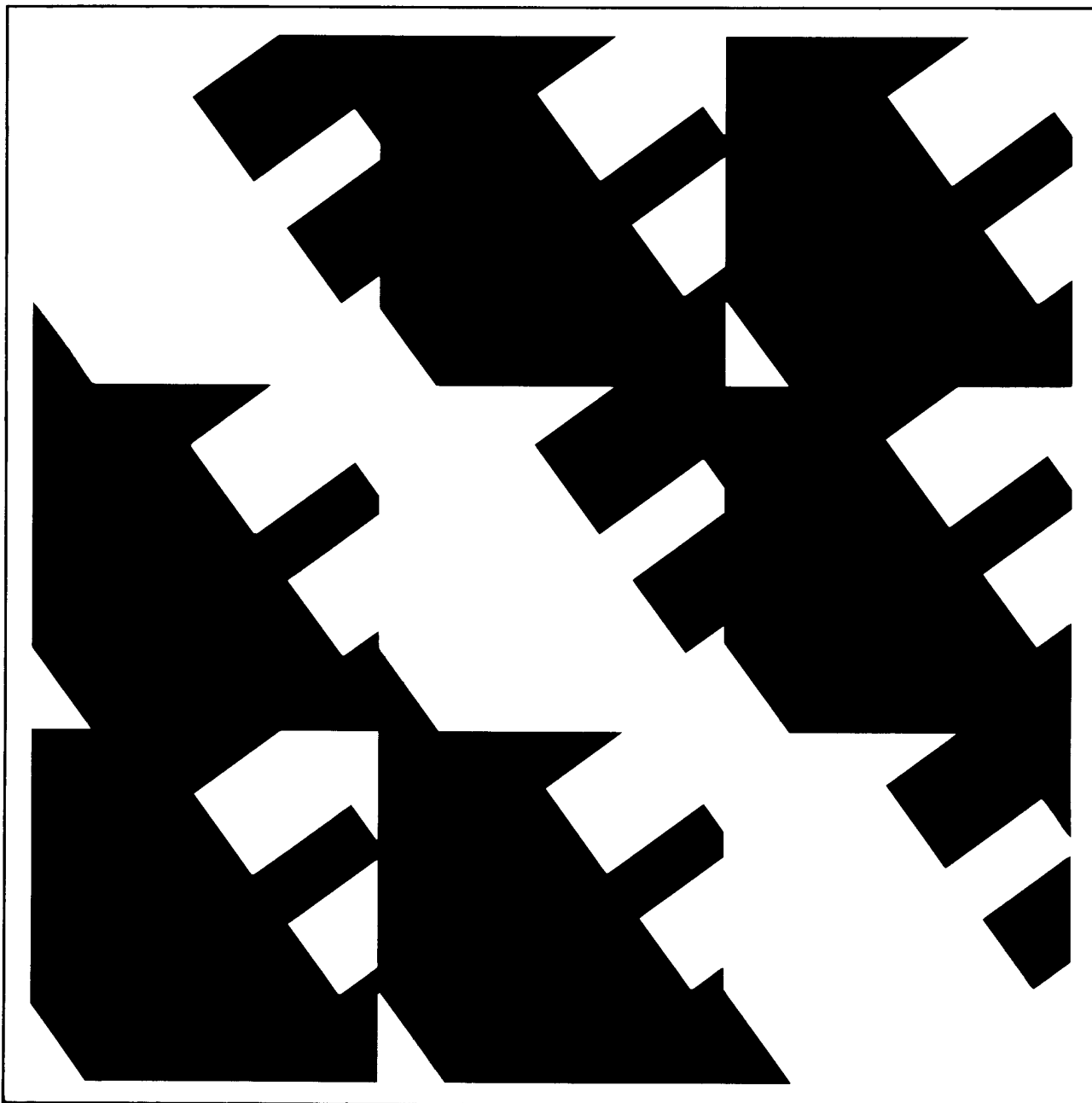


IEEE Trial-Use Standard for Media-Independent Information Transfer

IEEE Std 949



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**IEEE Trial-Use Standard for
Media-Independent Information Transfer**

Sponsor

**Microprocessor Standards Committee of the
IEEE Computer Society**

Draft American National Standard

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Foreword

(This Foreword is not a part of IEEE Std 949, IEEE Trial-Use Standard for Media-Independent Information Transfer.)

The activity of this committee started as a result of a problem within the IEEE Microprocessor Standards Committee. This problem was the inability to transfer data between members of the committee in other than printed form.

