



A11103 480518

NIST
PUBLICATIONS

NISTIR 4524

Raster Graphics Conformance Testing

Frankie E. Spielman

**U.S. DEPARTMENT OF COMMERCE
National Institute of Standards
and Technology
Computer Systems Laboratory
Gaithersburg, MD 20899**

**U.S. DEPARTMENT OF COMMERCE
Robert A. Mosbacher, Secretary
NATIONAL INSTITUTE OF STANDARDS
AND TECHNOLOGY
John W. Lyons, Director**

NIST

QC
100
.U56
#4524
1991
C.2

Raster Graphics Conformance Testing

Frankie E. Spielman

**U.S. DEPARTMENT OF COMMERCE
National Institute of Standards
and Technology
Computer Systems Laboratory
Gaithersburg, MD 20899**

February 1991



**U.S. DEPARTMENT OF COMMERCE
Robert A. Mosbacher, Secretary
NATIONAL INSTITUTE OF STANDARDS
AND TECHNOLOGY
John W. Lyons, Director**

Raster Graphics Conformance Testing

Frankie E. Spielman

ABSTRACT

This publication is a report which evaluates the alternatives for identifying and selecting a conformance testing laboratory for raster graphics in support of the Department of Defense (DoD) Computer-aided Acquisition and Logistic Support (CALS) Program. It discusses and analyzes four different approaches to selecting a conformance testing laboratory. After discussing the approaches, it recommends an alternative for DoD to pursue in selecting a laboratory for conducting conformance testing of raster graphics implementations. The annexes to the report describe the requirements, procedures, forms, and criteria necessary for establishing and managing a raster graphics conformance testing program.

Key words: accreditation, CALS, conformance testing, laboratory assessment, raster graphics, testing forms, testing laboratories, testing procedures.

TABLE OF CONTENTS

Introduction	1
Background	1
Definitions	2
Discussion of approaches	3
Laboratory Accreditation	3
Formal Assessment	4
Informal Assessment	5
Independent Assessment	5
Analysis of the Approaches	5
Other considerations	7
Recommendation	8
Acknowledgements	9
References	9
Annex A: Description of the Requirements	10
Annex B: Instructions and Forms	20
Annex C: NVLAP Fee Schedule	41
Annex D: Accrediting Testing Laboratories	42

Raster Graphics Conformance Testing

1 Introduction

This report discusses the alternatives for identifying and selecting testing laboratories for raster graphics in support of the Department of Defense (DoD) Computer-aided Acquisition and Logistic Support (CALs) Program. It discusses and analyzes different approaches to selecting a laboratory for testing the extent to which a raster graphics implementation conforms to the appropriate military standards and specifications. After discussing the approaches, a recommendation is made to DoD for conducting conformance testing of DoD raster graphics implementations. The annexes to this report describe the requirements, procedures, forms, and criteria necessary for establishing and managing a raster graphics conformance testing program. This report is a deliverable under the Calendar Year 1990 Statement Of Work, task number 7.2.2.

2 Background

There are two military documents applicable to raster graphics implementations, MIL-R-28002A and MIL-STD-1840A. MIL-R-28002A, Raster Graphics Representation in Binary Format, Requirements for, [6] is a military specification which defines the structure and encoding of raster data files to be delivered to the government. MIL-STD-1840A, Automated Interchange of Technical Information, [7] is a military standard which specifies a file header to be placed ahead of any raster data specified in MIL-R-28002A.

MIL-R-28002A describes two different possible representations of raster data: Type I and Type II. Type I is simply International Consultative Committee on Telegraphy and Telephony (CCITT) T.6 encoded raster data for an entire image enclosed within the MIL-STD-1840A header information. Type II is a MIL-STD-1840A header wrapped around an Office Document Architecture (ODA) style document as specified in the National Institute of Standards and Technology (NIST) ODA Raster Document Application Profile (DAP), Appendix A to MIL-R-28002A.

NIST has developed two documents associated with raster conformance testing which are to be used for testing compliance to MIL-R-28002A; see Annex A, Description of the Requirements for Raster Conformance Testing of MIL-STD-1840A and MIL-R-28002A, and Annex B, Instructions and Forms for Raster Conformance Testing of MIL-STD-1840A and MIL-R-28002A.

A laboratory testing system was developed for Type I data through an established contract with the National Communications System (NCS). Plans have been developed by NIST to perform specific conformance tests on the following DoD systems: CALS Test Network

(CTN) Testing Platform, Digital Storage and Retrieval Engineering Data System (DSREDS), Engineering Data Computer Assisted Retrieval System (EDCARS), and Engineering Data Management Information and Control System (EDMICS). There is no other formal mechanism currently available for conducting raster graphics conformance testing.

In testing conformance to MIL-R-28002A, both types (Type I and II) of data must be addressed. Although previous emphasis on testing has been placed on Type I data, the basic criteria to be used in selecting testing laboratories should be the same regardless of the type of raster graphics data. The primary difference is the actual testing procedures for each type of data. For Type I data, the primary focus is on testing for compliance to FIPS PUB 150 [1] (CCITT T.6 Group 4 compression algorithm). For type II data, the focus is on testing the tiling standard as specified in the Document Application Profile (DAP), Appendix A, of the MIL-R-28002A. Once the DAP is approved for inclusion in the OSI Implementor's Workshop Stable Agreements, NIST anticipates developing a FIPS based on the DAP (Proposed FIPS DAP).

3 Definitions

The following definitions apply for the terminology as it is used in this document.

Accreditation - the formalized initial and continuing process of ensuring a testing laboratory is competent to carry out specific (types of) tests.

Accreditation criteria - a set of requirements used by an accrediting body which a testing laboratory must meet to be accredited.

Accrediting body - A governmental or non-governmental body which conducts and administers a testing laboratory accreditation system and grants accreditation.

Document Application Profile (DAP) - The specification of a combination of features defined in ISO 8613, intended to form a subset to fulfill the requirements of a document application.

Formal assessment - through a formal agreement via either a contracting vehicle or interagency agreement, a method of evaluating and selecting a testing laboratory that is competent to carry out specific tests or types of tests.

Independent assessment - each government activity provides the testing for evaluating a vendor's claim of conformance or compliance to a military standard or specification without being tested by a third-party.

Informal assessment - a DoD sponsored process of evaluating and selecting a DoD test bed laboratory that provides DoD with a self-claimed capability to verify an implementation's compliance to a military standard or specification.

Laboratory accreditation - a formal recognition, administered by an accrediting body, that a testing laboratory is competent to carry out specific tests or types of tests.

Laboratory Accreditation Program (LAP) - a program established and administered under the National Voluntary Laboratory Accreditation Program.

National Voluntary Laboratory Accreditation Program (NVLAP) - a system for accrediting testing laboratories found competent to perform specific tests or types of tests.

Proficiency testing - methods of checking testing laboratory's performance by means of inter-laboratory tests.

Testing laboratory - an organization that measures, examines, tests, or otherwise determines the characteristics of products.

4 Discussion of approaches

The following paragraphs describe four different approaches in selecting a testing laboratory for CALS: Laboratory Accreditation, Formal Assessment, Informal Assessment, and Independent Assessment.

