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MIL-STD-1840C
26 JUNE 1997

SUPERSEDING
MIL-STD-1840B
3 NOVEMBER 1992

DEPARTMENT OF DEFENSE
INTERFACE STANDARD

AUTOMATED INTERCHANGE OF TECHNICAL INFORMATION

AMSC N/A

AREA IPSC

Distribution Statement A: Approved for public release; distribution is unlimited.

FOREWORD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense (DoD).

2. This standard has been designated as an interface standard by the DoD, and may be used in all acquisition contracts without a waiver.

3. This standard applies to technical information which may be part of the traditional technical data package used for system or item acquisition; technical information used to design, manufacture, field, and dispose of a system or item; or technical documentation used for system or item support.

4. This interface standard defines the means for exchanging large quantities of engineering and technical support data among heterogeneous computer systems. MIL-STD-1840 is often called the "parent" or "umbrella" standard for the Continuous Acquisition and Life-Cycle Support (CALS) program because it identifies other standards, specifications, and practices to be used in a CALS solution. It applies selected Federal, DoD, International, National, and Internet standards, specifications, or practices for the exchange of digital information between organizations or systems, and for the conduct of business by electronic means.

5. The areas addressed by this standard pertain to the interface of computers for automating the creation, storage, retrieval, and delivery of all forms of technical information. The standard defines a logical file identification and bundling convention for device- and medium-independent transfer of technical information. This standard also addresses the transfer of electronic product data for engineering uses and the packaging of data for electronic commerce.

6. To accommodate operational needs and technology advances for information transfer, this revision of the standard adds five (5) new data format types, adds three (3) new data file header records, provides for six (6) new transfer media types to complement 9-track reel tape, and defines increased Information Security (INFOSEC) capabilities including digital signature and encryption. The "`dtype: `" record is redefined as an extensible means of automatically exchanging data file subtype information. The Joint Engineering Data Management Information and Control System (JEDMICS) is explicitly supported in this revision.

7. This revision of the standard supports the transfer of data by electronic as well as physical media. It provides for the use of Electronic Data Interchange (EDI) or the Internet for electronic data file transfers. The Multipurpose Internet Mail Extensions (MIME) type, "`Application/CALS-1840`" is a registered media type for the electronic exchange of transfer units via the Internet.

8. This revision of the standard is fully "Year 2000" (Y2K) compliant.

9. The improved tailoring guidance in this revision facilitates the proper application of the interface standard without contractually levying unnecessary or burdensome requirements.

10. Throughout the development of this revision, an effort was made to retain maximum compatibility between this interface standard and its earlier versions. Although it is unlikely that a transfer package prepared in accordance with MIL-STD-1840C could be read by tools written to comply with earlier versions, well-written software tools for this revision may be made to successfully decode transfer packages prepared to earlier versions of the standard.

11. As it has no commercial equivalents, this standard also could be employed for many information exchange applications not specifically described herein. Its use is not limited to technical data exchange in a defense acquisition environment.

12. This standardization document will continue to be updated as new technologies, formats, and media for the transfer of digital product and technical information emerge. In particular, some of the transfer media types presented in appendix A have received only general interface requirements in this revision. This is due to the lack of mature international or commercial standards and detailed Publicly Available Specifications (PASs) to define detailed interface requirements at this time. As the use of some of these technologies will be too valuable to preclude, these transfer media types are introduced for use with the recognition that many of their detailed interface provisions will need to be individually defined by each project, in the contract or other form of agreement.

13. As part of the CALS initiative to introduce the use of digital technology into the process of reviewing and coordinating standards, this revision of the standard has been reformatted for improved readability as both a paper and an electronic document. The body text of this document uses the same font as the previous revision, but slightly enlarged to give an improved on-screen appearance when displayed by a computer. The tables and figures now use a sans-serif font for a cleaner appearance and to be distinguished easily from the body text. Computer code entries, values, and listings are shown in a `non-proportional typewriter font` so that they may be identified easily and with minimal confusion.

14. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: ATTN: CALS Digital Standards Office, DISA Center for Standards, Code JIEO/JEBEB, 10701 Parkridge Blvd, Reston, VA 20191-4357, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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1. SCOPE

1.1 Scope. This interface standard establishes the logical structure and formats for the transfer of digital information between organizations or systems exchanging digital forms of technical information. This standard facilitates the development and support of systems throughout their life cycle and the conduct of business by electronic means. The areas addressed by this standard involve the interface with computer technologies which are automating the creation, storage, retrieval, and delivery of hard copy forms of technical manuals and engineering drawings. The standard also addresses electronic product data technology and the packaging of data for electronic commerce. The standard defines a logical file identification and bundling convention for device- and medium-independent exchange of technical information. This revision of the standard adds several new data types, provides for new transfer media complementing 9-track reel tape, and supports increased Information Security (INFOSEC) capabilities including digital signature and encryption.

1.2 Applicability. This interface standard defines the digital data file formats and information structures used for the exchange of technical information in digital form. The format, information structures, and transfer procedures established herein are applicable in all cases where the information can be prepared and received in the form of American Standard Code for Information Interchange (ASCII) text files, product definition data files, raster image files, graphics files, or other forms of binary encoding such as audio and video data. This standard may be employed for information exchange applications not specifically described herein; its use is not limited to technical data exchange in a defense acquisition environment. This standard applies to technical information which is part of the traditional technical data package used for system or item acquisition; technical information used to design, manufacture, field, and dispose of a system or item; and the technical documentation used for system or item support. This includes information such as product data, product acquisition and implementation information, and product support data.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, and 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-M-38761/2	–	Microfilm Aperture, Tabulating Cards and Ships Drawing Index for Naval Sea Systems Command Ships, Systems, and Equipment, Preparation of.
MIL-PRF-28000	–	Digital Representation for Communication of Product Data: IGES Application Subsets and IGES Application Protocols.
MIL-PRF-28001	–	Markup Requirements and Generic Style Specification for Exchange of Text and Its Presentation.
MIL-PRF-28002	–	Raster Graphics Representation in Binary Format, Requirements for.
MIL-PRF-28003	–	Digital Representation for Communication of Illustration Data: Computer Graphics Metafile (CGM) Application Profile.

(Electronic copies of the CALS core standardization documents can be accessed via the Internet. Download from the World Wide Web, Uniform Resource Locator (URL) `http://www-cals.itsi.disa.mil/` .)

FEDERAL INFORMATION PROCESSING STANDARDS (FIPS)

FIPS PUB 4-1	–	Representation for Calendar Date and Ordinal Date for Information Interchange.
FIPS PUB 46-2	–	Data Encryption Standard (DES).
FIPS PUB 81	–	DES Modes of Operation.
FIPS PUB 113	–	Computer Data Authentication.
FIPS PUB 180-1	–	Secure Hash Standard.
FIPS PUB 185	–	Escrowed Encryption Standard (EES).
FIPS PUB 186	–	Digital Signature Standard (DSS).
FIPS PUB 188	–	Standard Security Label for Information Transfer.

(Copies of the Federal Information Processing Standards (FIPS) are available to Department of Defense activities from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. Others must request copies of FIPS from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161-2171. Electronic copies of the FIPS publications can be accessed via the Internet. Download from the World Wide Web, URL `http://www.itl.nist.gov/div897/pubs/` .)

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-1806	–	Marking Technical Data Prepared by or for the Department of Defense.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-331	–	Directory of DoD Engineering Data Repositories.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

OTHER GOVERNMENT DOCUMENTS

MD4002101-1.52	–	FORTEZZA Application Implementors' Guide.
MD4000501-1.52	–	FORTEZZA Cryptologic Interface Programmers' Guide.
	–	FORTEZZA Interface Control Document.
	–	FORTEZZA Plus Interface Control Document.
R21-TECH-23-94	–	Key Exchange Algorithm.

(Application for copies should be addressed to the NSA-V21, 9800 Savage Road, Fort Meade, MD 20755. Electronic copies of the FORTEZZA documents can be accessed via the Internet. The applicable World Wide Web URL is `http://www.armadillo.huntsville.al.us/` .)

DI-EGDS-80811	–	VHDL Modeling Guidelines for DID Compliance.
DoD Cataloging Handbook H4/H8	–	Commercial and Government Entity (CAGE) Codes.

(Unless otherwise indicated, copies of the above other Government documents are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 8879	–	Information Processing – Text and Office Systems – Standard Generalized Markup Language (SGML)
ISO/IEC 10918-1	–	Information technology – Digital compression and coding of continuous-tone still images – Part 1: Requirements and guidelines.
ISO/IEC 11172-1	–	Information technology – Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbit/s – Part 1: Systems.

ISO/IEC 11172-2	–	Information technology – Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbit/s – Part 2: Video.
ISO/IEC 11172-3	–	Information technology – Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbit/s – Part 3: Audio.

(Application for copies should be addressed to the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094, for issue to DoD activities only. All other requestors should obtain copies from the American National Standards Institute (ANSI), 11 West 42nd Street, 13th Floor, New York, NY 10036.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI X3.4-1986	–	American National Standard Code for Information Interchange.
ANSI X3.225	–	American National Standard – Information Systems – Compaction Algorithm – Binary Arithmetic Coding.
ANSI Y14.1	–	American National Standard – Engineering Drawing and Related Documentation Practices – Drawing Sheet Size and Format.

(Application for copies should be addressed to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

UNITED STATES PRODUCT DATA ASSOCIATION (US PRO)

ISO 10303-21	–	Industrial automation systems and integration – Product data representation and exchange – Part 21: Clear text encoding of the exchange structure.
ISO 10303-201	–	Industrial automation systems and integration – Product data representation and exchange – Part 201: Explicit Draughting.
ISO 10303-202	–	Industrial automation systems and integration – Product data representation and exchange – Part 202: Associative Draughting.

ISO 10303-203	–	Industrial automation systems and integration – Product data representation and exchange – Part 203: Application protocol: Configuration controlled 3D designs of mechanical parts and assemblies.
ANS US PRO/ IPO-100-1996	–	Digital Representation for Communication of Product Definition Data, IGES 5.3
ANS US PRO/ IPO-110-1994	–	3D Piping IGES Application Protocol
ANS US PRO/ IPO-111-1997	–	Initial Graphics Exchange Specification (IGES) Layered Electrical Product Application Protocol

(Application for copies should be addressed to the US PRO, Trident Research Center, Suite 204, 5300 International Blvd, North Charleston, SC 29418. These standards can be ordered on the World Wide Web, URL `http://uspro.scra.org/` . The US PRO has been designated by ANSI and the ISO as the distribution agency for the Standard for the Exchange of Product Model Data (STEP) standards and selected American National Standards within the United States.)

ELECTRONIC INDUSTRIES ASSOCIATION (EIA)

EIA 548	–	Electronic Design Interchange Format (EDIF).
EIA 5670000	–	EIA Commercial Component Model Specification.

(Application for copies should be addressed to the Electronic Industries Association, 2001 Pennsylvania Avenue NW, Washington, DC 20006.)

INSTITUTE FOR INTERCONNECTING AND PACKAGING ELECTRONIC CIRCUITS (IPC)

IPC-D-350	–	Printed Board Description in Digital Form.
IPC-D-351	–	Printed Board Drawings in Digital Form.
IPC-D-352	–	Electronic Design Data Description for Printed Boards in Digital Form.
IPC-D-354	–	Library Format Description for Printed Board Digital Form.
IPC-D-356	–	Bare Board Electrical Test Information in Digital Format.

(Application for copies should be addressed to the Institute for Interconnecting and Packaging Electronic Circuits, 7380 N. Lincoln Avenue, Lincolnwood, IL 60646.)

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 1076 – VHSIC Hardware Description Language (VHDL).

(Application for copies should be addressed to the Institute of Electrical and Electronics Engineers, Inc., 345 E. 47th Street, New York, NY 10017.)

THE OPEN GROUP

ISBN 1-85912-034-2 – Open Group CAE Specification C436.

(Application for copies should be addressed to The Open Group, 11 Cambridge Center, Cambridge, MA 02142-1405.)

INTERNET ENGINEERING TASK FORCE (IETF)

RFC 1108 – U.S. Department of Defense Security Options for the Internet Protocol.

RFC 1319 – The MD2 Message-Digest Algorithm.

RFC 1321 – The MD5 Message-Digest Algorithm.

RFC 1851 – The ESP Triple DES Transform.

RFC 1895 – The Application/CALS-1840 Content-type.

RFC 1951 – DEFLATE Compressed Data Format Specification version 1.3.

RFC 1952 – GZIP file format specification version 4.3.

RFC 2045 – Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies.

RFC 2046 – Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types.

RFC 2047 – MIME (Multipurpose Internet Mail Extensions) Part Three: Message Header Extensions for non-ASCII Text.

RFC 2049 – Multipurpose Internet Mail Extensions (MIME) Part Five: Conformance Criteria and Examples.

(Application for copies should be addressed to the Internet Engineering Task Force. Copies of these documents can be accessed via the Internet. Download from the World Wide Web, URL `http://www.ietf.org/` , or the library at `http://ds.internic.net/ds/dspg0intdoc.html` .)

OTHER NON-GOVERNMENT DOCUMENTS

APPNOTE.ZIP – Application Notes for PKZIP Version 2.04G.

(Application for copies should be addressed to PKWARE, Inc, 9025 N. Deerwood Drive, Brown Deer, WI 53223-2437. Copies of this document can be accessed via the Internet. Download from the World Wide Web, URL `http://www.pkware.com/` .)

PKCS #1 – RSA Encryption Standard.

(Application for copies should be addressed to the RSA Laboratories, 100 Marine Parkway, Redwood City, CA 94065. Copies of this document can be accessed via the Internet. Download from the World Wide Web, URL `http://www.rsa.com/` .)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available via libraries or other informational services.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

3.1 Abbreviations and acronyms used in this standard. The abbreviations and acronyms used in this standard are defined as follows:

a.	3D	–	Three-dimensional
b.	ANS	–	American National Standard
c.	ANSI	–	American National Standards Institute
d.	AP	–	Application Protocol
e.	ASCII	–	American Standard Code for Information Interchange
f.	CAE	–	Common Applications Environment
g.	CAGE	–	Commercial and Government Entity
h.	CALS	–	Continuous Acquisition and Life-Cycle Support
i.	CCITT	–	Consultative Committee for International Telegraphy and Telephony (now the International Telecommunications Union Telecommunication Standardization Sector, ITU-T)
j.	CDRL	–	Contract Data Requirements List
k.	CGM	–	Computer Graphics Metafile
l.	CMV	–	Cryptographic Module Validation
m.	CSL	–	Computer Systems Laboratory
n.	DEK	–	Data Encryption Key
o.	DES	–	Data Encryption Standard
p.	DID	–	Data Item Description
q.	DIP	–	Dual Inline Package
r.	DISA	–	Defense Information Systems Agency
s.	DoD	–	Department of Defense
t.	DoDISS	–	Department of Defense Index of Specifications and Standards
u.	DSS	–	Digital Signature Standard
v.	DTD	–	Document Type Definition
w.	EDI	–	Electronic Data Interchange
x.	EDIF	–	Electronic Design Interchange Format

y.	EES	–	Escrowed Encryption Standard
z.	EIA	–	Electronic Industries Association
aa.	ESP	–	Encapsulating Security Payload
ab.	FIPS	–	Federal Information Processing Standards
ac.	FOSI	–	Formatting Output Specification Instance
ad.	GNU	–	Gnu's Not Unix!
ae.	GZIP	–	GNU Zip
af.	HyTime	–	Hypermedia/Time-based Structuring Language
ag.	IEEE	–	Institute of Electrical and Electronics Engineers
ah.	IETF	–	Internet Engineering Task Force
ai.	IGES	–	Initial Graphics Exchange Specification
aj.	IK	–	Interchange Key
ak.	INFOSEC	–	Information Security
al.	IPC	–	Institute for Interconnecting and Packaging Electronic Circuits
am.	IPSC	–	Information Processing Standards for Computers
an.	ISO	–	International Organization for Standardization
ao.	ITU-T	–	International Telecommunications Union Telecommunication Standardization Sector (previously the Consultative Committee for International Telegraphy and Telephony, CCITT)
ap.	JEDMICS	–	Joint Engineering Data Management Information and Control System
aq.	JIEO	–	Joint Interoperability and Engineering Organization
ar.	JPEG	–	Joint Photographic Experts Group
as.	LEP	–	Layered Electrical Product
at.	LZW	–	Lempel-Ziv-Welch
au.	MD2	–	Message Digest 2
av.	MD5	–	Message Digest 5
aw.	Mbit/s	–	Megabits per Second
ax.	MIME	–	Multipurpose Internet Mail Extensions

ay.	MPEG	–	Motion Picture Experts Group
az.	NA	–	Not Applicable
ba.	NCM	–	Numerical Control Manufacturing
bb.	NIST	–	National Institute of Standards and Technology
bc.	ODA	–	Office Document Architecture
bd.	PAS	–	Publicly Available Specification
be.	PDL	–	Page Description Language
bf.	PMO	–	Program Management Office
bg.	RFC	–	Request for Comment
bh.	RSA	–	Rivest-Shamir-Adleman
bi.	SGML	–	Standard Generalized Markup Language
bj.	STEP	–	Standard for the Exchange of Product Model Data
bk.	URL	–	Uniform Resource Locator
bl.	US PRO	–	United States Product Data Association
bm.	UTC	–	Coordinated Universal Time
bn.	VHDL	–	VHSIC Hardware Description Language
bo.	VHSIC	–	Very High Speed Integrated Circuit
bp.	Y2K	–	Year 2000

3.2 Application profiles for Computer Graphics Metafile (CGM). A set of specifications (beyond that in the published standard) appropriate to a particular environment. The goal of an application profile is to eliminate implementation dependencies and to provide for the effective and unambiguous use of a standard.

3.3 Application Protocol (AP). Defines the context for the use of product data and specifies the use of the standard in that context to satisfy an industrial need.

3.4 Application subset for Initial Graphics Exchange Specification (IGES). A defined set of specific entity types which are used to completely and unambiguously represent the information requirements for a particular application.

3.5 Array. An n-dimensional ordered set of data items identified by a single name and one or more indices, so that each element is individually addressable.

3.6 American Standard Code for Information Interchange (ASCII) character set. The ASCII character set includes 128 upper and lower case letters, numerals, and special purpose symbols, each encoded by a unique 7-bit binary number.

3.7 American Standard Code for Information Interchange (ASCII) text. A sub-set of the ASCII character set consisting principally of the printable characters.

3.8 Commercial and Government Entity (CAGE) code. A five character code, listed in Cataloging Handbook H4/H8, which is assigned to commercial and Government activities that manufacture items, develop items, or provide services or supplies for the Government. When used with a drawing number or part number, the CAGE code designates the design activity from whose series the drawing or part number is assigned.

3.9 Component (electrical). Items that are usually packaged as an indivisible unit to be assembled on a board or substrate. Examples include integrated circuits, resistors, capacitors, inductors, transformers, discrete transistors, Dual Inline Package (DIP) switches, fuses, and encapsulated relays.

3.10 Computer Graphics Metafile (CGM). The specification for a mechanism for storing and transferring picture description information.

3.11 Data element. A uniquely named and defined component of a data definition; a data "cell" into which actual data values from "n" records can be placed (such as the data element QUANTITY, which can be populated with values from "n" records).

3.12 Data file. A stream of bits, octets, or bytes treated as a unit. For example, in stock control, a data file could consist of a set of invoice records.

3.13 Decryption. The process of decoding encrypted computer information back into a form that is easily readable by human or machine.

3.14 Descriptive markup. Markup that describes the structure and other attributes of a document in a non-system-specific manner, independently of any processing that may be performed on it.

3.15 Destination system. The computer hardware and software system receiving transferred data.

3.16 Digital data. Data represented in discrete form for manipulation and storage by a computer.

3.17 Digital signature. Digital data that authenticates the identity of the approving authority or sending agent by the use of a computationally unique string of numbers that enables the detection of unauthorized modifications to the contents of a signed data file.

3.18 Document. A collection of information that is processed as a unit.

3.19 Document type. A class of documents having similar characteristics, such as a journal, article, technical manual, or memo.

3.20 Document type declaration. A markup declaration that contains the formal specification of a Document Type Definition (DTD).

3.21 Document type declaration set. A declaration set intended for inclusion within a document type declaration. It consists of one or more entity sets and element type sets.

3.22 Document Type Definition (DTD). A DTD includes a formal specification, expressed in a document type declaration, of the element types, element relationships and attributes, and references that can be represented by markup. A DTD thereby defines the vocabulary of the markup (in SGML syntax) that must be interpreted by the application in order to apply the established rules to documents of a particular type.

3.23 Drawing. An engineering document or digital data file(s) that discloses (directly or by reference), by means of graphic or textual presentations, or a combination of both, the physical and functional requirements of an item.

3.24 Electronic Data Interchange (EDI). The computer-to-computer exchange of formatted, transactional information between autonomous organizations.

3.25 Electronic Design Interchange Format (EDIF). A neutral, platform independent format for the interchange of integrated circuit design data from design to manufacturing organizations.

3.26 Encryption. The process of transforming or converting computer information into an unintelligible form to conceal its meaning.

3.27 Engineering data. Engineering documents such as drawings, associated lists, accompanying documents, manufacturer’s specifications and standards, or other information prepared by a design activity and relating to the design, manufacture, procurement, test, or inspection of items.

3.28 Engineering drawing. See "drawing."

3.29 File. A structured, digitally-encoded collection of information consisting of records, items or arrays, and data elements.

3.30 Format. A specific arrangement of data.

3.31 Generic text file. A file type for arbitrarily formatted text-based data. Generic text files are suitable for sending source code. This file type does not encompass SGML or other separately defined file types.

3.32 Hypermedia/Time-based Structuring Language (HyTime). A standardized hypermedia structuring language for representing hypertext linking, temporal and spatial event scheduling, and synchronization.

3.33 Illustration. A picture, graph, diagram, or other form of graphical representation.

3.34 Initial Graphics Exchange Specification (IGES). This specification defines file structure and language formats for the representation of geometric, topological, and non-geometric product definition data.

3.35 Institute for Interconnecting and Packaging Electronic Circuits (IPC). Trade association and ANSI approved standards body which has developed printed circuit board manufacturing information exchange standards.

3.36 Joint Photographic Experts Group (JPEG). A raster image compression standard designed for storing color and grayscale photographic images and artwork which will be viewed by the human eye.

3.37 Markup. Text that is added to the data of a document to convey structure or content information, such as by SGML tags.

3.38 Media label. A physical label affixed to each unit of digitally encoded media (such as magnetic tape, floppy diskettes, or optical disks) which identifies the origin, destination, and characteristics of the media.

3.39 Media set. A group of one or more units of a medium (such as magnetic tape, floppy diskettes, or optical disks) which collectively represent the collection of related files comprising a specific delivery of a transfer package.

3.40 Metadata. External data about a data file, such as indexing information, or support data to assist in processing the data file.

3.41 Metafile. A mechanism for retaining and transferring graphical data and control information. The information contains a device independent description of one or more graphic images.

3.42 Multipurpose Internet Mail Extensions (MIME). A message protocol which specifies message headers and leaves the message content as text. MIME provides facilities to include multiple objects in a single message, whether the data is ASCII or non-textual material such as images and audio.

3.43 Motion Picture Experts Group (MPEG). A standard for compressing and storing moving picture images and audio material which will be viewed or listened to by a human.

3.44 Page Description Language (PDL). A programming language to describe the displayable appearance of a page containing text, graphics, and sampled images. Used to communicate a high level, device independent description of a document between a composition system and a display system or printer.

3.45 Pel. The smallest graphic element that can be individually addressed within a picture. Also known as a "pixel," or "picture element."

3.46 Product acquisition and implementation information. Information including parameters, original design activity CAGE codes and associated part numbers, and other data necessary to manufacture, assemble, or acquire a system, its supporting components, spares, and other equipment.

3.47 Product data. All data elements necessary to define the geometry, function, and behavior of a piece part or an assembly of parts over its life span. Product data consists of engineering drawings and specifications, but also includes new and evolving digital data forms that define parameters, features, and characteristics which enhance product functionality in a system and provide the data in a platform independent form directly usable by computer applications. The term includes all product definition data elements as well as additional logistics elements for reliability and maintainability.

