NOTICE OF CHANGE

NOT MEASUREMENT SENSITIVE

MIL-STD-2500A
NOTICE 3
1 October 1998

DEPARTMENT OF DEFENSE
INTERFACE STANDARD

NATIONAL IMAGERY TRANSMISSION FORMAT (VERSION 2.0)
FOR THE NATIONAL IMAGERY TRANSMISSION FORMAT STANDARD

TO ALL HOLDERS OF MIL-STD-2500A:

1. THE FOLLOWING PAGES OF MIL-STD-2500A HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
cover	1 October 1998		reprinted without change
ii	1 October 1998	ii	26 September 1997
1	1 October 1998	1	12 October 1994
2	1 October 1998	2	reprinted without change
3	1 October 1998	3	12 October 1994
4	1 October 1998	4	12 October 1994
7	1 October 1998	7	12 October 1994
8	1 October 1998	8	12 October 1994
9	1 October 1998	9	12 October 1994
10	1 October 1998	10	12 October 1994
17	1 October 1998	17	reprinted without change
18	1 October 1998	18	12 October 1994
19	1 October 1998	19	26 September 1997
20	1 October 1998	20	26 September 1997
21	1 October 1998	21	26 September 1997
22	1 October 1998	22	26 September 1997
23	1 October 1998	23	12 October 1994
24	1 October 1998	24	12 October 1994
25	1 October 1998	25	12 October 1994
26	1 October 1998	26	12 October 1994
27	1 October 1998	27	12 October 1994
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NEW PAGE	DATE	SUPERSEDED PAGE	DATE
31	1 October 1998	31	reprinted without change
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56	1 October 1998	56	reprinted without change
63	1 October 1998	63	reprinted without change
64	1 October 1998	64	12 October 1994
65	1 October 1998	65	12 October 1994
66	1 October 1998	66	reprinted without change
DD1426	1 October 1998	DD1426	26 September 1997

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-2500A will verify that the page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the military standard is completely revised or canceled.

Custodians:
Army - CR
Navy - OM
Air Force - 90

Preparing Activity:
Misc - MP
(Project INST 0052)

NOTE: The cover page of this standard has been Changed for administrative reasons. There are no other changes to this document.

NOT MEASUREMENT SENSITIVE

MIL-STD-2500A
12 October 1994
SUPERSEDING
MIL-STD-2500
18 June 1993

DEPARTMENT OF DEFENSE INTERFACE STANDARD

NATIONAL IMAGERY TRANSMISSION FORMAT STANDARD (VERSION 2.0) FOR THE NATIONAL IMAGERY TRANSMISSION FORMAT STANDARD

AMSC N/A **AREA INST**

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FOREWORD

1. The National Imagery Transmission Format Standard (NITFS) is the standard for formatting digital imagery and imagery-related products and exchanging them among the Department of Defense (DOD), other members of the Intelligence Community (IC), as defined by the Executive Order 12333, and other United States Government departments and agencies.

2. The NITFS Technical Board (NTB) developed this standard based upon currently available technical information.

3. The DOD and other IC members are committed to the interoperability of systems used for formatting, transmitting, receiving, and processing imagery and imagery-related information. This standard describes the National Imagery Transmission Format (NITF) file format and establishes its application within the NITFS.

4. There is no intent to modify MIL-STD-2500A to Y2K (Year 2000). The convention to be used for date time groups within this standard is: 00-59 indicates 2000-2059, and 60-99 indicates 1960-1999. MIL-STD-2500B with NOTICE 1 supersedes MIL-STD-2500A on 1 October 1998. MIL-STD-2500B supports the century field in date time groups.

5. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to National Imagery and Mapping Agency, MS P-24, 12310 Sunrise Valley Drive, Reston, VA 20191-3449 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

1.1 Scope. This standard establishes the requirements for the file format component of the National Imagery Transmission Format Standard (NITFS). The file format described in this document is called the National Imagery Transmission Format (NITF). The NITFS is a collection of related standards and specifications developed to provide a foundation for interoperability in the dissemination of imagery and imagery-related products among different computer systems. An overview of the component documents of the NITFS can be found in MIL-HDBK-1300A.

1.2 Content. This standard provides a detailed description of the overall structure of the file format as well as specification of the valid data content and format for all fields defined within a NITF file. Several NITF implementation issues are addressed in the appendix. Issues pertinent to the use of NITF as the message format for imagery transmission are described in the transmission protocol component of NITFS, MIL-STD-2045-44500. An example of NITF as the basis for message formation in tactical communications is provided in section 6.

1.3 Applicability. This standard is applicable to the DOD and other IC members. It is mandatory for all Secondary Imagery Dissemination Systems (SIDS) in accordance with the memorandum by the Assistant Secretary of Defense for Command, Control, Communications and Intelligence ASD(C^3I), Subject: National Imagery Transmission Format Standard (NITFS), 12 August 1991. This directive will be implemented in accordance with N-0105/98 and MIL-HDBK-1300A. New equipment and systems, those undergoing major modification or those capable of rehabilitation will conform to this standard.

1.4 Tailoring task, method, or requirements specification. Certifiable implementation of the NITF for support of interoperability is subject to constraints not specified in this standard. Pertinent compliance requirements are defined in N-0105-98.

1.5 Relationship to earlier formats. NITF Version 2.0 is an extension of the NITF Version 1.1. It includes the addition of (1) symbol graphics encoded using Computer Graphics Metafile (CGM), (2) image compression using Joint Photographic Experts Group Image Compression (JPEG), (3) Bi-Level Image Compression, and (4) Vector Quantization image compression. NITF Version 2.0 also expands the range of certain header fields and modifies the way some fields are interpreted. Therefore, software designed to read both NITF Version 1.1 and Version 2.0 files needs to treat these fields differently. For this document, NITF refers to NITF Version 2.0.

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 issue of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODIIA) and supplement thereto, cited in the solicitation.

STANDARDS

FEDERAL

FED-STD-1027B - Telecommunications: Glossary of Telecommunication Terms

FEDERAL INFORMATION PROCESSING STANDARDS

FIPS PUB 10-3 - Countries, Dependencies, Areas of Special Sovereignty, and Their Principal Administrative Divisions.

FIPS PUB 128 - Computer Graphics Metafile (CGM) [adaptation of American National Standards Institute (ANSI) X3.122-1986.

MILITARY

MIL-STD-2301A - Computer Graphics Metafile (CGM) Implementation Standard for the National Imagery Transmission Format Standard

MIL-STD-2045-44500 - Tactical Communications Protocol 2 (TACO2) for the National Imagery Transmission Format Standard (NITFS)

MIL-STD-188-198A - Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard (NITFS)

MIL-STD-188-199 - Vector Quantization Decompression for the National Imagery Transmission Format Standard (NITFS)

MIL-STD-6040 - United States Message Text Format

HANDBOOK

MILITARY

MIL-STD-1300A - National Imagery Transmission Format Standard (NITFS) Handbook

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, 700 Robbins Avenue, Building #4, Section D, Philadelphia, PA 19111-5094. Others must request copies of FIPS from the National Technical Information Service, 585 Port Royal Road, Springfield, VA 22161-2171.)

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

Technical Manual No. 5-241-1 - GRIDS and GRID REFERENCES, Department of the Army

N-0105/98 - National Imagery Transmission Format Standard (NITFS) Standards Compliance and Interoperability Test and Evaluation Program Plan, Version 1.0

(Copies of Technical Manual No. 5-241-1 may be obtained from the appropriate Military Service Publication Center through the Military Service assigned administrative support. Copies of N-0105/98 may be obtained from the National Imagery and Mapping Agency, MSP-24, 12310 Sunrise Valley Drive, Reston, VA 20191-3449.)

3. DEFINITIONS

3.1 Acronyms used in this standard. The following definitions are applicable for the purpose of this standard. In addition, terms used in this standard and defined in the FED-STD-1037B will use the FED-STD-1037B definition unless noted.

a. AL	-	Attachment Level
b. ANSI	-	American National Standards Institute
c. ASCII	-	American Standard Code for Information Interchange
d. ASD(C^3I)	-	Assistant Secretary of Defense for Command, Control, Communications, and Intelligence
e. CCIR	-	International Radio Consulative Committee
f. CCITT	-	International Telegraph and Telephone Consultative Committee (Organized under the auspices of International Telecommunications Union (ITU))
g. CGM	-	Computer Graphics Metafile
h. CRT	-	Cathode Ray Tube
i. C^3I	-	Command, Control, Communications, and Intelligence
j. DES	-	Data Extension Segment
k. DL	-	Display Level
l. DOD	-	Department of Defense
m. DPCM	-	Differential Pulse Code Modulation
n. FIPS	-	Federal Information Processing Standard

o. IC	-	(1) Intelligence Community (2) Image Compression
p. ITU	-	International Telecommunications Union
q. JPEG	-	Joint Photographic Experts Group
r. LSB	-	Least Significant Bit
s. LUT	-	Look-Up Table
t. MOA	-	Memoranda of Agreement
u. MSB	-	Most Significant Bit
v. MTF	-	Message Text Format
w. NITF	-	National Imagery Transmission Format
x. NITFS	-	National Imagery Transmission Format Standard
y. NPPBH	-	Number of Pixels Per Block Horizontal
z. NPPBV	-	Number of Pixels Per Block Vertical
aa. NTB	-	National Imagery Transmission Format Standard Technical Board
ab. OADR	-	Originating Agency's Determination is Required
ac. RGB	-	Red, Green, Blue
ad. SID	-	Secondary Imagery Dissemination
ae. SIDS	-	Secondary Imagery Dissemination System
af. TACO2	-	Tactical Communications Protocol 2
ag. UN	-	United Nations
ah. USMTF	-	United States Message Text Format

ai. VQ	-	Vector Quantization
aj. YCbCr601	-	Y = Brightness of signal, Cb = Chrominance (blue), Cr = Chrominance (red)
ak. Y2K	-	Year 2000

3.2 Definition of terms. The definitions used in this document are defined as follows:

a. Alphanumeric - For the purpose of MIL-STD-2500A, fields that may contain any printable ASCII characters (including punctuation marks) are indicated as "Alphanumeric" in the Value Range specification. The reader is warned that this is a nonstandard use of the term. The allowable range of values for numeric fields typically is indicated in the form N-M, where N and M are the minimum and maximum values, respectively.

b. American Standard Code for Information Interchange (ASCII) - The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, data communications systems, and associated equipment.

c. Bandwidth - 1. The difference between the limiting frequencies within which performance of a device, in respect to some characteristic, falls within specified limits. 2. The difference between the limiting frequencies of a continuous frequency band.

d. Block - For the purpose of MIL-STD-2500A, a block is a rectangular array of pixels. An image consists of the union of one or more non-overlapping blocks. (Synonymous with tile.)

