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REFERENCE

FIPS PUB 128-1

FEDERAL INFORMATION PROCESSING STANDARDS PUBLICATION
(Supersedes FIPS PUB 128 – 1987 March 16)

COMPUTER GRAPHICS METAFILE (CGM)

CATEGORY: SOFTWARE STANDARD   SUBCATEGORY: GRAPHICS

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Computer Systems Laboratory
National Institute of Standards and Technology
Gaithersburg, MD 20899

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Foreword

The Federal Information Processing Standards Publication Series of the National Institute of Standards and Technology (NIST) is the official publication relating to standards and guidelines adopted and promulgated under the provisions of Section 111(d) of the Federal Property and Administrative Services Act of 1949 as amended by the Computer Security Act of 1987, Public Law 100-235. These mandates have given the Secretary of Commerce and NIST important responsibilities for improving the utilization and management of computer and related telecommunications systems in the Federal Government. The NIST through its Computer Systems Laboratory provides leadership, technical guidance, and coordination of Government efforts in the development of standards and guidelines in these areas.

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James H. Burrows, Director
Computer Systems Laboratory

Abstract

This revised FIPS adopts the redesignated version of the CGM standard, known as ANSI/ISO 8632.1-4:1992, and adds a requirement for the use of profiles. A profile defines the options, elements, and parameters of ANSI/ISO 8632 necessary to accomplish a particular function and to maximize the probability of interchange between systems implementing the profile. The revised FIPS also adopts MIL-D-28003A, Computer-Aided Acquisition and Logistics Support (CALS), as the first CGM Application Profile.

Key words: Computer Graphics Metafile (CGM); CGM profile; Federal Information Processing Standard (FIPS); graphics data interface standard; metafile; MIL-D-28003A; picture transfer; software.

Federal Information
Processing Standards Publication 128-1

1993 May 11

Announcing the Standard for

COMPUTER GRAPHICS METAFILE (CGM)

Federal Information Processing Standards Publications (FIPS PUBS) are issued by the National Institute of Standards and Technology (NIST) after approval by the Secretary of Commerce pursuant to Section 111(d) of the Federal Property and Administrative Services Act of 1949 as amended by the Computer Security Act of 1987, Public Law 100-235.

1. **Name of Standard.** Computer Graphics Metafile (CGM) (FIPS PUB 128-1).

2. **Category of Standard.** Software Standard, Graphics.

3. **Explanation.** This publication is a revision of FIPS PUB 128. This revision supersedes FIPS PUB 128 and modifies the standard by:

   (1) adopting the redesignated version of the CGM standard, known as ANSI/ISO 8632.1-4:1992;

   (2) adding a requirement for the use of profiles. A profile defines the options, elements, and parameters of ANSI/ISO 8632 necessary to accomplish a particular function and to maximize the probability of interchange between systems implementing the profile; and

   (3) adopting the first such profile as a requirement, namely the military specification MIL-D-28003A, November 15, 1991, more commonly known as the CALS (Computer-aided Acquisition and Logistics Support) CGM Application Profile.

   This publication announces adoption of American National Standards Institute/International Organization for Standardization (ANSI/ISO) Computer Graphics Metafile (CGM), ANSI/ISO 8632.1-4:1992 which consists of two parts identified in the Specifications section, as a Federal Information Processing Standard (FIPS). ANSI/ISO 8632 is a graphics data interface standard which specifies a file format suitable for the description, storage, and communication of graphical (pictorial) information in a device-independent manner. The purpose of the standard is to facilitate the transfer of graphical information between different graphical software systems, different graphical devices, and different computer graphics installations. However, ANSI/ISO 8632 is not completely specified, nor do all implementations contain all possible options, elements, and parameters. The purpose of the MIL-D-28003A CGM profile is to enable its users to ensure predictable interchange results and interworking of machines, sites, and applications by rigorously defining and adhering to the same subset of ANSI/ISO 8632. Since a proliferation of CGM profiles is not desirable, only those future profiles deemed necessary to satisfy Federal user requirements not met by MIL-D-28003A will be added by revision to this standard.

4. **Approving Authority.** Secretary of Commerce.

5. **Maintenance Agency.** U.S. Department of Commerce, National Institute of Standards and Technology (NIST), Computer Systems Laboratory (CSL).

6. **Cross Index.**

   a. American National Standard/International Organization for Standardization (ANSI/ISO) Computer Graphics Metafile (CGM), ANSI/ISO 8632.1-4:1992.

   b. Military Specification, Digital Representation of Illustration Data: CGM Application Profile, MIL-D-28003A, November 15, 1991.