4.1 Laboratory Accreditation

The process of accrediting a testing laboratory is done through the NIST National Voluntary Laboratory Accreditation Program (NVLAP) [8]. The Program purpose is to accredit laboratories for specific tests or types of tests in product or service areas where a need for accreditation has been determined. It is funded through fees collected to cover the costs of activities pertaining to the evaluation and accreditation of laboratories. NVLAP accredited laboratories pay annual fees, go through on-site reassessment every two years, and participate in scheduled proficiency testing to maintain accredited status. More detailed discussion of this process can be found in a report, "NBS Plan for Validation (Conformance Testing) of Computer Products in Support of the CALS Program," included in NBSIR 88-3726 [5].

To become accredited and maintain accreditation, a testing laboratory must agree in writing to several stringent requirements which include initial and periodic on-site assessments and evaluation. In addition, NVLAP requires the payment of relevant initial and annual fees to defray the cost of administering the Laboratory Accreditation Program (LAP), see Annex C, NVLAP Fee Schedule. As of October 1, 1989, the fees for computer

applications testing were \$2,950 for the initial fee and \$1,250 for the annual fee. Establishing a LAP to conduct raster conformance testing will require a NIST sponsor, such as DoD, for Computer Systems Laboratory (CSL) to coordinate the development of the technical material. This material includes a set of criteria for accrediting testing laboratories which addresses the testing laboratory's quality system, staff, facilities, equipment, test procedures, and records. The sponsor must also develop a technical handbook to be used by the testing laboratory and an evaluation checklist to be used by NVLAP during the assessment and evaluation period. ISO/IEC Guide 25, General Requirements for the Technical Competence of Testing Laboratories, [3] describes the criteria that must be met before a testing laboratory may be accredited. Annex D, Accrediting Testing Laboratories for Standard for the Exchange of Product Model Data (STEP) [2], illustrates an adaptation of the criteria specified in the ISO/IEC Guide 25. ISO/IEC Guide 38, General Requirements for the Acceptance of Testing Laboratories, [4] also provides additional guidance in recognizing a testing laboratory and the acceptability of the laboratory's technical competence, impartiality, and integrity.

Establishing an accredited laboratory for a raster conformance testing program will take approximately one year and require an investment by the testing laboratory as well as DoD.

4.2 Formal Assessment

In many respects, the formal assessment approach is similar to the laboratory accreditation approach except that the testing laboratory is not accredited by NVLAP. A competitive procurement would be held in which a Request For Proposal (RFP) is issued, proposals evaluated, and the contract awarded. The criteria used for the evaluation of proposals may be similar to those used in the laboratory accreditation approach. These criteria include the laboratory's quality system, staff, facilities, equipment, test procedures, and records. There will be, however, more flexibility in the degree to which each criteria will be evaluated during the laboratory selection process. An on-site visit and evaluation of the testing laboratory is not required. The testing laboratory will not be required to pay initial or annual fees; however, DoD will be responsible for any costs associated with preparation, award, and oversight of such a contract vehicle.

Under the format assessment approach, it is also possible that a formal agreement, which includes all the same criteria as defined in the RFP, could be established whereby a federal government activity, including a DoD activity, could be selected as the testing laboratory. If a DoD activity is selected, an interagency agreement would be used in lieu of a contract award.

It will take approximately nine months to complete the evaluation and selection of a conformance testing laboratory under this approach.

4.3 Informal Assessment

The informal assessment approach is a DoD self-claimed method that will provide DoD the flexibility to establish a testing laboratory approval process that specifically matches the needs of DoD. Any or all of the criteria from the proceeding approaches could be incorporated into the testing laboratory approval plan. Working agreements could be established between DoD and the DoD designated sites without the requirement to administer contracts. With this approach, DoD can determine the testing fee to charge for each client's test. There will not be a certificate issued to the vendor unless DoD or CTN were to assume this responsibility.

The time required for this approach would have to be determined by DoD, but would basically be the time it takes to develop the plans and to identify and approve DoD designated sites.

4.4 Independent Assessment

The Independent Assessment approach is the basic philosophy that is being followed today. A vendor claims conformance or compliance to a military standard or specification without being tested by a third-party. The RFPs for each specific procurement may specify certain criteria that will be used during the evaluation and acceptance of the vendor's product. This approach may provide a certain degree of confidence that the product complies with the military standard or specification; however, the degree of testing is dependent upon the specific contract and the associated application. It does not necessarily mean that the product conforms to all aspects of the standard or specification, nor does it provide any consistent evaluation of products from RFP to RFP.

This approach already exists and no additional time would be required.

5 Analysis of the Approaches

Table 1 tabulates the differences between the four approaches. The criteria for evaluating the testing laboratories are listed in alphabetical order.

Table 1. Tabulated Evaluation

Evaluation Criteria	Accred- ited	Formal	Infor- mal	I n d e p - pendent
Accreditation	Yes	No	No	N/A
Assessment	3rd party	3rd party	DoD	N/A
Certificate Issued	Yes	Yes	Yes	No
	(CSL)	(CSL)	(DoD)	
DoD Flexibility	Limited	Partial	Full	Full
FIPS PUB 150 Testing	Yes	Yes	No	No
Initial/Annual Fees	Yes	No	No	N/A
ISO/IEC Guide 25 Applied	Yes	Yes	Yes	No
Lab Establishment Time	12 Mos	9 Mos	?	None
MIL-R-28002A Testing	Yes	Yes	Yes	Yes
On-site visit expenses	Yes	No	No	N/A
Periodic assessment	Yes	Yes	Yes	N/A
Proposed FIPS DAP Test	Yes	Yes	No	No
Vendor Testing Fees	Yes	Yes	Yes	Contract

The following paragraphs summarize the advantages and disadvantages of each approach based upon the evaluation criteria.

The laboratory accreditation approach will provide the most impartial and independent conformance testing capability and is the only approach that will result in an accredited testing laboratory for testing conformance of products to FIPS PUB 150, the DAP, and MIL-STD-1840A/MIL-R-28002A raster header records. The assessment process used in selecting a testing laboratory will be done by a third-party and all the requirements identified in ISO Guide 25 will be satisfied. On the other hand, this approach does require more stringent rules to be followed and the payment of initial and annual fees by the testing laboratory. NVLAP does not issue certificates with regard to product conformity. If certificates are to be issued, other arrangements, as discussed later, will have to be made.

The formal assessment approach will provide more flexibility in the administration of the testing program. The evaluation and selection of a testing laboratory could be done by CSL thus eliminating some of the NVLAP procedural steps and possibly providing a slightly quicker selection process. The requirements of ISO Guide 25 could be followed and a certificate could be issued by NIST for compliance to FIPS PUB 150, the DAP, and MIL-STD-1840A/MIL-R-28002A header records. This approach does not result in an accredited testing laboratory.