e. Blocked Image Mask - A structure which identifies the blocks in a blocked (tiled) image which contain no valid data, and which are not transmitted or recorded. The structure allows the receiver to recognize the offset for each recorded/transmitted block. For example, a 2 x 2 blocked image which contained no valid data in the second block (block 1) would be recorded in the order: block 0, block 2, block 3. The blocked image mask would identify block 1 as a non-recorded/non-transmitted block, and would allow the receiving application to construct the image in the correct order.

f. Briefing board - A briefing aid that includes an exploited, annotated hardcopy image and other textual and/or graphical material that presents significant intelligence information.

g. Brightness - An attribute of visual perception, in accordance with which a source appears to emit more or less light. Note 1: Usage should be restricted to non-quantitative reference to physiological sensations and perceptions of light. Note 2: "Brightness" was formerly used as a synonym for the photometric term "luminance" and (incorrectly) for the radiometric term "radiance." For the purpose of NITFS, larger pixel values represent higher intensity, and lower pixel values represent lower intensity levels.

h. Broadcast operation - The transmission of information so that it may be simultaneously received by stations that usually make no acknowledgement.

i. Byte - A sequence of N adjacent binary digits, usually treated as a unit, where N is a non zero integral number. Note: In pre-1970 literature, "byte" referred to a variable length field. Since that time the usage has changed so that now it almost always refers to an eight-bit field. This usage predominates in computer and data transmission literature; when so used, the term is synonymous with "octet." For the purpose of MIL-STD-188-198A (JPEG), a byte is defined as an eight-bit octet.

j. Character - 1. A letter, digit, or other symbol that is used as part of the organization, control, or representation of data. 2. One of the units of an alphabet. Note: For MIL-STD-2301A, a character (ANSI 3.4-1986 7-bit ASCII code padded into 8-bits) is an unsigned integer between and including 32 and 126 and is specified in this document using the character array C1, C2, ... Cn.

k. Conditional - In the context of NITF, a data field whose existence depends on the value used in a previous field.

l. Data - Representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means. Any representations such as characters or analog quantities to which meaning is or might be assigned.

m. Data communication - The transfer of information between functional units by means of data transmission according to a protocol.

n. Differential Pulse-Code Modulation (DPCM) - A version of pulse-code modulation in which an analog signal is sampled, and the difference between the actual value of each sample and its predicted value (derived from the previous sample or samples) is quantized and is converted by encoding to a digital signal. Note: There are several variations on differential pulse-code modulation.

o. Effectivity - Some of the capabilities specified in this document are not required as of the issue date of the document. All such capabilities are marked with effectivity numbers, (for example, Effectivity 1). Each effectivity number will be replaced by a specific date in subsequent releases of this document.

p. Gray scale - An optical pattern consisting of discrete steps or shades of gray between black and white.

q. Interface - 1. A concept involving the definition of the interconnection between two equipment items or systems. The definition includes the type, quantity, and function of the interconnecting circuits and the type, form, and content of signals to be interchanged via those circuits. Mechanical details of plugs, sockets, and pin numbers, etc., may be included within the context of the definition. 2. A shared boundary, e.g., the boundary between two subsystems or two devices. 3. A boundary or point common to two or more similar or dissimilar command and control systems, subsystems, or other entities against which or at which necessary information flow takes place. 4. A boundary or point common to two or more systems or other entities across which useful information flow takes place. (It is implied that useful information flow requires the definition of the interconnection of the systems which enables them to interoperate.) 5. The process of interrelating two or more dissimilar circuits or systems 6. The point of interconnection between user terminal equipment and commercial communication-service facilities.

5. DETAILED REQUIREMENTS

5.1 Format description

5.1.1 Fixed fields. The format contains header, subheader, and data fields. The NITF header fields are byte aligned. A file header carries information about the identification, classification, structure, content, size of the file as a whole, and size of the major data components within the file. For each kind of data supported by the format, each data item in the file has an associated subheader containing information that describes characteristics of the data item and an associated data field that contains the actual data item.

5.1.2 Extension fields. Flexibility to add support for kinds of data and data characteristics not explicitly defined in this standard is provided within the format. This is accomplished by providing for one or two fields in each header/subheader containing "tagged records" and a group of "tagged data segments." The tagged records in the headers/subheaders may contain additional characteristics of the corresponding data, while the tagged data segments are intended primarily to provide a vehicle for adding support for new kinds of data. The "tags" for the tagged records, and tagged segments, will be coordinated centrally in accordance with MIL-HDBK-1300A to avoid conflicting use, and in some cases, record formats will be configuration managed to control changes to data formats affecting a broad NITF user base.

5.1.3 Supported data types. A NITF file shall support inclusion of four standard kinds of data in a single file: image, symbol, label, and text. It shall be possible to include zero, one, or multiple data items of each standard data type in a single file (for example: several images, but no symbols). Standard data types shall be placed in the file in the following order: all image data items (images), followed by all symbol data items (symbols), followed by all label data items (labels), followed by all text data items (documents). Additional kinds of data may be included in a NITF file by use of Data Extension Segments (DES) (see 5.9). A data item of a standard data type is called a standard data item. A data item of a type defined in a DES is called an extension data item. The order of these major file components is illustrated on figure 2.

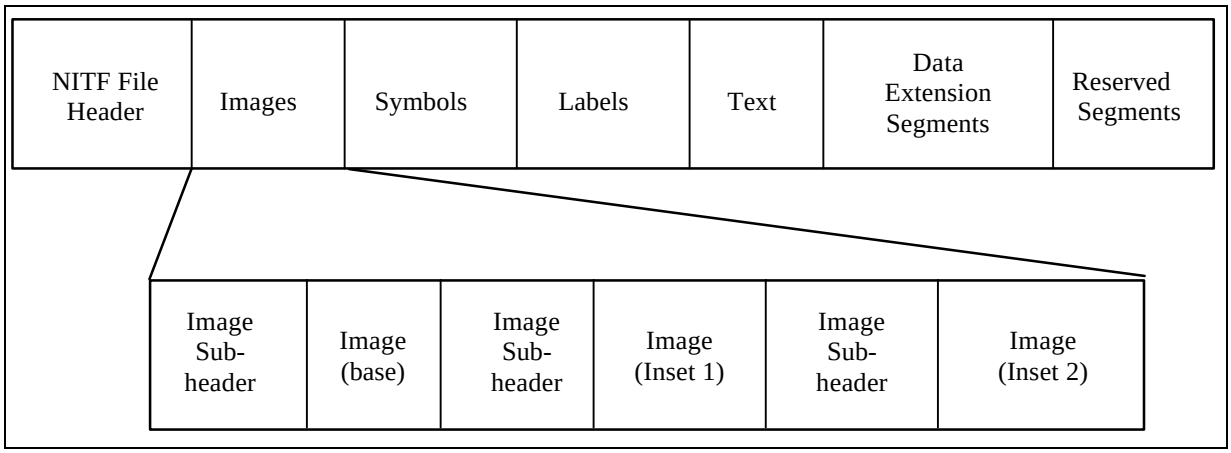

FIGURE 2. NITF file structure.

5.1.4 Application guidance. The NITF file format is intended for typical use with a single image, the base image, and data related to that image. The additional images that may be present in the file are expected to be related images, perhaps enhanced or modified subimages of the base image. These additional images typically will be displayed as "insets", that is, overlaid on the base image. Conceptually, though not required physically by the format, the base image is the "first" image, followed by its overlaid insets. Similarly, labels and symbols are expected to identify or explain information in the base image or one of the subimages. Finally, analysis, background, or other information relevant to interpreting the information content of the base image and its related subimages may be contained in documents - text data items - included in the NITF file. While the format is sufficiently general to support more ambitious applications, it is well to keep the intended use in mind when reading the requirements. NITFS certification requirements (N-0105/98) for systems will reflect the usage just described.

5.1.5 Standard data item subheaders. Each individual, standard data item included in a NITF file, such as an image or a symbol, shall be preceded by a "subheader" corresponding to that data item. This subheader shall contain information pertaining to that particular data item and data type only. If no items of a given type are included in the file, a subheader for that data type shall not be included in the file. All data items and associated subheaders of a single type shall precede the first subheader for the next data type. The ordering of multiple data items of one type is arbitrary. A diagram of the overall NITF file structure is shown on figure 2 as an example in which there is a "base" image and two smaller "inset" images overlaid on the base. This example is typical of the applications that historically motivated development of the NITF. The expansion of the Images section illustrates the interleaving of multiple images and their associated headers.

5.2 The NITF file header. Each NITF file shall begin with a header, the file header, whose fields contain identification and origination information, file-level security information, and the number and size of data items of each type contained in the file. Figure 3 depicts the NITF file header. It depicts the types of information contained in the header and shows the headers organization as a sequence of groups of related fields. The expansion of the "Image Group" illustrates how the header's overall length and content may expand or contract depending on the number of data items of each type included in the file. The fields of the NITF header are detailed in table I. Definitions of valid data for each header field are detailed in table II.

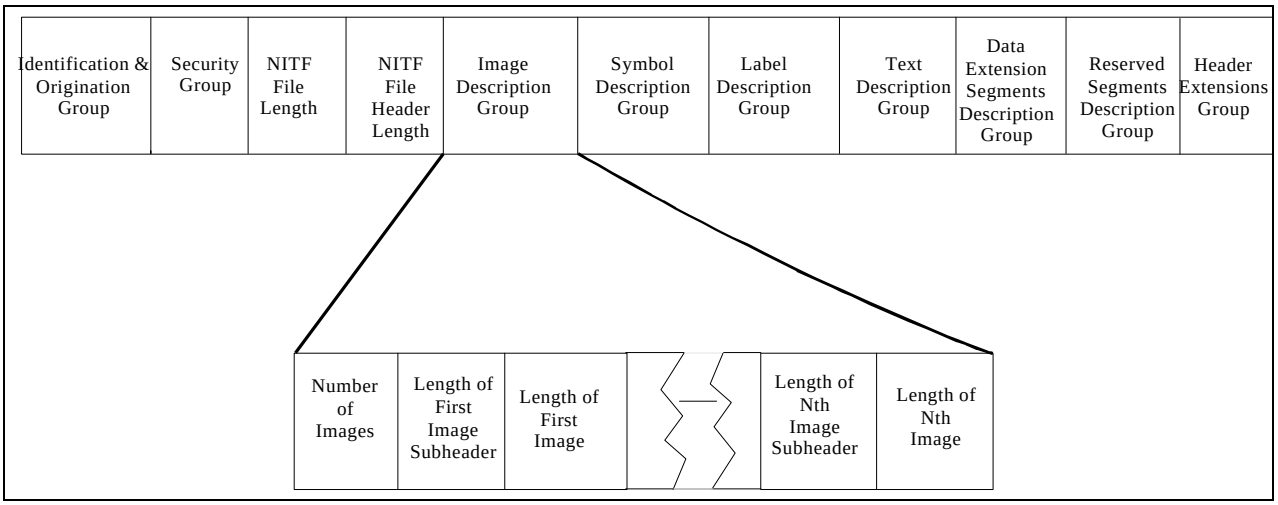

FIGURE 3. NITF file header structure.