While all members had access to microcomputer based systems, compatibility stopped at that point. Different operating systems and disk formats of those systems precluded the transfer of data between systems even though most systems used identical media.

Generalizing this problem to the transfer of information led to the following set of criteria:

- (1) Media Independence
- (2) KISS (Keep It Simple Stupid)
- (3) Life Expectancy of Greater than 10 Years
- (4) Wide Applicability
- (5) Multiple Files Capabilities
- (6) Attributes of Data to be Examinable
- (7) Reliability

This list is in the order established by weighted voting on the original list.

Expansion of this list into a definition for each of the goals led to some of the following additional criteria.

Media Independence means that the standard can be used on the following media:

- (1) Floppy disk
- (2) Optical disk
- (3) Telecommunication
- (4) Magnetic tape
- (5) Paper tape
- (6) Hollerith cards
- (7) PROMs and ROM
- (8) Bar codes
- (9) Paper — OCR readable
- (10) Future transfer media

Lifetime means that the technique will be useful for a long enough period of time, so that information written now can be recovered much later. One of the consequences of this requirement is adequate volume capacity.

It was generally agreed that the reliability of the data is dependent on the type of media employed and that each type of media uses different methods of ensuring that the data transmitted is accurate.

This standard does not address any bad data handling. Problems such as bad blocks on a disk device or communications channel must be handled by the media driver as the media is unknown from the point of view of this standard.

The Appendix to this standard describing the layout of different media is only a recommendation for the different media. In the case of floppy disks, allowance has been made for media dependent labels, which are addressed by other standards, by displacing the start of the MIIT volume past the first track to accommodate any labels or computer dependent features.

At the time this standard was approved the membership of the working group was as follows:

Bob Davis, *Chairman*

Nels Anderson
Wayne Fischer

Michael Smolin

Tom Pittman
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The following persons were on the balloting committee that approved this document for submission to the IEEE Standards Board:

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Draft American National Standard

IEEE Trial-Use Standard for Media-Independent Information Transfer

1. Scope

1.1. Implementation Objectives. The purpose of this standard is to define a format for the transmission of files and their attributes between computer systems, independent of the medium of transmission.

It is intended that any information medium capable of representing a consecutive sequence of 8-bit bytes should be adaptable to the format specified in this standard. The format is designed to facilitate the human interface to file selection from transmissions by foreign systems.

1.2. Inclusions. This standard specifies

- (1) Directory and volume format for a set of sequential files of 8-bit bytes, represented on a single medium
- (2) A standard file type for ASCII text files
- (3) A mechanism for dividing logical volumes over several physical media
- (4) A mechanism for combining several logical volumes into one physical medium

1.3. Exclusions. This standard does not specify

- (1) The physical media
- (2) Physical blocking factors
- (3) Medium-specific error detection and correction mechanisms
- (4) The number of bytes on a standard volume
- (5) The number of files in a standard volume
- (6) The organization of files having other than the standard file types

2. Definitions

The terms in this standard are used in their accepted technical sense. However, the meaning of the following terms is critical to the correct interpretation of this standard, and where the given definitions differ from accepted usages, the given definitions should prevail with respect to this standard.

MIIT. Media-Independent Information Transfer. Used as a general term to refer to any volume conforming to this standard.

file. One named collection of data.

volume. One collection of data commencing with a Volume ID and containing a number of bytes specified in the volume size of the volume director.

medium. A vehicle capable of transferring data.

shall and should. In this standard, the use of the word *shall* signifies that which is obligatory in any conforming implementation; the use of the word *should* signifies that which is strongly recommended as being in keeping with the intent of the standard, despite architectural or other constraints that may on occasion render the recommendations impractical.

3. Volume Structure

A MIIT volume shall consist of a sequence of 256 or more consecutive 8-bit data bytes, which is divided into two parts, the directory, and the files.

3.1. Directory. The MIIT directory shall consist of one or more consecutive directors, each 256 bytes long. The first shall be the volume identification, as specified in 4.1. The remaining directors, if any, shall define the files in the volume, as specified in 4.3 and 4.4, or shall be comments, as specified in 4.2.

3.2. Files. The files part of a MIIT volume shall consist of zero or more bytes, following the directory. Three standard file types are specified, and 31 file-type codes are allocated for user specification. The remaining 59 valid file-type codes are reserved for future revisions of this standard.