Of the first three approaches, the informal assessment approach will provide the most flexibility in administering a DoD testing program. The evaluation and selection of CALS test beds could be administered by a central organization within DoD without the third-party evaluation and selection process. The absence of a

third-party evaluation could potentially increase the chances of bias in the operation of a conformance testing program. This approach will be a DoD self-monitoring environment allowing the possible inclusion of specific MIL-STD-1840A header (Hollerith) data requirements tailored to the different services. Contracts will not have to be awarded; however, formal working agreements would be appropriate. This approach will not result in an accredited testing laboratory and NIST certificates will not be issued. On the other hand, DoD could elect to issue DoD certificates.

The independent assessment approach does provide DoD and the Services the greatest degree of flexibility and is an easier path to take. But as can be seen in the table, many of the criteria do not apply. There is no approved testing laboratory, the process under which testing occurs is not controlled, and there would be no certificates issued. There would be no uniform process of conducting raster conformance testing.

A vendor testing fee would apply in each of the first three approaches. A vendor who requests testing of his product will pay a fee for the process. This testing fee includes money to be paid to the testing laboratory for conducting the test and to CSL or DoD for administering the test, evaluating the test report, and issuing a certificate.

Since NVLAP does not issue certificates of validation, CSL will issue the certificates in either the accredited or formal assessment approaches if a certificate is desired. DoD will issue certificates in the informal assessment approach. The testing procedures must provide for either CSL or DoD (informal assessment) to evaluate each test report produced by the testing laboratory before issuing a certificate to the vendor.

6 Other considerations

There is no apparent interest in the international or national arena to develop a conformance testing program for FIPS PUB 150 because the facsimile community's approach to compliance relies upon a specific vendor's product to function with other vendor's products. In the document storage and interchange arena such as in DoD applications, however, it is recognized by several experts that testing conformance to FIPS PUB 150 is significantly more important. This is because of the disastrous situation that could occur if a large volume of images were recorded on a storage media using an incorrect compression algorithm. Given this possible scenario, developing a testing program for FIPS PUB 150, the DAP, and/or MIL-R-28002A becomes more important.

In regards to testing of Type II data, another level of complexity to the overall testing effort is added. In addition to testing FIPS PUB 150, there is a requirement to test the data stream for

proper encoding of the presentation attributes, coding attributes, and associated attribute values in accordance with the DAP.

There is an international effort in progress for conformance testing of the ODA/ODIF standard and their related DAPs. The Testing ODA Conformance (TODAC) project is a collaborative effort between the Canadian Government Department of Communications (DOC) and the UK National Computing Centre (NCC). They currently have test tools and test services to test ODA/ODIF data streams. They also are working on expanding this effort to test the semantics of specific DAPs based on the syntax language specified in section 7 of the DAP. The NIST Raster ODA DAP, however, is based on the tiled raster addendum to ISO 8613-7 and TODAC cannot test tiled raster data streams at this time. A letter has been sent to DOC asking for information and their interest in supporting the testing of tiled raster data streams. No response has been received to date.

In the longer range planning, it is anticipated that the NIST Raster ODA DAP will be moved to the OSI Implementor's Stable Agreements. At that time, the possibility of developing a FIPS based upon the DAP will be explored either as part of GOSIP or as a separate FIPS. A national testing program for Type II could then be developed based upon this proposed FIPS. If Type II testing is to occur before that time, a DoD test suite will have to be developed. The estimated cost for this effort is \$50,000 in fiscal year 1991 dollars.

7 Recommendation

The independent assessment approach does not provide a uniform method of testing and therefore would not be a feasible solution and should not be considered. On the other hand, the laboratory accreditation approach will provide the highest recognition but will require more resources to administer. At this time, the demand is probably not great enough to warrant the cost and further consideration of this approach. Between the formal and informal assessment approaches, the formal assessment approach provides more global recognition because of the third-party testing and a NIST-issued certificate; whereas, the informal assessment approach provides more flexibility within primarily a DoD self-monitoring testing environment.

NIST recommends DoD use the current plans and procedures as defined in Annexes A and B for the near term testing of the CTN Test Platform, DSREDS, EDCARS, and EDMICS; modify the procedures as required; and then sponsor development of an RFP and award a contract as defined under the formal assessment approach. It is also possible under this approach that a DoD site could be selected as the testing laboratory. The benefits of accepting this approach include: a NIST certification program, FIPS PUB 150 testing, consistency in evaluations of implementations, no potential

conflict of interest, and relatively short lead time to identify a qualified testing laboratory.

Acknowledgements

I would like to acknowledge L. Arnold Johnson and Sharon J. Kemmerer for their contributions to this document.

References

- [1] Federal Information Processing Standards (FIPS), "Facsimile Coding Schemes and Coding Control Functions for Group 4 Facsimile Apparatus," FIPS Publication 150, November 4, 1988.
- [2] International Organization for Standardization, "Conformance Testing Methodology and Framework: General Concepts," ISO TC184/SC4/WG6, Committee Draft (CD), Document N10, November 15, 1990.
- [3] International Organization for Standardization/International Electrotechnical Commission, "General Requirements for the Technical Competence of Testing Laboratories," Guide 25, 1982.
- [4] International Organization for Standardization/International Electrotechnical Commission, "General Requirements for the Acceptance of Testing Laboratories," Guide 38, 1983.
- [5] Kemmerer, Sharon J., Editor, "A Collection of Technical Studies Completed for the Computer-aided Acquisition and Logistic Support (CALS) Program, Fiscal Year 1987, Volume 1 of 4," NBSIR 88-3726, March 1988.
- [6] Military Specification, "Raster Graphics Representation in Binary Format, Requirements for," MIL-R-28002A, 30 November 1990.
- [7] Military Standard, "Automated Interchange of Technical Information," MIL-STD-1840A, 22 December 1987.
- [8] National Institute of Standards and Technology, "Computer Application Testing POSIX Conformance Testing," NVLAP Program Handbook (Draft), January 1991

**Annex A: Description of the Requirements
for
Raster Conformance Testing
of
MIL-STD-1840A and MIL-R-28002A**

A.1 Introduction

Raster image processing performed in accordance with the military standard MIL-STD-1840A and specification MIL-R-28002A may be thought of as occurring in two distinct phases. The first phase of operation involves the storage and retrieval of raster image files, along with other related files, from a mass storage medium. The second phase of operation involves the compression, decompression, and/or interchange of the raster image files. The testing procedure outlined in this document is associated with this second phase and is designed to test a system's ability to interchange images in compliance with MIL-STD-1840A and MIL-R-28002A.

A.2 Features to be tested

Not all aspects of MIL-STD-1840A concern the processing of raster image files. This test procedure is designed to test only those features which have bearing upon image processing as defined in MIL-STD-1840A and MIL-R-28002A; other features described in the MIL-STD-1840A are outside the province of raster image processing and will not be tested.

The following features set forth in MIL-STD-1840A shall be tested:

- magnetic tape format and naming conventions, as described in paragraphs 5.1.1, 5.1.3, and 5.2.1.
- document declaration file
 - o all 15 records must be present
 - o all 15 records must contain valid values¹

¹ Specific values permissible for the document declaration file record entries are found in Appendix A.