5.2.1 Incomplete header. Several length fields in the file header are needed to parse the file. They contain the lengths of specific components of the file (i.e., FL through LRnnn). In some operational circumstances (e.g., those with critical time or storage constraints) all the information needed to populate the header fields may not be available at the start of file creation and transfer. If any length field in the file header cannot be filled with valid data, a STREAMING_FILE_HEADER Data Extension Segment (see paragraph 5.10) shall be used to provide the data needed to complete the file header. Incomplete length fields shall be totally filled with ASCII "9" characters (0x39) as place holders. A system receiving a file with an incomplete header shall locate the data extension and interpret the data in the DES as though it is actually located at the beginning of the file. As an option it may restore the file header fragment from the DES to populate the header. Any modification of this file shall result in the file being stored with a fully compliant header.

TABLE I. NITF file header.

(R) = required, (O) = optional, and (C) = conditional

FIELD	NAME	SIZE	VALUE RANGE	TYPE
FHDR	File Type & Version	9	NITFNN.NN	R
CLEVEL	Compliance Level	2	1-99	R
STYPE	System Type	4	Reserved	O
OSTAID	Originating Station ID	10	Alphanumeric	R
FDT	File Date & Time	14	DDHHMMSSZMONYY	R
FTITLE	File Title	80	Alphanumeric	O
FSCLAS	File Security Classification	1	T, S, C, R, or U	R
FSCODE	File Codewords	40	Alphanumeric	O
FSCTLH	File Control and Handling	40	Alphanumeric	O
FSREL	File Releasing Instructions	40	Alphanumeric	O
FSCAUT	File Classification Authority	20	Alphanumeric	O
FSCTLN	File Security Control Number	20	Alphanumeric	O
FSDWNG	File Security Downgrade	6	Alphanumeric	O
FSDEVT	File Downgrading Event	40	Alphanumeric	C
FSCOP	Message Copy Number	5	0-99999	O
FSCPYS	Message Number of Copies	5	0-99999	O
ENCRYP	Encryption	1	0=Not Encrypted 1=Encrypted	R
FBKGC	File Background Color	3	Unsigned Binary Integer (0x00-0xFF, 0x00-0xFF, 0x00-0xFF) (Default is Not Applicable)	R

TABLE I. NITF file header - Continued.

(R) = required, (O) = optional, and (C) = conditional

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ONAME	Originator's Name	~~27~~4	Alphanumeric	O
OPHONE	Originator's Phone Number	18	Alphanumeric	O
FL	File Length	12	000000000388-999999999998, 999999999999	R
HL	NITF File Header Length	6	000001-999998, 999999	R
NUMI	Number of Images	3	0-999	R
LISH001	Length of 1st Image Subheader	6	000000-999998, 999999	C
LI001	Length of 1st Image	10	0000000000-9999999998, 9999999999	C
.....				
LISHnnn	Length of nth Image Subheader	6	000439-999998, 999999	C
LInnn	Length of nth Image	10	0000000001-9999999998, 9999999999	C
NUMS	Number of Symbols	3	0-999	R
LSSH001	Length of 1st Symbol Subheader	4	0000-9998, 9999	C
LS001	Length of 1st Symbol	6	000000-999998, 999999	C
.....				
LSSHnnn	Length of nth Symbol Subheader	4	0258-9998, 9999	C
LSnnn	Length of nth Symbol	6	000001-999998, 999999	C
NUML	Number of Labels	3	0-999	R
LLSH001	Length of 1st Label Subheader	4	0000-9998, 9999	C
LL001	Length of 1st Label	3	000-320, 999	C
.....				
LLSHnnn	Length of Nth Label Subheader	4	0000-9998, 9999	C
LLnnn	Length of Nth Label	3	000-320, 999	C
NUMT	Number of Text Files	3	0-999	R
LTSH001	Length of 1st Text Subheader	4	0000-9998, 9999	C
LT001	Length of 1st Text File	5	00000-99998, 99999	C

TABLE I. NITF file header - Continued.
(R) = required, (O) = optional, and (C) = conditional

FIELD	NAME	SIZE	VALUE RANGE	TYPE
.....				
LTSHnnn	Length of n^{th} Text Subheader	4	0282-9998, 9999	C
LTnnn	Length of n^{th} Text File	5	00001-99998, 99999	C
NUMDES	Number of Data Extension Segments	3	0-999	R
LDSH001	Length of 1^{st} Data Extension Segment Subheader	4	0000-9998, 9999	C
LD001	Length of 1^{st} Data Extension Segment Data Field	9	000000000-999999998, 999999999	C
.....				
LDSHnnn	Length of n^{th} Data Extension Segment Subheader	4	0200-9998, 9999	C
LDnnn	Length of n^{th} Data Extension Segment Data	9	000000001-999999998, 999999999	C
NUMRES	Number of Reserved Extension Segments	3	0-999	R
LRSH001	Length of 1^{st} Reserved Extension Segment Subheader	4	0000-9998, 9999	C
LR001	Length of 1^{st} Reserved Extension Segment Data Field	7	0000000-9999998, 9999999	C
.....				
LRSHnnn	Length of n^{th} Reserved Extension Segment Subheader	4	0000-9998, 9999	C
LRnnn	Length of n^{th} Reserved Extension Segment Data Field	7	0000000-9999998, 9999999	C
UDHDL	User Defined Header Data Length	5	00000-99998, 99999	R
UDHOFL	User Defined Header Overflow	3	0-999	C
UDHD	User Defined Header Data	*	Registered Tagged Record Extensions	C
XHDL	Extended Header Data Length	5	00000-99998, 99999	R
XHD	Extended Header Data	**	Controlled Tagged Record Extensions	C

* As specified in UDHDL
** As specified in XHDL

TABLE II. NITF file header fields.

FHDR	An ASCII character string of the form NITFNN.NN, which indicates this file is formatted using version NN.NN of NITF. The valid values for this field are NITF01.10 and NITF02.00.
CLEVEL	This field shall contain the compliance level required to interpret fully all components of the file. Valid entries are integer values 01 through 07 and 99 and are assigned in accordance with certification requirements established in N-0105/98. Values 00, and 08 through 98 are reserved for future use.
STYPE	System type or capability. This field is reserved for future use and shall be filled with spaces (ASCII 32, decimal).
OSTAID	This field shall contain the identification code of the originating station.
FDT	This field shall contain the time (Zulu) of the files origination in the format DDHHMMSSZMONYY, where DD is the day of the month (01-31), HH is the hour (00-23), MM is the minute (00-59), SS is the second (00-59), the character Z is required, MON is first three characters of the month; and YY is the last two digits of the year.
FTITLE	This field shall contain the title of the NITF file.
FSCLAS	This field shall contain a valid value representing the classification level of the entire file. Valid values are T (=Top Secret), S (=Secret), C (=Confidential), R (= Restricted), U (=Unclassified).
FSCODE	This field shall contain a valid indicator of the security compartments associated with the file. Valid values are one or more of the following separated by single spaces (ASCII 32, decimal) within the field: digraphs in accordance with table V, trigraphs not contained in table V, and complete codewords or project numbers. The selection of a relevant set of codewords and project numbers is application specific. If this field is all spaces, it shall imply that no codewords apply to the file.
FSCTLH	This field shall contain valid security handling instructions associated with the file. Valid values are one or more of the following separated by single spaces (ASCII 32, decimal) within the field: digraphs in accordance with table V, trigraphs not contained in table V, complete codewords or project numbers, complete words and abbreviations of more than two characters, phrases only if the words within the phrase are separated by hyphens. The selection of a relevant set of security handling instructions is implementation specific. If this field is all spaces, it shall imply that no file control and handling instructions apply.

TABLE II. NITF file header fields - Continued.

FSREL	This field shall contain a valid list of countries and/or groups of countries to which the file is authorized for release. Valid items in the list are one or more of the following separated by single spaces (ASCII 32, decimal) within the field: country codes and groupings that are digraphs in accordance with FIPS PUB 10-4. If this field is all spaces, it shall imply that no file release instructions apply.
FSCAUT	This field shall contain a valid identity code of the classification authority for the file. The code shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all spaces, it shall imply that no file classification authority applies.
FSCTLN	This field shall contain a valid security control number associated with the file. The format of the security control number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all spaces, it shall imply that no file security control number applies.
FSDWNG	This field shall contain a valid indicator that designates the point in time at which a declassification or downgrading action is to take place. The valid values are (1) the calendar date in the format YYMMDD, YY indicates the last two digits of the year using the following convention, dates 00 to 59 represent 2000 to 2059 and 60 to 99 represent 1960 to 1999 (2) the code "999999" when the originating agency's determination is required (OADR), and (3) the code "999998" when a specific event determines at what point declassification or downgrading is to take place. If this field is all spaces, it shall imply that no file security downgrade condition applies.
FSDEVT	If the File Security Downgrade field (FSDWNG) equals "999998," this field shall be present and shall contain a valid specification of the downgrade event. If this field is present and all spaces, it shall imply that an error exists. Valid values for the event specification are determined by the application.
FSCOP	This field shall contain the copy number of the file.
FSCPYS	This field shall contain the total number of copies of the file.
ENCRYP	This field shall contain the value zero until such time as this specification is updated to define the use of other values.
FBKGC	This field shall contain the file background color to be used behind the displayable segment types. The three color components of the file background in the order Red, Green, Blue where (0x00, 0x00, 0x00) is black and (0xFF, 0xFF, 0xFF) is white.
ONAME	This field shall contain a valid name for the operator who originated the file. If the field is all spaces, it shall mean that no operator is assigned responsibility for origination.
OPHONE	If not all blanks, this field shall contain a valid phone number for the operator who originated the file. If the field is all spaces, it shall mean that no phone number is available for the operator assigned responsibility for origination.
FL	This field shall contain the length in bytes of the entire file including all headers, subheaders, and data. Note: The largest file is limited to 999999999998 ($10^{12} - 2$) bytes; a value of 999999999999 in this field indicates that the actual file length was not available when the file header was created (see section 5.2.1 Incomplete Header).
HL	This field shall contain a valid length in bytes of the NITF file header. The value of this field never shall be zero. Note: The largest file header is limited to 999998 ($10^{6} - 2$) bytes; a value of 999999 in this field indicates that the actual file header length was not available when the file header was created (see section 5.2.1 Incomplete Header).

TABLE II. NITF file header fields - Continued.