3.48 Product definition data. Denotes the totality of data elements required to completely define a product. Product definition data includes geometry, topology, relationship, tolerances, attributes, and features necessary to completely define a component part or an assembly of parts for the purpose of design, analysis, manufacture, test, and inspection.

3.49 Product support data. Information including training and maintenance manuals with their associated illustrations, and other data needed to achieve and maintain the system in a required state of readiness.

3.50 (Formal) PUBLIC identifier. A PUBLIC identifier that is constructed in accordance with ISO 8879, so that its owner identifier and the components of its text identifier can be distinguished.

NOTE: A PUBLIC identifier does not convey public usage rights to the entity it identifies, but only its availability to the system using this entity. In particular, the owner of the entity may choose to sell or license it to others, or to restrict its access to a single organization.

3.51 Raster. A matrix, constructed of orthogonally positioned rows and columns of discrete data points. The binary value of each data point indicates the presence or absence of a visual artifact. The aggregate of these artifacts, displaying their assigned values, represents raster data.

3.52 Raster data. The presentation or storage of images or text in raster form. Raster data is sometimes called a "bitmap," and is composed of rows of pels.

3.53 Record. A collection of related data elements treated as a unit.

3.54 Source system. The computer hardware and software that will structure technical information for interchange in accordance with this standard.

3.55 Special word file. A file of words peculiar to a transfer unit to which they are related and which are not in the destination system lexicon. This file may be used to facilitate other, as yet undefined, supporting textual information.

3.56 Standard Generalized Markup Language (SGML). A standard that defines a language for document representation which formalizes markup and frees it of system and processing dependencies. It provides a coherent and unambiguous syntax for describing any element(s) a user chooses to identify within a document.

3.57 Standard Generalized Markup Language (SGML) declaration. A markup declaration that specifies the character set, concrete syntax, optional features, and capacity requirements of a document’s markup. The SGML declaration applies to all of the SGML entities of a document.

3.58 Standard for the Exchange of Product Model Data (STEP). A series of parts within an international standard (ISO 10303) that defines resources, languages, models, and APs for the exchange of product model data.

3.59 Standard for the Exchange of Product Model Data (STEP) Application Protocol (AP). A part of the international standard for STEP, ISO 10303, that describes the use of integrated resources satisfying the scope and information requirements for a specific application context.

3.60 Standard for the Exchange of Product Model Data (STEP) conformance class. A subset of a STEP AP for which conformance may be claimed.

3.61 System. A specific suite of computer hardware and software. As used in the terms "Source System" and "Destination System," the term does not necessarily correspond one-to-one with "site" or "base," in that most prime contractor sites and DoD installations have more than one system.

3.62 Tape volume. A single reel or cartridge of magnetic tape with recorded data.

3.63 Technical data. Recorded information, regardless of the form or method of the recording, of a scientific or technical nature.

3.64 Technical data package. A technical description that supports the life cycle of an item, including engineering, production, and logistic support. The technical description defines the design configuration and procedures required to ensure adequacy of item performance. It consists of all applicable data, such as engineering drawings, associated lists, product and process specifications and standards, performance requirements, quality assurance provisions, and packaging details.

3.65 Transfer package. A collection of one or more transfer sets (except sequential media, where a transfer package is composed of exactly one transfer set).

3.66 Transfer set. A collection of one or more transfer units.

3.67 Transfer unit. A collection of files consisting of one transfer unit declaration file and one or more data files (the smallest collection of files to make a successful interchange of technical information).

3.68 Transfer unit declaration file. A file accompanying a set of data files comprising a transfer unit. This file provides all information necessary to the successful disposition of the digital files at the destination, but has no purpose beyond that function.

3.69 Vector graphics. The presentation of images stored as vector or other mathematical representations.

4. GENERAL REQUIREMENTS

4.1 Purpose and coverage. This standard covers the following types of transfer units for delivery in digital form:

a. Page image transfer unit.

b. PDL transfer unit.

c. SGML document transfer unit.

d. Product data transfer unit.

e. Miscellaneous transfer unit.

4.2 Transfer unit contents. Information covered by this standard consists of text, illustrations, and product data in digital form. This information shall be organized into transfer units for transmission or transfer. Each transfer unit shall be encoded in a format as specified in the contract or other form of agreement. One transfer unit declaration file and at least one transfer unit data file, containing the appropriate transfer unit data file header records, shall constitute a transfer unit.

4.2.1 Page image transfer unit. A page image transfer unit shall consist of the following:

a. Exactly one transfer unit declaration file.

b. One or more page image files as specified in the contract or other form of agreement.

c. Zero or more special word files as specified in the contract or other form of agreement.

d. Zero or more digital signature files.

4.2.2 PDL transfer unit. A PDL transfer unit shall consist of the following:

a. Exactly one transfer unit declaration file.

b. One or more PDL files as specified in the contract or other form of agreement.

c. Zero or more digital signature files.

4.2.3 SGML document transfer unit. An SGML document transfer unit shall consist of the following:

a. Exactly one transfer unit declaration file.

b. Zero or one document type declaration file.

c. Exactly one SGML coded text source file.

d. Zero or more SGML text entity files. Entities with PUBLIC identifiers need not be transmitted with the transfer unit when the receiver has access to a copy of the entity and knows it by that PUBLIC identifier.

e. Zero or more non-SGML entity files, such as illustrations (see 4.4.7) or audio/video (see 4.4.13). There shall be one transfer unit data file for each non-SGML entity referenced in the transfer unit. Entities with PUBLIC identifiers need not be transmitted with the transfer unit when the receiver has access to a copy of the entity and knows it by that PUBLIC identifier.

f. Zero or one SGML style and format information data files. These may be a Formatting Output Specification Instance (FOSI) or other mechanism(s) for preparing interchangeable style and format information as specified in the contract or other form of agreement.

g. Zero or more special word files as specified in the contract or other form of agreement.

h. Zero or more contract defined data files as specified in the contract or other form of agreement.

i. Zero or more digital signature files.

4.2.4 Product data transfer unit. A product data transfer unit shall consist of the following:

a. Exactly one transfer unit declaration file.

b. Zero or more engineering drawing data files in IGES, STEP, or raster format as specified in the contract or other form of agreement.

c. Zero or more engineering product model data files in IGES or STEP format.

d. Zero or more electrical/electronic application data files in accordance with 4.4.11.4.

e. Zero or more Numerical Control Manufacturing (NCM) data files.

f. Zero or more digital signature files.

4.2.5 Miscellaneous transfer unit. A miscellaneous transfer unit shall consist of the following:

a. Exactly one transfer unit declaration file.

b. At least one data file per transfer unit from among the types listed in 4.4, as specified in the contract or other form of agreement.

c. Zero or more digital signature files.

4.3 Transfer unit declaration file format. There shall be exactly one transfer unit declaration file with each transfer unit delivered in digital form. This transfer unit declaration file shall uniquely identify a transfer unit delivered in digital form and shall be prepared in accordance with the requirements of section 5 of this standard.

4.4 Transfer unit data file formats. The format for each type of transfer unit data file shall be in accordance with one of the following paragraphs:

4.4.1 Page image data files. Page image data files shall be in accordance with MIL-PRF-28000 for IGES data files, MIL-PRF-28002 for raster image data files, and MIL-PRF-28003 for CGM data files.

4.4.2 Special word data files. Special word data files shall be as specified in the contract or other form of agreement.

4.4.3 PDL data files. PDL data files shall be as specified in the contract or other form of agreement.

4.4.4 Document type declaration files. The requirement for a separate document type declaration file shall be as specified in the contract or other form of agreement. A document type declaration file shall contain the following in the order listed below:

a. Zero or one SGML declaration (include the SGML declaration only if the SGML document being transmitted does not conform to the SGML declaration as specified in MIL-PRF-28001).

b. Exactly one document type declaration for the SGML document being transmitted. DTD declaration subset entities referenced in the document type declaration by PUBLIC identifiers do not need to be included if they are known to the destination system by their PUBLIC identifiers.

4.4.5 SGML coded text source data files. Text source data files shall be ASCII text files, SGML coded and marked up (tagged) in accordance with MIL-PRF-28001, or as specified in the contract or other form of agreement. An SGML coded text source data file shall contain the following in the order listed below:

a. Zero or one SGML declaration (include the SGML declaration only if the SGML document being transmitted does not conform to the SGML declaration specified in MIL-PRF-28001 or has not been transmitted by any other means).

b. Exactly one document type declaration for the SGML document being transmitted (include the document type declaration only if a document type declaration file is not present in the SGML transfer unit). DTD declaration subset entities referenced in the document type declaration by PUBLIC identifiers do not need to be included if they are known to the destination system by their PUBLIC identifiers.

c. Exactly one document instance.

4.4.6 SGML text entity files. SGML text entity files are included in SGML document transfer units as part of the exchange of an SGML document, and also included in miscellaneous transfer units as stand-alone SGML text entity files, such as a DTD. The file shall contain the content of the SGML text entity in accordance with MIL-PRF-28001. The SGML text entity SYSTEM identifier or PUBLIC identifier shall be specified in the appropriate header record.

4.4.7 Illustration data files. Each set of text source files for a technical publication shall be supported with an illustration data file for each graphic entity in the technical publication, except where there are multiple instances of the same graphic entity in different locations in the technical publication. In this situation, a single illustration data file may be used to satisfy all of the graphic entity instances. The illustration data files shall contain digital data encoded in raster (MIL-PRF-28002), IGES (MIL-PRF-28000, Class 1), or CGM (MIL-PRF-28003) format.

4.4.7.1 IGES illustration data files. IGES illustration data files shall be in accordance with MIL-PRF-28000, and shall be Class 1 application subsets, or as specified in the contract or other form of agreement.

4.4.7.2 Raster illustration data files. Raster illustration data files shall be in accordance with MIL-PRF-28002, or as specified in the contract or other form of agreement.

4.4.7.3 CGM illustration data files. CGM illustration data files shall be in accordance with MIL-PRF-28003, which specifies such files in monochrome, grayscale, or color format, or as specified in the contract or other form of agreement.

4.4.7.4 JPEG illustration data files. JPEG illustration data files shall be in accordance with ISO/IEC 10918-1, or as specified in the contract or other form of agreement.

4.4.8 Style and format information data files. Style and format information data files shall define the style and display format of the document in accordance with MIL-PRF-28001, or as specified in the contract or other form of agreement.

4.4.9 Contract defined data files. Contract defined data file formats shall be as specified in the contract or other form of agreement.

4.4.10 Engineering drawing data files. The engineering data file representations of engineering drawings shall be IGES, STEP, or raster files. The specific form of the transferred files shall be as specified in the contract or other form of agreement.

4.4.10.1 IGES engineering drawing data files. IGES engineering drawing data files shall be Class 2 application data subsets in accordance with MIL-PRF-28000.

4.4.10.2 Raster engineering drawing data files. Raster engineering drawing data files shall be in accordance with MIL-PRF-28002.

4.4.10.3 STEP engineering drawing data files. The engineering data file representation shall be in an ISO 10303-21 physical file exchange format for an ISO 10303-201 AP drawing or other ISO 10303 drawing AP as specified in the contract or other form of agreement.

4.4.11 Product data. Engineering product data files for the exchange of design, analysis, manufacturing/production, or repair information in digital format shall be as specified herein.

4.4.11.1 Product data – STEP physical files. STEP product data sets shall be in accordance with the ISO 10303-21 physical exchange file format for an ISO 10303 Application Protocol conformance class that is specified in the contract or other form of agreement.

4.4.11.2 Product data – mechanical and structural. Engineering product model data shall be encoded as IGES or STEP data. The specific file format or AP of the transferred files shall be as specified in the contract or other form of agreement.

4.4.11.2.1 IGES product model data. Product model data files in IGES format shall be in accordance with MIL-PRF-28000.

4.4.11.2.2 IGES three-dimensional (3D) piping. Three-dimensional piping data files shall conform to IGES Class 5 Application Protocol in accordance with MIL-PRF-28000 and US PRO/IPO-110-1996.

4.4.11.2.3 Configuration control design data files. STEP product data sets for configuration control design shall comply with the ISO 10303-203 AP conformance classes specified in the contract or by other form of agreement.

4.4.11.3 Product data – NCM data files. Unless otherwise specified in the contract or other form of agreement, NCM data files shall be Class 4 application data subsets in accordance with MIL-PRF-28000, or a STEP compliant NCM data file.

4.4.11.4 Product data – electrical and electronic. Electrical/electronic application data files shall be delivered in one or more of the following file formats as specified in the contract or other form of agreement.

4.4.11.4.1 EDIF electrical/electronic application data files. Electrical/electronic application data files of this form shall be delivered in accordance with the EDIF product description and file format standard as defined in EIA 548.

4.4.11.4.2 VHDL electronic application data files. Electronic application data files of this form shall be delivered in accordance with the Very High Speed Integrated Circuit (VHSIC) Hardware Description Language (VHDL) product description and file format standard as defined in IEEE 1076. VHDL electronic application data files will comply with the following, in descending order of precedence:

a. The Data Item Description (DID) for VHDL Documentation (Identification Number DI-EGDS-80811.)

b. The industry AP EIA 5670000 – Commercial Component Model Specification.

4.4.11.4.3 IGES electrical/electronic application data files. IGES electrical/electronic application data files shall comply with the Layered Electrical Product (LEP) AP in accordance with ANS US PRO/IPO-111-1997.

4.4.11.4.4 IPC electrical/electronic application data files. Electrical/electronic application data files of this form shall be delivered in accordance with the IPC product description and file format standard in accordance with IPC-D-350 through IPC-D-352, IPC-D-354, and IPC-D-356.

4.4.12 Grayscale or color illustration data files. Requirements for half-tone or color illustration shall be as specified in the contract or other form of agreement.

4.4.13 Audio/video files. Audio/video or multiplexed audio and video data files shall be MPEG files in accordance with the ISO/IEC 11172 specification parts.

4.4.13.1 Multiplexed audio and video data files. Unless otherwise specified in the contract or other form of agreement, multiplexed audio and video data files shall conform to ISO/IEC 11172-1.

4.4.13.2 Video data files. Unless otherwise specified in the contract or other form of agreement, video data files shall conform to ISO/IEC 11172-2.

4.4.13.3 Audio data files. Unless otherwise specified in the contract or other form of agreement, audio data files shall conform to ISO/IEC 11172-3.

4.4.14 Multipurpose Internet Mail Extensions (MIME) files. Data encapsulated in MIME format shall be in accordance with IETF Request for Comment (RFC) 2045, RFC 2046, RFC 2047, and RFC 2049.

4.4.15 Digital signature files. Data files containing a digital signature for the external authentication of other data shall be in accordance with 5.5.2.

4.4.16 Generic text files. Generic text-based data files shall be in accordance with ANSI X3.4 unless otherwise specified in the contract or other form of agreement. Text-based data files which are formatted in accordance with other data types defined herein, such as SGML coded and marked up (tagged) files, shall not be transferred as generic text files.

4.5 Declaration file and header record date and time formats. All transfer set data fields containing date information shall be formatted to include a 4-digit year in accordance with FIPS PUB 4-1. All date and date-time entries shall use the "YYYYMMDD/HHHH:SS" format, where "YYYY" is the four-digit year, "MM" is the month, "DD" is the day of the month, "HHHH" is the hour using a 24-hour clock, and "SS" is the seconds. All time references are based on Coordinated Universal Time (UTC). For example, the date: "November 14, 1997 at 3:21 p.m., 33 seconds UTC," would be represented as:

19971114/1521:33

5. DETAILED REQUIREMENTS

5.1 General. This section applies to all transfer media and specifies the structure, content, media options, and packaging requirements of the digital information which constitute a transfer package.

5.2 Transfer package structure. File naming, file types, and file structure set forth in this section shall be implemented on all media. A transfer package shall consist of one or more transfer sets except for sequential media which shall consist of one transfer set (see appendix A). The structure and content of each file shall conform to the requirements set forth in this section. Figure 1 provides a graphic representation of a transfer package.

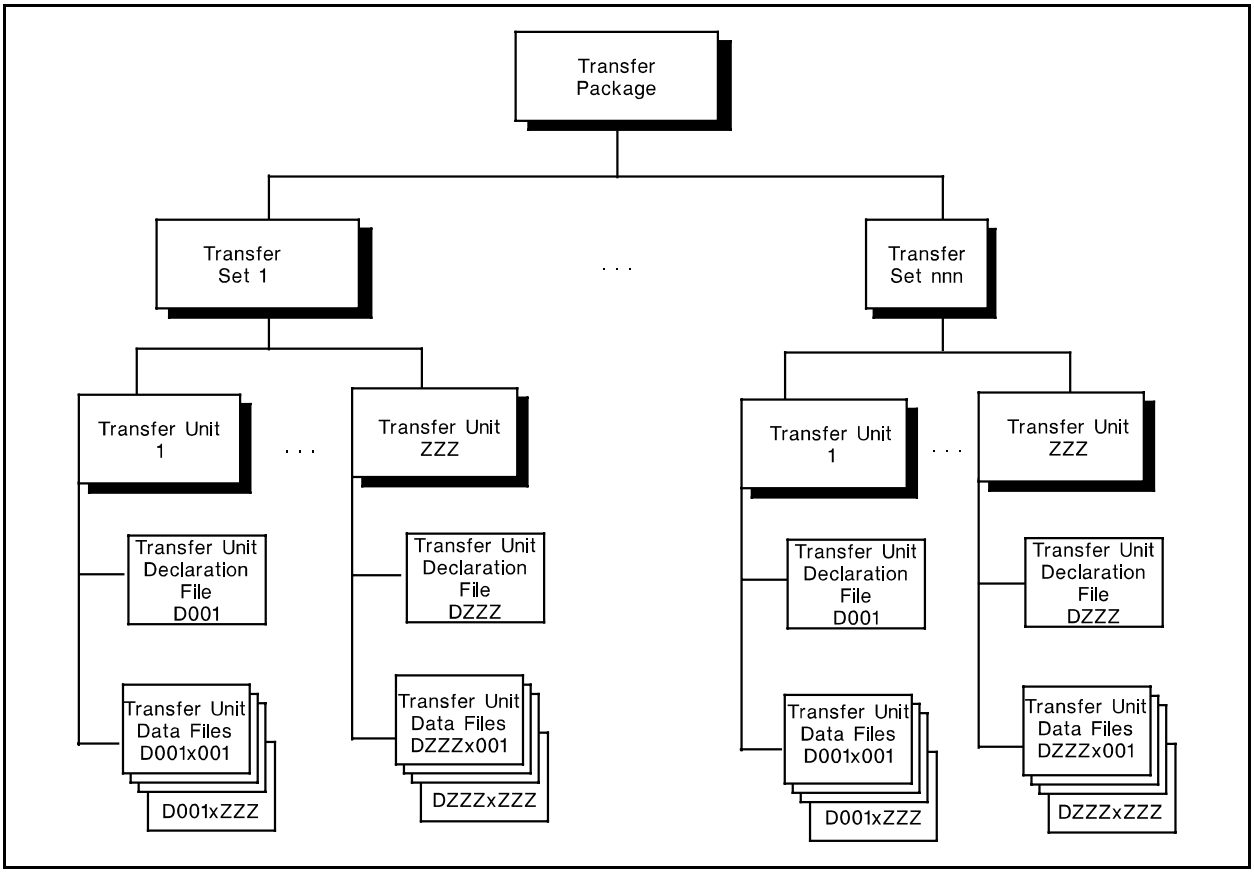

FIGURE 1. Transfer package contents.

5.3 Transfer unit format. This section specifies the naming convention, format, and content of transfer unit declaration files and transfer unit data files. A transfer unit shall consist of one transfer unit declaration file and at least one transfer unit data file. Specific types of transfer unit data files are described in section 4.

5.3.1 Transfer unit declaration file. The transfer unit declaration file provides all information necessary to uniquely identify the transfer unit and contains the count of each transfer unit data file type contained in the transfer unit (see 6.5). Transfer unit declaration files shall be as specified herein.

5.3.1.1 Transfer unit declaration file name. The file name used for each transfer unit declaration file shall be four characters long; the first character shall be "D"; the last three characters shall be the ASCII representation of an alphanumeric identifier for the transfer unit. This four character identifier provides a unique name for each transfer unit contained in a transfer set. The alphanumeric identifier for each transfer unit declaration shall begin at "001" and shall be incremented in ASCII collating sequence for each additional transfer unit contained in a transfer set. The following restrictions on the construction of valid alphanumeric identifiers shall apply:

a. After numbers "001" to "999" have been exhausted as identifiers, the ASCII upper case letters "A" to "Z" shall be used to lexicographically extend the set of identifiers.

b. The lexical progression shall occur from "001" to "ZZZ" as follows:

```
001...999,
A00...A09, A0A...A0Z, A10...A1Z, ..., AY0...AYZ, AZ0...AZZ
B00...B09, B0A...B0Z, B10...B1Z, ..., BY0...BYZ, BZ0...BZZ
.
.
.
Z00...Z09, Z0A...Z0Z, Z10...Z1Z, ..., ZY0...ZYZ, ZZ0...ZZZ
```

5.3.1.2 Transfer unit declaration file content. The transfer unit declaration file shall be written in fixed length records of 128 bytes each. Each record has a dedicated use, and each record is required. All of the record data shall be encoded in ASCII character format. Each record shall have a record identifier string from table I as the first characters in the record; the last two characters in the identifier string shall be the ASCII colon character followed by the ASCII space character (": "). The ASCII comma character followed by the ASCII space character (", "), shall be used for the data field delimiter. The first space after a comma is not significant as data. Subsequent spaces are part of the data. Transfer unit declaration file records shall always occur in the order in which they are presented in table I. When data to be placed in a record exists (known or unknown) but is not supplied, the ASCII character string "EMPTY" shall be used. When the data required by a record is not applicable to the

transfer unit, the ASCII character string "NA" shall be used. When data to be placed in a record does not exist, the ASCII character string "NONE" shall be used (see 5.3.1.3). The content of data appearing in transfer unit declaration file records shall be specified in the contract or other form of agreement prior to actual transmission of a transfer package. An example of a declaration file is shown on figure 2.

5.3.1.3 Prohibition on use of the NULL character. Use of the ASCII NULL character (position 0/0 on the ASCII table) is prohibited in transfer unit declaration files and all MIL-STD-1840 header records.

5.3.2 Transfer unit data file types. Transfer unit data files may be of the types shown in table III and shall be as specified herein. Required data files not enumerated herein shall be as specified in the contract or other form of agreement.

a. Document type declaration and SGML coded text source files. Consistent with MIL-PRF-28001.

b. FOSI files. Consistent with MIL-PRF-28001.

c. Illustration files. Raster, IGES, JPEG, or CGM format, containing the illustrations of the transfer set.

d. Product data files. Raster, IGES, STEP, VHDL, EDIF, IPC, or tool path (cutter location) format.

e. Page image files. Raster or CGM format.

f. Contract defined data and format.

g. Special word files. A special word file shall be as specified in the contract or other form of agreement.

h. Audio/video files (see 4.4.13).

i. MIME-encapsulated data files. Arbitrary type of data file(s) encapsulated in a registered MIME media type.

j. Digital signature files. Identification of the signature or encryption algorithms used, plus the digital signature hash(es)/digest(s) for parts of or for the complete transfer set (see 5.5.2.4).

TABLE I. Transfer unit declaration file records.

RECORD ID	RECORD NAME	DESCRIPTION
`version:`	Version	A character string containing the military standard, revision level, change level, and effective date of the revision of the standard under which the transfer unit is transmitted. For transfer units transmitted under this standard, the character string shall be: `version: MIL-STD-1840C, 0, 19970626`
`srcsys:`	Source system	A character string containing the name, address, and other information as specified in the contract or other form of agreement needed to identify the system from which the transfer unit originated.
`srcdocid:`	Source system document identifier	The character string used by the source system to uniquely identify a document (such as a technical publication number, engineering drawing number, or database file set identifier).
`srcrelid:`	Source system related document identifier	A character string used by the source system to identify another document to which this document is closely related (such as when this document is a supplement to another document).
`chglvl:`	Change/revision level and date of the document or product data	A character string indicating the revision, change level, and date of the change to the document or product data in the following format: `chglvl:` CHG TYPE, REV LEVEL, CHG LEVEL, DATE (See table II for an explanation of each entry for this record. The date-time format shall be "YYYYMMDD/HHHH:SS".)
`dteisu:`	Date of issue of the document	This shall be the date and time of issue of the original document or the latest revision to the document. The date-time format shall be "YYYYMMDD/HHHH:SS".
`dstsys:`	Destination system	A character string containing the name, address, and other information as specified in the contract or other form of agreement needed to identify the destination system to which the transfer unit is going.