3.2.1. Text File. Files consisting only of 7-bit ASCII characters shall be assigned the file type

code 34 (hexadecimal 22, ASCII character quote). The eighth bit of the bytes in text files is not significant. All graphics and control characters in a text file shall have their standard significance according to ISO 646-1983(E), Information Processing – ISO 7-bit Coded Character Set for Information Interchange.¹

3.2.2. Data File. Files other than text files shall be assigned the file type code 35 (hexadecimal 23, ASCII character pound sign). No particular type is specified for such files, and any data file so identified shall have its type and significance specified by means outside the scope of this standard.

3.2.3. User-Defined Files. Users of this standard should assign file types codes 96 – 126 (hexadecimal 60 – 7E), inclusive, to any implementation-defined files. This standard does not specify the type or significance of files so identified. The use of these file types codes constitutes a conforming extension of this standard.

4. Director Formats

Each director shall consist of 256 7-bit ASCII characters; the eighth bit is not significant. Except for the Ownership field and the comment directors, all characters in the directors shall be limited to the 95 printing graphics of the standard ASCII character set (decimal 32 – 126, hexadecimal 20 – 7E, characters space through tilde, inclusive).

4.1. Volume Identification Director. The volume identification shall consist of the fields listed in Table 1.

4.2. Comments Director. Any number of comment directors may be interspersed in the direct-

ory after the volume identification, to expand on the text information of the ownership fields of any director or to provide usage information to be read by the receiver of the volume. See Table 2.

4.3. File Directors. The directors for standard text (3.2.1) and data (3.2.2) files, and for extended files with user-defined types (3.2.3), shall be of the format of Table 3.

4.4. Contained MIIT Volumes Directors. The MIIT format allows for one or more MIIT files to be the medium of another MIIT volume. These files are identified by a file type code 36 (hexadecimal 24, ASCII currency symbol). The beginning of such a contained volume shall be a standard MIIT directory, whose volume name is the same as the volume name in the director that points to it. The other corresponding fields should also be the same.

It may be that the contained volume cannot be contained within the host volume. In this case the contained directors shall be given a unique two-digit sequence number. Sequence number 00 designates the first part of the contained MIIT volume, where the volume identification is to be found. Each section of the contained volume should be the same size, and the contained volume section should be the only file of its containing volume. The contained volume directors of each host volume that together comprise a single contained MIIT volume should differ only in their sequence numbers.

If a MIIT volume cannot be contained in 100 host volumes, a second level of containment should be used, which may be applied recursively.

The format of a contained volume director is as given in Table 4.

¹ISO documents are available from the Sales Department, American National Standards Institute, 1430 Broadway, New York, NY 10018, USA. ISO documents also available from the ISO Office, 1, rue de Varembe, Case postale 56, CH-1211, Genève 20, Switzerland/Suisse.

Table 1
Volume Director

Byte	Field Name	Significance
00	Volume ID	Identifies this director as the volume identification, and shall contain the type code 33 (hexadecimal 21, ASCII exclamation point).
01 – 32	Volume name	Names the volume. If the name is shorter than 32 characters it should be left-justified in this field, and this field shall be filled out with spaces on the right.
33 – 49	User specified	May be used by the implementor for any purpose. It is not significant in standard MIIT volumes. If unused, this field shall contain spaces.
50 – 63	Creation date	Contains, in ASCII decimal digits, the date and time of creation of the volume, in the format (YYYYMMDDHHMMSS). Insignificant or unavailable subfields of this field shall contain spaces.
64 – 77	Optional date	Should contain an implementor-defined date, and is in the same format as the creation date. If unused, it shall contain spaces.
78 – 79	Version number	This field shall contain the version number of the standard. This field shall be set to 11 for this version 1.1 of the standard.
80 – 85	RFU	Reserved for future use. This field shall contain spaces.
86 – 105	Directory size	This field shall contain the number of bytes in the directory. The number is represented in ASCII-coded decimal, right-justified, with either zero or space fill. The directory size shall be the product of the number of directors multiplied by 256.
106 – 107	Error checking	This field shall be used to determine if error checking is present for the directory and what method of error checking is used. If no error checking is used for the directory portion of the volume, this field shall be filled with spaces. If a 16-bit checksum is used, this field shall contain the ASCII characters 'CS', hexadecimal 43 and 53. If a 16-bit CRC – CCITT with polynomial $G(X) = X^{16} + X^{12} + X^5 + 1$ and the 32-bit CRC as* is used this field shall contain the ASCII characters 'CR', hexadecimal 43 and 52. If a 32-bit CRC is to be used, it shall use the polynomial $G(X) = X^{32} + X^{26} + X^{23} + X^{22} + X^{16} + X^{12} + X^{11} + X^{10} + X^9 + X^7 + X^5 + X^4 + X^2 + X^1$ and this field shall contain the ASCII character 'EC', hexadecimal 45 and 43. A 64-bit checksum may be used in which case this field shall contain the ASCII characters 'ES', hexadecimal 45 and 53. If the first character in this field is a lowercase ASCII letter in the hexadecimal range 61 to 7A and followed by any other character, the method of data checking is user defined. All other combinations are reserved for future expansion of this standard.
108 – 127	Volume size	Contains the number of bytes in the volume. The number is represented in ASCII-coded decimal, right-justified, with either zero or space fill. The difference between the volume size and the directory size is the number of bytes in the files part of the volume. The volume size shall not be less than the directory size.
128 – 255	Ownership	Should designate legal ownership, originator, or other information relevant to the ownership of the volume. Carriage Return and line feed control characters may be used to format the information for ease of reading. If 128 characters are insufficient to fully report volume ownership, additional information may be included in Comment directors following the volume identification. If the ownership information requires less than 128 characters, this field should be filled out with spaces.