NUMI	This field shall contain the number of separate images included in the file. The value is valid only if it is within the specified range and the total of the Number of Images, plus the Number of Symbols, plus the Number of Labels does not exceed 999. This field shall be zero if and only if no images are included in the file.
LISH001	If the field NUMI contains a value of one or more, this field shall contain a valid length in bytes for the subheader of the first image in the file. This field is conditional and shall be omitted if NUMI field contains zero. Note: The largest image subheader is limited to 999998 ($10^6 - 2$) bytes; a value of 999999 in this field indicates that the actual image subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LI001	This field shall contain a valid length in bytes of the first image. This field is conditional and shall be omitted if NUMI field contains zero. Note: The largest image segment is limited to 9999999998 ($10^{10} - 2$) bytes; a value of 9999999999 in this field indicates that the actual image segment length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LISHnnn	This field shall contain a valid length in bytes for the nnnth image subheader, where nnn is the number of the image counting from the first image (nnn=001) in order of the images' appearance in the file. This field shall occur as many times as specified in the NUMI field. This field is conditional and shall be omitted if the NUMI field contains BCS zeros (0x30). Note: The largest image subheader is limited to 999998 ($10^6 - 2$) bytes; a value of 999999 in this field indicates that the actual image subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LInnn	This field shall contain a valid length in bytes of the nnnth image, where nnn is the image number of the image counting from the first image (nnn=001) in order of the images' appearance in the file. If the image is compressed, the length after compression shall be used. This field shall occur as many times as specified in the NUMI field. This field is conditional and shall be omitted if the NUMI field contains BCS zeros (0x30). Note: The largest image segment is limited to 9999999998 ($10^{10} - 2$) bytes; a value of 9999999999 in this field indicates that the actual image segment length was not available when the file header was created (see section 5.2.1 Incomplete Header).
NUMS	This field shall contain the number of separate symbols included in the file. The value is valid only if it is within the specified range and the total of the Number of Images, plus the Number of Symbols, plus the Number of Labels does not exceed 999. This field shall be zero if and only if no symbols are included in the file.
LSSH001	If the field NUMS contains a value of one or more, this field shall contain a valid length in bytes for the subheader of the first symbol in the file. This field is conditional and shall be omitted if NUMS field contains zero. Note: The largest symbol subheader is limited to 9998 ($10^4 - 2$) bytes; a value of 9999 in this field indicates that the actual symbol subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LS001	This field shall contain a valid length in bytes for the first symbol segment. This field is conditional and shall be omitted if NUMS field contains zero. Note: The largest symbol segment is limited to 999998 ($10^6 - 2$) bytes; a value of 999999 in this field indicates that the actual symbol segment length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LSSHnnn	This field shall contain a valid length in bytes for the nnnth symbol subheader, where nnn is the number of the symbols counting from the first symbol (nnn=001) in the order of the symbols' appearance in the file. This field shall occur as many times as specified in the NUMS field. This field is conditional and shall be omitted if the NUMS contains BCS zeros (0x30). Note: The largest symbol subheader is limited to 9998 ($10^4 - 2$) bytes; a value of 9999 in this field indicates that the actual symbol subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LSnnn	This field shall contain a valid length in bytes of the nnnth symbol, where nnn is the number of the symbol, counting from the first symbol (nnn=001) in the order of the symbols' appearance in the file. This field shall occur as many times as specified in the NUMS field. This field is conditional and shall be omitted if NUMS field contains BCS zeros (0x30). Note: The largest symbol segment is limited to 999998 ($10^6 - 2$) bytes; a value of 999999 in this field indicates that the actual symbol segment length was not available when the file header was created (see section 5.2.1 Incomplete Header).

TABLE II. NITF file header fields - Continued.

NUML	This field shall contain the number of separate labels included in the file. The value is valid only if it is within the specified range, and the total of the Number of Images, plus the Number of Symbols, plus the Number of Labels does not exceed 999. This field shall be zero if and only if no labels are included in the file.
LLSH001	If the field NUML contains a value of one or more, this field shall contain a valid length in bytes for the subheader of the first label in the file. This field is conditional and shall be omitted if NUML field contains zero. Note: The largest label subheader is limited to 9998 ($10^4 - 2$) bytes; a value of 9999 in this field indicates that the actual label subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LL001	This field shall contain a valid length in bytes for the first label. This field is conditional and shall be omitted if NUML field contains zero. Note: The largest label segment is limited to 998 ($10^3 - 2$) bytes; a value of 999 in this field indicates that the actual label segment length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LLSHnnn	This field shall contain a valid length in bytes for the nnnth label subheader, where nnn is the number of the labels, counting from the first label (nnn=001) in the order of the labels' appearance in the file. This field shall occur as many times as specified in the NUML field. This field is conditional and shall be omitted if NUML field contains zero. Note: The largest label subheader is limited to 9998 ($10^4 - 2$) bytes; a value of 9999 in this field indicates that the actual label subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LLnnn	This field shall contain a valid length in bytes of the nnnth label, where nnn is the number of the label, counting from the first label (nnn=001) in order of the labels' appearance in the file. This field shall occur as many times as specified in the NUML field. This field is conditional and shall be omitted if NUML field contains zero. Note: The largest label segment is limited to 998 ($10^3 - 2$) bytes; a value of 999 in this field indicates that the actual label segment length was not available when the file header was created (see section 5.2.1 Incomplete Header).
NUMT	This field shall contain the number of separate text items included in the file. The value is valid only if it is within the specified range. This field shall be zero if and only if no text items are included in the file.
LTSH001	If the field NUMT contains a value of one or more, this field shall contain a valid length in bytes for the subheader of the first text item in the file. This field is conditional and shall be omitted if NUMT field contains zero. Note: The largest text subheader is limited to 9998 ($10^4 - 2$) bytes; a value of 9999 in this field indicates that the actual text subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LT001	This field shall contain a valid length in bytes for the first text item. This field is conditional and shall be omitted if NUMT field contains zero. Note: The largest text segment is limited to 998 ($10^3 - 2$) bytes; a value of 999 in this field indicates that the actual text segment length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LTSHnnn	This field shall contain a valid length in bytes for the nnnth text item subheader, where nnn is the number of the text item, counting from the first text item (nnn=001) in the order of the text items' appearance in the file. This field shall occur as many times as specified in the NUMT field. This field is conditional and shall be omitted if the NUMT field contains BCS zeros (0x30). Note:Tthe largest text subheader is limited to 9998 ($10^4 - 2$) bytes; a value of 9999 in this field indicates that the actual text subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LTnnn	This field shall contain a valid length in bytes of the nnnth text item, where nnn is the number of the text item, counting from the first text item (nnn=001) in the order of the text items' appearance in the file. This field shall occur as many times as specified in the NUMT field. This field is conditional and shall be omitted if the NUMT field contains BCS zeros (0x30). Note: The largest text segment is limited to 99998 ($10^5 - 2$) bytes; a value of 99999 in this field indicates that the actual text segment length was not available when the file header was created (see section 5.2.1 Incomplete Header).

TABLE II. NITF file header fields - Continued.

NUMDES	This field shall contain the number of separate DES included in the file. This field shall be zero only if no DES are included in the file.
LDSH001	If the field NUMDES contains a value of one or more, this field shall contain a valid length in bytes for the subheader of the first DES in the file. This field is conditional and shall be omitted if the NUMDES field contains zero. Note: The largest DES subheader is limited to 9998 ($10^4 - 2$) bytes; a value of 9999 in this field indicates that the actual DES subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LD001	This field shall contain a valid length in bytes for the data field of the first DES. This field is conditional and shall be omitted if the NUMDES field contains zero. Note: The largest DES is limited to 999999998 ($10^9 - 2$) bytes; a value of 999999999 in this field indicates that the actual DES length was not available when the file header was created (see section 5.2.1 Incomplete Header).
.....	
LDSHnnn	This field shall contain a valid length in bytes for the nnnth data extension segment subheader, where nnn is the number of the data extension segment counting from the first data extension segment (nnn=001) in order of the data extension segment's appearance in the file. This field shall occur as many times as are specified in the NUMDES field. This field is conditional and shall be omitted if the NUMDES field contains BCS zeros (0x30). Note: The largest DES subheader is limited to 9998 ($10^4 - 2$) bytes; a value of 9999 in this field indicates that the actual DES subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LDnnn	This field shall contain a valid length in bytes of the data in the nnnth DES, where nnn is the number of the DES counting from the first DES (nnn=001) in order of the DES's appearance in the file. This field shall occur as many times as are specified in the NUMDES field. This field is conditional and shall be omitted if the NUMDES field contains BCS zeros (0x30). Note: The largest DES is limited to 999999998 ($10^9 - 2$) bytes;. a value of 9999999999 in this field indicates that the actual DES length was not available when the file header was created (see section 5.2.1 Incomplete Header).
NUMRES	This field shall contain the number of separate reserved extension segments included in the file. This field shall be zero until such time as one or more reserved extension segments is defined.
LRSH001	This field is conditional and shall be omitted if the NUMRES field contains zero. Note: The largest RES subheader is limited to 9998 ($10^4 - 2$) bytes; a value of 9999 in this field indicates that the actual RES subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LR001	This field is conditional and shall be omitted if the NUMRES field contains zero. Note: The largest RES is limited to 9999998 ($10^7 - 2$) bytes;. a value of 9999999 in this field indicates that the actual RES length was not available when the file header was created (see section 5.2.1 Incomplete Header).
.....	
LRESHnnn	This field is conditional and shall be omitted if the NUMRES field contains zero. Note: The largest RES subheader is limited to 9998 ($10^4 - 2$) bytes; a value of 9999 in this field indicates that the actual RES subheader length was not available when the file header was created (see section 5.2.1 Incomplete Header).
LREnnn	This field is conditional and shall be omitted if the NUMRES field contains zero. Note: The largest RES is limited to 9999998 ($10^7 - 2$) bytes;. a value of 9999999 in this field indicates that the actual RES length was not available when the file header was created (see section 5.2.1 Incomplete Header).
UDHDL	This field shall contain the length in bytes of the entire UDHD field. The length is three plus sum of the lengths of all the registered tagged record extensions (see 5.9.1.1) appearing in the UDHD field, since they are not separated from one another. A value of zero shall mean that no registered tagged record extensions are included in the header. If a registered tagged record extension is too long to fit in the UDHD field, it may be put in a data extension segment (see 5.9.1.3.1).

TABLE II. NITF file header fields – Continued.