- raster data file header records
 - o all 11 records must be present
 - o all 11 records must contain valid values²

The features specified in MIL-R-28002A shall be tested using two sets of raster images. One set shall consist of binary bit-map (uncompressed) images; the other set shall be encoded according to MIL-R-28002A. The Request for Raster Conformance Test form specifies the type of encoding to be used (Type I or Type II). Each set shall constitute one document in accordance with MIL-STD-1840A. Both documents may be stored on a single magnetic tape, or each document may be stored on a separate tape. Each set of images is designed to test the system's processing ability for a variety of different image sizes and coding situations. In general, the images will run from the simplest to the most complex. Images in the two documents will be similar but not identical.

The test images will be designed to verify the system's ability to handle the following situations:

- page sizes from A through K (North American), and A4 through A0 (Metric)
 - o testing will include only standard image sizes, except that fewer than the number of standard lines may be used to reduce testing time and resources
 - o every page width will be present in the test set, although every test size may not appear in each document
- all permissible code words (all black run lengths, all white run lengths, all vertical and all pass modes)
- lines and images with a compression factor of less than one (negative compression)
- compressed images with incorrect encoding to check error recovery
 - o error report should include location at which error was detected
 - o images incorrectly encoded need not be returned as part of the processed test set

The images themselves may consist of scanned and/or computer generated images.

²Specific values permissible for raster data file header record entries are found in Appendix B.

For testing of Type I raster data files, the Conformance Testing Laboratory will verify that a file encoded by the system under test has the properly encoded MIL-STD-1840A raster header records followed by the encoded raster image. The raster image must be encoded in accordance with FIPS PUB 150, Facsimile Coding Schemes and Coding Control Functions for Group 4 Facsimile Apparatus (CCITT T.6 Group 4). Similarly, the Conformance Testing Laboratory will verify that the system under test can decode encoded files and create the corresponding bit-map images.

For testing of Type II raster data files, the Conformance Testing Laboratory will verify that a system under test can both receive and transmit data encoded with the proper MIL-STD-1840A raster header records followed by images encoded according to Appendix A, Document Application Profile (DAP), of MIL-R-28002A (DRAFT). The Conformance Testing Laboratory will verify that a file created by a system under test contains proper encoding for all the presentations, coding, and document profile attributes. For receiving, the system under test will be provided a series of encoded files and will be tested to verify that it can reassemble the original bit-map image.

A.3 Features not to be tested

The features of MIL-STD-1840A associated with document files other than raster graphics images will not be tested. Furthermore, the ability to convert between the standard CCITT T.6 compression algorithm and any other proprietary or non-standard compression algorithm will not be tested.

A.4 Testing environment limitations and modifications

For the purposes of this test, the following options set forth in MIL-STD-1840A and MIL-R-28002A shall apply:

- one 9-track magnetic tape density shall be used for the complete test
- image orientation shall be limited to 000,270 (portrait) or 090,270 (landscape) orientation
- record 7 in the raster data file headers must contain a '9' instead of a '1' or '2' if the image is a binary bit-map image; this is done in order to allow the identification of binary bit-map images. Note that this is NOT in accordance with MIL-STD-1840A and MIL-R-28002A and is to be used only for the purposes and duration of this test.

A.5 General testing procedure

The client responsible for the system being tested performs the first phase of the test procedure by submitting a request (Appendix

C) to the National Institute of Standards and Technology (NIST). The client shall specify the type of encoding (Type I or II) to be tested. NIST will instruct the Conformance Testing Laboratory to assemble and send a test package to the client. The testing procedure to be used is illustrated in Appendix D. This test package will consist of two sets of raster image files stored in accordance with MIL-STD-1840A and MIL-R-28002A and organized into two documents. The first set (or document) will consist of uncompressed, binary bit-map images of various sizes and contents. The second set will consist of images of various sizes and similar (though not identical) contents to the first set but will be encoded in accordance with MIL-R-28002A Type I or II format.

For the second phase of the test procedure, the system being tested will encode and compress the bit-map images (from set 1) using the type I or II format and will decode and decompress the encoded images (from set 2). Both sets of images will then be written back to magnetic tape as two documents in MIL-STD-1840A and MIL-R-28002A format. These image sets will be returned to the Conformance Testing Laboratory along with all completed documentation forms and any additional information as necessary.

For the final phase of the test procedure, the Conformance Testing Laboratory will then process the two image sets. The client's encoded images from set 1 will be compared to the laboratory's encoded versions of the original binary bit-map images. The client's bit-map images from set 2 will be compared to the laboratory's bit-map images. This procedure verifies the correctness of the encoding and compression/decompression algorithm, as well as the information contained in the raster data file header records regarding the image orientation, dimension, and pel density. The results of this comparison will be documented and included in a Conformance Test Report. The Conformance Testing Laboratory will then notify NIST of the test results, along with an evaluation stating whether the system being tested conforms or does not conform to MIL-R-28002A and MIL-STD-1840A. This evaluation signifies conformance under the specified system configuration only, and does not indicate whether the system being tested will conform under a different configuration. NIST will review and qualify these results for DoD. DoD will issue a letter of validation, Appendix E, for the tested implementation if NIST determines that the system complies with MIL-R-28002A and MIL-STD-1840A under the stated configuration.

Permissible Values for Document
Declaration File Records

Appendix A

All 15 records in the document declaration file must be present, and contain valid and correct information. The following are provided: a list of the records and a description of each record's content; and a sample document declaration file.

srcsys: Name and address of the sending organization; depending on who is preparing the tape, this record must contain the name and address of either the Conformance Testing Laboratory or the client responsible for the system being tested.

srcdocid: This record must contain a test identification number, supplied by the Conformance Testing Laboratory.

srcrelid: NONE

chglvl: ORIGINAL, YYYYMMDD

dteisus: YYYYMMDD (this date should be the same as the date in record 4)

dstsys: Name and address of the sending organization; depending on who is preparing the tape, this record must contain the name and address of either the Conformance Testing Laboratory or the client responsible for the system being tested.

dstdocid: This should be the test identification number, the same as in record 2.

dstrelid: NONE

dtetrn: YYYYMMDD (this is the date this document was transferred to magnetic tape)

dlvacc: NONE

filcnt: RNN (where NN = number of raster image files in this document)

ttlcls: Unclassified

doccls: Unclassified

doctyp: Test Images

docttl: Conformance Test Package

Sample Document Declaration File

Appendix A

srcsys: Tested Systems, Inc., 123 Tester Drive, Philadelphia, PA
19191
srcdocid: 124C41
srcrelid: NONE
chglvl: ORIGINAL, 19890719
dteis: 19890719
dstsys: Delta Information Systems, Horsham Business Center, 300
Welsh Road, Horsham, PA 19044
dstdocid: 124C41
dstrelid: NONE
dtetrn: 19890721
dlvacc: NONE
filcnt: R13
ttlcls: Unclassified
doccls: Unclassified
doctyp: Test Images
doctl: Conformance Test Package

Permissible Values for Raster
Data File Header Records

Appendix B

All 11 records of the raster data file header records must be present and contain valid information. A description of the records follows.

srcdocid: Refer to Paragraph 5.1.5 of MIL-STD-1840A

dstdocid: NONE

txtfilid: NONE

figid: NONE

srcgph: NONE

doccls: NONE

rtype: Contains a '1' for Type I compressed images, '2' for Type II encoded images, or a '9' for binary bit-map images

rorient: Contains '000,270' for portrait, or '090,270' for landscape

rpelcnt: NNNNNN,MMMMM (NNNNNN = # pels / line, MMMMM = lines per page)

rdensty: 0200 or 0300

notes: This record may contain a comment, or 'NONE'.