TABLE I. Transfer unit declaration file records - Continued.

RECORD ID	RECORD NAME	DESCRIPTION
dstdocid:	Destination system document identifier	A character string used by the destination system to uniquely identify the transferred document. This shall be the service or agency document number if one exists (such as a technical publication number or title, engineering drawing number, or database file set name).
dstrelid:	Destination system related document identifier	A character string used by the destination system to identify another document to which this document is closely related (such as when this document is a supplement to another document).
dtetrn:	Date of transfer	The date the transfer unit was transferred by the source system to the transmission media. The date-time format shall be "YYYYMMDD/HHHH:SS".
dlvacc:	Delivery Accounting	Free form record giving delivery information as specified in the contract or other form of agreement, such as contract number or CDRL item.
filcnt:	File count	A character string count of the numbers of each type of data file in the transfer unit. Precede each file count with the "Data File Type" code letter from table III used to identify the type of file. The fields shall be separated by the ASCII comma character followed by the ASCII space character (", "). If there are no files of a particular type in a transfer unit, then the letter and file count are omitted. Example: filcnt: T8, Q4, C1, R1 This example record indicates that the transfer unit includes eight text files, four IGES files, one CGM file, and one raster data file. No other file types are included in this transfer unit.
ttlcls:	Title security label	A character string stating the security/sensitivity level or other restrictions on the title of the document. The "ttlcls: " record is mandatory for all transfers; use the string "NA" as the record value if security is not applicable in a given transfer unit.

TABLE I. Transfer unit declaration file records - Continued.

RECORD ID	RECORD NAME	DESCRIPTION
doccls:	Document security label	A character string stating the highest security/sensitivity level or other restrictions on any file in the transfer unit. The "doccls: " record is mandatory for all transfers; use the string "NA" as the record value if security is not applicable in a given transfer unit.
doctyp:	Document type	A character string used by the source system to uniquely identify a document or engineering drawing type (such as "SUPPLEMENT", "JOB GUIDE", "SCHEMATIC DIAGRAM", "WORK CARD", or "ASSEMBLY DRAWING").
docttl:	Document title	A character string identifying the document (such as a technical publication or engineering drawing title).
transacttyp:	Transfer unit type	A character string specifying the transfer unit type. Allowable transfer unit types shall be one of the following in accordance with 4.2: "PAGE IMAGE", "PDL", "SGML", "PRODUCT DATA", or "MISCELLANEOUS".
rootfilid:	Root File Identifier	Identifier of the primary document (or "root") data file for a complex document, such as an Interactive Electronic Technical Manual (IETM). This is the "first" data file in the group of data files comprising the transfer unit (for example, the first node or document of an IETM). There shall be only one root file per transfer unit. This character string shall contain the root data file name (required), root data file date-time stamp in "YYYYMMDD/HHHH:SS" format (optional), and root data file size in bytes (optional). The fields shall be separated by the ASCII comma character followed by the ASCII space character (", "). Example: rootfilid: D001T010, 19980415/0800:00, 8437
sighash:	Signature hash	A character string identifying a data file which has been digitally signed, the digital signature algorithm and version used, and containing the digital signature hash or digest itself. There shall be one "sighash: " record per signed file (see 5.5.2.4).

TABLE I. Transfer unit declaration file records - Continued.

RECORD ID	RECORD NAME	DESCRIPTION
siginfo:	Signatory information	A character string containing the signatory identification information required to authenticate a digitally-signed data file. There shall be one "siginfo: " record per signature (see 5.5.2.4).
sigdata:	Signature data	A character string containing the digital signature and hash algorithm, version, and sequence information needed to use the digital signature to authenticate a data file. There shall be one "sigdata: " record per signature (see 5.5.2.4).
encdata:	Encryption data	A character string identifying a data file which has been encrypted, the encryption algorithm and version used, and containing parameters needed to decrypt the data file. There shall be one "encdata: " record per encrypted file (see 5.5.3.2).
dstinfo:	Recipient information	A character string containing the algorithm and version, Interchange Key (IK), and recipient identification required to decrypt an encrypted data file. There shall be one "dstinfo: " record for each recipient of the encrypted data files (see 5.5.3.2).
cmpdata:	Compression data	A character string identifying a data file which has been compressed, the compression algorithm, and the version used. There shall be one "cmpdata: " record per compressed file (see 5.6.1).
NOTE: All date and date-time entries shall use the "YYYYMMDD/HHHH:SS" format, where "YYYY" is the four-digit year, "MM" is the month, "DD" is the day of the month, "HHHH" is the hour using a 24-hour clock, and "SS" is the seconds. All time references are based on Coordinated Universal Time (UTC).		

TABLE II. Change level ("chglvl: ") header record entries.

CHG TYPE	REV LEVEL	CHG LEVEL	MEANING
ORIGINAL	0	0	The document or product data is the original.
ORIGINAL W/CHG	0	Highest level change included	The document or product data is the original with changes incorporated.
REVISION	Current revision level	0	The document or product data is a complete revision to a document or product data.
REVISION W/CHG	Current revision level	Highest level change included	The document or product data is a complete revision of a document or product data with changes incorporated.
CHANGE	0	Highest level change included	The document or product data is change material to an original, revision, or supplement
OTHER	0	0	Used when none of the above change types applies

NOTES:

1. "REV LEVEL" shall have a value of "0" when the revision level is the original level or revision tracking does not apply to the data.

2. "CHG LEVEL" shall have a value of "0" when the change level is the original or change tracking does not apply to the data.

3. Note that change levels typically apply to technical manuals while revisions typically apply to engineering drawings. However, engineering drawings may have revisions with Engineering Change Orders (ECOs) associated with the drawing as a change level.

4. Notices to military standards and handbooks, and amendments to military specifications, shall be indicated using the "CHG LEVEL" field.

```
version: MIL-STD-1840C, 0, 19970626
srcsys: AJAX Inc., 100 Doe St, San Diego, CA  92110
srcdocid: Fire control system ver 14
srcrelid: F-16 avionics system ver 12
chglvl: REVISION W/CHG, G, 2, 19970804/1209:03
dteisu: 19970804/0000:00
dstsys: ABC System, Wright Patterson AFB, OH, 45433
dstdocid: 4SA6-11-4
dstrelid: 4SA6-11
dtetrn: 19970911/1400:31
dlvacc: CDRL item A006 of Contract N33400-93-C-1052, Due 19970915
filcnt: T8, Q4, C1, R1
ttlcls: UNCLASSIFIED
doccls: UNCLASSIFIED
doctyp: System schematic
docttl: F-16 fire control system
transacttyp: SGML
rootfilid: D001T007, 19970830/0800:00, 54317
sighash: D001, SHA, 1, 1, 0, 467CD86C8E8CC10E2A8BD5FB045C50B834DC556F
siginfo: D001, Jane Buck, Data Specialist, 19970902/2359:42, 1, NONE
sigdata: D001, DSS, 1, NONE, NONE, 1, 0, 6C8BD8E8CC50ECD4678201FBA4556FCDC50B8345
sighash: D001T003, MD5, 1, 0, 0, 21FE567DD01A34BEC89012FF765C9DA2
siginfo: D001T003, Jane Buck, Data Specialist, 19970902/2359:43, 1, NONE
sigdata: D001T003, MD5, 1, RSA, 1, 0, 0, DE01A9822FE5CE41376FBD0089A3625D
encdata: D001, DES-CBC, 1, 0, FE54DC3201AB89347655B7D01276A631
dstinfo: D001, 3DES, 1, Joe Datsa, 0, 021DCEF354DDED7674E4FBA1CCBCAC29
encdata: D001C001, DES-CBC, 1, 0, 01AB32CDFE5476CB89AA482FED8999CE
dstinfo: D001C001, 3DES, 1, Joe Datsa, 0, FDE0530DAD1935C98B1B045E334353D6
cmpdata: D001, ZIP, 2.04G
cmpdata: D001Q004, ZIP, 2.04G
```

NOTE: The records "`version: `" and "`transacttyp: `" are not present in MIL-STD-1840A transfer units, but are used in MIL-STD-1840B and subsequent versions of this standard.

FIGURE 2. Example of a declaration file.

5.3.2.1 Transfer unit data file name. The file name for transfer unit data files shall be eight characters long, with the first four characters being the same as the transfer unit declaration file name (see 5.3.1.1). The fifth character shall be a code from table III, identifying the type of data file. The last three characters shall be a character representation of an alphanumeric identifier from "`001`" to "`ZZZ`" and the identifier shall increment sequentially for each transfer unit data file within the same transfer unit data file type for a given transfer unit, such that each transfer unit data file has a unique name represented by the first four and last four characters of the eight character string. The alphanumeric identifier for each transfer unit declaration file shall begin at "`001`" and shall be incremented in ASCII collating sequence for each additional transfer unit contained in a transfer set. The following restrictions on the construction of valid alphanumeric identifiers shall apply:

a. After numbers "`001`" to "`999`" have been exhausted as identifiers, the ASCII upper case letters "`A`" to "`Z`" shall be used to lexicographically extend the set of identifiers.

b. The lexical progression shall occur from "001" to "ZZZ" as follows:

```
001...999,
A00...A09, A0A...A0Z, A10...A1Z, ..., AY0...AYZ, AZ0...AZZ
B00...B09, B0A...B0Z, B10...B1Z, ..., BY0...BYZ, BZ0...BZZ
.
.
.
Z00...Z09, Z0A...Z0Z, Z10...Z1Z, ..., ZY0...ZYZ, ZZ0...ZZZ
```

5.3.2.2 Transfer unit data file header records. Each data file shall have identifying header records encoded in 7-bit ASCII and as specified herein. The records shall contain only those characters permitted by ANSI X3.4-1986. Table IV is a complete list of all possible data file record identifiers. Each record identifier in table IV is followed by a description of the record and the specific restrictions on the content of the record. Table V specifies which records are mandatory for each data file type. Each data file shall contain the mandatory records shown in table V. Any optional records which may accompany the file are also identified in table V. Though not all header records are present in each data file type and not all values are required, data file header records shall always occur in the order in which they are listed in table IV. All data file header records shall be of fixed length. Record lengths for all data file types shall be in accordance with table III. Each record shall have its record identifier string from table IV as the first characters in the record; the last two characters in the record identifier string shall always be the ASCII colon character followed by the ASCII space character (": ", see 5.3.1.2). When alphanumeric data to be placed in a record does not exist, the ASCII character string "NONE" shall be used (see 5.3.1.3). When the data for this record is not provided, the ASCII character "0" shall be used. The header record shall be padded with the ASCII space character (" ", position 2/0 of the ASCII table).

5.4 Transfer media options. All media used for data file transfers shall implement the file types cited in table III. All media shall permit the transmission of a transfer package. Some types of media may permit the transmission of more than one transfer package on a single unit of that medium. The location, arrangement, or other structuring of transfer packages on such media shall be as specified in the contract or other form of agreement (see 6.3.2). The location, arrangement, or other structuring of transfer sets, transfer units, and files within a transfer package shall be as specified herein. See appendix A for options and recommendations on alternative media types for information transfer.

TABLE III. Data file name code letters and file header format.

CODE LETTER	DATA FILE TYPE	FIXED HEADER RECORD LENGTH	FIXED HEADER BLOCK LENGTH
A	Contract defined, or mutually agreed upon, data file	256	2048
B	MIME file	256	2048
C	CGM file	80	800
D	Digital signature file	256	2048
E	EDIF file	80	800
F	Generic text file	80	800
G	Document type declaration file with no contained text data	256	2048
H	Style and format information data file	256	2048
I	IPC file	80	800
J	JPEG file	128	2048
M	Audio/video file	128	2048
N	SGML text entity file	256	2048
O	NCM file	80	800
P	PDL file	128	2048
Q	IGES file	80	800
R	Raster file	128	2048
S	STEP file	80	800
T	SGML coded text file	256	2048
V	VHDL file	80	1920
X	Special word file	256	2048
Z	Grayscale / color illustration data file	128	2048

NOTES:

1. The first block of each transfer unit data file, containing the header records, shall be the fixed block length (in bytes) specified herein regardless of media type.

2. All data file header records shall be contained in the first logical block of the data file. Each header record shall be padded to the appropriate length in bytes with the ASCII space character (" ", position 2/0 of the ASCII table).

3. Data file header blocks shall be filled with the ASCII space character (" ", position 2/0 of the ASCII table) to the appropriate length in bytes. The block size therefore determines the beginning of the actual data content of the transferred file, regardless of any other impact it has on the data.

TABLE IV. Transfer unit data file header records.

RECORD ID	RECORD NAME	DESCRIPTION
specversion:	Specification version	For any transfer unit data file type other than "A", a character string identifying the document number, revision level, change level, and date of the specification governing the format and content of the data file. The date format shall be "YYYYMMDD". Example: specversion: MIL-PRF-28002, B, 1, 19930930 For a transfer unit data file type of "A", use the ISO formal PUBLIC identifier "text identifier". Note that this replaces the "specversion: " document number, revision level, change level, and date fields with the single field containing the formal PUBLIC identifier. Example: specversion: PUBLIC "-//USA-DOD//DTD NAVSEA ETM CLASS 2 REV C 960830//EN"
srcdocid:	Source system document identifier	This is a character string used by the source system to uniquely identify this document (such as the technical publication number) to which this file belongs, comprises, or applies. 1. This character string shall be the same as the source system document identifier ("srcdocid: ") of the transfer unit declaration file except for product data transfer units. 2. For product data transfer units, the first 69 bytes of the "srcdocid: " header record shall be in accordance with table VI. The remaining bytes shall be padded with the ASCII space character (" "), or used as specified in the contract or other form of agreement. This record facilitates the transfer of information included when the product data originates in aperture card form or is required for subsequent issue in that form. Either "srcdocid: " or "srcdocdx: " shall be used for a single product data transfer unit. If the "srcdocid: " is populated, then the receiving system shall ignore any entries in the "srcdocdx: " record.

TABLE IV. Transfer unit data file header records - Continued.

RECORD ID	RECORD NAME	DESCRIPTION
srcdocdx:	Source system document index	This is a character string which passes indexing and other associated data about the document (such as engineering drawing or Technical Variance Document (TVD)) from the source system to the receiving system (especially a JEDMICS repository). The "srcdocdx: " header record shall be used in accordance with table VII. Either "srcdocid: " or "srcdocdx: " shall be used for a single product data transfer unit. If the "srcdocid: " is populated, then the receiving system shall ignore any entries in the "srcdocdx: " record.
dstdocid:	Destination system document identifier	This character string shall be the same as the destination system document identifier ("dstdocid: ") of the transfer unit declaration file. The parenthetical words "(Multiple Documents)" shall be appended to the identifier if the entity is intended for use in more than one transfer unit.
datfilid:	Data file identifier	This record shall contain the contract specified description, identifying the content and processing of this file. For example, the contract might require this record to indicate the type of processing needed to use the data.
moduleid:	Module identifier	For SGML document file sets, this is the PUBLIC identifier by which this module is known in the SGML document. If there is a document type declaration file, the "moduleid: " for the document type declaration file and SGML coded text file shall be identical. For an SGML external entity that has no PUBLIC identifier, the "moduleid: " shall be the entity name from the entity declaration in the transfer element document type declaration.
dtype:	Data type	This record shall be used to indicate the specific subtype or class of the data file. Unless otherwise specified in the contract or other form of agreement, this record shall be encoded in accordance with appendix D.

TABLE IV. Transfer unit data file header records - Continued.

RECORD ID	RECORD NAME	DESCRIPTION
rorient:	Raster image orientation	Two, right-justified, three-character strings separated by the ASCII comma character followed by the ASCII space character (", "), specifying respectively the direction of the progression of successive pels along a line relative to the horizontal, and the direction of the progression of successive lines relative to the pel path. If the value is fewer than three characters, the string shall be padded with the ASCII space character (" "). If more than one value is applicable to the data file, the ASCII character string "MIXED" shall be used. Permissible and default pel path and line direction values are listed in MIL-PRF-28002. Example: rorient: 270, 90
rpelcnt:	Raster image pel count	Two, right-justified, six character strings separated by the ASCII comma character followed by the ASCII space character (", "), specifying respectively the integer count of pels contained per line in the pel path direction, and the integer count of lines contained in the line progression direction. If the value is fewer than six characters, the string shall be padded with the ASCII space character (" "). If more than one value is applicable to the data file, the ASCII character string "MIXED" shall be used. Example: rpelcnt: 4400, 6800
rdensity:	Raster image density	One, right-justified, four character string, representing the numerical value of the raster image density. If the value is fewer than four characters, the string shall be padded with the ASCII space character (" "). If more than one value is applicable to the data file, the ASCII character string "MIXED" shall be used. Permissible and default image density values are listed in MIL-PRF-28002. Example: rdensity: 200
didid:	Data Item Description identifier	This record shall contain the applicable Data Item Description (DID) identification number.

TABLE IV. Transfer unit data file header records - Continued.

RECORD ID	RECORD NAME	DESCRIPTION
doccls:	Document security label	Character string stating the security/sensitivity level or other restrictions on the data file. The "doccls: " record is mandatory for all transfers; use the string "NA" as the record value if security is not applicable in a given transfer unit.
fosipubid:	PUBLIC identifier of an associated FOSI	For the document type declaration or text source file containing the document type declaration of the document being transmitted, this string is the established PUBLIC identifier of the FOSI to be used in formatting the document. If the FOSI for the document does not have an SGML PUBLIC identifier established, this record may be omitted from the document type declaration or text source file. This header record shall not be used with any text source file that does not contain the document type declaration.
origfilid:	Original data file name	This character string shall contain the original data file name from the source system (required), original data file date-time stamp in "YYYYMMDD/HHHH:SS" format (optional), and original data file size in bytes (optional). The fields shall be separated by the ASCII comma character followed by the ASCII space character (", "). Example: `origfilid: Bracket_Design_Sheet01.01, 19970731/1659:59, 1167129`
notes:	Notes	Notes shall consist of free form text consistent with the number of characters permitted for header records in each file type.
NOTE: All date and date-time entries shall use the "YYYYMMDD/HHHH:SS" format, where "YYYY" is the four-digit year, "MM" is the month, "DD" is the day of the month, "HHHH" is the hour using a 24-hour clock, and "SS" is the seconds. All time references are based on Coordinated Universal Time (UTC).		

TABLE V. Record identifiers for transfer unit data files.

DATA FILE HEADER		DATA FILE CODE LETTER (SEE TABLE III)										
RECORD NAME	**DESCRIPTION**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**M**
specversion:	Specification version	M	M	M	M	M	M	M	M	M	M	M
srcdocid:	Source system document identifier	A*	A*	A*	A*	A*	A*	A*	A*	A*	A*	A*
srcdocdx:	Source system document index	A*	A*	A*	A*	A*	A*	A*	A*	A*	A*	A*
dstdocid:	Destination system document identifier	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
datfilid:	Data file identifier	M	M	NI	NI	NI	NI	NI	NI	NI	NI	NI
moduleid:	Module identifier	O	O	I	NI	O	O	M	M	O	I	I
dtype:	Data type	O	M	M	M	O	M	O	M	O	O	M
rorient:	Raster image orientation	NI	NI	NI	NI	NI	NI	NI	NI	NI	M	NI
rpelcnt:	Raster image pel count	NI	NI	NI	NI	NI	NI	NI	NI	NI	M	NI
rdensity:	Raster image density	NI	NI	NI	NI	NI	NI	NI	NI	NI	M	NI
didid:	Data Item Description identifier	O	O	O	O	O	O	O	O	O	O	O
doccls:	Document security label	M	M	M	M	M	M	NI	NI	M	M	M
fosipubid:	PUBLIC identifier of an associated FOSI	NI	NI	NI	NI	NI	NI	M+	NI	NI	N	NI
origfilid:	Original data file name	O	O	O	O	O	O	O	O	O	O	O
notes:	Notes	M	M	M	M	M	M	M	M	M	M	M

LEGEND:
A – Alternate, mandatory (either "srcdocid: " or "srcdocdx: " is required).
I – Mandatory (the header record is required) except in product data transactions.
M – Mandatory (the header record is required).
NI – Not Included (the header record shall not be included).
O – Optional (the header record shall be included as specified in the contract or other form of agreement).
* – Shall be identical to the corresponding transfer declaration file record (see table IV), except in product data transfers.
+ – Mandatory when a public identifier exists. If a document type declaration file does not exist, this record shall be included with the SGML coded text file header when a public identifier exists.

TABLE V. Record identifiers for transfer unit data files - Continued.

DATA FILE HEADER		DATA FILE CODE LETTER (SEE TABLE III)									
RECORD NAME	DESCRIPTION	N	O	P	Q	R	S	T	V	X	Z
specversion:	Specification version	M	M	M	M	M	M	M	M	M	M
srcdocid:	Source system document identifier	A*	A*	A*	A*	A*	A*	A*	A*	A*	A*
srcdocdx:	Source system document index	A*	A*	A*	A*	A*	A*	A*	A*	A*	A*
dstdocid:	Destination system document identifier	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
datfilid:	Data file identifier	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
moduleid:	Module identifier	M	I	O	I	I	I	M	O	O	O
dtype:	Data type	O	M	M	M	M	M	M	O	O	O
rorient:	Raster image orientation	NI	NI	NI	NI	M&	NI	NI	NI	NI	NI
rpelcnt:	Raster image pel count	NI	NI	NI	NI	M&	NI	NI	NI	NI	NI
rdensity:	Raster image density	NI	NI	NI	NI	M&	NI	NI	NI	NI	NI
didid:	Data Item Description identifier	O	O	O	O	O	O	O	M	O	O
doccls:	Document security label	M	M	M	M	M	M	M	M	M	M
fosipubid:	PUBLIC identifier of an associated FOSI	NI	NI	NI	NI	NI	NI	M+	NI	NI	NI
origfilid:	Original data file name	O	O	O	O	O	O	O	O	O	O
notes:	Notes	M	M	M	M	M	M	M	M	M	M

LEGEND:
A – Alternate, mandatory (either "srcdocid: " or "srcdocdx: " is required).
I – Mandatory (the header record is required) except in product data transactions.
M – Mandatory (the header record is required).
NI – Not Included (the header record shall not be included).
O – Optional (the header record shall be included as specified in the contract or other form of agreement).
* – Shall be identical to the corresponding transfer declaration file record (see table IV), except in product data transfers.
+ – Mandatory when a public identifier exists. If a document type declaration file does not exist, this record shall be included with the SGML coded text file header when a public identifier exists.
& – Mandatory for Type 1 raster. Not included for Type 2, Type 3, or Type 4 raster data files (see 6.6).

TABLE VI. Source system document identifier ("srcdocid: ") record content.

POSITION	DATA ELEMENT NAME	CONTENT
1-10	Record identifier	The character string "srcdocid: " includes the ASCII space character (" ") in the tenth position following the colon.
11-12 a	Type of document	Code identifying the type of document that this image represents or of which it is a part. Use the "Type of Document" code in accordance with table C-I unless otherwise specified in the contract or other form of agreement.
13-27 a/n	Document identifier or drawing number	Alphanumeric sequence assigned by the originating organization or as specified in the contract or other form of agreement. This shall be an identifier unique to the assigning organization (such as drawing number, parts list number, or document identifier of a Defense Standardization Program document).
28-32 a/n	CAGE code	Commercial and Government Entity (CAGE) code of the original design activity, facility, or company as indicated on and assigned to the drawing or document.
33-34 a/n rj	Revision letter	Sheet/image revision level. If there are multiple sheets/images to the document, then sheet/image one will identify the highest revision level of the set. If the revision level is numeric, convert it to an alpha code using table C-III.
35-36 a/n	Accompanying documentation kind	Code identifying the type of document accompanying the document identified in position 11-34. This data element is used to identify accompanying and related Engineering Change Notices (ECNs). Use the "Document" code in accordance with table C-II unless otherwise specified in the contract or other form of agreement.
37-43 a/n	Accompanying document identifier	Alphanumeric sequence assigned by the originating organization or as specified in the contract or other form of agreement. This shall be an identifier unique to the assigning organization (such as drawing number, parts list number, or document identifier of a Defense Standardization Program document).
44 a	Accompanying document revision	Revision level of the accompanying document. If the revision level is numeric, convert it to an alpha code using table C-III.
45-48 a/n	Weapon system code	Code assigned to the weapon system by contract.