UDHOFL	If present, this field shall contain "000" if the tagged record extensions in UDMD do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow, this field shall be omitted if the field UDHDL contains zero.
UDHD	If present, this field shall contain user defined registered tagged record extensions (see 5.9.1.1). The length of this field shall be the length specified by the field UDHDL. Registered tagged record extensions shall appear one after the other with no intervening bytes. The first byte of this field shall be the first byte of the first registered tagged record extension appearing in the field. The last byte of this field shall be the last byte of the last registered tagged record extension to appear in the field. This field shall be omitted if the field UDHDL contains zero.
XHDL	This field shall contain the length in bytes of the entire XHD field. The length is three plus sum of the lengths of all the controlled tagged record extensions (see 5.9.1.2) appearing in the XHD field, since they are not separated from one another. A value of zero shall mean that no controlled tagged record extensions are included in the NITF header. If a controlled tagged record extension is too long to fit in the XHD field, it may be put in a data extension segment (see 5.9.1.3.1).
XHD	If present, this field shall contain controlled tagged record extensions (see 5.9.1.2) approved and under configuration management of the NITF Technical Board. The length of this field shall be the length specified by the field XHDL. The first three characters shall be "000" if this field does not overflow into a DES, or shall contain the sequence number in the file of the DES into which it does overflow. Controlled tagged record extensions shall appear one after the other with no intervening bytes. The fourth byte of this field shall be the first byte of the first controlled tagged record extension appearing in the field. The last byte of this field shall be the last controlled tagged record extension to appear in the field. This field shall be omitted if the field XHDL contains zero.

5.3 NITF overlay concept. The NITF is sufficiently flexible to support future enhancements while remaining backward compatible. However, this flexibility also allows applications to use the NITF in ways that do not reflect the underlying need that the NITF was developed to address. Such applications, while possibly conforming to the letter of the NITF file format specification, may not be certifiable or accreditable for use by U.S. Government organizations. (For detailed NITFS certification requirements, the reader should consult N-0105/98.) The following subsections describe relationships anticipated to exist among the data items in an NITF file and how these relationships are represented in the file.

5.3.1 Image product/file relationships. Though the concept of an image product may include multiple files in the future, it is expected that typical applications will represent an image product in a single file. Within each image product the image with the lowest display level is the base image. Each image product shall comprise one base image plus associated data. If a base image is present, it shall form the basis for using the other data contained in the product. Images other than the base image are inset images. Inset images contained in the product are intended to be referenced to the base image, possibly by their placement (via the ILOC field of the image subheader) relative to the

base image or by visual cues provided by symbols and labels. All other images (the "inset" images), symbols, and labels are expected to define overlays to the base image in the sense that, when displayed, they will overwrite the base image. The relative visibility, when displayed, of the various displayable items in the file is recorded in the file by use of the display level (the "DLVL" field in the standard data type subheaders, specifically IDLVL for images, SDLVL for symbols, and LDLVL for labels). Groupings of related items may be formed by use of the attachment level (the "ALVL" field in the standard data type subheaders, specifically IALVL for images, SALVL for symbols, and LALVL for labels). The aggregate of the data items in an NITF file, including extended data as described in 5.9, should be regarded as constituting a single image-based product. Although loose aggregations of items of the various supported data types having no particular relationship to one another could be put into an NITF file, this use of the format would conflict with the motivations behind the NITF development. Use of the format in such a way is strongly discouraged.

5.3.2 Overlays and display level. The order in which images, symbols, and labels are "stacked" visually when displayed shall be determined by their display level (the DLVL field in the standard data type subheaders, specifically IDLVL for images, SDLVL for symbols, and LDLVL for labels), not by their relative position within the NITF file. The display level is a positive integer less than 1000. Every image, symbol, and label in an NITF file shall have a unique display level. That is, no two items may have the same display level. This requirement allows display appearance to be independent of data processing order.

5.3.3 Display level interpretation. The display level determines the display precedence of images, symbols, and labels when they are output to a display device. That is, at any pixel location shared by more than one image, symbol, or label, the value displayed there is that determined from the item with the highest numbered display level. An example is provided on figure 4. Figure 4 illustrates a sample "output presentation" from an NITF file that illustrates the effects of display level assignment. The Display Level (DL) of each item shown on figure 4 is indicated in the list of items on figure 4, where the list is in the order that the items were placed in the NITF file containing them. In the case shown, the item with display level one is not an image but rather an opaque CGM rectangle (symbol data, not image data). Because the CGM rectangle is larger than the base image (which, in this case, serves as the first overlay because its display level is two), it provides a border to the base image. Following increasing DL value, the border is overlaid by the exploited image which, in turn, is overlaid by arrow one, which is in turn overlaid by the image inset, which is overlaid by the label, which is overlaid by the arrow label, etc. It is emphasized again that data are not displayed in the same sequence in which they appear in the NITF file. The AL values in the list refer to "Attachment Levels" these are described next.

Value Range specification. The reader is warned that this is a nonstandard use of the term alphanumeric. The allowable range of values for numeric fields typically is indicated in the form N-M, where N and M are the minimum and maximum values, respectively.

TABLE III. NITF image subheader
(R) = required, (O) = optional, and (C) = conditional

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IM	File Part Type	2	IM	R
IID	Image ID	10	Alphanumeric	R
IDATIM	Image Date & Time	14	DDHHMMSSZMONYY	O
TGTID	Target ID	17	BBBBBBBBBBFFFFFCC	O
ITITLE	Image Title	80	Alphanumeric	O
ISCLAS	Image Security Classification	1	T, S, C, R, or U	R
ISCODE	Image Codewords	40	Alphanumeric	O
ISCTLH	Image Control and Handling	40	Alphanumeric	O
ISREL	Image Releasing Instructions	40	Alphanumeric	O
ISCAUT	Image Classification Authority	20	Alphanumeric	O
ISCTLN	Image Security Control Number	20	Alphanumeric	O
ISDWNG	Image Security Downgrade	6	Alphanumeric	O
ISDEVT	Image Downgrading Event	40	Alphanumeric	C
ENCRYP	Encryption	1	0=Not Encrypted 1=Encrypted	R
ISORCE	Image Source	42	Alphanumeric	O
NROWS	Number of Significant Rows in image	8	00000000-99999998, 99999999	R
NCOLS	Number of Significant Columns in image	8	00000000-99999998, 99999999	R
PVTYPE	Pixel value type	3	Alphanumeric	R

TABLE III. NITF image subheader - Continued.
(R) = required, (O) = optional, and (C) = conditional

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IREP	Image Representation	8	Alphanumeric	R
ICAT	Image Category	8	Alphanumeric	R
ABPP	Actual Bits-Per-Pixel Per Band	2	01-64	O
PJUST	Pixel Justification	1	L or R	O
ICORDS	Image Coordinate System	1	U, G, C, or N	R
IGEOLO	Image Geographic Location	60	ddmmssXdddmmssY (four times) or, ggXYZmmmmmmmmm (four times)	C
NICOM	Number of Image Comments	1	0-9	R
ICOM1	Image Comment 1	80	Alphanumeric	C
.....				
ICOMnn	Image Comment nn	80	Alphanumeric	C
IC	Image Compression	2	NC, NM, C1, C3, C4, C5, M1, M2, M3, M4, M5, or I1	R
COMRAT	Compression Rate Code	4	Alphanumeric	C
NBANDS	Number of Bands	1	1-9	R
IREPBAND1	1st Band Representation	2	Alphanumeric	R
ISUBCAT1	1st Band Significance for Image Category	6	Alphanumeric	R
IFC1	1st Band Image Filter Condition	1	N	R
IMFLT1	1st Band Standard Image Filter Code	3	Reserved	R
NLUTS1	1st Band Number of LUTS	1	0-4	R

TABLE IV. NITF IMAGE SUBHEADER FIELDS – Continued.

NROWS	This field shall contain the total number of rows of significant pixels in the image. When NPPBV * NBPC > NROWS, the remaining last rows (NPPBV * NBPC - NROWS) shall contain fill data (such as, only the rows indexed 0 through NROWS - 1 of the image contain "significant" data). The pixel fill values are determined by the application. Note: The largest NROWS is limited to 99999998 ($10^8 – 2$) bytes;. a value of 99999999 in this field indicates that the actual NROWS was not available when the file header was created (see section 5.2.1 Incomplete Header).
NCOLS	This field shall contain the total number of columns of significant pixels in the image. When NPPBH * NBPR > NCOLS, the remaining last pixels of each row (NPPBH * NBPR - NCOLS) shall contain fill data (that is, only the columns indexed 0 through NCOLS - 1 of the image contain "significant data). The pixel fill values are determined by the application. Note: The largest NCOLS is limited to 99999998 ($10^8 – 2$) bytes;. a value of 99999999 in this field indicates that the actual NCOLS was not available when the file header was created (see section 5.2.1 Incomplete Header).
PVTYPE	This field shall contain an indicator of the type of computer representation used for the value for each pixel for each band in the image. Valid entries are INT for integer, SI for 2's complement signed integer, R for real, C for complex, B for bit-mapped, U for user-defined. The data bits of INT and SI values shall appear in the file in order of significance, beginning with the most significant bit (MSB) and ending with the least significant bit (LSB). INT and SI data types shall be limited to 16 bits. R values shall be represented according to IEEE 32-bit floating point representation. C values shall be represented with the Real and Imaginary parts each represented in IEEE 32-bit floating point representation and appearing in adjacent four-byte blocks, first Real, then Imaginary. B pixel values shall be represented as single bits with value 1 or 0.
IREP	This field shall contain a valid indicator for the general kind of image represented by the data. Valid representation indicators are MONO for monochrome; RGB for red, green, or blue true color, RGB/LUT for mapped color; and MULTI for multiband imagery. In addition, compressed imagery can have this field set to YCbCr601 when compressed in the CCIR 601 color space using JPEG (field IC=C3). This field should be used in conjunction with the ICAT, ISUBCATnn, and IREPBANDnn fields to interpret the significance of each band in the image.
ICAT	This field shall contain a valid indicator of the specific category (often revealing the nature of the collector or intended use) of imagery. Valid categories are VIS for visible imagery, MAP for maps, SAR for synthetic aperture radar, IR for infrared, MS for multispectral, FP for fingerprints, MRI for magnetic resonance imagery, XRAY for x-rays, and CAT for cat scans. The default value is VIS. This field should be used in conjunction with the IREP, ISUBCATnn, and IREPBANDnn fields to interpret the significance of each band in the image.

TABLE IV. NITF IMAGE SUBHEADER FIELDS – Continued.

