the axes and preparatory, miscellaneous and tooling functions.

Machine builders who do not wish to comply fully with this ISO Recommendation are asked to follow it as much as possible.

1. SCOPE

- 1.1 This ISO Recommendation applies to variable block format punched tapes, with tabulation, with addresses or with tabulation and addresses, for positioning and straight-cut machining. It is intended to
 - (a) recommend application of the rules providing a minimum of uniformity in the manufacture of input media;
 - (b) inform users of numerically controlled machines on the potentialities of control systems.
- 1.2 Compliance with the conditions expressed in this ISO Recommendation does not guarantee interchangeability of tapes between machines of compatible features. To provide for interchangeability, tapes must conform to ISO Recommendation R 1057, *Interchangeable punched tape variable block format for positioning and straight-cut numerically controlled machines*.
- 1.3 The format characteristics are specified in section 3 and in Annexes C and D.

1.4 The technical terms used in this ISO Recommendation are based on the data processing vocabulary of ISO Recommendation R . . . ¹⁾.

1.5 Tape dimensions, character codes and nomenclature of axes conform respectively to the following ISO Recommendations :

R . . . ²⁾, *Dimensions for punched paper tape for data interchange;*

R 840, *Code for numerical control of machines (compatible with the ISO 7-bit character set);*

R . . . ³⁾, *Representation of six and seven bit coded character sets on punched tape;*

R 841, *Axis and motion nomenclature for numerically controlled machines.*

2. FORMAT MAKE-UP

2.1 Addresses

The address consists of a character which shall be in accordance with Annex B.

2.2 Blocks

2.2.1 A block consists of the following :

2.2.1.1 The “sequence number” word (optional).

2.2.1.2 The data words.

2.2.1.3 The “end of block” character showing the end of each block, and which may, in addition, precede the first block of the programme.

2.2.2 The data words are shown below. Their use depends on the function provided by the machine. “Dimension” words shall not be repeated in the same block.

It is recommended that the order be the following one :

2.2.2.1 The “preparatory function” word. ⁴⁾

2.2.2.2 The “dimension” words.

These words shall be arranged in the following sequence :

X, Y, Z, U, V, W, P, Q, R, A, B, C, D, E.

2.2.2.3 The “feed function” word or words.

2.2.2.4 The “spindle speed function” word.

2.2.2.5 The “tool function” word.

2.2.2.6 The “miscellaneous function” word.

2.2.3 The words, the “tab” character excepted, may be omitted when not indispensable in a specific block of data. This should be understood as meaning that there is no change in the condition of the machine with respect to the function denoting the omitted word.

Instructions which are inherently executed in a single block must be repeated whenever necessary, e.g. a tool change.

2.2.4 The words appearing after the last one having an actual use within a block may be omitted, including the “tab” character, i.e. the “end of block” character may be used after any complete word.

¹⁾ Now being drafted within Sub-Committee ISO/TC 97/SC 1, *Vocabulary*.

²⁾ At present, Draft ISO Recommendation No. 1671.

³⁾ At present, Draft ISO Recommendation No. 1418.

⁴⁾ For coding of preparatory and miscellaneous functions, see ISO Recommendation R 1056, *Punched tape block formats for the numerical control of machines – Coding of preparatory functions G and miscellaneous functions M*.

2.3 Words

- 2.3.1 In order to reduce tape length, either leading or trailing zeros may be omitted from the “dimension” words where consistent with the control system, the location of the implicit decimal point as defined in the format specification remaining constant. When a system with “tab” and without address is used, a number containing only zeros must be expressed by at least one zero.
- 2.3.2 The “tab” and/or address characters are the first of the word; the address character follows the “tab”, if any, and is followed by digital data.
The “tab” character shall be omitted in the “sequence number” word.
- 2.3.3 The “dimension” words shall be either co-ordinate dimension words (absolute dimension) or incremental dimension words (relative dimension) according to format specification, and shall contain digital data as follows :
- 2.3.3.1 The most significant digit of the “dimension” word shall be first.
- 2.3.3.2 *Units*
- 2.3.3.2.1 All linear dimensions shall be expressed in millimetres or in inches and decimal fractions thereof.
- 2.3.3.2.2 All angular dimensions shall be expressed in decimal parts of a revolution or in degrees and decimal parts of a degree; decimal parts of a revolution is recommended practice.
- 2.3.3.3 *Decimal point*
Decimal point shall not be used, its implicit position being defined by the format specification.
- 2.3.3.4 *Sign of linear and angular dimensions*
- 2.3.3.4.1 When the control system allows using absolute dimensions either positive or negative with respect to the origin of the co-ordinate system, the algebraic sign (+ or –) is part of the “dimension” word and shall precede the first digit.
- 2.3.3.4.2 When the control system only permits use of positive absolute dimensions, the algebraic sign shall be omitted from the “dimension” words.
- 2.3.3.4.3 When the control system uses incremental dimensions, the algebraic sign (+ or –) is compulsory and shall precede the first digit of each dimension in order to show the direction of motion.
- 2.3.4 Non-dimension words, when employed, shall contain digital data as follows :
- 2.3.4.1 The “sequence number” shall consist of three (3) digits.
- 2.3.4.2 The “preparatory function” shall be expressed by a two (2) digit coded number. For designation, see footnote ⁴⁾ on page 4.
- 2.3.4.3 The “feed function or functions” shall be expressed by a coded number, the composition of which is described in Annex A.
- 2.3.4.4 The “spindle speed function” shall be expressed by a coded number, the composition of which is described in Annex A.
- 2.3.4.5 The “tool function” shall be expressed by a coded number, the number of digits being specified in the format specification.
- 2.3.4.6 The “miscellaneous function” shall be expressed by a two (2) digit coded number. For designation, see footnote ⁴⁾ on page 4.

3. FORMAT SPECIFICATION

This consists of three sections, as follows :

- format classification shorthand, in accordance with Annex C;
- format classification detailed shorthand, in accordance with Annex D;
- itemized data of the format contents, which are not subject to standardization. An explanatory note is attached for guidance of users (Appendix Z).

NOTE. – Appendix Y shows an example of tab and address variable block format.