TABLE VI. Source system document identifier ("srcdocid: ") record content - Continued.

POSITION	DATA ELEMENT NAME	CONTENT
49-52 n	Image number	Number assigned to the image in accordance with table C-IV.
53-56 n	Total number of images	The total number of file images per individual sheet-page of a document shall be used in accordance with table C-IV (for Army, this equals images for a specific number of drawing revision level).
57 a	Data rights	A code identifying the data rights associated with the document. Unless otherwise specified in the contract or other form of agreement, this code shall be "L" for limited, or "U" for unlimited rights to the data contained in the document.
58-59 a/n	Control activity	The code for the control activity in accordance with MIL-HDBK-331, or as specified in the contract or other form of agreement.
60 a	Card format code	Identify the aperture card format code, if applicable ("H", "T", or the ASCII space character, " "; see C.4.4).
61 a	Security classification	Identify the security classification assigned to the sheet/image. Use the appropriate code as specified in the contract or other form of agreement.
62-65 n	Sheet number	A document sheet/page identification shall be used in accordance with table C-V.
66-67 a/n rj	Drawing size	Identify the drawing size (acceptable size codes are "A" to "K" and "A4" to "A0").
68 a	Distribution	Identify the distribution code in accordance with MIL-STD-1806.
69 a	Data control code	Identify the export data control code in accordance with MIL-STD-1806.
70-73 n	Total sheets	The total number of sheets which exist for the document specified in positions 13-27 (see table C-V).
74-75 a/n	Aperture card/ hollerith card dialect code	The JEDMICS program dialect code defining the applicable data fields for the document. If this code is unknown or not applicable, this field shall be left empty by the use of two ASCII space characters (" ", see 6.3.4).

LEGEND:
a – Upper case ASCII letters only.
a/n – Alphanumeric; upper case ASCII letters and numbers only.
lj – Left justified, padded with the ASCII space character (" ").
n – Numeric; ASCII numbers"0" through "9" only, with leading ASCII zeros ("0") .
rj – Right justified, preceded by ASCII zeros ("0").

TABLE VII. Source system document index ("srcdocdx: ") record content.

POSITION	DATA ELEMENT NAME	CONTENT
1-10	Record identifier	The character string "srcdocdx: " includes the ASCII space character (" ") in the tenth position following the colon.
11-12 n	Dialect type	A two digit code indicating which system of dialects was used to encode the dialect identifier (see 6.3.4).
13-16 n	Dialect identifier	A four digit code indicating which combination of data fields are active and what meaning is intended for them (see 6.3.4).
17-21 a/n	CAGE code	Commercial and Government Entity (CAGE) code of the original design, activity, or company as indicated on and assigned to the drawing number.
22-53 ASCII lj	Document identifier or drawing number	A sequence of letters, numbers, and certain punctuation marks which have been assigned by the originating organization as a unique identifier.
54-56 a/n	Type of document	Code identifying the type of document that this image represents or of which it is a part. Use the "Type of Document" code in accordance with table C-I unless otherwise specified in the contract or other form of agreement.
57-62 a/n lj	Revision	Either the Drawing Revision, Sheet Revision, or Technical Variance Document (TVD) Revision depending on the dialect type. If the revision level is numeric, convert it to an alpha code using table C-III.
63-76 ASCII lj	Sheet number	The number or other identifying sequence of characters and punctuation which identify this sheet within the drawing.
77-82 a/n lj	Image number	Either the Image Number, Card Number, Frame Number or Numeric Sequential Designator, depending on the dialect type.
83-84	Accompanying document kind	Either the code for Accompanying Document Kind in accordance with table C-III, or the TVD type in accordance with MIL-M-38761/2. The meaning of this data element depends on the dialect type.
85-96 a/n	Accompanying document identifier	Either the accompanying document number or the TVD number, depending on the dialect type.
97 a/n	Accompanying document revision	Accompanying document revision level. If the revision level is numeric, convert it to an alpha code using table C-III.

TABLE VII. Source system document index ("srcdocdx: ") record content - Continued.

POSITION	DATA ELEMENT NAME	CONTENT
98 a	Data rights	A code identifying the data rights associated with the document. Unless otherwise specified in the contract or other form of agreement, this code shall be "L" for limited, or "U" for unlimited rights to the data contained in the document.
99-100 a	EDRS activity code	The Engineering Data Repository System (EDRS) activity code assigned to the DoD engineering data repository responsible for distributing copies of the document.
101 a	Security classification	Either the Drawing Security Classification, or Sheet Security Classification, depending on the dialect type.
102 a	Distribution statement code	A code indicating restriction on the distribution of the drawing. Distribution statement codes shall be in accordance with MIL-STD-1806.
103 a	Export control code	A code indicating whether or not the drawing is subject to export control laws. Use "Y" for "yes," or "N" for "no."
104-105 a/n rj	Drawing size	Either the Sheet Size, Card Size, or Image Size depending on the dialect type. Drawing size codes shall be in accordance with ANSI Y14.1.
106-117 a/n lj	Weapon system code	Either the Army Materiel Category (MATCAT), Air Force Materiel Management Aggregation Code (MMAC), Navy Special Material Identification Code (SMIC), Training Device Code, or Aircraft System Code applicable to the document, depending on the dialect type.
118-120 a/n	WBS code	Work Breakdown Structure (WBS) element: either the Ship Work Breakdown Structure (SWBS) element, Extended Ship Work Breakdown Structure (ESWBS) element, Configuration Identification Number (CIN), or Group Code applicable to the drawing, accompanying document, or TVD, depending on the dialect type.
121-124 a lj	Ship type	A code indicating the general type of ship (for example, "CV" for an aircraft carrier) to which the drawing, accompanying document, or TVD applies, depending on the dialect type.
125-128 a/n rj	Hull number	An identifier used with Ship Type to uniquely identify the ship to which the drawing, accompanying document, or TVD applies, depending on the dialect type.

LEGEND:
a – Upper case ASCII letters only.
a/n – Alphanumeric; upper case ASCII letters and numbers only.
ASCII – Upper case ASCII letters, numbers, and certain punctuation marks (such as "-", "/", ".", " " (space)).
lj – Left justified, padded with the ASCII space character (" ").
n – Numeric; ASCII numbers"0" through "9" only, with leading ASCII zeros ("0") .
rj – Right justified, preceded by ASCII zeros ("0").

5.5 Information Security (INFOSEC). Data file transfers of commercially sensitive or military classified data shall comply with all established organizational INFOSEC policies and regulations. Transfers requiring INFOSEC features shall be as specified herein, or as specified in the contract or other form of agreement.

5.5.1 Classified and sensitive data. The physical security and protection of the data and data header records contained in a transfer set shall be the responsibility of the security features or practices of the source and destination systems of the transfer. That is, only a "known secure" (certified and accredited) source system, transfer medium, and destination system together can ensure a secure transfer. This is an organizational security responsibility and shall be as specified in the contract or other form of agreement (see 6.3.6). The mandatory document security label header record defined in tables IV and V shall be used for all data files in a transfer, as specified in the contract or other form of agreement.

5.5.2 Digital signatures. Digital signatures can be used to certify the contents of all or part of a data file transfer. Use of digital signatures can detect if the data has changed during transfer. A single signature is used to protect the transfer unit declaration file and one or more of the transfer unit data files, or the entire transfer package. Digital signatures do not protect classified data from being disclosed or compromised (see 5.5.1 and 5.5.3).

5.5.2.1 Digital signature concepts. A digital signature is a stream of digits computed according to a set of rules such that the identity of the signatory and the integrity of the data can be verified. The digital signature and its application to data file transfers employs a secure hashing algorithm. A hashing algorithm generates a digest or number from the contents of a data file. The generated digest, or "hash," is called secure if it is computationally infeasible to find a message that corresponds to the given digest or to find two different data files that will produce the same digest. Any change to the data file during transfer will, with a very high probability, result in a different digest or hash, and the signature will not pass verification.

5.5.2.2 Digital signature applicability. Digital signatures are useful when the integrity of the data is important and when the detection of altered data is necessary. This capability can be used to detect unauthorized changes or the unintended corruption of data during a file transfer. Digital signatures may be used where protection of the data from disclosure is not a concern or disclosure is prevented by other means. Digital signatures are distinct from encryption in that they do not change the encoding of the data, but instead derive a digest or hash to be used for data authentication. Computing a digital signature generally requires fewer computations than encrypting the data file, and the digital signature is generally smaller than the data being signed. Although a digital signature can certify whether or not a change has occurred to the signed data, it cannot detect where the change was made.

5.5.2.3 Signature header records. Signature header records shall be encoded in accordance with table VIII and this paragraph. Signature of data files is optional (see 6.3.6). One or more individual data files, or an entire transfer unit, may be signed before transfer. For each data file to be signed, a secure hash shall be generated in accordance with 5.5.2.4. The resulting bit stream shall be converted to ASCII characters in accordance with 5.5.2.7. These ASCII characters shall be recorded in a "`sighash: `" header record in the transfer unit declaration file. The transfer unit declaration file shall contain one "`sighash: `" record for each signature of the transfer unit, plus one "`sighash: `" record for each transfer unit data file which is signed. In addition to the "`sighash: `" record, one accompanying "`siginfo: `" and "`sigdata: `" record is required for each signature. Signature records shall be stored in the transfer unit declaration file in the order specified in table I. In the case of multiple signatures, the signature records for the transfer unit signature(s) shall be stored first, in "seq-no" order, followed by the signature records for any transfer unit data files which have been signed individually, in transfer unit data file name lexical order and "seq-no" order (see 5.3.2.1, 5.5.2.9, and figure 2).

TABLE VIII. Digital signature header records.

RECORD	RECORD FIELD	DEFINITION
`sighash:` filename, hshalgid, hshversion, despad, bitpad, hash		
	filename	The name of the transfer unit declaration file (four characters; for example, "`D001`") or the transfer unit data file (eight characters; for example, "`D001S002`") being signed.
	hshalgid	Identification of the hash algorithm (see table IX).
	hshversion	The version, if any, of the hash algorithm. If there is no version, the value of "hshversion" shall be "`0`".
	despad	The number of ending binary zeros applied to the DES hash result to create a hash length which is an integral multiple of 8 bits, before its binary-to-ASCII conversion (for DES only; see 5.5.2.6 and 5.5.2.7). If there is no pad, the value of despad shall be "`0`".
	bitpad	The number of ending binary zeros applied to the signature hash to create a bit stream length which is an integral multiple of 4 bits, before its binary-to-ASCII conversion (see 5.5.2.7). If there is no pad, the value of "bitpad" shall be "`0`".
	hash	The ASCII encoded computed hash or digest of the data (see 5.5.2.7).

TABLE VIII. Digital signature header records - Continued.

RECORD	RECORD FIELD	DEFINITION
siginfo: filename, name, title, date-time, seq-no, id		
	filename	The name of the transfer unit declaration file (four characters; for example, "D001") or the transfer unit data file (eight characters; for example, "D001S002") being signed.
	name	The signatory's name.
	title	The signatory's title.
	date-time	The time-stamp for the signature, with the form "YYYYMMDD/HHHH:SS", where "YYYY" is the four-digit year, "MM" is the month, "DD" is the day of the month, "HHHH" is the hour using a 24-hour clock, and "SS" is the seconds. All time references are based on Coordinated Universal Time (UTC).
	seq-no	Identifies the sequence number order in which the signature corresponding to this record was applied. The first signatory has a sequence number of "1". Successive sequential signatories shall increment the "seq-no" value by 1. Signatories in parallel shall use the same sequence number. If "seq-no" is not used, its value shall be "1".
	id	A character string used to identify a particular (public) key belonging to the signatory. If "id" is not used, its value shall be "NONE" (see 5.5.2.10).

TABLE VIII. Digital signature header records - Continued.

RECORD	RECORD FIELD	DEFINITION
sigdata: filename, sigalgid, sigversion, hshalgid, hshversion, seq-no, bitpad, sig		
	filename	The name of the transfer unit declaration file (four characters; for example, "D001") or the transfer unit data file (eight characters; for example, "D001S001") being signed.
	sigalgid	Identifies the algorithm used to generate the digital signature (see table IX).
	sigversion	The version, if any, of the "sigalgid" algorithm. If there is no version, the value of "sigversion" shall be "0".
	hshalgid	Identifies the algorithm used to generate the hash (see table IX).
	hshversion	The version, if any, of the "hshalgid" algorithm. If there is no version, the value of "hshalgid" shall be "0".
	seq-no	Identifies the sequence number order in which the signature corresponding to this record was applied. The first signatory has a sequence number of "1". Successive sequential signatories shall increment the "seq-no" value by 1. Signatories in parallel shall use the same sequence number. If "seq-no" is not used, its value shall be "1".
	bitpad	The number of ending binary zeros applied to the signature hash to create a bit stream length which is and integral multiple of 4 before its binary-to-ASCII conversion. If there is no pad, the value of "bitpad" shall be "0" (see 5.5.2.7).
	sig	The signature encoded as ASCII characters (see 5.5.2.7).

5.5.2.4 Digital signature of data to be transferred. The secure hash and digital signature shall be computed on the data as it will be transmitted. That is, the block of header data which accompanies the data file during transfer is included when computing the file's hash. The computation of the hash shall occur after the data has been formatted for the transport medium by the source system. The signature verification shall be performed before any transformations of the data into the destination system format. Care shall be taken with text data to account for any transformations of line end conventions. Several signatures, in sequence or in parallel, may be applied (see 5.5.2.9). Any signatory signing the transfer unit or transfer unit data file in sequence after previous signatories provides an integrity check on the previous signatures (that is, signed "in turn"). A signatory signing in parallel with, or as a peer to, other signatories does not provide an integrity check for the peer signatures, but does for any previous signatures (such as signature "for coordination").

5.5.2.4.1 Digital signature of transfer units. A transfer unit signature shall be generated by hashing all transfer unit data files, including their header blocks, in lexical order by file name (see 5.3.2.1). A digital signature shall be computed for the entire transfer unit, and the signature results stored in digital signature header records in the transfer unit declaration file (see 5.5.2.3). The digital signature(s) on a transfer unit shall be checked upon receipt by hashing the transfer unit data files with their included headers in the same lexical order (by file name) as was used to generate the signature(s).

5.5.2.4.2 Digital signature of transfer unit data files. One or more individual transfer unit data files may have a digital signature, exclusive of any transfer unit signature. A transfer unit data file's signature shall be generated by hashing the individual transfer unit data file including its header block. A digital signature shall be computed for this hash, and the signature results stored in digital signature header records for each transfer unit data file in the transfer unit declaration file (see 5.5.2.3). The digital signature(s) on a transfer unit data file shall be checked upon receipt by hashing the transfer unit data file with its included header, as was used to generate the signature(s).

5.5.2.5 Selection of hashing and signature algorithms. The selection of digital hashing and signature algorithms shall be as specified in the contract or other form of agreement (see 6.3.6). The algorithms listed in table IX are not exhaustive. If an algorithm in table IX is used, the indicated field value shall be used for "sigalgid" or "hshalgid". When the "sigalgid" specifies both encryption method and hash algorithm, such as when using the DSS, the values of the "hshalgid" and "hshversion" fields shall be the ASCII string "NONE".

TABLE IX. Hashing and signature algorithm values.

FIELD	FIELD VALUE	DEFINITION
sigalgid	3DES	Triple Data Encryption Standard (DES) mode, also known as the DES Encrypt-Decrypt-Encrypt (EDE) multiple encryption mode (RFC 1851)
	DES-CBC	DES, Cipher Block Chaining (CBC) mode (FIPS PUB 113)
	DES-CFB	DES, Cipher Feedback (CFB) mode (FIPS PUB 81)
	DES-ECB	DES, Electronic Codebook (ECB) mode (FIPS PUB 81)
	DES-OFB	DES, Output Feedback (OFB) mode (FIPS PUB 81)
	DSS	Digital Signature Standard (DSS, FIPS PUB 186)
	RSA	Rivest-Shamir-Adleman (RSA) signature algorithm employing a complementary key pair (public and private, PKCS #1)
hshalgid	DES-CBC	DES, CBC mode (FIPS PUB 113)
	MD2	Message Digest 2 (RFC 1319)
	MD5	Message Digest 5 (RFC 1321)
	SHA	Secure Hash Algorithm (SHA, FIPS PUB 180-1)

5.5.2.6 Data Encryption Standard (DES) hash padding. When one of the DES algorithms are used to encrypt a hash result, the hash result is divided into 64-bit segments, each segment is encrypted, and the results are concatenated together in the same sequence as the original segments. If padding is required to create a hash with a length that is an integral multiple of 8 bits, the hash shall be padded with ending binary zeros, and the number of padding zeros shall be identified in the "despad" field of the "sighash: " record (see table VIII).

5.5.2.7 Binary-to-ASCII bit stream conversion. Encoding of binary signature hashes and encryption Interchange Keys (IKs) for inclusion in transfer unit declaration files and transfer unit data file header records shall be in accordance with this paragraph. The bit stream representing the data to be encoded is arranged with the most significant digit first. Starting with the most significant (first) four bits, each four-bit block shall be converted to an ASCII

character in accordance with table X, resulting in a string of ASCII characters representing the binary stream. If padding of the bit stream is required to create a hash with a length that is an integral multiple of 4, the hash shall be padded with ending binary zeros, and the number of padding zeros identified in the "bitpad" field of the "sighash: " or "dstinfo: " record (for DES padding, see 5.5.2.6). At the completion of the transfer, the signature hashes and encryption IKs shall be returned to their binary form by reversing this conversion. Any padding zeros shall be discarded after the hash or IK is converted back into a binary stream.

TABLE X. Binary-to-ASCII bit stream conversion values.

BIT STREAM	ASCII CHARACTER	BIT STREAM	ASCII CHARACTER
0000	0	1000	8
0001	1	1001	9
0010	2	1010	A
0011	3	1011	B
0100	4	1100	C
0101	5	1101	D
0110	6	1110	E
0111	7	1111	F

NOTE: ASCII characters used in this conversion shall be upper case.

5.5.2.8 Digital signature file type. Digital signatures as stand-alone data files may be associated with specific data files in a transfer unit. These signatures may be used to verify the integrity of the data contained in individual data files, either after transfer or for archival purposes. Digital signatures for individual data files are contained in a "D" file type (see tables III and V). The data in each "D" file consists solely of the "sighash: ", "siginfo: ", and "sigdata: " records (see table VIII). The "sighash: " record in a "D" file contains the filename field only; all other fields are omitted. The filename value is the transfer unit data file name of the file to which the signatures correspond. The "siginfo: " and "sigdata: " records remain as defined in table VIII.

5.5.2.9 Signature of previously signed transfer data. Multiple signatures on previously signed transfer data shall be performed in accordance with this paragraph. For a transfer unit, the new signature(s) shall be computed in accordance with 5.5.2.4, temporarily appending to the transfer unit any "sighash: ", "siginfo: ", and "sigdata: " records for that transfer unit

whose "seq-no" is less than the signatory's "seq-no". The resulting signature, converted to ASCII characters in accordance with 5.5.2.7, shall be placed in a new "siginfo: " record in the transfer unit declaration file. To ensure interoperability in calculating the signature hashes, the lexical order of data files by file name shall be maintained in accordance with 5.5.2.4.1. A transfer unit data file's digital signature is computed on the data contained in the transfer unit data file identified in the "sighash: " record, including its header block, plus any previous (lower "seq-no") signature(s) contained in the transfer unit declaration file or in an accompanying "D" digital signature file. For the purpose of computing the hash signature element, previous signature records or digital signature files are temporarily appended to the end of the transfer unit data file during the hash calculation.

5.5.2.10 Digital signature authentication infrastructure. The means for authenticating digital signatures and their sources is outside the scope of this standard. Digital signature keys, and their corresponding identifiers, are exchanged between parties participating in a transfer via means that are independent of the data exchange in which they are employed. The management of digital signature data such as effectivity and authority, shall be as specified in the contract or other form of agreement (see 6.3.6).

5.5.3 Data encryption. Data may be protected from disclosure during transfer through the use of encryption. Encryption of data files is optional (see 6.3.6). One or more individual data files, or the entire transfer package, may be encrypted before transfer. The encryption to safeguard a transfer unit or transfer unit data file shall be performed on the data as it will be transmitted. That is, the block of header data which accompanies the data file during transfer is included when encrypting each file. The encryption of the data shall occur after the data has been formatted for the transport medium by the source system. The decryption of the data shall be performed before any transformations of the data into the destination system format. Information about the encryption shall be placed in the "encdata: " and "dstinfo: " records of the transfer unit declaration file. The transfer unit declaration file shall not be encrypted. When both encryption and a secure hash (as part of a digital signature) are applied to the same data file, the encryption algorithm shall be applied first, and the secure hash computed on the encrypted data.

5.5.3.1 Encryption mechanism. Data encryption typically is performed using two keys. First a Data Encryption Key (DEK) is generated and used only for encrypting the data in the exchange. The DEK is then encrypted, using an IK, for transfer in the data exchange along with the encrypted data. The IK may be the recipient's public key from a paired (public and private) key set, or a shared secret key. This approach permits the data to be protected to be encrypted only once, even for multiple recipients.

5.5.3.2 Encryption header records. Encryption header records shall be encoded in accordance with table XI and this paragraph. An encrypted transfer unit shall contain all transfer unit data files, including their header blocks, in lexical order by file name (see 5.3.2.1). An "encdata: " record shall be added to the transfer unit declaration file. The "encdata: " record identifies the encrypted transfer unit and specifies the algorithm used to encrypt the transfer unit. For each recipient of the encrypted transfer unit, a "dstinfo: " record shall be added to the transfer unit declaration file. The "dstinfo: " record identifies the transfer unit recipient(s), identifies the algorithm used to encrypt the DEK, and provides each recipient with an encrypted copy of the DEK in the "encik" field. For each transfer unit data file in the transfer unit that is encrypted, exclusive of transfer unit encryption, an "encdata: " record shall be added to the transfer unit declaration file. For each recipient of the encrypted data files, a "dstinfo: " record shall be added to the transfer unit declaration file (see figure 2). The fields in the encryption information records shall be separated by the ASCII comma character followed by the ASCII space character (", ").

TABLE XI. Encryption header records.

RECORD	RECORD FIELD	DEFINITION
encdata: filename, dekalgid, dekversion, bitpad, dekiv		
	filename	The name of the transfer unit declaration file (four characters; for example, "D001") or the transfer unit data file (eight characters; for example, "D001S001") being encrypted.
	dekalgid	The DEK algorithm identifier for the algorithm used to encrypt the file with the IK (see table XII).
	dekversion	Algorithm version, if any, of the "dekalgid". If there is no version, the value of "dekversion" shall be "0".
	bitpad	The number of ending binary zeros applied to the IK to create a bit stream length which is an integral multiple of 4 before its binary-to-ASCII conversion. If there is no pad, the value of "bitpad" shall be "0" (see 5.5.2.7).
	dekiv	The Digital Encryption Key Initialization Vector parameters to be used when initializing the data encryption algorithm (optional). If present, and a binary value, the "dekiv" shall be enclosed as ASCII characters in accordance with 5.5.2.7. If there is no DEK initialization vector, the value of "dekiv" shall be "NONE".

TABLE XI. Encryption header records - Continued.

