<table>
<tr><td>NOTICE OF
CHANGE</td><td>NOT MEASUREMENT
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**NOT MEASUREMENT
SENSITIVE**

**MIL-STD-188-196
NOTICE 1
27 June 1996**

DEPARTMENT OF DEFENSE
INTERFACE STANDARD

BI-LEVEL IMAGE COMPRESSION
FOR THE NATIONAL IMAGERY TRANSMISSION FORMAT STANDARD

TO ALL HOLDERS OF MIL-STD-188-196:

1. THE FOLLOWING PAGES OF MIL-STD-188-196 HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
cover	27 June 1996	cover	18 June 1993
ii	27 June 1996	ii	18 June 1993
iii	27 June 1996	iii	18 June 1993
iv	27 June 1996	iv	18 June 1993
1	27 June 1996	1	18 June 1993
2	27 June 1996	2	reprinted without change
3	27 June 1996	3	18 June 1993
4	27 June 1996	4	18 June 1993
5	27 June 1996	5	18 June 1993
6	27 June 1996	6	reprinted without change
31	27 June 1996	31	18 June 1993
32	27 June 1996	32	reprinted without change
DD1426 27 June 1996	DD1426	18 June 1993	

AMSC N/A   **AREA TCSS**

MIL-STD-188-196, NOTICE 1, 27 JUNE 1996

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

3.   Holders of MIL-STD-188-196 will verify that 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: Preparing Activity:

   Army - SC   CIO - CI
   Navy - EC
   Air Force - 90   (Project TCSS-196001)
   Misc NS

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

DEPARTMENT OF DEFENSE
INTERFACE STANDARD

BI-LEVEL IMAGE COMPRESSION
FOR THE
NATIONAL IMAGERY TRANSMISSION FORMAT STANDARD

AMSC N/A   **AREA TCSS**

Supersedes cover of MIL-STD-188-196.

MIL-STD-188-196, NOTICE 1

FOREWORD

1.   This standard is approved for use by all departments and agencies of the Department of Defense (DOD).

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

3.   The National Imagery Transmission Format Standard Technical Board (NTB) developed this standard based upon currently available technical information.

4.   The DOD and members of the IC are committed to interoperability of systems used for formatting, transmitting, receiving, and processing imagery and imagery-related information. This standard describes the one-dimensional and two-dimensional image Data compression strategy articulated in International Telecommunication Union (ITU), CCITT Recommendation T.4, Standardization of Group 3 Facsimile Apparatus for Document Transmission, (Geneva, 1980, amended at Malaga-Torremolinos, 1984 and Melbourne, 1988) and establishes its application within the NITFS.

5.   Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Central Imagery Office, STSD/ISD, 14675 Lee Road, Chantilly, VA 22021 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

6.   Portions of this document were reproduced from the CCITT Recommendation T.4 (1988) with prior authorization from the copyright holder, International Telecommunication Union (ITU). DOD takes sole responsibility for the selection of portions from the ITU document for reproduction, with subsequent additions or changes, which should not be attributed to the ITU.

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CONTENTS

Supersedes page iv of MIL-STD-188-196.

1. SCOPE

1.1 <u>Scope</u>. This standard establishes the requirements to be met by NITFS systems when image data are compressed using the bi-level facsimile compression specified by the International Telecommunications Union (ITU) International Telegraph and Telephone Consultative Committee (CCITT) Recommendation T.4 and MIL-STD-188-161C for Group 3 facsimile devices. No attempt has been made to discuss image scanning, communication, or printing systems.

1.2 <u>Content</u>. This standard provides technical detail of the NITFS compression algorithm designated by the code C1 in the image compression field of the image subheader for bi-level images or overlays. It also provides the required run-length code tables for use in imagery dissemination systems complying with NITFS.

1.3 <u>Applicability</u>. This standard is applicable to the IC and the DOD. 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 standard shall be implemented in accordance with the JIEO Circular 9008 and the MIL-HDBK-1300A. New equipment and systems, those undergoing major modification, or those capable of rehabilitation shall conform to this standard.

1.4 Tailoring task, algorithm, or requirement specifications. The minimum compliance requirements for implementation of this compression algorithm are defined in JIEO Circular 9008.

1.5 <u>Types of operation</u>. This standard establishes the requirements for the communication or interchange of image data in compressed form. The bi-level compression standard may be operated in one of three modes:

    a.   mode 1   -   one-dimensional coding.

    b.   mode 2   -   two-dimensional coding with standard vertical resolution, $K = 2$.

    c.   mode 3   -   two-dimensional coding with higher vertical resolution, $K = 4$ (see 5.3.1.1).

The corresponding modes are specified by 1D, 2DS, and 2DH, respectively, in the Compression Rate Code field of the National Imagery Transmission Format (NITF) file image subheader.

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MIL-STD-188-196, NOTICE 1

2. APPLICABLE DOCUMENTS

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

2.2 <u>Government documents</u>.

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

STANDARDS

    FEDERAL

        FED-STD-1037B   -   Telecommunications: Glossary of Telecommunication Terms.

    FEDERAL INFORMATION PROCESSING STANDARDS

        FIPS PUB 147   -   Group 3 Facsimile Apparatus for Document Transmission (DOD adopted).

    MILITARY

        MIL-STD-188-161   -   Interoperability and Performance Standards for Digital Facsimile Equipment.

        MIL-STD-2500A   -   National Imagery Transmission Format (Version 2.0) for the National Imagery Transmission Format Standard (NITFS).

    HANDBOOK

        MIL-HDBK-1300A   -   National Imagery Transmission Format Standard (NITFS).

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.) (Copies of Federal Information Processing Standards (FIPS) are available to Department of Defense activities from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. Others must request copies of FIPS from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161-2171.)