REQUEST FOR
RASTER CONFORMANCE TEST

Appendix C

Company Name: _____ Date: _____

Primary Contact

Technical Representative

Name: _____

Title: _____

Phone: _____

Address: _____

Configuration Information

Group 4 Processing (Sub)System -

Type of Data: I or II (Circle one)

Hardware: _____ Software: _____

Version/Release ID: _____ Release Date: _____

Chip Manufacturer: _____ Chip Number: _____

Interfaces-

Host Computer Mfr: _____ Model: _____

Operating System: _____

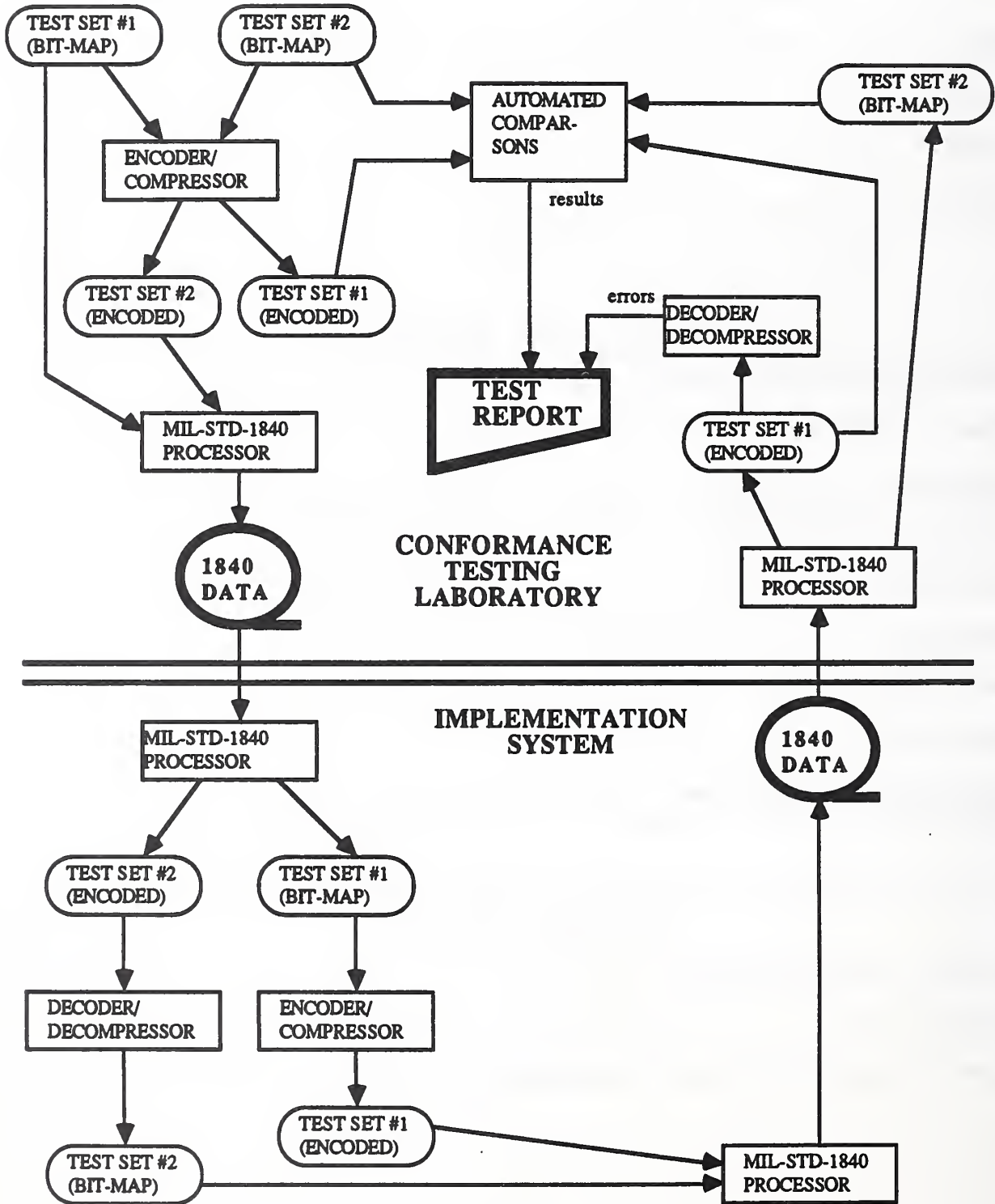
Other device interfaces: _____
(Attach additional documentation to describe different interfaces)

FOR NIST USE ONLY

Client Request Number: _____

Assigned to: _____ Date: _____

RASTER CONFORMANCE TESTING



LETTER OF VALIDATION

Appendix E

{Date}

This letter of validation is based on the conformance test results detailed in the Conformance Test Report, Number {actual number assigned to the report}. The compression/decompression processor of the tested Implementation System has been validated within a specific testing environment and according to MIL-STD-1840A and MIL-R-28002A. The Conformance Test Report should be reviewed because it provides details on the testing environment and the conformance test results.

Validation Holder: {name of client}

Processor Identification: {Compression/Decompression processor name and version}

Validation Environment:

Host Hardware: {validation hardware}
Hardware Options: {hardware options}
Operating System: {operating system and version}
Processor Chip: {name and version number}
Processor Board: {name and version number}
Other Processor-Dependent Requirements: {list any other requirements necessary for processing the Group 4 algorithm}

Expiration Date: {date}

Conformance Testing System: {system & version}

DoD Specification Conformance Tested: MIL-R-28002A, dated 20 December 1988, with change notice 1, dated 30 November 1989

Other related standards: Data interchanged using MIL-STD-1840A, dated 22 December 1987, with change notice 1, dated 20 December 1988

(Authorized Signature)

NOTE: Braces, {}, are used to identify all information unique to each client that must be completed on this form.

**Annex B: Instructions and Forms
for
Raster Conformance Testing
of
MIL-STD-1840A and MIL-R-28002A**

B.1 Inventory

The following should be found in the Conformance Testing Package:

- 1 copy of Testing Procedure - Instructions and Forms for Systems Undergoing Testing (this document)
- 1 Raster Conformance Test Specification form
- 1 Raster Test Release Authorization form
- 1 Raster Conformance Test Log form
- 1 Raster Test Incident Report form
- 1 Raster Conformance Processed Files form
- 1 Raster Test Results File form
- 1 sample packet of completed forms
- reel(s) of 9-track magnetic tape recorded at 1600 or 6250 CPI density

If any item on this list is missing, please contact the Conformance Testing Laboratory immediately.

B.2 Introduction

This document contains the instructions, forms, and information necessary to process the test images and complete the associated documentation forms and reports. Please make photocopies of all of the enclosed blank forms (especially the Raster Conformance Test Log and Raster Test Incident Report forms). Please note that, as of this point, any actions taken with the magnetic tape reels must be recorded as part of the testing procedure.

