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**Automation systems and integration —  
Numerical control of machines —  
Program format and definitions of  
address words —**

Part 1:

**Data format for positioning, line motion  
and contouring control systems**

*Systèmes d'automatisation industrielle et intégration — Commande  
numérique des machines — Format de programme et définitions des  
mots adresses —*

*Partie 1: Format des données pour les systèmes de positionnement, de  
commande paraxiale de mouvement et de contourage*



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6983-1 was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 1, *Physical device control*.

This second edition cancels and replaces the first edition (ISO 6983-1:1982), which has been technically revised.

The following changes have been made to the first edition:

- the content has been restructured in a more logical order;
- the commonly used preparatory (G) and miscellaneous (M) function codes have been grouped in one standard (see Annex E);
- address indexing has been introduced (see 6.2);
- the equal (=) sign has been added to allow for axis indexing (see 6.2.1);
- new data formats have been specified to existing programming methods: helical interpolation (see 7.3); dwell time (see Clause 13); thread cutting (see Clause 11).

ISO 6983 consists of the following parts, under the general title *Automation systems and integration — Numerical control of machines — Program format and definitions of address words*:

- *Part 1: Data format for positioning, line motion and contouring control systems*

The following parts are under preparation:

- *Part 2: Coding of miscellaneous functions M (class 1 to 8)* [Technical Report]

## Introduction

ISO 6983 describes a word address program format for machine control programs on different data storages, e.g. perforated tape, magnetic media, universal serial bus (USB) stick, hard disk, floppy disk, random-access memory (RAM), etc., or provided from a remote data source. ISO 6983 covers variable block format only and is not intended to specify machine design.

ISO 6983 is intended to specify the program format for the control program to be used for numerical controls (NC) on machines/machine tools. However, ISO 6983 can also be used for all kinds of geometric specifications and interactions with machines.

The program format specified by ISO 6983 is commonly referred to as “G code programming” or “ISO programming”.

Compliance with ISO 6983 does not guarantee interchangeability of machine control programs between different machines/machine tools. Annex D details some of the additional considerations necessary to ensure this interchangeability.

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# Automation systems and integration — Numerical control of machines — Program format and definitions of address words —

## Part 1: Data format for positioning, line motion and contouring control systems

### 1 Scope

This part of ISO 6983 specifies requirements and makes recommendations for a data format for positioning, line motion and contouring control systems used in the numerical control of machines. This part of ISO 6983 helps the co-ordination of system design in order to minimize the variety of program manuscripts required, to promote uniformity of programming techniques, and to foster interchangeability of input programs between numerically controlled machines of the same classification by type, process, function, size and accuracy. It is intended that simple numerically controlled machines be programmed using a simple format, which is systematically extensible for more complex machines.

This part of ISO 6983 is not intended for use in the specialized cases of numerically controlled flame cutting machines and drafting machines used specifically and exclusively in the shipbuilding industry. In this application, a related format ("the ESSI Format") is specified in ISO 6582.

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2806, *Industrial automation systems — Numerical control of machines — Vocabulary*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2806 apply.

### 4 Program format

The machine program shall be structured in blocks of data, which contain sets of commands to the control system. A block shall consist of a number of words each of which is a specific instruction to the control system.

A character designated "end of block" shall terminate every block of data and in addition shall precede the first block of data.

A "program start" character shall precede all control data including "end of block". It is recommended that it should be used as an "absolute rewind stop" character.