RECORD	RECORD FIELD	DEFINITION
dstinfo: filename, ikalgid, ikversion, keyid, bitpad, encik		
	filename	The name of the transfer unit declaration file (four character; for example, "D001") for transfer unit data file (eight characters; for example, "D001S002") being encrypted.
	ikalgid	The algorithm used to encode the IK (see table XII).
	ikversion	Algorithm version, if any, of the "ikalgid". If there is no version, the value of "ikversion" shall be "0".
	keyid	A string identifying the recipient with whose key the IK was encoded. If "keyid" is not used, its value shall be "NONE" (see 5.5.3.4).
	bitpad	The number of ending binary zeros applied to the IK to create a bit stream length which is an integral multiple of 4 before its binary-to-ASCII conversion. If there is no pad, the value of "bitpad" shall be "0" (see 5.5.2.7).
	encik	The Encryption Interchange Key (such as the recipient's public key or a shared secret key) which is the encrypted copy of the DEK needed to decrypt the data transfer. If present, and a binary value, "encik" shall be encoded as ASCII characters in accordance with 5.5.2.7.

5.5.3.3 Encryption key algorithms. The selection of encryption key algorithms shall be as specified in the contract or other form of agreement (see 6.3.6). The algorithms listed in table XII are not exhaustive. If an algorithm in table XII is used, the indicated field value shall be used for "dekalgid: " or "ikalgid: ".

TABLE XII. Encryption algorithm values.

FIELD	FIELD VALUE	DEFINITION
dekalgid	DES-CBC	Data Encryption Standard (DES), Cipher Block Chaining (CBC) mode (FIPS PUB 113)
	FORTEZZA	FORTEZZA encryption services (MD4002101-1.52)
	TYPE-I	Type I Card encryption (formerly known as FORTEZZA Plus, MD4000501-1.52)
ikalgid:	3DES	Triple DES mode, also known as the DES Encrypt-Decrypt-Encrypt (EDE) multiple encryption mode (RFC 1851)
	DES-CBC	DES, Cipher Block Chaining (CBC) mode (FIPS PUB 113)
	DES-CFB	DES, Cipher Feedback (CFB) mode (FIPS PUB 81)
	DES-ECB	DES, Electronic Codebook (ECB) mode (FIPS PUB 81)
	DES-OFB	DES, Output Feedback (OFB) mode (FIPS PUB 81)
	KEA	Key Exchange Algorithm (KEA, R21-TECH-23-94)
	RSA	Rivest-Shamir-Adleman (RSA) encryption algorithm employing a complementary key pair (public and private, PKCS #1)

5.5.3.4 Encryption key management. The means for conveying and authenticating interchange keys is outside of the scope of this standard. These encryption keys, and their corresponding identifiers, are exchanged between parties participating in a transfer via means that are independent of the data exchange in which they are employed. The management of encryption keys shall be as specified in the contract or other form of agreement (see 6.3.6).

5.6 Data compression. Data may be compressed before transfer to reduce the quantity of transfer media required or to speed up electronic transfer. Compression of data files is optional (see 6.3.7). One or more individual data files, or the entire transfer package, may be compressed before transfer. The compression shall be performed on the data as it will be transmitted. That is, the block of header data which accompanies the data file during transfer is included when compressing the data. The compression of the data shall occur after the data has been formatted for the transport medium by the source system. The decompression of the data shall be performed before any transformations of the data into the destination system format. Information about the compression shall be placed in a "cmpdata: " record

in the transfer unit declaration file. The transfer unit declaration file shall not be compressed. When both compression and encryption are applied to the same data, the compression shall be performed first, and the encryption applied to the compressed data.

5.6.1 Compression header records. Compression header records shall be encoded in accordance with table XIII and this paragraph. A compressed transfer unit shall contain all transfer unit data files, including their header blocks, in lexical order by file name (see 5.3.2.1). A "cmpdata: " record shall be added to the transfer unit declaration file. The "cmpdata: " record identifies the compressed transfer unit and specifies the algorithm used to compress the transfer unit. For each transfer unit data file in the transfer unit that is compressed, exclusive of transfer unit compression, a "cmpdata: " record shall be added to the transfer unit declaration file (see figure 2). The fields in the compression information records shall be separated by the ASCII comma character followed by the ASCII space character (", ").

TABLE XIII. Compression header records.

RECORD	RECORD FIELD	DEFINITION
cmpdata: filename, cmpalgid, cmpversion		
	filename	The name of the transfer unit declaration file (four characters; for example, "D001") or the transfer unit data file (eight characters; for example, "D001S001") being compressed.
	cmpalgid	The compression algorithm identifier for the algorithm used to compress the data (see table XIV).
	cmpversion	Algorithm version, if any, of the "cmpalgid". If there is no version, the value of "cmpversion" shall be "0".

5.6.2 Compression algorithms. The selection of compression algorithms shall be as specified in the contract or other form of agreement (see 6.3.7). The algorithms listed in table XIV are not exhaustive. If an algorithm in table XIV is used, the indicated field value shall be used for "cmpalgid".

TABLE XIV. Compression algorithm values.

FIELD	FIELD VALUE	DEFINITION
cmpalgid	COMPRESS	X/Open Compress (Open Group CAE Specification C436)
	GZIP	GNU data compression GZIP file format (RFC 1952)
	X3.225	ANSI X3.225 compaction algorithm (ANSI X3.225)
	ZIP	Zip file format (PKWARE APPNOTE.ZIP)

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. This standard directs the application of standards and specifications which are intended to provide the capability for reliable and economical transfer of various digital forms of technical information. The standards implemented herein have been chosen because they are widely supported and accepted by national or international standards bodies. Because of the rapidly evolving technologies involved, many of these standards are themselves evolving significantly, and will be further implemented in future revisions of this standard.

6.2 Issue of Department of Defense Index of Specifications and Standards (DoDISS). When this standard is used in acquisition, the applicable issue of the DoDISS must be cited in the solicitation (see 2.2 and 2.3).

6.3 Tailoring guidance. This standard has been designated as an "Interface Standard" by the DoD, and may be used in acquisition contracts without a waiver. To ensure proper application of this standard, invitations for bids, requests for proposals, and contractual statements of work should tailor the requirements in sections 4 and 5, and appendices A, B, C, and D of this standard to exclude any unnecessary requirements and to stipulate project-specific details. Note that the processing time before, during, and after transfer, and automation system overhead and complexity, may be significantly affected by the options selected for use or imposed by the contract. The frequent use of the term "as specified in the contract or other form of agreement" in sections 4 and 5, and the appendices, highlights the importance of detailed communications and agreement between sender and receiver to ensure complete and successful transfer of data. The following paragraphs indicate specific areas where tailoring should be considered in the application of this interface standard.

6.3.1 Data requirements. When this standard is invoked in the contract, it will only apply to contract data called out in the Contract Data Requirements List (CDRL). Each item in the CDRL will be annotated on the respective DD Form 1423 to indicate that MIL-STD-1840 specifies the format for delivery. The content of the information to be delivered is defined by the DIDs referenced in the CDRL. See MIL-HDBK-59, Continuous Acquisition and Life-Cycle Support (CALS) Implementation Guide, for guidance in developing CALS data requirements for a project.

6.3.2 Media requirements. The transfer media requirements for MIL-STD-1840 technical data exchange must be specified in the contract or other form of agreement. See appendix A for media options and recommendations.

6.3.3 Packaging requirements. The physical packaging requirements for MIL-STD-1840 transfer media must be specified in the contract or other form of agreement. See appendix B for packaging options and recommendations.

6.3.4 Product data transfer unit indexing. Engineering data destined for storage in JEDMICS should be associated with indexing information and other metadata. The "`srcdocid: `" and "`srcdocdx: `" header records are designed for the transmission of this type of information (see tables VI and VII). The indexing information requirements based on these records must be specified in the contract or other form of agreement. See appendix C for additional engineering data and metadata coding instructions. The JEDMICS Program Management Office (PMO) focal point for JEDMICS dialect type and dialect identifier information is:

Code PML590 JEDMICS PMO
Naval Supply Systems Command (NAVSUP)
P.O. Box 2050
Mechanicsburg, PA 17055-0791

6.3.5 Data format type and subtype selection. The use of data formats or data format types other than those described in table III must be specified in the contract or other form of agreement. Additionally, the "`dtype: `" record has been defined for use with table IV to indicate the specific subtype or class of a transfer unit data file. This record is designed as an extensible means of automatically transferring data file subtype information. Use of the "`dtype: `" record should be specified in the contract or other form of agreement. See appendix D for additional instructions on the use and format of the "`dtype: `" header record.

6.3.6 Information Security, digital signature, and encryption requirements. When required to meet project needs, the INFOSEC features to be applied during information interchange should be specified in the contract or other form of agreement. The algorithms and conventions for digital signature and encryption of transfer units or transfer unit data files should be specified in the contract or other form of agreement. The infrastructure for digital signature authentication and encryption key management, such as by the use of ITU-T Recommendation X.509, Information Technology – Open Systems Interconnection – The Directory: Authentication Framework, is the responsibility of the project and should be specified in the contract or other form of agreement. See 5.5 for INFOSEC capabilities and requirements.

6.3.6.1 Notes on digital signature authentication. Given an acceptable digital signature management infrastructure, digital signatures both verify and authenticate a transfer. With the number of variables and the speed at which this technology is changing, the implementation of this infrastructure is left to each project at this time. Other than the signature records in the declaration file, a transfer unit contains no internal confirmation that the destination system should or should not expect a digital signature. Therefore, whether transfer units will be signed digitally should be specified in the contract or other form of agreement. Depending

on project requirements and local security policies, it may be inappropriate to accept transfer units without a digital signature, because the transfer contents cannot be independently authenticated otherwise. However, receiving encrypted transfer units without digital signatures may be acceptable to a project, because many of the algorithms used will provide an authentication of the source system, and because the transfer unit may contain signatures after it is decrypted.

6.3.6.2 Encryption and digital signature order. During the development of this standard, the decision was made to require the encryption of transfer units before applying the digital signature for transfer when performing both encryption and digital signature on the same transfer unit. This sequence of encryption and signature can logically be performed in either order, and there are security arguments supporting each method. The encrypt-then-sign sequence was selected for operational reasons, so that a transfer unit can be authenticated upon receipt without decrypting the data. This may reduce processing time at the destination system, as non-authenticated transfers will not be decrypted. This sequence also means that encrypted transfer units can be securely handled by non-trusted systems and non-cleared personnel until they are decrypted on the destination system.

6.3.7 Data compression. When required to meet individual project needs, the compression features to be applied during information interchange should be specified in the contract or other form of agreement. The algorithms and conventions for the compression of transfer units or transfer unit data files should be specified in the contract or other form of agreement. See 5.6 for compression capabilities and requirements. Compression is performed before encryption when both are applied to the same data, as encrypted data is randomized and is likely to grow in size if passed through a compression algorithm.

6.3.8 Date and time entries. When users find that some of the values in date-time entries are not relevant, the values used in the date-time entry should be agreed upon in the contract or other form of agreement. An engineering drawing or a technical manual may have no formal "time" stamp, or there might be no "day" in the date stamp of a document that is only dated by month and year. In these cases, a string containing the ASCII character zero ("0"), or the system clock date and time, might be substituted for the field when there is no other value. For example, the date of issue of an engineering drawing might be shown as:

```
dteisu: 19970804/0000:00
```

6.4 Destination/source system. Throughout this standard, the phrases "source system" and "destination system" are used in lieu of any specific designation of a military service or DoD agency. This convention does not preclude this standard from being used for information transfer between and among DoD agencies, non-DoD agencies, or private sector organizations.

6.5 File name and media limitations. For individual transfer units, when the maximum number of unique transfer unit data file names is exceeded, the transfer unit should be divided into two or more transfer units within a transfer set. For a transfer set, when the maximum number of unique transfer unit declaration file names is exceeded, the transfer set should be divided into two or more transfer sets within a transfer package. When the maximum number of unique transfer unit declaration file names is exceeded, the transfer package should be divided into two or more transfer packages. Sequential media are limited to a single transfer set within a transfer package (see A.4). Transfer packages for magnetic tape should be limited to three tape volumes where practical. The alphanumeric naming convention defined in 5.3 allows 34,695 unique data file names and 34,695 unique transfer unit names.

6.6 Raster data file header records. The "`rorient: `", "`rpelcnt: `", and "`rdensity: `" header records are now included only in Type 1 raster data files. These three records must not be included in Type 2, Type 3, or Type 4 raster data. They are duplicated within the Type 2 Office Document Architecture (ODA) encoding for raster data. Type 3 and Type 4 raster data files include their own equivalents to these records within their data formats.

6.7 CGM raster. The CGM Tile Array provides a raster graphics capability which is functionally equivalent to other raster encodings such as MIL-PRF-28002 and JPEG. The CGM Tile Array defines tiled raster graphics as images that can be bitonal or in color, and may be compressed according to one of a number of possible methods. The CGM standard defines seven compression types, including International Telecommunications Union Telecommunication Standardization Sector (ITU-T) Group 3 and Group 4, and adds JPEG and Lempel-Ziv-Welch (LZW) compression by the process of registration. Thus, a CGM file may contain an embedded JPEG raster graphic when desired, as an alternative to transferring the JPEG graphic as a "`J`" file type.

6.8 Information Security metrics and validation. FIPS PUB 190, Guideline for the Use of Advanced Authentication Technology Alternatives, and FIPS PUB 191, Guideline for the Analysis of Local Area Network Security, provide information useful in applying INFOSEC to data transfers. FIPS PUB 140-1, Security Requirements for Cryptographic Modules, is a framework standard which defines security levels for cryptographic services, including digital signature and encryption. The National Institute of Standards and Technology (NIST) Computer Systems Laboratory (CSL) administers the Cryptographic Module Validation (CMV) program to validate cryptographic modules for conformity with FIPS PUB 140-1, and maintains a Validated Products List of conforming products. Users may refer to FIPS PUB 140-1 and the CMV program for assistance in measuring and validating the INFOSEC levels of their automated data exchange systems.

6.9 Software processors for MIL-STD-1840 transfers. Header records may be added or changed in future versions of MIL-STD-1840. This will affect software written using hard-coded byte offset values or other hard-coded variables based on the current definitions. Developers of software interpreters or processor utilities for the preparation and interchange of data files are advised to not rely on counting the offsets to determine where the data content begins, as some header records may be of arbitrary length or non-existent in future revisions.

6.10 Operating system considerations. The line end conventions of text-based files may differ between operating systems. Although this is not explicitly a MIL-STD-1840 information interchange issue, users should be aware that some data files may need carriage returns or line feeds changed to work properly on their local system.

6.11 Year 2000 (Y2K) compliance. To ensure proper data interchange into the 21st century, all new software and data acquired by DoD should be Y2K compliant. That is, both software and data should be capable of explicitly expressing and representing date fields with full four-digit years. Years should be properly represented and computed beyond the year 1999. The year 2000 should be recognized properly by calendar functions as a leap year. Software and data intended for use in 2000 and beyond should represent a year as four (4) digits.

6.12 Subject term (key word) listing. The following subject terms (key words) are applicable:

CALS
CGM
Data Transfer
Digital Signature
EDI
Electronic Commerce
Electronic Data Interchange
Encryption
IGES
Information Security
INFOSEC
JEDMICS
Language, Page Description
Manuals, technical
MIME
Product Data Exchange
Publications, technical
Publishing, electronic
Raster

SGML
STEP
Transfer Package
Transfer Unit
Year 2000
Y2K

6.13 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

APPENDIX A

TRANSFER MEDIA OPTIONS

A.1 SCOPE

A.1.1 Scope. This appendix defines the physical and electronic media options available for data transfers using this standard. Selection of one or more media types should be as specified in the individual project requirements, and support a life cycle data management strategy (see 6.3.2). Media types are presented in this appendix in the order of increasing complexity, with no implied priority. This appendix is a mandatory part of the standard. The information contained herein is intended for compliance.

A.2 APPLICABLE DOCUMENTS

A.2.1 General. The documents listed in this section are specified in this appendix. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in this appendix, whether or not they are listed.

A.2.2 Government documents.

A.2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

FEDERAL INFORMATION PROCESSING STANDARDS (FIPS)

FIPS PUB 161-2 – Electronic Data Interchange (EDI).

(Copies of the Federal Information Processing Standards (FIPS) are available to Department of Defense activities from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. Others must request copies of FIPS from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161-2171. Electronic copies of the FIPS publications can be accessed via the Internet. Download from the World Wide Web, URL `http://www.itl.nist.gov/div897/pubs/` .)

APPENDIX A

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-974	–	Contractor Integrated Technical Information Service (CITIS)

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-59	–	Continuous Acquisition and Life-Cycle Support (CALS) Implementation Guide.
MIL-HDBK-9660	–	DoD-Produced CD-ROM Products.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

A.2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 9660	–	Volume and File Structure of CD-ROM for Information Interchange

(Application for copies should be addressed to the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094, for issue to DoD activities only. All other requestors should obtain documents from the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI X3.27-1987	–	File Structure and Labeling of Magnetic Tapes for Information Interchange.
ANSI X3.39-1986	–	Recorded Magnetic Tape for Information Interchange (1600 CPI, P.G.).

ANSI X3.54-1986	–	Recorded Magnetic Tape for Information Interchange (6250 CPI, Group coded Recording).
ANSI ASC X12.51-1995	–	Transaction Set 841, Specifications/Technical Information

(Application for copies should be addressed to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

INTERNET ENGINEERING TASK FORCE (IETF)

RFC 822	–	Standard for the Format of ARPA Internet Text Messages.
RFC 1421	–	Privacy Enhancement for Internet Electronic Mail: Part I: Message Encryption and Authentication Procedures.

(Application for copies should be addressed to the Internet Engineering Task Force (IETF). Copies of these documents can be accessed via the Internet. Download from the World Wide Web, URL `http://www.ietf.org/` , or the IETF library at `http://ds.internic.net/ds/dspg0intdoc.html` .)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available via libraries or other informational services.)

A.2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

A.3 DEFINITIONS

A.3.1 Abbreviations and acronyms used in this appendix. The abbreviations and acronyms used in this appendix are defined as follows:

a.	ARPA	–	Advanced Research Projects Agency
b.	`BOT`	–	Beginning of Tape
c.	BPI	–	Bits Per Inch

d.	CD-ROM	–	Compact Disc Read-Only Memory
e.	CITIS	–	Contractor Integrated Technical Information Service
f.	CPI	–	Characters Per Inch
g.	`cpio`	–	Copy file archives in and out
h.	DAT	–	Digital Audio Tape
i.	`EOF`	–	End of File
j.	`EOT`	–	End of Tape
k.	`EOV`	–	End of Volume
l.	FTP	–	File Transfer Protocol
m.	GB	–	Gigabyte(s)
n.	`HDR`	–	Tape File Header Label
o.	IANA	–	Internet Assigned Numbers Authority
p.	MB	–	Megabyte(s)
q.	mm	–	Millimeter
r.	QIC	–	Quarter-Inch Cartridge
s.	SNA	–	Systems Network Architecture
t.	`tar`	–	Tape archive
u.	`TM`	–	Tape Mark
v.	`VOL`	–	Tape Volume

A.4 SELECTION OF TRANSFER MEDIA – GENERAL

A.4.1 Selection of media for data transfers. A variety of computer media are available and in widespread use for the transfer of technical information. Because of the wide range of media capabilities and delivery modes, the most appropriate media for transfers will vary by delivery situation. Therefore, the medium, or combination of media, to be used shall be as specified in the contract or other form of agreement (see 6.3.2). The media types described in this appendix may be used, in accordance with the requirements of 5.4.

A.4.2 Transfer unit declaration file. No matter which transfer medium or combination of media is selected, the transfer unit declaration file shall be prepared, named, and used in accordance with 5.3.1.

A.4.3 Transfer unit data files. Transfer unit data files shall be in accordance with 5.3.2. The file naming conventions defined in 5.3.2.1 shall be used. The record length required for the various transfer unit data files shall be the same as in table III. Header records shall occur at the beginning of each data file in accordance with 5.3.2.2.

A.4.4 Limitations – general. MIL-STD-1840 is designed as an interface standard for the exchange of technical data, rather than for long-term archival storage. Because of the header records included with each data file in a transfer set, the use of files directly from the transfer media is not possible without post-processing for the removal of MIL-STD-1840 headers, and the possible renaming of files to meet destination system requirements. Specific limitations for each media type are discussed in A.5, A.6, and A.7.

A.4.5 Recommended practices – general. In selecting an optimized mix of transfer media types, consider both project life cycle requirements and the automation platforms which will be used. Sequential magnetic tape and random access magnetic or optical media are effective for the transfer of large quantities of electronic data. Electronic telecommunications transfer using Electronic Data Interchange or electronic mail can move limited quantities of technical information very rapidly, but may be time consuming and expensive for large transfers. Media types based on open standards are recommended over those which rely on proprietary standards, especially for long-term projects, as proprietary standards are vulnerable to unforeseeable changes in the commercial marketplace. MIL-HDBK-59 provides additional guidelines for data transfer and alternatives. Specific recommendations for each media type are discussed in A.5, A.6, and A.7.

A.5 SEQUENTIAL MEDIA TYPES

A.5.1 Sequential magnetic media. The traditional medium for large technical data transfers has been sequential magnetic tape. The physical media may take the form of 9-track reel tape or one of several types of tape cartridges. Transfer packages for sequential media shall be limited to a single transfer set.

A.5.2 9-track magnetic tape. 9-track magnetic tape is available and reliable, benefitting from decades of widespread use. The standards for 9-track tape are mature, open, and well documented. Several tape tools are available in the public domain to assist in MIL-STD-1840 transfers.

A.5.2.1 Format. The file structure and labeling of 9-track magnetic tapes for delivery of the files to a destination system shall be written in accordance with ANSI X3.27-1987. The tape volume labels and file labels shall comply with Level 1, 2, 3, or 4 of ANSI X3.27-1987. All records shall be fixed length implementing ANSI type-F fixed length record files. Acceptable recording densities for 9-track magnetic tape are 1600 CPI and 6250 CPI only, on 9-track magnetic tapes, in accordance with ANSI X3.39-1986 and ANSI X3.54-1986, respectively. The 17 character ANSI file label field shall contain the file name of the associated transfer unit declaration file (see 5.3.1.1) or transfer unit data file (see 5.3.2.1).

A.5.2.1.1 Transfer unit declaration file for 9-track tape media. The transfer unit declaration file content for sequential media shall be in accordance with 5.3.1. The maximum block length of a transfer unit declaration file for sequential media shall be 2048 bytes.

A.5.2.1.2 Transfer unit data files for 9-track tape media. The record type, record length and block length required for the various data files shall be the same as in table III. The appropriate header records as defined in 5.3.2.2 shall be written in the first physical block of the file. The remainder of the header block shall be padded to the appropriate block size with the ASCII space character (" ", position 2/0 of the ASCII table). The second and subsequent blocks of the file shall contain the data encoded in the appropriate data form for the type of data file being transferred.

A.5.2.1.3 Order of files for 9-track tape media. Files within a transfer set written to 9-track tape sequential media shall be ordered as follows:

a. For transfer sets which contain one transfer unit, the transfer unit declaration file shall be the first file written to the media followed by all associated transfer unit data files. The transfer unit data files may be written in any order.

b. For transfer sets which contain more than one transfer unit, all transfer unit declaration files shall be written as a contiguous group and precede all transfer unit data files in order to facilitate locating a specific transfer unit. Transfer unit data files may be written in any order, but transfer unit data files of each transfer unit shall form a contiguous group. These groups of transfer unit data files shall be written in the same order as the respective transfer unit declaration files.

A.5.2.1.4 Volume identifier. The tape volume identifier shall consist of a six character name; the first four characters are arbitrarily assigned to identify the set and the last two are the tape number. The tape number for the first tape shall be "01"; subsequent tape numbers shall increase sequentially beginning with "02". The character set shall be limited to the ASCII number characters from zero ("0") to nine ("9") and the upper case ASCII letter

characters. The first character of the volume name shall be an upper case letter. The owner and accessibility fields of the volume label shall be ignored when the tapes are read into the destination system.

A.5.2.1.5 Volume tape set example. Figure A.1 shows a representative tape volume and file configuration written in ANSI Level 3 format.

a. Following the physical Beginning Of Tape (BOT) mark on the tape, there shall be the volume header label (VOL1).

b. The first file shall immediately follow the volume header label (VOL1). Each file shall be encoded on the tape as follows with only one exception (see A.5.2.1.5.d):

(1) File Header Labels (HDR1, HDR2, ... HDR9)
(2) Tape Mark (TM)
(3) File Section (data encoded into appropriate blocks)
(4) Tape Mark (TM)
(5) End Of File Header Labels (EOF1, EOF2, ... EOF9)
(6) Tape Mark (TM)

c. The last file in a tape volume set shall be followed by a second consecutive tape mark.