Table 2
Comment Director

Byte	Field Name	Significance
000	Comment ID	Shall be a space (decimal 32, hexadecimal 20).
001 – 255	Comment text	Shall be any 7-bit ASCII characters in byte form representation in accordance with ISO 646-1973(E). Carriage return and linefeed characters (decimal 13 and 10) may be used to format the text for ease of reading.

Table 3
File Director

Byte	Field Name	Significance
00	File type	Identifies this director as a file director. The file type shall be either one of the standard file types codes specified in 3.2 or one of the user-defined file type codes.
01 – 32	File name	Names the file. If the name is shorter than 32 characters it should be left-justified in the field, and this field shall be filled out with spaces on the right.
33 – 49	User specified	May be used by the implementor for any purpose. It is not significant in standard MIIT text files (type 34). If unused, this field shall contain spaces.
50 – 63	Creation date	Specifies, in ASCII decimal digits, the date and time of creation of the file, in the format (YYMMDDHHMMSS). Insignificant or unavailable subfields of this field shall contain spaces.
64 – 77	Optional date	Should contain an implementor-defined date, and is in the same format as the creation date. If unused, it shall contain spaces.
78 – 85	RFU	Reserved for future use. This field shall contain spaces.
86 – 105	File size	Contains the number of bytes in the file. The number is represented in ASCII-coded decimal, right-justified, with either zero or space fill.
106 – 107	Error checking	This field shall be used to determine if error checking is present for the file and what method of error checking is used. If no error checking is used for this file, this field shall be filled with spaces. If a 16-bit checksum is used, this field shall contain the ASCII characters 'CS,' hexadecimal 43 and 53. If a 16-bit CRC — CCITT with polynomial $G(X) = X^{16} + X^{12} + X^5 + 1$ is used this field shall contain the ASCII characters 'CR,' hexadecimal 43 and 52. If a 32-bit CRC is to be used, it shall use the polynomial $G(X) = X^{32} + X^{26} + X^{23} + X^{16} + X^{12} + X^{11} + X^{10} + X^8 + X^7 + X^5 + X^4 + X^2 + X + 1$ and this field shall contain the ASCII characters 'EC,' hexadecimal 45 and 43. A 64-bit checksum may be used in which case this field shall contain the ASCII characters 'ES,' hexadecimal 45 and 53. If the first character in this field is a lower case ASCII character in the hexadecimal range 61 to 7A and followed by any other character, the method of data checking is user defined. All other combinations are reserved for future expansion of this standard.
108 – 127	File location	Shall contain the position of the file in the volume, relative to the beginning of the directory. The number is represented in ASCII-coded decimal, right-justified, with either zero or space fill. The file location shall not be less than the directory size. The sum of the file location and the file size shall not exceed the volume size.
128 – 255	Ownership	Should designate legal ownership, copyright notice, originator, or other information relevant to the ownership of the file. Carriage return and line feed control characters may be used to format the information for ease of reading. If 128 characters are insufficient to fully report file ownership, additional information should be included in comment directors following the file director. If the ownership information requires less than 128 characters, this field should be filled out with spaces.