ABPP	This field shall contain the number of "significant bits" for the value in each band of each pixel without compression. Even when the image is compressed, ABPP contains the number of significant bits per pixel that were present in the image before compression. This field shall be less than or equal to Number of Bits Per Pixel (field NBPP). The number of adjacent bits within each NBPP is used to represent the value. These "representation bits" shall be left justified or right justified within the NBPP bits, according to the value in the PJUST field. For example, if 11-bit pixels are stored in 16 bits, this field shall contain 11 and NBPP shall contain 16. The default number of "significant bits" to be used (if this field is all zeros) is the value contained in NBPP.
PJUST	When ABPP is not equal to NBPP, this field indicates whether the significant bits are left justified (L) or right justified (R). Nonsignificant bits in each pixel shall contain the value 0. Any value other than L or R in this field shall indicate right justified.
ICORDS	This field shall contain a valid code indicating the geo-referenced coordinate system for the image. The valid values for this field are: U=UTM, G=Geodetic (Geographic), C=Geocentric, N=None.
IGEOLO	If the Image Coordinate System field ICORDS value is not N, this field shall contain a valid geographic location, in terms of corner locations, of the image in the coordinate system specified in the ICORDS field. The locations of the four corners of the (significant) image data shall be given in image coordinate order: (0,0), (0, MaxCol), (MaxRow, MaxCol), (MaxRow, 0). MaxCol and MaxRow shall be determined from the values contained, respectively, in NCOLS and NROWS as MaxCol = NCOLS - 1 and MaxRow = NROWS - 1. Valid corner locations in geodetic and geocentric coordinates shall be expressed as latitude and longitude. The format ddmmssX represents degrees, minutes, and seconds of latitude with X = N or S for north or south, and dddmmssY represents degrees, minutes, and seconds of longitude with Y = E or W for east or west, respectively. For the UTM coordinate system, coordinates shall be expressed in UTM grid coordinates (also known as Military Grid Reference System (MGRS) coordinates) to the accuracy indicated by the Value Range specification. A description of UTM Grid Coordinates can be found in Technical Manual No. 5-241-1 of the Department of the Army, GRIDS and GRID REFERENCES, 1983.
NICOM	This field shall contain the valid number of free text image comments.
ICOM1	This field shall contain the first line of comment text. The fields ICOM1 through ICOMnn, if present, shall contain free form alphanumeric text. They are intended for use as a single comment block and should be used that way. If the comment is classified, it will be preceded by the classification, including codeword(s). This field shall be omitted if the value in the Number of Image Comments field (NICOM) is zero.

TABLE IV. NITF image subheader fields - Continued.

.....	
ICOMnn	This field shall contain the nnth line of comment text, for 1 < nn ≤ value in the NICOM field. See description of ICOM1 for usage. This field shall be omitted if the value in the NICOM field is zero.
IC	This field shall contain a valid code indicating the form of compression used in representing the image data. Valid values for this field are C1 to mean bi-level, C3 to mean JPEG, C4 to mean Vector Quantization, C5 to mean lossless JPEG, I1 to mean down sampled JPEG, and NC to mean the image is not compressed. Also valid are the codes M1, M3, M4, and M5 for compressed images, and NM for uncompressed images, indicating a blocked image that contains a block mask and/or a transparent pixel mask. The format of a mask image is identical to the format of its corresponding non-masked image, except for the presence of an Image Data Mask Subheader at the beginning of the image data area. The format of the Image Data Mask Subheader is described in 5.5.1.5 and is shown in Table IV(A). The definitions of the compression schemes associated with codes C1/M1, C3/M3, C4/M4, C5/M5, and I1 are given, respectively, in MIL-STD-188-196, MIL-STD-188-198A, MIL-STD-188-199, and NIMA N0106-97. This field shall not contain C1 if NBANDS > 1 or NBLOCKS > 1.

TABLE IV. NITF image subheader fields - Continued.

COMRAT	If the Image Compression (IC) field contains C1, C3, C4, C5, M1, M3, M4, M5, or I1, this field shall be present and contain a code indicating the compression rate for the image. If the value in IC is C1 or M1, the valid codes are 1D, 2DS, and 2DH, where: 1D means one Dimensional Coding, 2DS means two Dimensional Coding Standard Vertical Resolution, K=2 2DH means two Dimensional Coding High Vertical Resolution, K=4 A "0" (zero) will be used for the Y value when custom Q-Tables are used. Explanation of these codes can be found in MIL-STD-188-196. Explanation of the compression rate for vector quantization can be found in MIL-STD-188-199. Valid codes in this case are 0.75, 1.40, 2.30, and 4.50. If the value in IC is C3 or M3, this field is used to identify the default quantization table(s) used by the JPEG compression algorithm. In this case, the format of this field is XX.Y where XX is the image data type (00 = general purpose, 01 through 99 are reserved), and Y represents the quality level 1 through 5. Explanation of these codes can be found in MIL-STD-188-198A. If the value in IC is C4 or M4, this field shall contain a value given in the form n.nn representing the number of bits-per-pixel for the compressed image. Explanation of the compression rate for vector quantization can be found in MIL-STD-188-199. This field is omitted if the value in IC is NC or NM. If the value in IC is C5, M5, this field is used to identify the lossless JPEG algorithm. If the value in IC is I1, this field is used to identify the down sampled JPEG algorithm. Explanation of the compression rates for lossless and down sampled JPEG can be found in NIMA N0106-97.
NBANDS	This field shall contain the number of bands comprising the image. This field and the IREP field are interrelated and independent of the IMODE field. The corresponding values for (IREP, NBANDS) are (MONO, 1); (RGB, 3); (RGB/LUT, 1); (YCbCr601, 3); (MULTI, 2-9).
IREPBAND1	When NBANDS contains the value one, this field shall contain all spaces. In all other cases, this field shall contain a valid indicator of the interpretation of the first band. Valid values are R, G, and B when IREP contains RGB. In all other cases, the use of this field is user-defined. However, its purpose is to provide the significance of the first band of the image with regard to the general image type as recorded in IREP. The significance of each band in the image can be derived from the combination of the IREP, IREPBANDnn and ICAT and ISUBCATnn fields. If IREP=Mono then IREPBAND1=2 alphanumeric spaces (0x20) and NBANDS=1 If IREP=RGB then IREPBAND1=R or G or B and IREPBANDn=R or G or B and NBANDS=3 IF IREP =RGB/LUT then IREPBAND1=LU and NBANDS=1 If IREP=YcbCr then IREPBAND1=Y and IREPBANDn=CB then Cr and NBANDS=3 If IREP=MULTI the valid values are user defined. Note: IREPBAND1/n are 2 alphanumeric character entries, therefore, for single character entries will be followed by a space (0x20).
ISUBCAT1	The use of this field is user-defined. Its purpose is to provide the significance of the first band of the image with regard to the specific category, ICAT, of the overall image. An example would be the wavelength of IR imagery.

TABLE IV. NITF image subheader fields - Continued.

IFC1	This field shall contain the value N (to mean none). Other values are reserved for future use.
IMFLT1	This field is reserved for future use. It shall be filled with blanks.
NLUTS1	This field shall contain the number of look-up tables associated with the 1st band of the image. If the image is a single band (NBANDS = 1), pseudocolor (IREP = RGB/LUT) image, this field shall contain the value three. The first, second, and third LUTS, in this case, shall map the image to the Red, Green, and Blue display bands, respectively. This is not an option for any band after the first (NLUTSnn, nn>1), since RGB/LUT images are single band. Any other use of look-up tables is defined by application.
NELUT1	This file shall contain the number of entries in each of the look-up tables for the first band of data. This field shall be omitted if the value in NLUTS1 is zero.
LUTD1	This field shall be omitted if the first Band Number of LUTs is zero. Otherwise, this field shall contain the data defining the first look-up table for the first image band. Each entry in the look-up table is composed of one byte, ordered from most significant bit to least significant bit representing a value from 0 to 255. To use the look-up table for each integer k, $0 \leq k \leq$ NELUT1-1, the pixel value k in the first image band shall be mapped to the value of the k^{th} byte of the look-up table. This field supports only integer band data (PVTYPE = INT).
.....	
LUTD1nn	This field shall be omitted if the 1st Band Number of LUTs is zero. Otherwise, this field shall contain the data defining the nn^{th} look-up table for the first image band. This field shall occur for each nn with $1<nn \leq$ NLUTS1. Each entry in the look-up table is composed of one byte, ordered from most significant bit to least significant bit representing a value from 0 to 255. To use the look-up table, for each integer n, $0 \leq k \leq$ NELUT1, the pixel value k in the nn^{th} image band shall be mapped to the value of the k^{th} byte of the nn^{th} look-up table for the first band. This field supports only integer band data (PVTYPE = INT).
.....	
IREPBANDnn	This field shall contain a valid indicator of the interpretation of the nn^{th} band. Valid values are R, G, and B when IREP contains RGB. In all other cases, the use of this field is user-defined. However, its purpose is to provide the significance of the first band of the image with regard to the general image type as recorded in IREP. If IREP=Mono then IREPBAND1=2 alphanumeric spaces (0x20) and NBANDS=1 If IREP=RGB then IREPBAND1=R or G or B and IREPBANDn=R or G or B and NBANDS=3 IF IREP =RGB/LUT then IREPBAND1=LU and NBANDS=1 If IREP=YcbCr then IREPBAND1=Y and IREPBANDn=CB then Cr and NBANDS=3 If IREP=MULTI the valid values are user defined. Note: IREPBAND1/n are 2 alphanumeric character entries, therefore, for single character entries will be followed by a space (0x20).

TABLE IV. NITF image subheader fields - Continued.

ISUBCATnn	The use of this field is user-defined. Its purpose is to provide the significance of the nnth band of the image with regard to the specific category, ICAT, of the overall image. An example would be the wavelength of IR imagery.
IFCnn	This field shall contain the value N (to mean none). Other values are reserved for future use.
IMFLTnn	This field is reserved for future use. It shall be filled with blanks.
NLUTSnn	This field shall contain the number of look-up tables associated with the nnth band of the image. Use of the look-up tables is user defined in all cases after the first band.
NELUTnn	This field shall contain the number of entries in each of the look-up tables for the nnth band of data. this field shall be omitted if the value in NLUTSnn is zero.
LUTDnn1	This field shall be omitted if the nnth Band Number of LUTs is zero. Otherwise, this field shall contain the data defining the 1st look-up table for the nnth image band. Each entry in the look-up table is composed of one byte, ordered from most significant bit to least significant bit representing a value from 0 to 255. To use the look-up table, for each integer k, $0 \leq k \leq$ NELUTnn-1, the pixel value k in the nnth image band shall be mapped to the value of the kth byte of the look-up table. This field supports only integer band data (PVTYPE = INT).
.....	
LUTDnnmm	This field shall be omitted if the nnth Band Number of LUTs is zero. Otherwise, this field shall contain the data defining the mmth look-up table for the nnth image band. Each entry in the look-up table is composed of one byte, ordered from most significant bit to least significant bit representing a value from 0 to 255. To use the look-up table, for each integer k, $0 \leq k \leq$ NELUTnn-1, the pixel value k in the nnth image band shall be mapped to the value of the kth byte of the look-up table. This field supports only integer band data (PVTYPE = INT).
ISYNC	This field shall contain "0" or "4", which indicates if a synchronization code has been provided for uncompressed or compressed data. This field shall be set to "0" for C1 or C3 compression. (C1 and C3 have their own internal mechanism for resynchronization.) For uncompressed data, a value of "0" indicates that no code is inserted. A value of "4" indicates that a byte aligned 32-bit integer, encoded MSB to LSB, has been inserted. The value is the row number of the next row starting at zero and incrementing by one for uncompressed. This code will provide a reference point for resynchronization of the image display in environments where the communications system cannot be expected to provide error free data, such as broadcast transmissions.