Each of the forms included with this package has a particular purpose and use in the test reports. The Raster Conformance Test Specification form is used to record a list of all files read from the tape(s). If the file is a raster file, the entry will also list the file type (compressed or uncompressed) and the image dimensions and orientation. A short description of the file's contents may also be included although this is not required.

The Raster Test Release Authorization merely authorizes the Conformance Testing Laboratory to release the results of the test to the National Institute of Standards and Technology (NIST). This form should be completed by the head of the client organization responsible for the system being tested.

The Raster Conformance Test Log is used to describe the events that take place during testing. There are spaces for the date and time the event occurred, a short description of the activities and events that occurred, and a space for incident report references. If an incident requiring further description occurs, make a notation in the 'Incident Report #' column and complete an Incident Report. A separate log should be kept for each major phase of the test. For example, there should be one log for the encoding of the bit-map images and one for the decoding of encoded images.

The Raster Test Results File form should be filled out by the client's team leader or supervisor. This is a certification that the documentation returned with the processed tape(s) is complete and accurate.

Every file processed and transferred back to magnetic tape should be entered on the Raster Conformance Processed Files form. Along with the image names, include the file's storage type (either binary bit-map or encoded type I or II), tape the file is on (if there is more than one tape volume), image orientation and dimensions, and any comments you may have about the image.

There is also a sample packet of completed forms with this package.

B.3 Recommended Testing Procedure

The Raster Conformance Test Log ("log") must be kept up to date and accurate during all phases of testing and a separate log kept for each of the major phases mentioned below. Each entry in the log should contain a brief description of the event, and the name of the software in use at the time the event occurred. References to incident reports should be numbered consecutively. Each log entry does not require an incident report; incident reports are generally reserved for events which have a major impact on the testing procedure or sequence, such as an error during image compression, the completion of a test run (successfully or not), a major catastrophe in the system's memory, or other event of similar magnitude.

The exact testing procedure will vary from system to system; however, the general procedure outlined below is applicable to all systems.

B.3.1 Initial Transfer of File Set #1 (Uncompressed Bit-mapped Images)

The recommended first stage of testing is the transfer of the uncompressed binary bit-map files from MIL-STD-1840A tape format to a form which the system's encoder/compressor can process. As the files are transferred from tape, record the file name and image dimensions and orientation on the Raster Conformance Test Specification form. If the system has appropriate facilities, you

may also provide a brief description of the image on the test specification form. Note the transfer in the log, along with any error events or incidents of note in incident reports. This step should be repeated until all files in File Set #1 (bit-map) are successfully transferred, as any information garbling at this stage will affect all other operations on File Set #1.

B.3.2 Encoding and Compression of File Set #1

Encoding and compression of File Set #1 is the next step. The encoding and compression of each individual file should be recorded in the log and incidents reported as appropriate. Note that some files may have negative compression.

B.3.3 Initial Transfer of File Set #2

The transfer procedure for the encoded/compressed image test set is approximately the same as that for File Set #1. The same type of information and parameters are recorded on the Raster Conformance Test Specification form and the log.

B.3.4 Decoding and Decompression of File Set #2

The decoding and decompression of File Set #2 (encoded) should follow basically the same format as that taken with the compression of File Set #1. Make a notation of the decoding/decompression of each individual file in the log, along with any errors or especially noteworthy incidents in incident reports. At this point, the tester may optionally write a short description of the image on the Raster Conformance Test Specification form. Please note that at least one image in File Set #2 may be improperly coded. It is not necessary to decompress an improperly coded image; it should not be included with the other files of File Set #2 when transferring the decompressed images back to tape. However, the incident report should document the coding error as fully as possible, e.g. line where the error was detected, nature of the coding error, etc.

B.3.5 Final Transfer of File Sets #1 and #2

At this point, every file in File Set #1 should have been encoded/compressed and every file in File Set #2 should have been decoded/decompressed to binary bit-map format (barring the file(s) with improper coding). These files should then be transferred back to magnetic tape as two separate documents, File Set #1 (encoded) comprising one document and File Set #2 (bit-map) comprising the other. Once again, these events should be entered into the log, and any errors or other significant events recorded on incident reports. Note also that if your original test package contained one magnetic tape, both documents should be returned on a single tape; if the test package contained two tapes, then the documents should be stored on separate magnetic tapes.

As each document is stored to tape, you should enter it on the Raster Conformance Processed Files form.

B.3.6 Completion of Report Forms

The Raster Test Release Authorization form must be completed by an individual with the authority to authorize the release of the results of the conformance test to NIST.

The Raster Test Results File form should be completed by the conformance test team leader, an authorized client representative, and a designated observer who was present during the entire test. This form states that the returned documentation is the complete and accurate record of the testing and processing performed.

B.4. Test Package Return

The processed tapes should be clearly marked as to their contents. You should return to the Conformance Testing Laboratory a package which includes the reel(s) of magnetic tape containing the processed images, the completed Raster Conformance Test Log (all completed sheets), all associated Raster Test Incident Reports, the completed Raster Conformance Processed Files form, the completed Results File form, and the completed Raster Test Release Authorization form. The absence or incompleteness of any portion of the test package will result in an incomplete test and a negative evaluation which will be documented in the Conformance Test Report.

**Raster Conformance
Test Specification**

Client Request Number: _____

Client Name: _____

Test Cases

(List both compressed and uncompressed images)

<u>Filename</u>	<u>Orientation</u>	<u>Dimensions</u>	<u>Comments/Notes</u>

**Raster Test
Release Authorization**

_____ hereby authorizes the
(Company Undergoing Test)
Conformance Testing Laboratory _____
to release the Conformance Test Report to the National Institute
of Standards and Technology for general distribution. The test
is identified as: _____.
(Client Request Number)

Authorized Signature: _____
Name: _____
Title: _____
Date: _____

Raster Conformance
Test Log

Client Request Number: _____

Person(s) Conducting Test: _____

Test Description:

Date / Time Activities and Event Entries Incident Report #

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**Raster Test
Incident Report**

Client Request Number: _____

Incident Report Number: _____

Description of Incident:

Impact of Incident Upon Test:

**Raster Conformance
Processed Files**

Client Request Number: _____

Client Name: _____

Test Cases

<u>Filename</u>	<u>Storage</u>	<u>Tape #</u>	<u>Orientation</u>	<u>Dimensions</u>	<u>Comments</u>

**Raster Test
Results File**

Client Request Number: _____

Software Identification: _____

The undersigned certify that the material and records contained in this file are all those and only those associated with the above identified Group 4 Compression / Decompression test.