Supersedes page 3 of MIL-STD-188-196.

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

    DISA/JIEO Circular 9008   -   NITFS Certification Test and Evaluation Program Plan.

(Copies of DISA/JIEO Circular 9008 may be obtained from the Defense Information Systems Agency, Joint Interoperability Test Command (JITC), Building 57305, Fort Huachuca, AZ 85613-7020)

2.3 <u>Non-Government publications</u>. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation.

INTERNATIONAL TELECOMMUNICATION UNION (ITU) / INTERNATIONAL TELEPHONE AND TELEGRAPH CONSULTATIVE COMMITTEE (CCITT)

    CCITT Recommendation T.4   -   Standardization of Group 3 Facsimile Apparatus for Document Transmission, (Geneva, 1980, amended at Malaga-Torremolinos, 1984 and Melbourne, 1988).

(Application for copies should be addressed to the ITU General Secretariat, Salas Section Place des Nations, C-II-1211, Geneva 20 Switzerland)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

    ANSI X3.4-1986   -   American National Standard Code for Information Interchange (ASCII), 1986.

(Application for copies of ANSI X3.4-1986 should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018-3308.)

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

Supersedes page 4 of MIL-STD-188-196.

MIL-STD-188-196, NOTICE 1

3. DEFINITIONS

3.1 <u>Acronyms used in this standard</u>. 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 shall use the FED-STD-1037B definition unless otherwise noted.

a.   ANSI   American National Standards Institute

b.   ASCII   American Standard Code for Information Interchange

c.   ASD(C³I)   Assistant Secretary of Defense for Command, Control, Communications, and Intelligence

d.   CCITT   International Telegraph and Telephone Consultative Committee

e.   CFS   Center for Standards

f.   C³I   Command, Control, Communications, and Intelligence

g.   DOD   Department of Defense

h.   DODISS   Department of Defense Index of Specifications and Standards

i.   DISA   Defense Information Systems Agency

j.   EOL   End of Line

k.   FIPS   Federal Information Processing Standard

l.   IC   (1) Intelligence Community
                  (2) Image Compression

m.   JIEO   Joint Interoperability and Engineering Organization

n.   JITC   Joint Interoperability Test Command

o.   MOA   Memoranda of Agreement

p.   NITF   National Image Transmission Format

q.   NITFS   National Image Transmission Format Standard

r.   NTB   NITFS Technical Board

Supersedes page 31 of MIL-STD-188-196.

s.   RTC   Return to Control

t.   SIDS   Secondary Imagery Dissemination System

3.2 <u>Definitions used in this standard</u>. The definitions used in this document are defined as follows:

a. Band - For the purpose of NITFS, used interchangeably with component. (See component.)

b. Bi-level image - Image information where each pixel is represented with one bit.

c. C1 - The code used to indicate the Bi-level compression algorithm in the image compression (IC) field of the image subheader.

d. CCITT group 3 - Bi-level image encoding, one- and two-dimensional, as defined in CCITT Recommendation T.4.

e. Component - For the NITFS, one of the two-dimensional arrays that comprise an image. Used interchangeably with band.

f. Fill - In NITFS context, optional Data inserted at the end of a coded image line. Fill is designated by inserting a variable length of zeroes.

g. IC - The Image Compression field of the NITF image subheader.

h. Make-up code word - Huffman code word used for run lengths greater than 64 pixels and up to 2560 pixels. A make-up code word is followed by a terminating code word.

i. Parameter K - Parameter used for two-dimensional coding of the bi-level Data. Specifies that every K line will be coded one-dimensionally. After the Kth line has been coded one-dimensionally, the subsequent K-1 lines will be coded two-dimensionally.

j. Pixel - For the purpose of NITFS, the smallest element from an N band image. Each pixel consists of N samples taken from corresponding locations in each of the image bands. For a single band image, sample and pixel can be used interchangeably.

k. Sample - For the NITFS, one element in the two-dimensional array that comprises a band of the image.

l. Terminating code word - Huffman code word used for run lengths of less than 64 pixels. Each encoded run length stream must end with a terminating code word.

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MIL-STD-188-196

CONCLUDING MATERIAL

Custodians:
  Army - SC
  Navy - EC
  Air Force - 90
  MISC - NS

Preparing activity:
  Misc - CI

Agent:
  Not applicable

Review activities:
  OASD - SO, DO, HP, IR, IQ
  Army - AM, AR, MI, TM, MD,
  CE2, IE, ET, AC, PT, CR2
  Navy - NC, MC, OM, TD, CG
  Air Force - 02, 13, 17, 21, 29, 33, 93
  DLA - DH
  Misc - MP, DI, NA, DCI, DC7

(Project TCSS-1960)

Civil agency coordinating activities:
  USDA - AFS, APS
  DOC - NIST
  DOE
  EPA
  GPO
  HHS - NIH
  DOI - BLM, GES
  DOT - CGCT, OST
  NCS

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1,2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER **MIL-STD-188-196**	2. DOCUMENT DATE (YYMMDD) **930618**

3. DOCUMENT TITLE
BI-LEVEL IMAGE COMPRESSION FOR THE NITFS

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

5. REASON FOR RECOMMENDATION

6. SUBMITTER		
a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) AUTOVON *(If applicable)*	7. DATE SUBMITTED *(YYMMDD)*

8. PREPARING ACTIVITY	**CENTRAL IMAGERY OFFICE (CIO)**
a. NAME **STSD/ISD**	b. TELEPHONE *(Include Area Code)* (1) Commercial (2) AUTOVON
c. ADDRESS *(Include Zip Code)* **14675 Lee Road** **Chantilly, VA 22021**	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS , CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340

DD Form 1426, OCT 89   *Previous editions are obsolete.*
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