(1) File Header Labels (HDR1, HDR2, ... HDR9)
(2) Tape Mark (TM)
(3) File Section (data encoded into appropriate blocks)
(4) Tape Mark (TM)
(5) End Of File Header Labels (EOF1, EOF2, ... EOF9)
(6) Tape Mark (TM)
(7) Tape Mark (TM)

d. The exception to A.5.2.1.5.b occurs when the End Of Tape (EOT) is encountered while one of the items listed in A.5.2.1.5.b is being written. In this case, the following items shall be written immediately after the current operation (if the current operation is writing a data block) or after the next data block is written.

(1) Tape Mark (TM)
(2) End Of Volume Header Labels (EOV1, EOV2, ... EOV9)
(3) Tape Mark (TM)
(4) Tape Mark (TM)

(New Volume; reel of tape)

(5) Volume Header Label (VOL1)
(6) File Header Labels (HDR1, HDR2, ... HDR9)

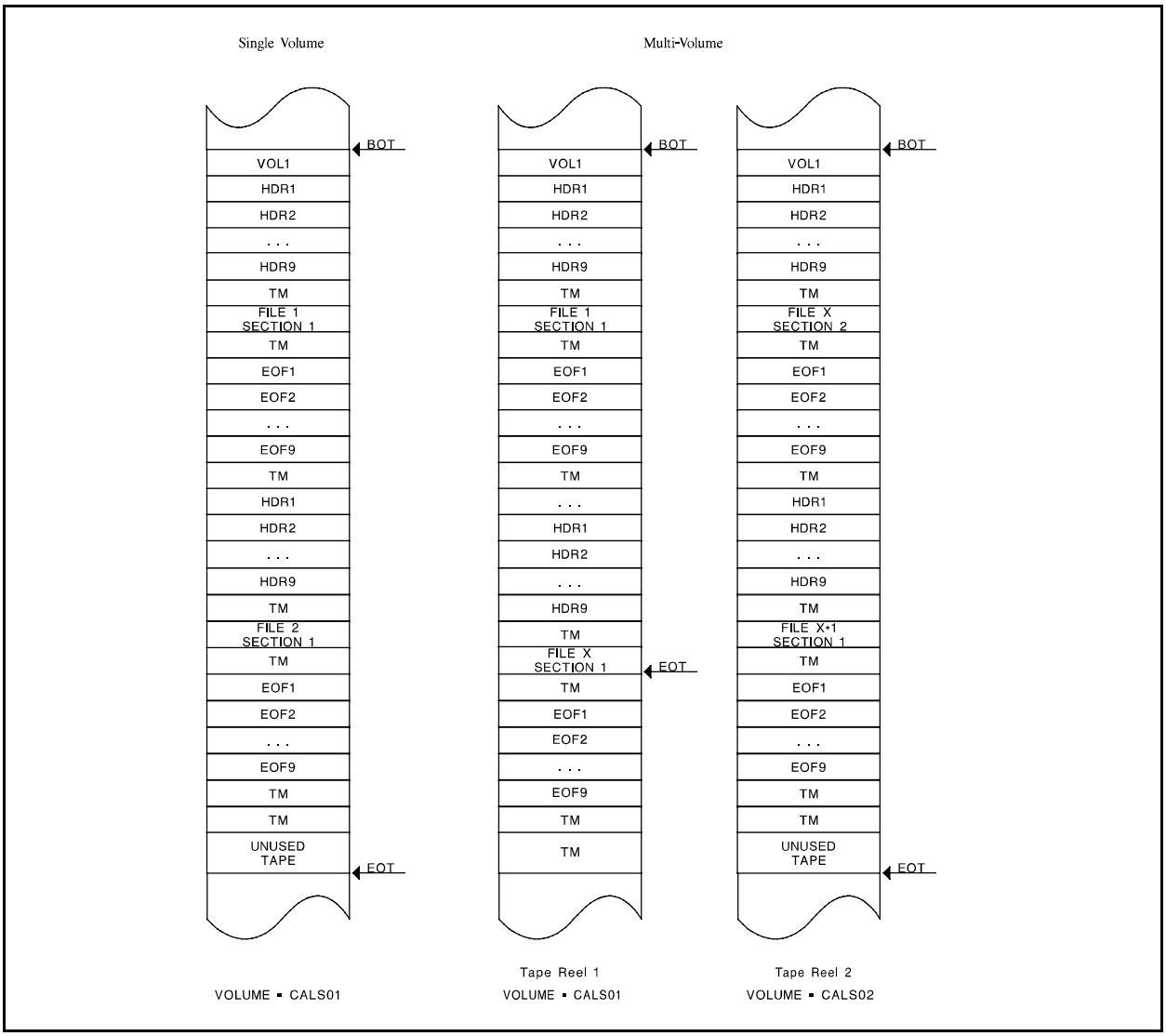

FIGURE A.1. Volume tape set example.

e. If the last data block written in A.5.2.1.5.d is the end of the data file, and the last data file in the transfer set, the following items shall be written instead:

(1) Tape Mark (TM)
(2) End Of File Header Labels (EOF1, EOF2, ... EOF9)
(3) Tape Mark (TM)
(4) Tape Mark (TM)

(Labels HDR3-9, EOF3-9 and, EOV3-9 may be written by the sending system. The destination system shall be able to ignore these labels if the destination system cannot process them.)

A.5.2.2 Limitations. Compared to more modern media types, 9-track tape reels have a limited storage capacity. A 9-track tape reel written at 6250 BPI will hold approximately 175 MB of data. Large transfer packages may require several tape reels where a single tape cartridge or optical disk would have sufficed (see 6.5). Transfer packages for magnetic tape should be limited to three tape volumes where practical. Reels of 9-track tape may be more expensive than other media. Reel tapes require protective packaging during transit (see appendix B).

A.5.2.3 Recommended practices. 9-track magnetic tape media remains an alternative for the transfer of technical information. Public domain and low-cost software and support tools, plus the longevity of the tape standards, provide an installed base to keep the time investment low for this medium. 9-track magnetic tape remains the lowest common denominator for the transfer of technical data.

A.5.3 Cartridge magnetic tape. While 9-track tape is a versatile medium, large transfer sets may require multiple tape reels. Cartridge tape systems provide a higher density data structure than reel tape, and therefore more data per media unit. These media are also widely available, with several mature standards. Cartridge tape systems have the additional benefit of higher levels of physical protection than reel tapes.

A.5.3.1 Format. The transfer unit declaration file content for sequential media shall be in accordance with 5.3.1. The maximum block length of a transfer unit declaration file for sequential media shall be 2048 bytes. The "tape archive (tar)" and "copy file archives in and out (cpio)" formats are available on a variety of computer systems. Tapes created using these formats are transferable between systems. Benchmark tests show that the "tar" format with cartridge tapes provides very fast overall reading/writing capabilities (for example, 11259 sample data files of 540 bytes each were transferred to a cartridge magnetic tape in less than 5 minutes). The "cpio" format may be more flexible in the presence of errors. Because of the differing storage capabilities and formats for tape cartridges, the cartridge type and size to be employed shall be as specified in the contract or other form of agreement.

A.5.3.1.1 Quarter-Inch Cartridge (QIC). QIC tape subsystems are available for most desktop and workstation computer systems. Transfer densities ranging from 60 MB to over 500 MB per tape unit are available.

A.5.3.1.2 Digital Audio Tape (DAT) cartridge. DAT tape subsystems are available for most desktop and workstation computer systems. The DAT format permits very high data density per unit of media. Formats for both 4 millimeter (mm) and 8 mm tapes permit transfer sets of up to 8 gigabytes (GB). For comparison, one 4 GB DAT can hold roughly as much information as 24 reels of 9-track tape.

A.5.3.2 Limitations. Although the standards governing both QIC and DAT are mature and stable, variations between differing implementations require the selected transfer media to be as specified in the contract or other form of agreement.

A.5.3.3 Recommended practices. When creating "`tar`" or "`cpio`" tapes for transfer, system limitations require that a subdirectory be transferred. Transferring from within a directory results in a limitation of approximately 1000 data files. To ensure the data can be read by the destination system, the permissions shall be set to "read all" prior to writing the tape. Failure to accomplish this step will require the destination system at the receiving site to change permissions at the highest operating system levels.

A.6 RANDOM ACCESS MEDIA TYPES

A.6.1 Random access media. Random access media permit data files to be accessed without having to read the complete media unit in a serial manner from its "front." Random access transfer media may be in the form of floppy disks, removable hard disk drives or drive cartridges, rewritable optical media, or Compact Disc Read-Only Memory (CD-ROM).

A.6.2 Floppy disks. Floppy disks are acceptable for smaller data transfers. Floppy disks are inexpensive, compact, and nearly universal among desktop and workstation computers. Additionally, floppy disks are a reasonably rugged transfer medium, usually requiring only a disk mailer for physical protection.

A.6.2.1 Format. Floppy disks that are written with an MS-DOS format are readable among many different systems, including both desktop and workstation computers. Floppy disks are available in both 3.5-inch and 5.25-inch sizes. Up to 1.44 MB of data can be transferred on a single normally formatted 3.5-inch high density disk, and 1.2 MB on a single 5.25-inch high density disk. Formats and formatting densities for floppy disks shall be as specified in the contract or other form of agreement.

A.6.2.2 Limitations. MS-DOS format floppy disks are limited to 224 files in the root directory. By creating a subdirectory structure, the number of files on a disk is limited only by the available media. For practical throughput, floppy disks should be limited to approximately 500 data files each. Because of the media structure, adding over 500 files will cause the data writing processes to slow down. Individual files may require as much as two minutes to write to a floppy disk, for very large files. 5.25-inch floppy drives and media are becoming less common, and many newer desktop and workstation computers will accept only 3.5-inch floppy disks.

A.6.2.3 Recommended practices. In general, floppy disk data transfers are best used for a small number of files, such as sample data sets. To ensure reliable interoperability, the use of disk format compression techniques is not recommended. Data compression of the transfer unit or transfer unit data files before transfer is acceptable (see 5.6).

A.6.3 Removable disk drives and disk cartridges. Several high capability removable drive systems are available. These include both removable hard disk drives and removable disk cartridges. Removable media are often used in a classified or sensitive data environment for its ease of securing the data when not in use (such as by storing a disk or cartridge in a safe). Removable hard disk drives and drive cartridges share the cartridge tape's advantage of high data density in a small, reusable package. These two classes of removable media are capable of holding from 44 MB to over 500 MB of data on a single hard disk drive or disk cartridge.

A.6.3.1 Format. Removable hard disk drives are functionally identical to fixed hard disk drives found on desktop and workstation computer systems. Removable hard disk drives typically employ industry-standard formatting, and occasionally vendor-specific proprietary formats. Removable disk cartridges are functionally similar to floppy disks, with performance and storage capabilities approaching those of hard disk drives. Currently available removable disk cartridges use vendor-specific proprietary formats. Formats used for both media classes shall be as specified in the contract or other form of agreement.

A.6.3.2 Limitations. As with fixed hard disk drives, a maximum of 512 files can be placed in the root directory. Creating a subdirectory structure and placing data files in the subdirectories will permit the entire media to be used. In a benchmark test, sample files of 540 bytes each were placed in a subdirectory on a commercial removable disk cartridge at a rate of five files per second. When the number of files approached 11,000 files, the transfer rate had decreased to one file every one minute and eight seconds. Removable hard disk drives should be protected from physical damage during shipment (see appendix B). Removable disk cartridges should be protected in the same manner as floppy disks.

A.6.3.3 Recommended practices. If more than one data set is delivered on a removable drive, each set shall be located in a separate directory. It is recommended that no more than one thousand (1,000) files be placed in any one subdirectory. For reliable interoperability, the use of disk format compression techniques is not recommended. Data compression of the transfer unit or transfer unit data files before transfer is acceptable (see 5.6).

A.6.4 Optical media. Optical media can transfer large quantities of data on an individual physical media unit. For example, a single CD-ROM can carry data transfer sets of up to 550 MB. Rewritable or write-once optical media is available in sizes from 25 MB to 20 GB.

A.6.4.1 Format. CD-ROMs shall be formatted in accordance with ISO 9660. Most rewritable or write-once optical media currently employs vendor-specific proprietary formats. Formats for these media types shall be as specified in the contract or other form of agreement.

A.6.4.2 Limitations. No limitations other than overall media size are noted for the number of data files in the root or subdirectory structures. While CD-ROMs have large storage capacities, their throughput performance is similar to that of floppy disk drives. For rewritable and write-once optical media, the variations between differing implementations require the selected transfer media to be specified by the contract or other form of agreement.

A.6.4.3 Recommended practices. The use of optical media for data transfer should follow the recommendations in MIL-HDBK-9660, or as specified in the contract or other form of agreement. Specifically, the labeling and destruction of CD-ROMS used to deliver data should be in accordance with MIL-HDBK-9660. Each transfer unit shall be placed on the optical media in a separate directory. Shipment of optical media is similar to that for floppy disks, with the advantage of being immune to magnetic fields.

A.7 ELECTRONIC MEDIA TYPES

A.7.1 Electronic transfers. Transfer of technical data using electronic media (telecommunications networks) is becoming practical on a large scale basis. Due to the rapidly-changing nature and evolving capabilities of the types of telecommunications networks which may be used, electronic transfers shall be defined and performed as specified in the contract or other form of agreement.

A.7.2 Electronic transfer considerations. The following limitations and recommended practices for the automated transfer of technical information apply to all types of electronic transfers such as CITIS, EDI, electronic mail, File Transfer Protocol (FTP), Telnet, and Systems Network Architecture (SNA).

A.7.2.1 Limitations. All current implementations of telecommunications networks are subject to variable, sometimes diminished, throughput for data being transferred. The actual transfer time for a given data file will depend not only on its total size, but also on the network's speed, bandwidth, loading, and utilization limitations. In general, these factors are beyond user control unless the network is dedicated to a single source and destination system for data transfer. Overall network service costs are directly dependent on total transfer time. Security of the data and the reliability of the transfer may also be concerns, depending on the network being used.

A.7.2.2 Recommended practices. Because of the likelihood of extended transfer times for large volumes of data, and the associated costs, other media types should be considered before an electronic transfer is used for multi-megabyte quantities of data. Large-volume file transfers may be accomplished more economically using magnetic media transfers via an overnight delivery service (see figure A.2). Compression of the transfer unit or transfer unit data files may be used to reduce transfer times (see 5.6). Users of telecommunications networks for electronic transfer should consider applying one or more of the INFOSEC methods supported by this standard (see 5.5).

One 9-track tape at 6250 BPI, containing 175 MB, shipped by express mail at 1700 hours in the evening and arriving at 0900 the next morning, yields an effective transfer rate of 10.9 MB per hour.
Data transfer over a T1 telecommunications line, rated at 1.54 megabits per second, yields a theoretical transfer rate of 693 MB per hour including transfer packet overhead, and assuming full utilization (no glitches and no other users). Resource sharing may severely impact any individual user's throughput. Additionally, telecommunications throughput is limited to the slowest component in the network. In practice, a telecommunications network may achieve an effective data transfer rate of from 60 to 100 MB per hour.
One 4 GB DAT cartridge, shipped by express mail at 1700 hours in the evening and arriving at 0900 the next morning, yields an effective transfer rate of 250 MB per hour.

FIGURE A.2. Comparison of transfer rates for media types.

A.7.3 Contractor Integrated Technical Information Service (CITIS). MIL-STD-974 defines a set of core and tailorable CITIS functions which constitute a contractor provided service for electronic access to and delivery of contractually required digital data. CITIS includes information services, data configuration management to maintain the validity and integrity of contained data, data item index, security and access control, and other core functions.

A.7.3.1 Format. CITIS shall transfer data between the contractor and the Government in accordance with this interface standard.

A.7.4 Electronic Data Interchange (EDI). EDI transactions may be used for automated technical data transfer.

A.7.4.1 Format. EDI transfers shall be in accordance with the ANSI ASC X12 841 "Specifications/Technical Information" transaction set and FIPS PUB 161-2. The implementation convention used for EDI transfers shall be as specified in the contract or other form of agreement.

A.7.5 Electronic mail. The MIME provide an open, well-documented, and tested network-based transport medium using electronic mail. "`Application/CALS-1840`" is a registered media type for the electronic exchange of transfer packages via the Internet using MIME.

A.7.5.1 Format. Transfer units using MIME shall be in accordance with RFC 1895 and as specified herein. The set of related files constituting a transfer unit corresponds to a single "`Multipart/Mixed`" MIME entity. Each transfer unit shall include a transfer unit declaration file (see 5.3.1), which shall be an "`Application/CALS-1840`" MIME entity and shall be the first body part in the "`Multipart/Mixed`" entity. Several transfer units may be included in a single MIME message.

A.7.5.1.1 Registration information. Table A-I presents the key Internet Assigned Numbers Authority (IANA) registration information for the MIME "`Application/CALS-1840`" media content-type/subtype.

TABLE A-I. Application/CALS-1840 registration information.

VARIABLE	VALUE
Media Type name:	`Application`
Media subtype name:	`CALS-1840`
Required parameters:	filename, version
Optional parameters:	None
Encoding considerations:	Base64 MIME encoding shall be used
Security considerations:	Depends on the referenced type (see A.7.5.1.4)

A.7.5.1.2 The filename parameter. The filename parameter gives the transfer unit name as defined by 5.3.1.1. This name shall be formatted in accordance with figure A.3. Each transfer unit shall be contained in a single "`Multipart/Mixed`" MIME entity which consists solely of "`Application/CALS-1840`" body parts. All Application/CALS-1840 body parts in a single "`Multipart/Mixed`" MIME entity shall have the same transfer unit sequence number ("`1840-tuseq`"). Within a single message all name values shall be unique.

For the transfer unit declaration file: `filename= "D" + "1840-tuseq"`
For any transfer unit data file: `filename= "D" + "1840-tuseq" + "1840-type" + "1840-dfseq"`
Where: 1840-tuseq = The transfer unit declaration file alphanumeric sequence identifier in accordance with 5.3.1.1 1840-type = The data file type code letter in accordance with table III 1840-dfseq = The data file alphanumeric sequence identifier in accordance with 5.3.2.1

FIGURE A.3. Application/CALS-1840 filename parameter.

A.7.5.1.3 The version parameter. The value of the "`Application/CALS-1840`" version parameter shall indicate the particular version of MIL-STD-1840 to which the data conforms. Valid version values appear on figure A.4.

`version`= "revision level", "change level", "date of standard"
Where the valid values are: `MIL-STD-1840C, 0, 19970626` or `MIL-STD-1840B, 0, 19921103` or `MIL-STD-1840A, 0, 19871222`
NOTE: The embedded blanks in the above strings are required, hence the value shall be enclosed in quotation marks (").

FIGURE A.4. Application/CALS-1840 version parameter.

A.7.5.1.4 Security considerations. No classified information, nor any other information that cannot be disclosed except to authorized personnel, shall be sent via the Internet without using appropriately approved cryptographic systems. Users intending to transfer classified or sensitive data must consult their cognizant security authority for prevailing policy restrictions.

A.7.5.1.5 System integrity considerations. None of the MIME body parts, as constituted for transfer, present executable data. When the file is post-processed after transfer, the resultant data may be executable. Processing will be under the control of the process associated with "`Application/CALS-1840`".

A.7.5.1.6 MIME data transfer example. The example on figure A.5 illustrates an Internet mail message containing a single transfer unit as the transfer set. The example product data transfer unit consists of three (3) body parts: the transfer unit data file, a STEP product model data file, and a digital signature file. The headers and data are in accordance with the "`Application/CALS-1840`" MIME type. The Base64 content-transfer-encoding preserves the transferred files' fixed record lengths.

```
To: you@some.org
From: me@here.com
Date: Tue, 11 Feb 1998 18:23:10 -0500
MIME-Version: 1.0
Content-Type: Multipart/Mixed; Boundary="Transfer_Example"

--Transfer_Example
Content-Type: Application/CALS-1840; filename=D001; version="MIL-STD-1840C, 0, 19970626"
Content-Transfer-Encoding: Base64

[Declaration File Contents]

--Transfer_Example
Content-Type: Application/CALS-1840; filename=D001S001; version="MIL-STD-1840C, 0, 19970626"
Content-Transfer-Encoding: Base64

[Data File -- STEP Content, Including Header Records]

--Transfer_Example
Content-Type: Application/CALS-1840; filename=D001D001; version="MIL-STD-1840C, 0, 19970626"
Content-Transfer-Encoding: Base64

[Data File -- Digital Signature Content, Including Header Records]

--Transfer_Example--
```

FIGURE A.5. MIME data transfer example.

APPENDIX B

PACKAGING AND MARKING

B.1 SCOPE

B.1.1 Scope. This appendix defines packaging and marking options for the shipment of physical computer media containing data transfer sets. This appendix is not a mandatory part of the standard. The information contained herein is intended for guidance only (see 6.3.3).

B.2 APPLICABLE DOCUMENTS

B.2.1 General. The documents listed in this section are specified in this appendix. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in this appendix, whether or not they are listed.

B.2.2 Government documents.

B.2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

FEDERAL SPECIFICATIONS

PPP-B-636	–	Boxes, Shipping, Fiberboard.
PPP-C-1842	–	Cushioning Material, Plastic, Open Cell (for Packaging Purpose).

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-1189	–	Standard Department of Defense Bar Code Symbology.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

APPENDIX B

B.2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI MH10.8M – American National Standard Material Handling Bar Code Symbols on Unit Loaded Transport Packages.

(Application for copies should be addressed to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available via libraries or other informational services.)

B.2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

B.3 DEFINITIONS

B.3.1 Abbreviations and acronyms used in this appendix. The acronyms and abbreviations used in this appendix are defined as follows:

a. CPI – Characters Per Inch

b POC – Point of Contact

B.4 SHIPMENT OF TRANSFER MEDIA

B.4.1 Packaging. The sender of digitally encoded transfer packages will be responsible for protection of the transfer medium or media sets.

B.4.2 Media labeling. All transfer media will have a media label affixed to it. Figure B.1 is an example of a media label. The media label will contain the following information as a minimum:

a. Name/organization – The company name or Government organization of the sender.

b. Date – The date the transfer package was transferred by the source system to the transmission media, the format will be "YYYYMMDD/HHHH:SS".

c. Version – A character string containing the military standard, revision level, change level, of the standard under which the transfer unit is transmitted. For transfer units transmitted under this standard, the character string will be:

```
version: MIL-STD-1840C, 0, 19970626
```

d. CAGE code – Commercial and Government Entity (CAGE) code of the sender.

e. Volume identifier (id) – See A.5.2.1.4.

f. Density/capacity – The density of the tape (such as 1600 CPI or 6250 CPI) or the capacity of the alternative media (such as 1.2 MB or 1.44 MB).

g. Media number – Provides the sequence number of the specific volume for multi-volume media sets (such as 1 of 2, 2 of 2).

h. Point of contact (POC) – The name, phone number, and organization of a person who is knowledgeable about the contents of the transfer unit and who may be contacted for detailed information.

```
Name/organization: ABC Corporation
Date: 19970902/1935:00
Version: MIL-STD-1840C, 0, 19970626
CAGE code: K1234
Volume id: CALS01
Density/capacity: 6250 CPI
Media number: 1 of 2
POC:  Mr. Joe Hill (510) 555-6300
      ABC Corporation
```

FIGURE B.1. Example of a media label.

B.4.2.1 Labeling of optical media. CD-ROMs should be labeled in accordance with MIL-HDBK-9660.

B.4.3 Encoded magnetic computer media. A packing slip showing the names and volume numbers of each reel, cartridge, or disk will be included in each package. A printed listing of the included transfer unit declaration files will be on the packing slip or attached to it.

B.4.3.1 Protection. Encoded magnetic tapes, cartridges, disks, and other electromagnetically inscribed information transfer media will be protected against dirt, moisture, and electrostatic discharge damage. For 9-track magnetic tape, place the protected tape(s) in a PPP-B-636 conforming box, allowing enough space for the addition of cushioning material. Fill the extra internal box spaces with PPP-C-1842 conforming cushioning material. For transfer media other than 9-track magnetic tape, the media will be protected against dirt, moisture, and electrostatic discharge damage and packaged for shipment using best commercial practices.