7. Related Documents.

    a. Federal Information Processing Standards Publication (FIPS PUB) 120-1, Graphical Kernel System (GKS).

    b. Federal Information Resources Management Regulations 201-20.303, Standards, and subpart 201-39.1002, Federal Standards.

    c. American National Standard Graphical Kernel System, GKS, ANSI X3.124.1-3-1985.

    d. ISO 646-1983, Information Processing — 7-Bit Coded Character Set for Information Interchange.

    e. ISO 2022-1986, Information Processing — ISO 7-Bit and 8-Bit Coded Character Sets — Code Extension Techniques.

    f. ISO 2375-1987, Data Processing — Procedure for Registration of Escape Sequences.

    g. ISO 7942-1985, Information Processing Systems — Computer Graphics — Graphical Kernel System (GKS).

    h. ISO 6429-1988, Information Processing — Control Functions for 7-Bit and 8-Bit Coded Character Sets.

    i. ANSI/ISO 8632.1-4:1992, Information Processing Systems — Computer Graphics Metafile (Part 1: Functional Specifications; Part 2: Character Encoding; Part 3: Binary Encoding; Part 4: Clear Text Encoding).

8. Objectives. The primary objectives of this standard are:

– To allow the portability of graphics data among different graphics installations and devices. This encourages a uniform interface for noninteractive picture description.

– To promote the exchange of graphic information enabling installations to share data and reduce time spent recomputing in efforts to regenerate graphics data.

– To promote the use of a standard set of elements using standard terminology, which aids graphics programmers in using graphics methods.

9. Applicability.

    a. This standard is for use in computer graphics applications that are either developed or acquired for government use. Although not developed specifically for the Printing/Graphics Arts industry, this standard may be used in printing and graphics art applications whenever desirable.

    b. The use of this standard is strongly recommended when one or more of the following situations exist:

– A graphics metafile is maintained at a central facility for a decentralized system that employs graphics devices of different makes and models that must utilize the data.

– A graphics metafile is required to preserve picture data when conversion or migration from one graphics system to another is necessary and the two systems are not necessarily compatible.

– A graphics metafile is intended for information interchange between a source system and a target system that are not necessarily compatible.

    c. Nonstandard features should be used only when the needed operation or function cannot reasonably be implemented with the standard features alone. Although nonstandard features can be very useful, it should be recognized that the use of these or any other nonstandard elements may make the interchange of graphics picture data and future conversion more difficult and costly.

    d. The use of profiles is strongly recommended in applications where it is vitally important to ensure predictable results between machines, sites and applications. They are defined by application constituencies who agree to adhere to the same subset of CGM. The first profile added herein by this revision is recommended for Department of Defense applications as well as other Federal government applications when the representation of graphics information in digital form is for use in technical illustrations and/or technical publications. In addition, this profile is recommended for satisfying Federal agencies' specifications when the use of a general-purpose, graphical interchange mechanism is required.

10. Specifications. ANSI/ISO 8632.1-4:1992, Computer Graphics Metafile, defines the scope of the specifications, the syntax and semantics of the CGM elements and requirements for a conforming implementation. The ANSI/ISO 8632 consists of four parts: (Part 1: Functional Specifications; Part 2: Character Encoding; Part 3: Binary Encoding; Part 4: Clear Text Encoding). In addition, MIL-D-28003A, the Military Specification for the Digital Representation of Illustration Data: CGM Application Profile, establishes the requirements to be met when two-dimensional picture description or illustration data that is vector or mixed vector and raster is delivered in the digital format of FIPS PUB 128-1.

11. Implementation. The implementation of this standard involves two areas of consideration: acquisition of CGM implementations and interpretations of the standard.

11.1 Acquisition of CGM Implementations. This revised standard becomes effective October 15, 1993. The use of the CGM Application Profile added as a result of this revision is mandatory October 15, 1994. Agencies are encouraged to use the Application Profile in acquisitions initiated during this period.

11.2 Interpretation of FIPS CGM. Resolution of questions regarding this standard will be provided by NIST. Questions concerning the content and specifications should be addressed to:

Director
Computer Systems Laboratory
ATTN: CGM Interpretation
National Institute of Standards and Technology
Gaithersburg, MD 20899

12. Waivers. Under certain exceptional circumstances, the heads of Federal departments and agencies may approve waivers to Federal Information Processing Standards (FIPS). The head of such agency may redelegate such authority only to a senior official designated pursuant to section 3506(b) of Title 44, U.S. Code. Waivers shall be granted only when:

a. Compliance with a standard would adversely affect the accomplishment of the mission of an operator of a Federal computer system, or

b. Cause a major adverse financial impact on the operator which is not offset by Governmentwide savings.

Agency heads may act upon a written waiver request containing the information detailed above. Agency heads may also act without a written waiver request when they determine that conditions for meeting the standard cannot be met. Agency heads may approve waivers only by a written decision which explains the basis on which the agency head made the required finding(s). A copy of each such decision, with procurement sensitive or classified portions clearly identified, shall be sent to: National Institute of Standards and Technology; ATTN: FIPS Waiver Decisions, Technology Building, Room B-154; Gaithersburg, MD 20899.