(Team Leader)

(Affiliation)

(Client Representative)

(Affiliation)

(Observer - Optional)

(Affiliation)

Raster Conformance (SAMPLE)
Test Specification

Client Request Number: 124041

Client Name: Pokey Data Division

Test Cases
(List both compressed and uncompressed images)

Filename	Orientation	Dimensions	Comments/Notes
D001R001	000,270	1728x2200	diagonal stripe
D001R002	000,270	1728x2200	cross hatch pattern
D001R003	000,270	1728x2200	random dots
D002R001	000,270	1728x2200	logic diagram
D002R002	000,270	1728x2200	schematic diagram
D002R003	000,270	1728x2200	(improperly coded)

Raster Test
Release Authorization (SAMPLE)

Pokey Data Division
(Company Undergoing Test) hereby authorizes the
Conformance Testing Laboratory Compressor Checker, Inc.
to release the Conformance Test Report to the National Institute
of Standards and Technology for general distribution. The test
is identified as: 124C41
(Client Request Number).

Authorized Signature: Jane Doe
Name: Jane Doe
Title: VP, Operations
Date: 7/25/89

Raster Conformance (SAMPLE)
Test Log

Client Request Number: 124041

Person(s) Conducting Test: John Doe

Test Description: Transfer files from original tape to on-line mass storage: File Set #1

<u>Date / Time</u>	<u>Activities and Event Entries</u>	<u>Incident Report #</u>
<u>7/20/89 9:00</u>	<u>Test group assembled, main points reviewed</u>	
<u>9:05</u>	<u>Tape #1 (uncompressed images) loaded onto drive</u>	
<u>9:06</u>	<u>MIL-transfer tape processor begins run</u>	
<u>9:07</u>	<u>1st file (D001) transferred</u>	
<u>9:08</u>	<u>2nd file (D001R001) transferred</u>	
<u>9:09</u>	<u>3rd file (D001R002) transferred</u>	
<u>9:10</u>	<u>4th file (D001R003) transferred</u>	
<u>9:10</u>	<u>MIL-transfer reports all files in document transferred to disk</u>	
<u>9:11</u>	<u>MIL-transfer halted normally, end of tape-to-system file transfer test</u>	

Raster Conformance
Test Log (SAMPLE)

Client Request Number: 124C41

Person(s) Conducting Test: John Doe

Test Description: Compression of file Set #1

Date / Time	Activities and Event Entries	Incident Report #
7/20/84 10:00	Images D001R001-D001R003 viewed on monitor	
10:10	Group 4 Compressor begins	
10:11	Begin processing D001R001	
10:20	Finish D001R001 compression -normal	
10:21	Begin processing D001R002	
10:27	Finish D001R002 compression -normal	
10:28	Begin processing D001R003	
10:30	Buffer region overflow & program crashes	IR # 1
10:33	Program's memory management modifications finished	
10:50	Test of program complete	
10:55	Begin processing D001R003 again	
11:25	Finish D001R003 compression -normal	
11:30	Program halts normally, end of test (Set #1)	

Raster Conformance
Test Log (SAMPLE)

Client Request Number: 124 C41

Person(s) Conducting Test: John Doe

Test Description: Transfer files from original tape to
on-line mass storage: File Set #2

<u>Date / Time</u>	<u>Activities and Event Entries</u>	<u>Incident Report #</u>
<u>7/21/89 9:00</u>	<u>Tape #2 (compressed images)</u> <u>loaded onto drive</u>	
<u>9:01</u>	<u>MIL-transfer tape processor</u> <u>begins run</u>	
<u>9:02</u>	<u>1st file (D002) transferred</u>	
<u>9:03</u>	<u>2nd file (D002 R001) transferred</u>	
<u>9:04</u>	<u>3rd file (D002 R002) transferred</u>	
<u>9:05</u>	<u>4th file (D002 R003) transferred</u>	
<u>9:05</u>	<u>MIL-transfer tape processor</u> <u>reports all files in</u> <u>document transferred to</u> <u>disk</u>	
<u>9:06</u>	<u>MIL-transfer halted normally,</u> <u>end of tape-to-system file</u> <u>transfer test</u>	

Raster Conformance Test Log (SAMPLE)

Client Request Number: 124041

Person(s) Conducting Test: John Doe

Test Description: Decompression of File Set #2

Date / Time	Activities and Event Entries	Incident Report #
7/21/89 10:00	Group 4 Decompressor begins run	
10:01	Begin processing D002R001	
10:17	Finish D002R001 Decompression - normal	
10:18	Begin processing D002R002	
10:24	Finish D002R002 Decompression - normal	
10:25	Begin processing D002R003	
10:27	Program reports D002R003 improper coding & exits	IR #2
10:28	Program invoked on D002R003 with full diagnostics	
10:33	Program reports improper coding at line 103, line runs past end of image	IR #3
10:34	Program halted normally, end of test (set #2)	

Raster Test
Incident Report (SAMPLE)

Client Request Number: 124041

Incident Report Number: IR#1

Description of Incident:

Group 4 Compression program reported a buffer memory region overflow. This was apparently due to negative compression of the image to an unexpected degree.

Impact of Incident Upon Test: Negligible. Error corrected by increasing memory buffer region available to the program. No other modifications required.

Raster Test
Incident Report (SAMPLE)

Client Request Number: 124C41

Incident Report Number: IR # 2

Description of Incident:

Group 4 Decompressor program reported an improper line encoded while decompressing Group 4 image D002 R003. Program then halted execution.

Impact of Incident Upon Test:

Indeterminate at this time. Most probable is that improper coding in image is detected. Program will be run with full diagnostics in operation to determine whether error is in image and/or in program.

Raster Test
Incident Report (SAMPLE)

Client Request Number: 124C41

Incident Report Number: IR# 3

Description of Incident:

Group 4 Decompressor program reported image encoded at line 103 of image. Program then suspended operation and was halted normally by system operator.

Impact of Incident Upon Test:

Program determined improper coding of the line. Error was found to be located in the image coding, not the software. This indicates successful completion of this test segment.

Raster Conformance (SAMPLE)
Processed Files

Client Request Number: 124041

Client Name: Pokey Data Division

Test Cases

Filename	Storage	Tape #	Orientation	Dimensions	Comments
D001R001	Gp4	1	000,270	1728 X 2200	
D001R002	Gp4	1	000,270	1728 X 2200	
D001R003	Gp4	1	000,270	1728 X 2200	
D002R001	bitmap	2	000,270	1728 X 2200	
D002R002	bitmap	2	000,270	1728 X 2200	

Raster Test
Results File (SAMPLE)

Client Request Number: 124C41

Software Identification: Group 4. V1

The undersigned certify that the material and records contained in this file are all those and only those associated with the above identified Group 4 Compression / Decompression test.