B.4.3.2 Marking. Encoded magnetic computer tape, cartridge, or disk shipping containers will be conspicuously labeled with a warning as shown on figure B.2.

FIGURE B.2. Example of a warning label.

B.4.4 Other physical computer media. Instructions for protection, packaging, and marking will be as specified in the contract or other form of agreement.

B.4.5 Bar-coded labels. The preparing, affixing, and reading of bar-coded transfer media labels will be in accordance with MIL-STD-1189 and ANSI MH10.8M, or as specified in the contract or other form of agreement.

APPENDIX C

PRODUCT DATA INDEX AND METADATA CODING

C.1 SCOPE

C.1.1 Scope. This appendix provides supporting instructions for the preparation of document identification and indexing metadata in product data transfers. This appendix is a mandatory part of the standard. The information contained herein is intended for compliance.

C.1.2 Purpose. The supplementary product data identification information included in this appendix specifically addresses legacy engineering data encoded on aperture cards, but may be used for the transmission of indexing information for any data type on any transfer medium.

C.2 APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

C.3 DEFINITIONS

C.3.1 Abbreviations and acronyms used in this appendix. The acronyms and abbreviations used in this appendix are defined as follows:

a. ECO – Engineering Change Order

C.4 PRODUCT DATA CODING

C.4.1 Product data coding explanations. This appendix provides supplementary data for use with table VI, "Source system document identifier (`srcdocid:`) record content", and table VII, "Source system document index (`srcdocdx:`) record content". This appendix should be tailored in accordance with 6.3.4.

C.4.2 Type of document. When applicable, the codes listed in table C-I shall be used in this field. Alternately, when specified in the contract or other form of agreement, the codes in table C-I will be used as prefixes to drawing numbers (see tables VI and VII). In these cases, leave the type of document field empty by using two ASCII space characters (" "). Additional codes may be used as specified in the contract or other form of agreement.

C.4.3 Accompanying document kind. When applicable, the codes listed in table C-II shall be used in this field. Additional codes may be used as specified in the contract or other form of agreement. These codes are only applicable when a base document is accompanied by Engineering Change Orders (ECOs) or similar changing, revising, or appending documents. When not applicable, leave empty by the use of two ASCII space characters (" ").

C.4.4 Card format code. This is an aperture card specific formatting code for legacy engineering data. The two applicable codes are "H" (upper legends) and "T" (lower legends) formatted cards. If this code is unknown or not applicable, leave the Card Format Code field empty by the use of the ASCII space character (" ").

C.4.5 Numeric-to-alpha conversion chart. If the revision level of a document, sheet, or image is numeric, the revision level shall be converted to an alpha value using the chart in table C-III (see table VI).

C.4.6 Determination of numeric entries for positions 49-56, 62-65, and 70-73 of "srcdocid: ". The values for the Image Number, Total Number of Images, Sheet Number, and Total Sheets fields are interrelated. Use table C-IV to determine the correct values for "srcdocid: " positions 49 through 56. Use table C-V to determine the correct values for "srcdocid: " positions 62 through 65 and 70 through 73. See figure C.1 for image content examples of the values in tables C-IV and C-V. See table VI for a description of each field in the "srcdocid: " record.

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TABLE C-I. Codes for type of document.

CODE	TYPE OF DOCUMENT	CODE	TYPE OF DOCUMENT
AL	Application/Auxiliary List	QL	Qualified Product List
AW	Art Work	RD	Redistribution List
CB	Circuit Board	RL	Running List
CC	Classification Characteristics	SD	Schematic Diagram
CP	Company Specification	SL	Specification List
CS	Company Standard	SS	System Schematic
D7	Undimensioned Drawing	TB	Test Bulletin
DL	Document/Drawing List	TD	Tool Drawing or List
EL	Equipment List	TL	Tabulating List
FL	Function List	TP	Test Procedures
GL	Gauge List	TR	Test Requirements
IL	Index List	TS	Test Specifications
KD	Kit Drawings	UL	Usage List
LD	Logic Diagram	WB	Wiring Board or Wire Print Board
MI	Master Index List	WD	Wiring Diagram
ML	Material List	WH	Wiring Harness
MP	Master Pattern	WL	Wiring List
NC	Numerical Control Data	WT	Wire Table
NO	Nuclear Ordnance Data	1L	Acquisition Data Only
PB	Program Bulletin	1N	Revision Notice
PD	Program Document	2L	Maintenance Data Only
PL	Parts List	3L	Acquisition and Maintenance Data
QA	Quality Assurance Data	4L	Acquisition Data Package List

NOTE: Only use code "1N" when the notice is filmed as an accompanying document (when code "NT" is in the accompanying document kind field) or the notice will drive a future revision to a basic document (see table C-II).

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TABLE C-II. Codes for accompanying document kind.

CODE	DOCUMENT
AD	Addendum
AM	Amendment
AN	Annex
AP	Appendix
AR	Article
AT	Attachment
NT	Notice (safety, engineering, Engineering Change Proposals (ECPs), or ECOs)
SP	Specification (slash sheet or other similar types of associated specifications)
SU	Supplement
NOTE: When the notice (Code "NT") is of a nature that will drive a future revision to a basic document, Code "1N" shall also appear in the type of document field (see table C-I).	

APPENDIX C

TABLE C-III. Numeric-to-alpha conversion chart.

N	A	N	A	N	A	N	A	N	A
1	A	45	BE	89	DJ	133	FN	177	HU
2	B	46	BF	90	DK	134	FP	178	HV
3	C	47	BG	91	DL	135	FR	179	HW
4	D	48	BH	92	DM	136	FT	180	HY
5	E	49	BJ	93	DN	137	FU	181	JA
6	F	50	BK	94	DP	138	FV	182	JB
7	G	51	BL	95	DR	139	FW	183	JC
8	H	52	BM	96	DT	140	FY	184	JD
9	J	53	BN	97	DU	141	GA	185	JE
10	K	54	BP	98	DV	142	GB	186	JF
11	L	55	BR	99	DW	143	GC	187	JG
12	M	56	BT	100	DY	144	GD	188	JH
13	N	57	BU	101	EA	145	GE	189	JJ
14	P	58	BV	102	EB	146	GF	190	JK
15	R	59	BW	103	EC	147	GG	191	JL
16	T	60	BY	104	ED	148	GH	192	JM
17	U	61	CA	105	EE	149	GJ	193	JN
18	V	62	CB	106	EF	150	GK	194	JP
19	W	63	CC	107	EG	151	GL	195	JR
20	Y	64	CD	108	EH	152	GM	196	JT
21	AA	65	CE	109	EJ	153	GN	197	JU
22	AB	66	CF	110	EK	154	GP	198	JV
23	AC	67	CG	111	EL	155	GR	199	JW
24	AD	68	CH	112	EM	156	GT	200	JY
25	AE	69	CJ	113	EN	157	GU	201	KA
26	AF	70	CK	114	EP	158	GV	202	KB
27	AG	71	CL	115	ER	159	GW	203	KC
28	AH	72	CM	116	ET	160	GY	204	KD
29	AJ	73	CN	117	EU	161	HA	205	KE
30	AK	74	CP	118	EV	162	HB	206	KF
31	AL	75	CR	119	EW	163	HC	207	KG
32	AM	76	CT	120	EY	164	HD	208	KH
33	AN	77	CU	121	FA	165	HE	209	KJ
34	AP	78	CV	122	FB	166	HF	210	KK
35	AR	79	CW	123	FC	167	HG	211	KL
36	AT	80	CY	124	FD	168	HH	212	KM
37	AU	81	DA	125	FE	169	HJ	213	KN
38	AV	82	DB	126	FF	170	HK	214	KP
39	AW	83	DC	127	FG	171	HL	215	KR
40	AY	84	DD	128	FH	172	HM	216	KT
41	BA	85	DE	129	FJ	173	HN	217	KU
42	BB	86	DF	130	FK	174	HP	218	KV
43	BC	87	DG	131	FL	175	HR	219	KW
44	BD	88	DH	132	FM	176	HT	220	KY

NOTES:
1. "N" = numeric value, "A" = corresponding alpha value.
2. Letters I, O, Q, S, X, and Z are not to be used.
3. See table VI for the use of this table.

TABLE C-IV. Determination of numeric entries for positions 49-56 of "srcdocid: ".

CONDITION	POSITION 49-52 (IMAGE NUMBER)	POSITION 53-56 (TOTAL NUMBER OF IMAGES)
1. When an engineering document contains only one sheet and requires only a single file (see figure C.1 condition 1 for an example).	Use 0001	Use 0001
2. When an engineering document contains two or more sheets that are sequentially numbered 1, 2, 3, 4 or A, B, C, D and so forth, and are contained in one file per sheet (see figure C.1 condition 2 for an example).	Use 0001 for Sheet 1 or A Use 0001 for Sheet 2 or B Use 0001 for Sheet 3 or C Use 0001 for Sheet 4 or D	Use 0001 for Sheet 1 or A Use 0001 for Sheet 2 or B Use 0001 for Sheet 3 or C Use 0001 for Sheet 4 or D
3. When an engineering document contains two or more pages that are not sequentially numbered and each page is contained in a single file, such as: Title Page, i, ii, 1.1, 1.A, 1.B; Page 2, 2.1, 2.2; Page 3; and so forth (see figure C.1 condition 3 for an example).	Use 0001 for Title Page Use 0002 for Page i Use 0003 for Page ii Use 0004 for Page 1.1 Use 0005 for Page 1.A Use 0006 for Page 1.B Use 0001 for Page 2 Use 0002 for Page 2.1 Use 0003 for Page 2.2 Use 0001 for Page 3	Use 0006 for Title Page Use 0006 for Page i Use 0006 for Page ii Use 0006 for Page 1.1 Use 0006 for Page 1.A Use 0006 for Page 1.B Use 0003 for Page 2 Use 0003 for Page 2.1 Use 0003 for Page 2.2 Use 0001 for Page 3
4. When engineering documents require both single and multiple files per sheet (see figure C.1 condition 4 for an example). (F1, F2, and F3 represent a single-sheet document that is divided between 3 files to include the whole page at a usable scale.)	Use 0001 for first file Use 0001 for F1 Use 0002 for F2 Use 0003 for F3	Use 0001 for first file Use 0003 for F1 Use 0003 for F2 Use 0003 for F3
NOTE: See table VI for the use of this table.		

TABLE C-V. Determination of numeric entries for positions 62-65 and 70-73 of "srcdocid: ".

CONDITION	POSITION 62-65 (SHEET NUMBER)	POSITION 70-73 (TOTAL SHEETS)
1. When an engineering document contains only one sheet and requires only a single file (see figure C.1 condition 1 for an example).	Use 0001	Use 0001
2. When an engineering document contains two or more sheets that are sequentially numbered 1, 2, 3, 4 or A, B, C, D and so forth, and are contained in one file per sheet (see figure C.1 condition 2 for an example).	Use 0001 for Sheet 1 or A Use 0002 for Sheet 2 or B Use 0003 for Sheet 3 or C Use 0004 for Sheet 4 or D	Use 0004
3. When an engineering document contains two or more pages that are not sequentially numbered and each page is contained in a single file, such as: Title Page, i, ii, 1.1, 1.A, 1.B; Page 2, 2.1, 2.2; Page 3; and so forth (see figure C.1 condition 3 for an example).	Use 0001 for Title Page Use 0001 for Page i Use 0001 for Page ii Use 0001 for Page 1.1 Use 0001 for Page 1.A Use 0001 for Page 1.B Use 0002 for Page 2 Use 0002 for Page 2.1 Use 0002 for Page 2.2 Use 0003 for Page 3	Use 0010
4. When engineering documents require both single and multiple files per sheet (see figure C.1 condition 4 for an example). (F1, F2, and F3 represent a single-sheet document that is divided between 3 files to include the whole page at a usable scale.)	Use 0001 for first sheet Use 0002 for F1 Use 0002 for F2 Use 0002 for F3	Use 0002
NOTE: See table VI for the use of this table.		

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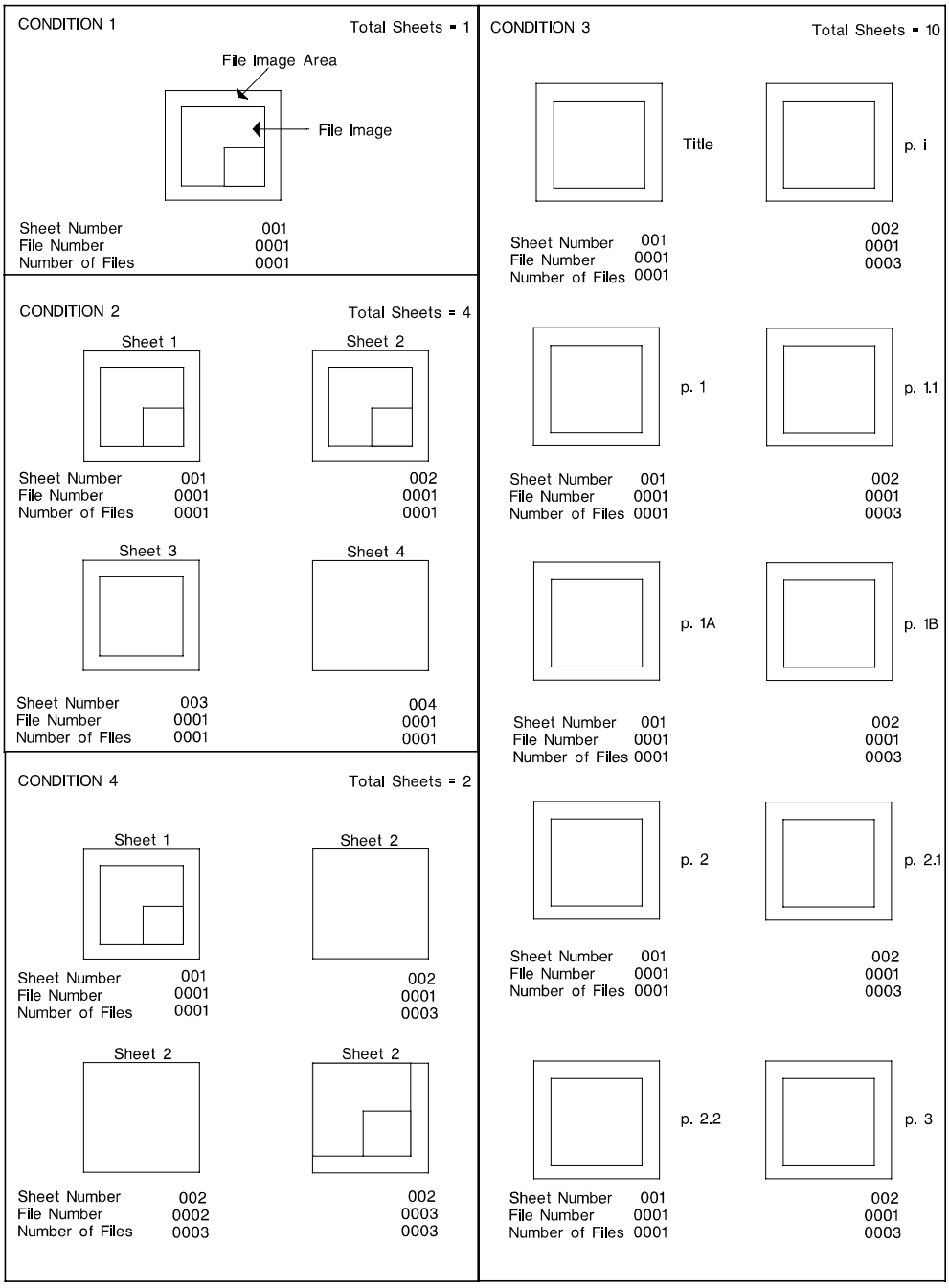

FIGURE C.1. Image content examples.

APPENDIX D

APPLICATION OF THE "dtype: " RECORD

D.1 SCOPE

D.1.1 Scope. This appendix provides instructions for the use and format of the "dtype: " header record as a mechanism for automatically identifying data format subtypes during data file transfers. Selection of data format subtypes should be dictated by the individual project requirements, and support a project life cycle data management strategy (see 6.3). This appendix is a mandatory part of the standard. The information contained herein is intended for compliance.

D.2 APPLICABLE DOCUMENTS

D.2.1 General. The documents listed in this section are specified in this appendix. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in this appendix, whether or not they are listed.

D.2.2 Government documents.

OTHER GOVERNMENT DOCUMENTS

Metafile for Interactive Documents	–	Application Guide and Draft Performance Specification for the Encoding of Interactive Documents

(Application for copies should be addressed to the Advanced Information System Branch, Code 183, NSWC, Carderock Division, 9500 MacArthur Blvd, West Bethesda, MD 20817. Copies of these documents can be accessed via the Internet. Download from the World Wide Web, URL http://navycals.dt.navy.mil/mid/ .)

D.2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 3592	–	NCM NC Processor O/P, Logical Structure.
ISO 4342	–	NCM Basic Part Program Reference Language.
ISO 4343	–	NCM NC Processor O/P, Minor Elements of 2000-type Commands, Post Processor Commands.
ISO/IEC 10179	–	Information technology – Processing Languages – Document Style Semantics and Specification Language (DSSSL)
ISO/IEC 10180	–	Information technology – Processing Languages – Standard Page Description Language
ISO/IEC 10744	–	Information technology – Hypermedia/Time-based Structuring Language (HyTime).

(Application for copies should be addressed to the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094, for issue to DoD activities only. All other requestors should obtain copies from the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI X3.37-1987 (R1993)	–	Programming Language APT.

(Application for copies should be addressed to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

ELECTRONIC INDUSTRIES ASSOCIATION (EIA)

EIA 274	–	Interchangeable Variable Block Data Contouring, Format for Positioning and Contouring/Positioning Numerically Controlled Machines
EIA 494	–	32 Bit Binary CL (BCL) and 7 Bit ASCII CL (ACL) Exchange Input Format for Numerically Controlled Machines.

(Application for copies should be addressed to the Electronic Industries Association, 2001 Pennsylvania Avenue NW, Washington, DC 20006.)

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INTERNET ENGINEERING TASK FORCE (IETF)

RFC 1866 – Hypertext Markup Language – 2.0

(Application for copies should be addressed to the Internet Engineering Task Force (IETF). Copies of these documents can be accessed via the Internet. Download from the World Wide Web, URL `http://www.ietf.org/` , or the IETF library at `http://ds.internic.net/ds/dspg0intdoc.html` .)

PUBLICLY AVAILABLE SPECIFICATIONS (PASs)

ISBN 0-201-62628-4 – Portable Document Format Reference Manual

(Application for copies should be addressed to the Adobe Systems Incorporated, 411 First Avenue South, Seattle, WA 98104-2871. Copies of this documents can be accessed via the Internet. Download from the World Wide Web, URL `http://www.adobe.com/` .)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available via libraries or other informational services.)

D.2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

D.3 DEFINITIONS

D.3.1 Abbreviations and acronyms used in this appendix. The abbreviations and acronyms used in this appendix are defined as follows:

a. ACL – ASCII Cutter Language

b. APT – Automatic Programming Tool

c. BCL – Binary Cutter Language

d. BOM – Bill of Materials

e. CL – Cutter Language

f.	de facto	–	Term used to mean that a standard is in common use, even if it is not a consensus or accredited standard (not an acronym).
g.	DSSSL	–	Document Style Semantics and Specification Language
h.	EBCDIC	–	Extended Binary Coded Decimal Interchange Code
i.	HTML	–	Hypertext Markup Language
j.	MACS	–	Mutually Acceptable Commercial Software
k.	NSWC	–	Naval Surface Warfare Center
l.	PDF	–	Portable Document Format

D.4 USE OF THE "`dtype: `" RECORD

D.4.1 "`dtype: `" definition. The "data type" header record shall be used to indicate the specific class or subtype of a transfer unit data file. The "`dtype: `" record is designed as a flexible and extensible means of transferring data file subtype information during a MIL-STD-1840 file transfer. The single-character data file name code letters appearing in table III are not detailed enough to completely identify unique data subtype information. Unless otherwise specified in the contract or other form of agreement, the "`dtype: `" record shall be formatted as specified herein.

D.4.2 Structure of the "`dtype: `" record. For each transfer unit data file type identified in table III, there are one or more allowable "`dtype: `" code values. The "`dtype: `" transfer unit data file header record shall be formatted in accordance with 5.3.2.2. The general form of the "`dtype: `" header record is:

`dtype:` DTYPE CODE

where "DTYPE CODE" is a string of one or more ASCII characters identifying the specific subtype or class of the transfer unit data file. For certain subtypes, "DTYPE CODE" will contain multiple fields (see D.5). When there is no data file subtype or when the "`dtype: `" is not provided, the ASCII character zero ("`0`") shall be used as the "DTYPE CODE" value.

D.4.3 Extension of the "`dtype: `" record. Additional "`dtype: `" values not listed in this appendix may be used within the context of individual contracts or other agreements to meet project-specific requirements. Project-defined "`dtype: `" records containing new subtypes shall be formatted as specified herein, or as specified in the contract or other form of agreement (see D.6.4).

D.4.3.1 "dtype: " naming conventions. Project-defined "dtype: " values shall be ASCII strings conforming to 5.3.2.2 and table III. The following naming conventions shall be used for assigning "dtype: " values: If available, use the same numeric value as the data class, type, profile, or subset as defined by its parent standard. If the data class, type, profile, or subset is not available, use the common acronym or abbreviation for the file subtype. Project-defined "dtype: " values should be unambiguous.

D.4.3.2 "dtype: " records and "specversion: ". When specification version information must be included to fully specify the transfer unit data file subtype, this information shall appear in the "specversion: " header record (see table IV). The "dtype: " record shall not contain version information. For example, the following two header records might be used to identify a project-defined file in Hypertext Markup Language (HTML) version 2.0:

```
specversion: RFC 1866, 0, 0, 19951100
.
.
.
dtype: HTML
.
.
.
```

D.5 "dtype: " FORMATS

D.5.1 "dtype: " header record formats. This appendix provides supplementary data for use with table III, "Data file name code letters and file header format", and table IV, "Transfer unit data file header records". The "dtype: " record formats herein specify the applicable data file subtypes, with explanatory notes for each data file code letter defined in table III.

D.5.2 Code letter "A", contract defined, or mutually agreed upon, file. All transfer unit data files of type "A" shall be as specified in the contract or other form of agreement (see D.6.3). The format of the individual "dtype: " codes for the "A" data file type shall be as presented in table D-I, or as specified in the contract or other form of agreement.

D.5.3 Code letter "B", MIME file. Although A.6.4 defines the normal use of MIME as an information transfer medium, there may be instances where it is desirable to transfer MIME-encoded data as a transfer unit data file. Transfer unit data files of type "B" may be used for this purpose. The "B" type file is a stand-alone ASCII data stream encoded as MIME data and stored in a file with no other contained data. Transfer unit data files of type "B" shall be subtype coded as the MIME type for which they were encoded in accordance with RFC 2046. For example, a data stream which was originally transferred by an electronic mail system as a "Multipart/Mixed" MIME attachment shall be "dtype: " coded as

"Multipart/Mixed". This will provide the maximum likelihood that "B" type files can be interpreted by standard MIME decoding software after transfer. The allowable "dtype: " codes for the "B" data file type shall be as presented in table D-II, or as specified in the contract or other form of agreement.

TABLE D-I. "dtype: " codes for data file type "A".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
A	Contract defined, or mutually agreed upon, file	PRJ, DT	NA	All "dtype: " codes for the "A" data file type shall be as specified in the contract or other form of agreement.
		PROJECT CODE		
		PRJ	NA	An ASCII string identifying the project, library, or registry which has defined and maintains the data file subtype code used in this header record, as specified in the contract or other form of agreement.
		DATA FILE SUBTYPE CODE		
		DT	NA	An ASCII string identifying the contract defined, or mutually agreed upon, data file subtype used in this header record. This code shall be as specified in the contract or other form of agreement.

NOTES:

1. Any ASCII string may be used for the "PRJ" and "DT" codes, within the fixed header record length limitations of table III.