TABLE IV. NITF image subheader fields - Continued.

IMODE	This field shall contain an indicator of whether the image bands are stored in the file sequentially or interleaved (by block or pixel). Valid values are B, P, and S. The significance of the IMODE value must be interpreted with the knowledge of whether the image is JPEG compressed (IC=C3, C5, I1, M3, or M5), VQ compressed (IC=C4 or M4), or uncompressed (IC=NC or NM). When IC=C1 , the use of IMODE is undefined. The interpretation of these values of IMODE for this case is specified in Paragraph 5.2.3.3 of the NITFS document, MIL-STD-188-198A. For the uncompressed case: The value S means band Sequential, where all blocks for the first band are followed by all blocks for the second band, and so on: [(block1, band1), (block2, band1), ... (blockM, band1)], [block1, band2), (block2, band2), ... (blockM, band2)], ... [(block1, bandN), (block2, bandN), ... (blockM, bandN)]. The values B and P indicate variations on block sequential where all data from all bands for the first block is followed by all data from all bands for the second block, and so on. The variations are in the way the bands are organized within each block. B means band interleaved by Block. This means that within each block, the bands follow one another: [(block1, band1), (block1, band2), ... (block1, bandN)], [block2, band1), (block2, band2), ... (block2, bandN)], ... [(blockM, band1), (blockM, band2), ... (blockM, bandN)]. P means band interleaved by Pixel within each block: such as, for each block, one after the other, the full pixel vector (all band values) appears for every pixel in the block, one pixel after another, the block column index varying faster than the block row index. If the NBANDS field is 1, the cases B and S coincide. In this case, this field shall contain B. If the Number of Blocks is 1(NBPR = NBPC = 1), this field shall contain B for non-interleaved by pixel, and P for interleaved by pixel. The value S is only valid for images with multiple blocks and multiple bands. For the JPEG-compressed case: The presence of B, P, or S implies specific ordering of data within the JPEG image data representation. The interpretation of these values of IMODE for this case is specified in Paragraph 5.2.3.3 of the NITFS document, MIL-STD-188-198A, and N0106-97. For the Vector Quantization compressed case: VQ compressed images are normally either RGB with a color look-up table, or monochromatic. In either case, the image is single band, and the IMODE field is undefined. However, it is possible to have a multiband VQ compressed image in band sequential, band interleaved by block, or band

TABLE IV. NITF image subheader fields - Continued.

NBPR	This field shall contain the number of image blocks in a row of blocks (see 5.5.1.2) in the horizontal direction. If the image consists of only a single block, this field shall contain the value one.
NBPC	This field shall contain the number of image blocks in a column of blocks (see 5.5.1.2) in the vertical direction. If the image consists of only a single block, this field shall contain the value one.
NPPBH	This field shall contain the number of pixels horizontally in each block of the image. It shall be the case that NBPR*NPPBH≥NCOLS.
NPPBV	This field shall contain the number of pixels vertically in each block of the image. It shall be the case that NBPC*NPPBV≥NROWS.
NBPP	If IC contains "NC", "NM", "C4", or "M4" this field shall contain the number of storage bits used for the value from each component of a pixel vector. The value in this field always shall be greater than or equal to Actual Bits Per Pixel (ABPP). For example, if 11-bit pixels are stored in 16 bits, this field shall contain 16 and Actual Bits Per Pixel shall contain 11. If IC = "C3," this field shall contain the value 8 or the value 12. If IC = "C1," this field shall contain the value 1.
IDLVL	This field shall contain a valid value that indicates the graphic display level of the image relative to other displayed file components in a composite display. The valid values are 001 to 999. The display level of each displayable file component (image, label, or symbol) within a file shall be unique; that is, each number from 001 to 999 is the display level of, at most, one item. The meaning of display level is fully discussed in 5.3.3. The image, symbol, or label component in the file having the minimum display level shall have attachment level zero. (ILOC, SLOC, and LLOC field descriptions).
IALVL	This field shall contain a valid value that indicates the attachment level of the image. Valid values for this field are 0, and the display level value of any other image, symbol, or label in the file. The meaning of attachment value is fully discussed in 5.3.4. The image, symbol, or label component in the file having the minimum display level shall have attachment level zero (ILOC, SLOC, and LLOC field descriptions).

Subheader. When an application identifies transparent pixels, it may replace them with a user defined value (for example, alight blue background) at the time of presentation. The application may also choose to ignore transparent pixels in histogram generation. In any case, transparent pixels are not valid data, and should not be used for interpretation or exploitation.

5.5.1.5 Image data mask subheader. The image data mask subheader is a conditional data structure included in the image data stream for masked images (IC values NM, M1, M3, M4, and M5). The image data mask subheader is not recorded for non-masked images (IC values NC, C1, C3, C4, C5, and I1) and identical to that of non-masked images except for the following: the first byte of the image data is offset from the beginning of the image data area by the length of the image data mask subheader; and empty image blocks are not recorded/transmitted in the image data area. If the image is band sequential (IMODE=S), there will be multiple block image and/or transparent pixel masks--one for each band. All block image masks will be recorded first, followed by all transparent pixel masks. Since the image data mask subheaders are in the image area, the data recorded/transmitted there are binary. The structure of the image data mask subheader is defined in detail in TABLE IV(A) and TABLE IV(B).

TABLE IV(A). NITF image data mask subheader.
(R) = required, (O) = optional, and (C) = conditional

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IMDATOFF	Blocked Image Data Offset	4	Unsigned Integer: 0 to $2^{32} - 1$	C
BMRLNTH	Block Mask Record Length	2	Unsigned Integer; 0=No Block mask; 4=Block mask present	C
TMRLNTH	Transparent Pixel Mask Record Length	2	Unsigned Integer; 0=No transparent pixel mask; 4=Transparent pixel mask Present	C
TPXCDLNTH	Transparent Output Pixel Code Length	2	Unsigned Integer; 0=No transparent pixels; or Transparent pixel code length in bits	C

TABLE IV(A). NITF image data mask subheader - Continued.

(R) = required, (O) = optional, and (C) = conditional

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TPXCD	Transparent Output Pixel Code	*	Unsigned Integer; 0 to 2^n - 1 where n=TPXCDLNTH	C
BMR0BND1	Block Mask Record 0. Band 1	4	Unsigned Integer; Offset in bytes from the beginning of Blocked Image Data to the first byte of block 0 of band 1 (usually 0); OxFFFFFFFF if the block is not recorded	C
....				
BMRnnBND1	Block Mask Record nn, Band 1	4	Unsigned Integer; Offset in bytes from the beginning of Blocked Image Data to the first byte of block nn of band 1; OxFFFFFFFF if the block is not recorded	C
....				
BMRnnBNDmm	Block Mask Record nn, Band mm	4	Unsigned Integer; Offset in bytes from the beginning of Blocked Image Data to the first byte of block nn of band mm; OxFFFFFFFF if the block is not recorded	C

TABLE IV(A). NITF image data mask subheader – Continued.

(R) = required, (O) = optional, and (C) = conditional

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TMR0BND1	Transparent Pixel Mask Record 0, Band 1	4	Unsigned Integer; Offset in bytes from the beginning of Blocked Image Data to the first byte of block 0 of band 1; OxFFFFFFFF if the block does not contain transparent pixels	C
TMRnnBND1	Transparent Pixel Mask Record nn, Band 1	4	Unsigned Integer; Offset in bytes from the beginning of Blocked Image Data to the first byte of block nn of band 1; OxFFFFFFFF if the block does not contain transparent pixels	C
....				
TMR0BNDmm	Transparent Pixel Mask Record 0, Band mm	4	Unsigned Integer; Offset in bytes from the beginning of Blocked Image Data to the first byte of block 0 of band mm; OxFFFFFFFF if the block does not contain transparent pixels	C
....				

TABLE IV(A). NITF image data mask subheader – Continued.

(R) = required, (O) = optional, and (C) = conditional

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TMRnnBNDmm	Transparent Pixel Mask Record nn, Band mm	4	Unsigned Integer; Offset in bytes from the beginning of Blocked Image Data to the first byte of block nn of band mm; OxFFFFFFFF if the block does not contain transparent pixels	C

The length of the TPXCD field is next highest number of bytes which can contain the number of bits identified in the TPXCDLNTH field. For example, a TPXCDLNTH value of 12 would be stored in a TPXCD field of two bytes.

TABLE IV(B). NITF image data mask subheader fields.

IMDATOFF	This field is included if the IC value equals NM, M3, or M4. It identifies the offset from the beginning of the Image Data Mask Subheader to the first byte of the blocked image data. This offset, when used in combination with the offsets provided in the BMR fields, can provide random access to any recorded image block in any image band.
BMRLNTH	This field is included if the IC value equals NM, M3, or M4. It identifies the length of each Block Mask Record in bytes. The total length of the Block Mask Records is equal to BMRLNTH x NBPR x NBPC x NBANDS. If all of the image blocks are recorded, this value is set to 0, and the conditional BMR fields are not recorded/transmitted. If this field is present, but coded as 0, then a transparent pixel mask is included.

TABLE IV(B). NITF image data mask subheader fields – Continued.

TMRLNTH	This field is included if the IC value equals NM, M3, or M4. It identifies the length of each Transparent Pixel Mask Record in bytes. The total length of the Transparent Pixel Mask Records is equal to TMRLNTH x NBPR x NBPC x NBANDS. If none of the image blocks contain transparent pixels, this value is set to 0, and the conditional TMR fields are not recorded/transmitted. For IC value of M3, the value is set to 0. If this field is present, but coded as 0, then a Block Mask is included.
TPXCDLNTH	This field is included if the IC value equals NM, M3, or M4. It identifies the length in bits of the Transparent Output Pixel Code. If coded as 0, then no transparent pixels are present, and the TPXCD field is not recorded. For IC value of M3, the value is set to 0.
TPXCD	This field is included if the IC value equals NM or M4, and TPXCDLNTH is not 0. It contains the output pixel code that represents a transparent pixel in the image. This value is unique within the image, and allows the user to identify transparent pixels. The transparent pixel output code length is determined by TPXCDLNTH, but the value is stored in two bytes. If the number of bits used by TPXCD is less than the number of bits available for storage, the value shall be justified in accordance with the PJUST field in the image subheader.
BMR0BND1	This field shall contain the first Block Mask Record of band 1. It is recorded/transmitted only if the BMRLNTH field is not 0. The field shall contain an offset in bytes from the beginning of the Blocked Image Data to the first byte of block 0 of band 1 (this value should be 0) if block 0 is recorded/transmitted, or 0xFFFFFFFF if block 0 of band 1 is not recorded/transmitted in the image data.

TABLE IV(B). NITF image data mask subheader fields – Continued.