In addition, notice of each waiver granted and each delegation of authority to approve waivers shall be sent promptly to the Committee on Government Operations of the House of Representatives and the Committee on Governmental Affairs of the Senate and shall be published promptly in the *Federal Register*.

When the determination on a waiver applies to the procurement of equipment and/or services, a notice of the waiver determination must be published in the *Commerce Business Daily* as a part of the notice of solicitation for offers of an acquisition or, if the waiver determination is made after that notice is published, by amendment to such notice.
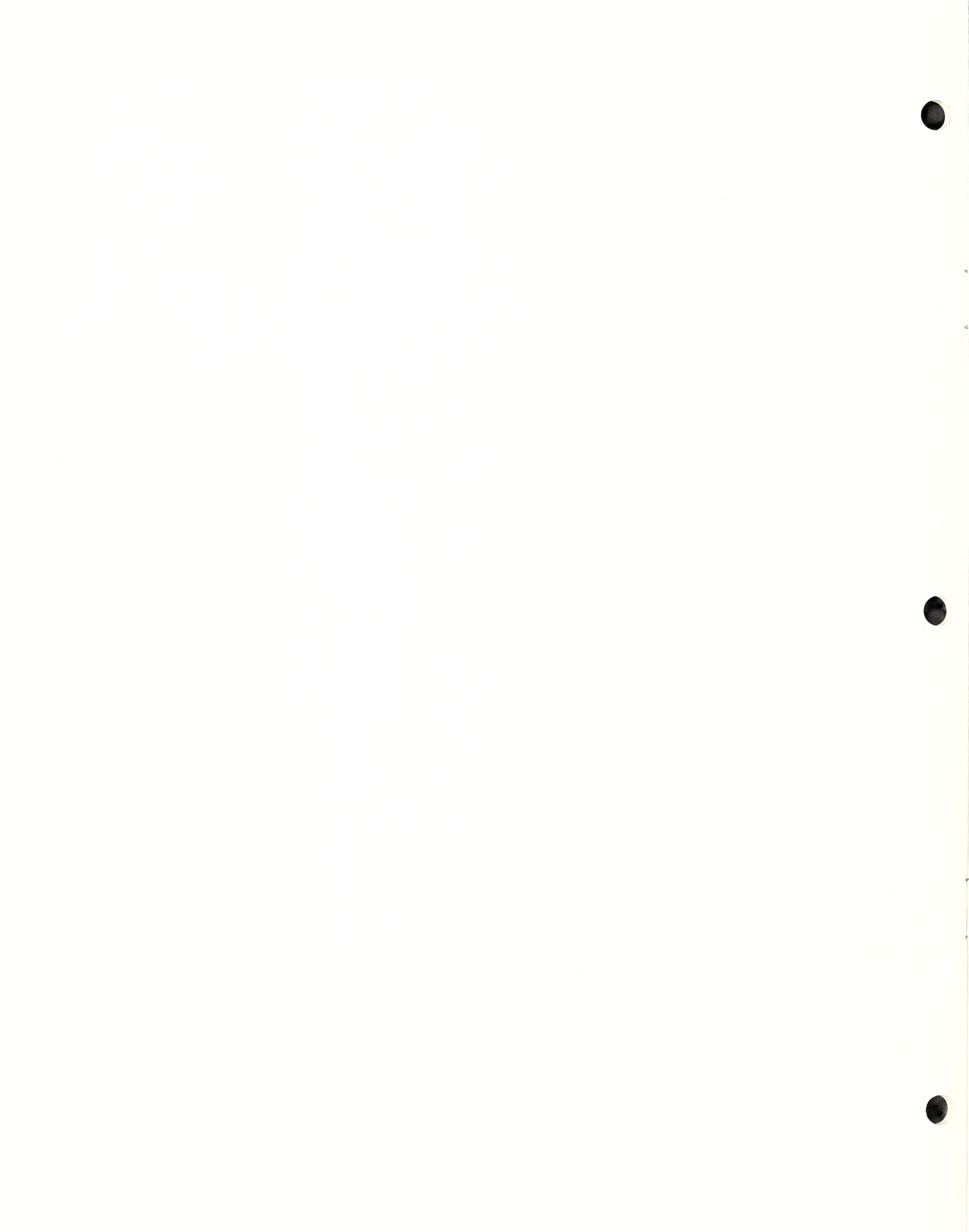
A copy of the waiver, any supporting documents, the document approving the waiver and any supporting and accompanying documents, with such deletions as the agency is authorized and decides to make under 5 U.S.C. Sec. 552(b), shall be part of the procurement documentation and retained by the agency.

13. Where to Obtain Copies. Copies of this publication are for sale by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161. (Sale of the included specifications document is by arrangement with the American National Standards Institute.) When ordering, refer to Federal Information Processing Standards Publication 128-1 (FIPSPUB128-1), and title. Payment may be made by check, money order, or NTIS deposit account.