2. This example shows the "dtype: " record for a transfer unit data file for the project named "PRODUCT_1", containing a file of project-defined subtype of "FORMAT_A":

```
dtype: PRODUCT_1, FORMAT_A
```

TABLE D-II. "dtype: " codes for data file type "B".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
B	MIME file	MIME TYPE	RFC 2046	Encoded/encapsulated Multipurpose Internet Mail Extensions (MIME) file
NOTE: This example shows the "dtype: " record for a transfer unit data file containing a still-encoded multipart MIME file with several encapsulated data files: `dtype: Multipart/Mixed`				

D.5.4 Code letter "C", CGM file. Transfer unit data files of type "C" shall be illustrations and graphic entities prepared in accordance with 4.4.7.3. MIL-PRF-28003 defines several Metafile Versions and color classifications with which a CGM data file may comply. These subtypes shall be identified by the "dtype: " record when transferring CGM files. The allowable "dtype: " codes for the "C" data file type shall be as presented in table D-III, or as specified in the contract or other form of agreement.

TABLE D-III. "dtype: " codes for data file type "C".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
C	CGM file	MV, CC	MIL-PRF-28003	Computer Graphics Metafile (CGM)
		METAFILE VERSION CODE		
		1	MIL-PRF-28003	Metafile Version 1
		2	MIL-PRF-28003	Metafile Version 2
		3	MIL-PRF-28003	Metafile Version 3
		4	MIL-PRF-28003	Metafile Version 4
		COLOR CLASSIFICATION CODE		
		A	MIL-PRF-28003	Monochrome
		B	MIL-PRF-28003	Grayscale
		C	MIL-PRF-28003	Color
NOTE: This example shows the "dtype: " record for a transfer unit data file containing a CGM illustration in Metafile Version 1 with a grayscale color classification: `dtype: 1, B`				

D.5.5 Code letter "D", digital signature file. Although 5.5.2 defines the normal use of digital signatures during an information transfer, there may be instances in the project life cycle where it is desirable to transfer digital signatures other than those used to verify a MIL-STD-1840 transfer package. For example, users may wish to exchange and store digital signatures for the engineering release of product data documents. Transfer unit data files of type "D" may be used for this purpose. The "D" type file is a stand-alone digital signature output containing the signature hash or digest in accordance with 5.5.2.10. The "dtype: " codes listed in table D-IV for the "D" data file type are not exhaustive. If an algorithm in table D-IV is used, the indicated "dtype: " code shall be used. Other "dtype: " codes for the "D" data file type shall be as specified in the contract or other form of agreement.

TABLE D-IV. "dtype: " codes for data file type "D".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
D	Digital signature file	3DES	RFC 1851	Triple Data Encryption Standard (DES) mode
		DES-CBC	FIPS PUB 113	DES, Cipher Block Chaining (CBC) mode
		DES-CFB	FIPS PUB 81	DES, Cipher Feedback (CFB) mode
		DES-ECB	FIPS PUB 81	DES, Electronic Codebook (ECB) mode
		DES-OFB	FIPS PUB 81	DES, Output Feedback (OFB) mode
		DSS	FIPS PUB 186	Digital Signature Standard (DSS)
		MD2	RFC 1319	Message Digest 2
		MD5	RFC 1321	Message Digest 5
		RSA	PKCS #1	Rivest-Shamir-Adleman (RSA)
		SHA	FIPS PUB 180-1	Secure Hash Algorithm (SHA)

NOTE: This example shows the "dtype: " record for a transfer unit data file containing a digital signature hash output (signature digest) using the Secure Hash Algorithm:

```
dtype: SHA
```

D.5.6 Code letter "E", EDIF file. Transfer unit data files of type "E" contain electrical and electronic design and manufacturing data and shall be in accordance with 4.4.11.4.1. The allowable "dtype: " code for the "E" data file type shall be as presented in table D-V, or as specified in the contract or other form of agreement.

TABLE D-V. "dtype: " codes for data file type "E".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
E	EDIF file	0	EIA 548	Electronic Design Interchange Format (EDIF)
NOTE: This example shows the "dtype: " record for a transfer unit data file containing a circuit board design model in the Electronic Design Interchange Format: dtype:0				

D.5.7 Code letter "F", generic text file. Transfer unit data files of type "F" shall be as specified in the contract or other form of agreement. The allowable "dtype: " codes for the "F" data file type shall be as presented in table D-VI, or as specified in the contract or other form of agreement.

D.5.8 Code letter "G", document type declaration file with no contained text data. Transfer unit data files of type "G" shall be in accordance with 4.4.4. A "G" type file shall consist of a document type declaration with no other contained data, to be included in an SGML document transfer unit (see 4.2.3). Document type declarations may be appended to the beginning of the document instance, in which case the data file shall be transferred as a "T" data type. The allowable "dtype: " code for the "G" data file type shall be as presented in table D-VII, or as specified in the contract or other form of agreement.

D.5.9 Code letter "H", style and format information data file. Transfer unit data files of type "H" are necessary for producing output from SGML tagged data and shall be in accordance with 4.4.8. The allowable "dtype: " codes for the "H" data file type shall be as presented in table D-VIII, or as specified in the contract or other form of agreement.

TABLE D-VI. "dtype: " codes for data file type "F".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
F	Generic text file	1	ANSI X3.4-1986	American Standard Code for Information Interchange (ASCII)
		2	NA	Extended Binary Coded Decimal Interchange Code (EBCDIC)

NOTES:

1. This subtype does not define or identify data file differences for the line end conventions of different operating systems. Transformation of line end conventions are the responsibility of the processing software on local systems, and may need to be accounted for by the source system or destination system to prevent unintentionally changing transferred data.

2. This example shows the "dtype: " record for a transfer unit data file containing computer program source code in plain ASCII:

```
dtype: 1
```

TABLE D-VII. "dtype: " codes for data file type "G".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
G	Document type declaration file with no contained text data	0	MIL-PRF-28001	SGML document type declaration

NOTE: This example shows the "dtype: " record for a transfer unit data file containing an SGML document type declaration file for inclusion with an SGML document transfer unit:

```
dtype: 0
```

D.5.10 Code letter "I", IPC file. Transfer unit data files of type "I" contain printed circuit board design and manufacturing data and shall be in accordance with 4.4.11.4.4. The allowable "dtype: " codes for the "I" data file type shall be as presented in table D-IX, or as specified in the contract or other form of agreement.

TABLE D-VIII. "dtype: " codes for data file type "H".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
H	Style and format information file	DSSSL	ISO 10179	Document Style Semantics and Specification Language (DSSSL)
		FOSI	MIL-PRF-28001	Formatting Output Specification Instance (FOSI)
		STYLE	NA	Style sheet

NOTES:

1. As defined in MIL-PRF-28001, style sheets are publishing system dependent.

2. This example shows the "dtype: " record for a transfer unit data file containing a FOSI:

```
dtype: FOSI
```

TABLE D-IX. "dtype: " codes for data file type "I".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
I	IPC file	350	IPC-D-350	Printed Board Description in Digital Form
		351	IPC-D-351	Printed Board Drawings in Digital Form
		352	IPC-D-352	Electronic Design Data Description for Printed Boards in Digital Form
		354	IPC-D-354	Library Format Description for Printed Board Digital Form
		356	IPC-D-356	Bare Board Electrical Test Information in Digital Format

NOTE: This example shows the "dtype: " record for a transfer unit data file containing printed circuit board production test information in IPC-D-356 format:

```
dtype: 356
```

D.5.11 Code letter "J", JPEG file. Transfer unit data files of type "J" shall be in accordance with 4.4.7.4. The allowable "dtype: " code for the "J" data file type shall be as presented in table D-X, or as specified in the contract or other form of agreement.

TABLE D-X. "dtype: " codes for data file type "J".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
J	JPEG file	0	ISO/IEC 10918-1	Joint Photographic Experts Group (JPEG) image
NOTE: This example shows the "dtype: " record for a transfer unit data file containing a scanned photograph encoded as a color JPEG image: `dtype: 0`				

D.5.12 Code letter "M", audio/video file. Multimedia data files of type "M" shall be in accordance with 4.4.13. The allowable "dtype: " codes for the "M" data file type shall be as presented in table D-XI, or as specified in the contract or other form of agreement.

TABLE D-XI. "dtype: " codes for data file type "M".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
M	Audio/video file	MPEG-1	ISO/IEC 11172-1	Motion Picture Experts Group (MPEG) audio/video
		MPEG-2	ISO/IEC 11172-2	Motion Picture Experts Group (MPEG) video
		MPEG-3	ISO/IEC 11172-3	Motion Picture Experts Group (MPEG) audio
NOTE: This example shows the "dtype: " record for a transfer unit data file containing an audio-only MPEG data stream: `dtype: MPEG-3`				

D.5.13 Code letter "N", SGML text entity file. Transfer unit data files containing SGML text entities of type "N" shall be in accordance with 4.4.6. The allowable "dtype: " code for the "N" data file type shall be as presented in table D-XII, or as specified in the contract or other form of agreement.

TABLE D-XII. "dtype: " codes for data file type "N".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
N	SGML text entity file	0	MIL-PRF-28001	Entity referenced in the SGML tagged instance but included as an external data file

NOTE: This example shows the "dtype: " record for a transfer unit data file containing a DTD as a stand-alone SGML text entity file:

```
dtype: 0
```

D.5.14 Code letter "O", NCM file. Transfer unit data files of type "O" contain raw parts geometry or compiled numerical control machine code manufacturing data and shall be in accordance with 4.4.11.3. The allowable "dtype: " codes for the "O" data file type shall be as presented in table D-XIII, or as specified in the contract or other form of agreement.

TABLE D-XIII. "dtype: " codes for data file type "0".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
0	NCM file	AAC	ANSI X3.37-1987 (R1993)	ANSI APT ASCII Cutter Language
		AAI	ANSI X3.37-1987 (R1993)	ANSI APT Input
		ABC	ANSI X3.37-1987 (R1993)	ANSI APT Binary Cutter Language
		ASC	ANSI X3.37-1987 (R1993)	ANSI APT Sys-Neutral
		BOM	NA	Bill of Materials
		EAC	EIA 494	EIA BCL ASCII Cutter Language
		GBR	EIA 274	Gerber file format (generated by design software)
		IAC	ISO 3592	ISO ASCII Cutter Language
		IIL	ISO 4342	ISO Input Language
		IPP	ISO 4343	ISO Post Processor
		PPP	NA	Process Planning

NOTES: This example shows the "dtype: " record for a transfer unit data file containing numerical control machining instructions in EIA 7-bit ASCII cutter language:

```
dtype: EAC
```

D.5.15 Code letter "P", PDL file. Transfer unit data files of type "P" are final form documents for storing compiled page layouts in an electronic form and shall be in accordance with 4.4.3. The allowable "dtype: " codes for the "P" data file type shall be as presented in table D-XIV, or as specified in the contract or other form of agreement.

TABLE D-XIV. "dtype: " codes for data file type "P".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
P	PDL file	PDF	Portable Document Format Reference Manual	Portable Document Format (PDF)
		SPDL	ISO/IEC 10180	Standard Page Description Language (SPDL)
NOTE: This example shows the "dtype: " record for a transfer unit data file containing a user manual stored in PDF: dtype: PDF				

D.5.16 Code letter "Q", IGES file. Transfer unit data files of type "Q" may be any of several types of illustration, drawing, design, or manufacturing product data and shall be in accordance with 4.4.7.1, 4.4.10.1, 4.4.11.2.1, 4.4.11.2.2, or 4.4.11.4.3. The allowable "dtype: " codes for the "Q" data file type shall be as presented in table D-XV, or as specified in the contract or other form of agreement.

D.5.17 Code letter "R", raster file. Transfer unit data files of type "R" contain raster data for illustration or product data in untiled or tiled form and shall be in accordance with 4.4.7.2 or 4.4.10.2. Engineering or acquisition data destined for storage in a JEDMICS repository is also "R" type data. The allowable "dtype: " codes for the "R" data file type shall be as presented in table D-XVI, or as specified in the contract or other form of agreement.

D.5.18 Code letter "S", STEP file. Transfer unit data files of type "S" shall be STEP product data in accordance with 4.4.10.3, 4.4.11.1, or 4.4.112.3. The allowable "dtype: " codes for the "S" data file type shall be as presented in table D-XVII, or as specified in the contract or other form of agreement.

TABLE D-XV. "dtype: " codes for data file type "Q".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
Q	IGES files	1	MIL-PRF-28000	Class 1 – Technical Illustration Subset
		2	MIL-PRF-28000	Class 2 – Engineering Drawing Subset
		4	MIL-PRF-28000	Class 4 – Geometry for NC Manufacturing Subset
		5	MIL-PRF-28000	Class 5 – 3D Piping Application Protocol (AP)
		6	MIL-PRF-28000	Class 6 – Layered Electrical Product (LEP) Application Protocol (AP)
		7	MIL-PRF-28000	Class 7 – 3D Geometry
NOTE: This example shows the "dtype: " record for a transfer unit data file containing a circuit board design encoded using the IGES Class 6 Layered Electrical Products AP: `dtype: 6`				

TABLE D-XVI. "dtype: " codes for data file type "R".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
R	Raster file	1	MIL-PRF-28002	Type 1 Untiled
		2	MIL-PRF-28002	Type 2 Office Document Architecture (ODA) Raster Document Application Profile (DAP) Tiled/Untiled
		3	MIL-PRF-28002	Type 3 Navy Image File Format (NIFF) Tiled/Untiled (see D.6.1.4)
		4	MIL-PRF-28002	Type 4 JEDMICS C4 Tiled (see D.6.1.5)
NOTE: This example shows the "dtype: " record for a transfer unit data file containing a JEDMICS C4 tiled raster image: `dtype: 4`				

TABLE D-XVII. "dtype: " codes for data file type "S".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
S	STEP file (Part 21 file)	AP: CC	ISO 10303	Standard for the Exchange of Product Model Data (STEP)
		APPLICATION PROTOCOL (AP) CODE		
		201	ISO 10303-201	STEP AP 201 Explicit Draughting
		202	ISO 10303-202	STEP AP 202 Associative Draughting
		203	ISO 10303-203	STEP AP 203 Configuration controlled 3D designs of mechanical parts and assemblies
		2xx	ISO 10303-2xx	Additional STEP APs as they become approved International Standards
		CONFORMANCE CLASS CODE		
		CC	Relevant AP	Appropriate conformance class corresponding to the transfer unit data file, as defined in the selected STEP AP

NOTES:

1. If more than one conformance class applies to the data file, the additional conformance class code(s) shall be separated by the ASCII comma character and the ASCII space character (", "). If no conformance class applies to the data file, a zero ("0") shall be used for the conformance class code.

2. This example shows the "dtype: " record for a transfer unit data file containing a STEP product model in accordance with AP 201 and conformance class 1:

```
dtype: 201: 1
```

3. This example shows the "dtype: " record for a transfer unit data file containing a STEP product model in accordance with AP 203 and conformance classes 1 and 5:

```
dtype: 203: 1, 5
```

D.5.19 Code letter "T", SGML coded text file. Transfer unit data files of type "T" shall be SGML coded text in accordance with 4.4.5. The allowable "dtype: " codes for the "T" data file type shall be as presented in table D-XVIII, or as specified in the contract or other form of agreement.

TABLE D-XVIII. "dtype: " codes for data file type "T".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
T	SGML coded text file	HTML	RFC 1866	Hypertext Markup Language (HTML)
		HYTIME	ISO/IEC 10744	Hypermedia/Time-based Structuring Language (HyTime) SGML file
		MID	Metafile for Interactive Documents	Metafile for Interactive Documents (MID)
		SGML	MIL-PRF-28001	SGML tagged instance

NOTES:

1. MID is a conforming application of ISO 8879 SGML and ISO/IEC 10744 HyTime, specified in the form of a DTD and including some meta-DTD elements (HyTime architectural forms). MID may be merged with the draft Standard Multimedia Scripting Language (SMSL) standard as an ISO standard.

2. Note that standard HTML is a conforming subset of SGML. Unless otherwise specified in the contract or other form of agreement, HTML transfer unit data files shall not contain browser-specific tags.

3. This example shows the "dtype: " record for a transfer unit data file containing an SGML tagged instance which is a Metafile for Interactive Documents file for use in an Interactive Electronic Technical Manual (IETM):

```
dtype: MID
```

D.5.20 Code letter "V", VHDL file. Transfer unit data files of type "V" shall be VHSIC integrated electronic circuit design and modeling data in accordance with 4.4.11.4.2. The allowable "dtype: " code for the "V" data file type shall be as presented in table D-XIX, or as specified in the contract or other form of agreement.

TABLE D-XIX. "dtype: " codes for data file type "V".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
V	VHDL file	0	IEEE 1076	VHSIC Hardware Description Language (VHDL)

NOTE: This example shows the "dtype: " record for a transfer unit data file containing an integrated circuit design modeled in VHDL format:

```
dtype: 0
```

D.5.21 Code letter "X", special word file. Transfer unit data files of type "X" shall be in accordance with 4.4.2. Formats and contents of special word files shall be as specified in the contract or other form of agreement. The allowable "dtype: " code for the "X" data file type shall be as presented in table D-XX, or as specified in the contract or other form of agreement.

TABLE D-XX. "dtype: " codes for data file type "X".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
X	Special word file	0	NA	Special word file

NOTES:

1. A special word file contains words peculiar to a transfer unit which are not in the destination system lexicon. This file type may be used to facilitate exchanges of otherwise-undefined textual information supporting systems such as the JEDMICS.

2. This example shows the "dtype: " record for a transfer unit data file containing a JEDMICS index as a special word file:

```
dtype: 0
```

D.5.22 Code letter "Z", grayscale / color illustration data file. Transfer unit data files of type "Z" shall be in accordance with 4.4.12. File formats and contents for half-tone or color illustration data shall be as specified in the contract or other form of agreement. The allowable "dtype: " code for the "Z" data file type shall be as presented in table D-XXI, or as specified in the contract or other form of agreement.

TABLE D-XXI. "dtype: " codes for data file type "Z".

CODE LETTER	DATA FILE TYPE	DTYPE CODE	REFERENCE DOCUMENT	DESCRIPTION
Z	Grayscale / color data file	0	NA	Grayscale or color illustration data
NOTE: This example shows the "dtype: " record for a transfer unit data file containing half-tone shading for print reproduction of a black-and-white photograph: `dtype: 0`				

D.6 NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

D.6.1 Selection of subtypes for this appendix. It was determined during the development of the "dtype: " record that this appendix should contain recognized CALS data file subtypes. For the purposes of this interface standard, these are defined as the DoD-sanctioned data types already appearing in one or more of the CALS core standardization documents or in their coordinated revision drafts. The following additional notes apply.

D.6.1.1 Portable Document Format subtype. The PDF format has been included as a PDL (type "P") subtype. PDF has been released as a PAS, has undergone some review in the CALS standards community, fulfills a documented DoD data format requirement, and may become formally recognized by the DoD as a standard for final form document management.

D.6.1.2 Extended Binary Coded Decimal Interchange Code subtype. The EBCDIC format has been included as a generic text file (type "F") subtype. EBCDIC is still used on mainframe computers within the DoD as a legacy standard for computer applications, program source code, and databases.

D.6.1.3 Numerical Control Manufacturing subtypes. Several common de facto formats are included among the NCM (type "0") subtypes. Many are legacy formats separately approved for DoD use.

D.6.1.4 Navy Image File Format raster subtype. NIFF is a raster (type "R") subtype based on the Tagged Image File Format (TIFF) and used for storing scanned images. The NIFF format will be documented as a PAS in MIL-PRF-28002. NIFF is fully specified in SPAWAR-S-903, Navy Implementation of Raster Scanning. The focal point for NIFF is:

Space and Naval Warfare Systems Command (SPAWAR)
2451 Crystal Drive
ATTN: Code 05L2C
Arlington, VA 22245-5200

D.6.1.5 JEDMICS C4 raster subtype. JEDMICS C4 is a Government-owned raster format for the storage of images in the JEDMICS system and is included as a raster (type "R") subtype. The C4 format will be documented as a PAS in MIL-PRF-28002. Additionally, the JEDMICS PMO is preparing the detailed documentation of C4, and is developing implementation guidance. The JEDMICS PMO focal point for further details on the implementation of the C4 format is:

Code PML590 JEDMICS PMO
Naval Supply Systems Command (NAVSUP)
P.O. Box 2050
Mechanicsburg, PA 17055-0791

D.6.2 Commercial standards as subtypes. Most of the popular de facto commercial and Internet file formats such as word processor data files, proprietary multimedia formats, and presentation graphics are not considered recognized CALS standards by this interface standard. These formats are primarily used for short-term office automation purposes rather than for the delivery of permanent product data and technical information. Commercial file formats are almost universally proprietary and "closed" standards which may change unpredictably. For this reason, these formats are usually unsuitable for the long-term storage of project information. Use of any of these file formats should be mutually agreeable between sender and receiver and should be documented as project-specific "A" file subtypes.

D.6.3 Definition of subtypes for the "A" file type. The "dtype: " record may be used to identify different subtypes of contractually defined data to meet individual project requirements. MIL-HDBK-59 provides guidance in the use of Mutually Acceptable Commercial Software (MACS) formats for some data, such as project management information. The definition and meaning of each "dtype: " value for "A" file subtypes must be clearly stated in the contract or other form of agreement. Contractually defined "dtype: " values have no meaning outside the scope of the contract which defines them.

D.6.4 Extensibility considerations. The format of the "dtype: " record is designed so that new data file subtypes may be added easily to meet project-specific requirements or to accommodate rapidly changing technologies. However, in the absence of a formal registry for new "dtype: " values, this feature could lead to a proliferation of inappropriate data file subtypes, and poor configuration control. Users are advised against creating new subtypes in the absence of a bona fide project requirement. New data file subtypes should be in accordance with the data file types in table III. Another risk is that multiple projects may define "dtype: " values which are similar but not the same for a given subtype, such as for common commercial formats, and this could adversely impact interoperability. Users are advised to collaborate or to re-use project-specific data file subtypes whenever practical. The "dtype: " structure and format documented herein should be maintained to the maximum extent practical when data file subtypes are created to meet project-specific requirements.

CONCLUDING MATERIAL

Custodians:
Army – CR
Navy – OM
Air Force – 16

Preparing Activity:
DISA – DC3
(Project IPSC 0339)

Review activities:
OASD – DO1, DO7, IQ, IR
Army – AC, AL, AT, MI, PT, SC1, SC3, TM, TM1
Navy – AS, CG2, CG5, CH, EC, MC5, ND, NM, TD
Air Force – 13, 17, 19, 33, 90, 93
DISA – DC1, DC5
DIA – DI1, DI3
NORAD & USSPACECOM – US
NSA – NS
Others – DOE, DOT-OST, GPO, NCS

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

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I RECOMMEND A CHANGE:	**1. DOCUMENT NUMBER** MIL-STD-1840C	**2. DOCUMENT DATE** ***(YYYY-MM-DD)*** 1997-06-26

3. DOCUMENT TITLE AUTOMATED INTERCHANGE OF TECHNICAL INFORMATION

4. NATURE OF CHANGE ***(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)***

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) DSN *(If applicable)*	7. DATE SUBMITTED *(YYYY-MM-DD)*

8. PREPARING ACTIVITY

a. NAME CALS Digital Standards Office DISA Center For Standards Code JIEO/JEBEB	b. TELEPHONE *(Include Area Code)* (1) Commercial (703) 735-3568 (2) DSN 653-3568
c. ADDRESS *(Include Zip Code)* 10701 Parkridge Boulevard Reston, VA 20191-4357	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Standardization Program Division 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 681-9340 DSN 761-9340

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (DO NOT STAPLE), and mailed. In block 4, be as specific as possible about particular problem areas such as wording which required interpretation, too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 5 any remarks not related to a specific paragraph of the document. If block 6 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

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CALS DIGITAL STANDARDS OFFICE
DISA CENTER FOR STANDARDS
CODE JIEO/JEBEB
10701 PARKRIDGE BOULEVARD
RESTON VA 20191-4357

CALS DIGITAL STANDARDS OFFICE
DISA CENTER FOR STANDARDS
CODE JIEO/JEBEB
10701 PARKRIDGE BOULEVARD
RESTON VA 20191-4357