BMR0BND1	This field shall contain the nnth Block Mask Record of band 1. It is recorded/transmitted only if the BMRLNTH field is not 0. The field shall contain an offset in bytes from the beginning of the blocked Image Data to the first byte of block nn of band 1 if block nn is recorded/transmitted, or 0xFFFFFFFF if block nn of band 1 is not recorded/transmitted in the image data. The number of BMR records for this band is NBPR x NBPC.
BMR0BNDmm	This field shall contain the first Block Mask Record of band mm. It is recorded/transmitted only if the BMRLNTH field is not 0. The field shall contain an offset in bytes from the beginning of the Blocked Image Data to the first byte of block 0 of band mm if block 0 is recorded/transmitted, or 0xFFFFFFFF if block 0 of band mm is not recorded/transmitted in the image data.
BMRnnBNDmm	This field shall contain the nnth Block Mask Record of band mm. It is recorded/transmitted only if the BMRLNTH field is not 0. The field shall contain an offset in bytes from the beginning of the Blocked Image Data to the first byte of block nn of band mm if block nn of band mm is not recorded/transmitted in the image data. The number of BMR records for this band is NBPR x NBPC.
TMR0BND1	This field shall contain the first Transparent Pixel Mask Record for band 1. It is recorded/transmitted only if the TMRLNTH field is not 0. The field shall contain an offset in bytes from the beginning of the blocked Image Data to the first byte of block 0 of and 1 if block- contains transparent pixels, or 0xFFFFFFFF to indicate that this block does not contain transparent pixels.

TABLE VII. NITF symbol subheader fields – Continued.

SSCTLH	This field shall contain valid security handling instructions associated with the symbol. Valid values are one or more of the following separated by single spaces (ASCII 32, decimal) within the field: digraphs in accordance with table V, trigraphs not contained in table V, complete words and abbreviations of more than two characters, and phrases only if the words within the phrase are separated by hyphens. The selection of a relevant set of security handling instructions is implementation specific. If this field is all spaces, it shall imply that no symbol control and handling instructions imply.
SSREL	This field shall contain a valid list of countries and/or groups of countries to which the symbol is authorized for release. Valid items in the list are one or more of the following separated by single spaces (ASCII 32, decimal) within the field: country codes and groupings that are digraphs in accordance with FIPS PUB 10-3. If this field is all spaces, it shall imply that no symbol release instructions imply.
SSCAUT	This field shall contain a valid identity code of the classification authority for the symbol. The code shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all spaces, it shall imply that no symbol classification authority applies.
SSCTLN	This field shall contain a valid security control number associated with the symbol. The format of the security control number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all spaces, it shall imply that no symbol security control number applies.
SSDWNG	This field shall contain a valid indicator that designates the time at which a declassification or downgrading action is to take place. The valid values are (1) the calendar date in the format YYMMDD, (2) the code "999999" when the originating agency's determination is required (OADR), and (3) the code "999998" when a specific event determines at what time declassification or downgrading takes place. If this field is all spaces, it shall imply that no symbol security downgrade condition applies.
SSDEVT	If the Symbol Security Downgrade field (SSDWNG) equals "999998," this field shall be present and shall contain a valid specification of the downgrade event. If this field is present and all spaces, it shall constitute an error. Valid values for the event specification are determined by the application.
ENCRYP	This field shall contain the value zero until such time as this specification is updated to define the use of other values.

TABLE VII. NITF symbol subheader fields – Continued.

STYPE	This field shall contain a valid indicator of the representation type of the symbol. Valid values are B, C, and O. B means bit-mapped. For bit-mapped symbols, the symbol parameters are found in the symbol subheader, and the symbol data values are contained in the symbol data field immediately following the subheader. C means Computer Graphics Metafile. The symbol data contain a Computer Graphics Metafile in binary format that defines the symbol according to the specification of CGM for NITF in NITFS MIL-STD-2301A. O means object. The Symbol Number (SNUM) is a reference number that indicates the specific symbol as defined in table VIII. No symbol data field if this shall be present contains O, since an object symbol only has a subheader. The currently defined objects are standard geometric shapes and annotations of sufficient simplicity that they can be implemented accurately from verbal descriptions. Future versions of the NITF will include various predefined objects such as symbols for military units, vehicles, weapons, aircraft.
NLIPS	If STYPE = B or O, this field shall contain the number of rows (lines) in the symbol image. This field shall contain zero if STYPE = C.
NPIXPL	If STYPE = B or O, this field shall contain the number of pixels in each row (line) of the symbol (equals the number of image columns in the symbol viewed as an image). This field shall contain zero if STYPE = C.
NWDTH	If STYPE = O, this field shall contain the line width for the object symbol in pixels. If this field equals the value in NLIPS, the symbol should be drawn solid (filled in). This field shall contain zero if STYPE = C or B.
NBPP	If STYPE = B, this field shall contain the number of storage bits used for the value of each pixel in the symbol. If STYPE = C, this field shall contain zero. If STYPE = O, this field shall contain the value "1".
SDLVL	This field shall contain a valid value that indicates the graphic display level of the symbol relative to other displayed file components in a composite display. The valid values are 001 to 999. The display level of each displayable file component (image, label, or symbol) within a file shall be unique; that is, each number from 001 to 999 is the display level of, at most, one item. The meaning of display level is discussed fully in 5.3.3. The symbol, image, or label component in the file having the minimum display level shall have attachment level zero (ILOC, SLOC, and LLOC field descriptions).
SALVL	This field shall contain a valid value that indicates the attachment level of the symbol. Valid values for this field are 0 and the display level value of any other image, symbol, or label in the file. The meaning of attachment value is discussed fully in 5.3.4. The symbol, image, or label component in the file having the minimum display level shall have attachment level zero (ILOC, SLOC, and LLOC field descriptions).

TABLE VII. NITF symbol subheader fields – Continued.

SLOC	The symbols location is specified by providing the location of a point bearing a particular relationship to the symbol. For a bit-mapped symbol, the point is the first pixel of the first row. For an object symbol, the point is specified in table VIII as part of each symbol's definition. For a CGM symbol, the point is defined in MIL-STD-2301A. This field shall contain the symbol location represented as rrrrrccccc, where rrrrr and ccccc are the row and column offset from the ILOC, SLOC, or LLOC value of the item to which the symbol is attached. A row and column value of 00000 indicates no offset. Positive row and column values indicate offsets down and to the right and range from 00001 to 99999, while negative row and column values indicate offsets up and to the left and must be within the range -0001 to -9999. The coordinate system used to express ILOC, SLOC, and LLOC fields shall be common for all images, labels, and symbols in the file having attachment level zero. The location in this common coordinate system of all displayable graphic components can be computed from the offsets given in the ILOC, SLOC, and LLOC fields.
SLOC2	This field shall contain an ordered pair of integers defining a location in Cartesian coordinates for use with object symbols. The meaning of this location is defined in table X for object symbols. The format is rrrrrccccc, where rrrrr is the row and ccccc is the column offset from the ILOC, CLOC, or LLOC value of the item to which the symbol is attached. If the symbol is unattached (SALVL = 0), rrrrr and ccccc represent offsets from the origin of the coordinate system that is common to all images, labels, and symbols in the file having attachment level zero. rrrrr and ccccc each range from -9999 to 99999.
SCOLOR	If STYPE = B, this field shall contain a valid single character code from among the following indicating how the bit-mapped symbol shall be color-mapped. If STYPE = O, this field shall contain a valid single character code from among the following list indicating how the object symbol shall be color-mapped. The object shall be rendered using the color for the value "1". If NBPP≥1, the following are valid: C to mean "use included Color Look-Up Table" G to mean "use included Gray Scale Look-Up Table" If NBPP = 1, the following are additionally valid: N to mean "interpret 0=Black, 1-White" K to mean "interpret 0=Transparent, 1=Black" W to mean "interpret 0=Transparent, 1=White" R to mean "interpret 0=Transparent, 1=Red" O to mean "interpret 0=Transparent, 1=Orange" B to mean "interpret 0=Transparent, 1=Blue" Y to mean "interpret 0=Transparent, 1=Yellow" If STYPE = C, this field shall contain the space character (ASCII 32, decimal).

TABLE VII. NITF symbol subheader fields – Continued.

SNUM	For object symbols, this field shall contain the unique numeric identifier (values 1-18) of one of the objects defined in table X. For bit-mapped and CGM symbols, this field shall contain 000000. The field is alphanumeric to support future use of alphanumeric symbol identifiers.
SROT	When STYPE = O, this field shall contain the rotation angle of the symbol in integer degrees about its rotation point in the counterclockwise direction with respect to the nominal orientation. Nominal orientation is the orientation corresponding to SROT = 000. If STYPE = B or C, this field shall contain 000, and shall be ignored.
NELUT	When STYPE = B, this field shall contain the number of entries in the look-up table associated with the symbol. Valid values are 0, 2, 4, 8, 16, 32, 64, 128, and 256. 0 shall be interpreted to mean no LUT is present (no data in DLUT field.) This field shall contain a zero when STYPE = O or C.
DLUT	If present, this field shall contain the data defining the color look-up table for the symbol. The data format for the two types of look-up tables (gray scale and color) is described in 5.6.2.1.1 and 5.6.2.1.2. This field shall not be present (NELUT = 0) if STYPE = O or C.
SXSHDL	This field shall contain the length in bytes of the sum of the following two fields (SXSOFL + SXSHD). This length is three plus the sum of the lengths of all the controlled tagged record extensions (see 5.9) appearing in the SXSHD field. A value of zero shall mean that no controlled tagged record extensions are included in the symbol subheader. If a controlled tagged record extension is too long to fit in the SXSHD field, it shall be put in an data extension segment (see 5.9).
SXSOFL	If present, this field shall contain "000" if the tagged record extensions in SXSHD do not overflow into a DES, or shall contain the sequence number in the file of the DES into which they do overflow. This field shall be omitted if the field SXSHDL contains zero.
SXSHD	If present, this field shall contain controlled tagged record extensions (see 5.9) approved and under configuration management by the NTB. The length of this field shall be the length specified by the field SXSHDL, less the length (3) of SXSOFL. Controlled tagged record extensions in this field for a symbol shall contain information pertaining specifically to the symbol. Controlled tagged record extensions shall appear one after the other in this field with no intervening bytes. The first byte of this field shall be the first byte of the first controlled tagged record extension appearing in the field. The last byte of this field shall be the last byte of the last controlled tagged record extension to appear in the field. This field shall be omitted if the field SXSHDL contains zero.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER **MIL-STD-2500A**	2. DOCUMENT DATE (YYMMDD) **941012**

3. DOCUMENT TITLE
NATIONAL IMAGERY TRANSMISSION FORMAT (VERSION 2.0) FOR THE NATIONAL IMAGERY TRANSMISSION FORMAT STANDARD

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

5. REASON FOR RECOMMENDATION

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a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
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