John Doe
(Team Leader)

Poker Data Division
(Affiliation)

Jane Doe
(Client Representative)

Poker Data Division
(Affiliation)

J.M. Verifier
(Observer - Optional)

Compression Checker, Inc.
(Affiliation)

Annex C

NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM

FEE SCHEDULE (EFFECTIVE 10/1/89)

PROGRAM	TEST METHOD FEE (each)	PROFICIENCY TESTING FEE	INITIAL ONE TIME FEE (1)	ADMIN./TECH. SUPPORT FEE (2)	ON-SITE ASSESSMENT FEE (3)
ACOUSTICAL TESTING SERVICES	\$65		\$250	\$1,250	\$1,200
ASBESTOS FIBER ANALYSIS:					
BULK (PLM) ONLY	\$250	\$700	\$250	\$1,650	\$1,200 (4)
AIRBORNE (TEM) ONLY	\$350	\$3,100	\$250	\$3,250	\$1,500 (4)
BOTH PLM & TEM	\$600	\$3,800	\$250	\$3,650	\$1,750 (4)
CARPET TESTING	\$35	\$750	\$250	\$1,250	\$1,200
COMMERCIAL PRODUCTS TESTING	\$20		\$250	\$1,250	\$1,200
COMPUTER APPLICATIONS TESTING	\$125	\$100/test method	\$250	\$1,250	\$1,200/test method
CONSTRUCTION TESTING SERVICES	\$15		\$250	\$1,250	\$1,200
ELECTROMAGNETIC COM. & TEL.:					
FCC	\$160	\$250	\$250	\$1,250	\$1,200
MIL-STD 462	\$25	\$100	\$250	\$1,250	\$2,400
PERSONNEL RADIATION DOSIMETRY	\$90	See (5) below	\$250	\$1,250	\$400 for 1-20 categories \$900 for 21 or more categories
SOLID FUEL ROOM HEATERS	\$10		\$250	\$1,250	\$1,200
THERMAL INSULATION MATERIALS	\$30	\$400	\$250	\$1,250	\$1,200

(1) One time per program only. Do not pay this fee if this is a renewal application.

(2) The Annual Administrative/Technical Support fee is assessed at the time a laboratory applies for initial accreditation and, thereafter, is due with each renewal application. This fixed fee is paid annually regardless of the number of programs in which a laboratory participates.

(3) The On-Site Assessment fee is due every other year. Pay this fee only in the year in which notification is received that an on-site assessment will be performed.

(4) This On-Site Assessment fee applies to both main and sub-facilities.

(5) The Dosimetry Proficiency Testing fee is due every other year. Pay this fee only in the year in which notification is received that proficiency testing must be performed. The Proficiency Testing fee is calculated on the Dosimeter and Test Category Selection form.

**Annex D: Accrediting Testing Laboratories
for
Standard for the Exchange of
Product Model Data (STEP)**

D.3.4 Criteria for Accrediting Testing Laboratories

The criteria address a laboratory's quality system, staff, facilities and equipment, test methods and procedures, records, and test reports. Following ISO/IEC Guide 25, the criteria below should be considered in order for a testing laboratory to be accredited:

D.3.4.1 Quality Assurance System

- the laboratory should operate an internal quality assurance program appropriate to the type, range, and volume of work performed. The quality assurance program should be documented in a quality assurance manual which is available for use by the laboratory staff. The manual should be maintained as relevant and current by a responsible member of the laboratory staff. A person or persons having responsibility for quality assurance within the laboratory should be designated by the laboratory management and have direct access to top management.

- the quality assurance manual contains information regarding:

- a) the structure of the laboratory (organizational charts);
- b) the operational and functional duties and services pertaining to quality, so that each person concerned will know the extent and the limits of his responsibility;
- c) general quality assurance procedures;
- d) quality assurance procedures specific for each test, as appropriate;
- e) where appropriate, proficiency testing, use of reference material, etc;
- f) satisfactory arrangements for feedback and corrective action whenever testing discrepancies are detected;
- g) procedure for dealing with technical complaints.

- the quality system should be systematically and periodically reviewed by, or on behalf of, management to ensure the continued effectiveness of the arrangements, and corrective action initiated. Such internal quality audits should be recorded together with details of any corrective action taken.

D.3.4.2 Testing Laboratory Staff

- staff should have the necessary education, training, technical knowledge and experience for their assigned functions.
- there should be a job description for each position category, which includes the necessary education, training, technical knowledge and experience.
- the proportion of supervisory to non-supervisory staff should be such as to ensure adequate supervision.
- suitable staff should be nominated to deputize for the senior technical and quality system management staff in their absence.
- information on the relevant qualifications, training, and experience of the technical staff should be maintained by the laboratory.

NOTE - In small laboratories, one person may fulfill more than one function.

D.3.4.3 Testing Equipment

- the testing laboratory should have access to all items of equipment required for correct execution of the conformance testing services for which it is recognized.
- all equipment should be properly maintained to ensure protection from deterioration. Instructions for a proper maintenance procedure for those items of equipment which require periodical maintenance should be available.
- any item of the equipment which has been subjected to overloading or mishandling, or which gives suspect results, or has been shown to be defective, should be taken out of service and clearly labelled until it has been repaired and then shown by testing to be performing its function satisfactorily.
- records should be maintained on each major item of equipment. Each record should include:
 - a) the name of the item of equipment;
 - b) the manufacturer's name and type identification and serial number;
 - c) date received and date placed in service;
 - d) current location, where appropriate;
 - e) details of maintenance.

D.3.4.4 Test Methods and Procedures

- the testing laboratory should have adequate documented instructions on the use and operation of all relevant equipment, on the handling and preparation of test items (where applicable), and on standard testing techniques. All instructions, standards, manuals, and reference data relevant to the work of the testing laboratory should be maintained up-to-date and be readily available to the staff.

- all manual calculation and data transfers should be subject to appropriate checks.

- where these results are derived by electronic data processing techniques, the stability of the system should be such that the accuracy of the results is not affected. This implies an ability to detect malfunctions in the hardware during program execution and to take appropriate action.

D.3.4.5 Environment

- the environment in which the tests are undertaken should not invalidate the test results or adversely affect the required accuracy. The testing premises should be protected as required from conditions such as excessive temperature, dust, moisture, steam, vibration, electromagnetic disturbance and interference, and should be maintained accordingly. There should be sufficient space to limit the risk of damage or danger and to allow operators to make practical and precise movements. The premises should have the equipment and energy sources needed for the testing.

- access to and use of all laboratory areas used for testing should be controlled in a manner appropriate to their designated purpose. Procedures should be defined to explain allowable entry by those not routinely cleared for laboratory admittance.

- adequate measures should be taken to ensure good housekeeping in the testing laboratory.

D.3.4.6 Records

- the testing laboratory should maintain a record system to suit its particular circumstances and comply with any existing regulations. It should retain on record all original observations, calculations and derived data, and the final test report for an appropriate period as designated by national requirements. The records for each test must contain sufficient information to permit satisfactory repetition of the test.

NOTE - In some countries it may be necessary to maintain records for a period specified by law.

- all records should be held secure and in confidence to the Client, unless otherwise required by law.

D.3.4.7 Test Reports

- the work carried out by the testing laboratory should be covered by a report which accurately, clearly, and unambiguously presents the test results and all other relevant information.

- each test report should include at least the following information:

- a) name and address of testing laboratory;
- b) unique identification of report (such as serial number), and of each page of the report sequential numbering);
- c) name and address of client;
- d) description and identification of the test item;
- e) date(s) of performance of test, as appropriate;
- f) a statement to the effect that the test results relate only to the items tested;
- g) identification of the abstract test suite and abstract test method;
- h) description of sampling procedure, where relevant;
- i) any deviations, additions to, or exclusions from the abstract test suite, and any other information relevant to a specific test;
- j) disclosure of any nonstandard test method or procedure utilized;
- k) derived results, supported by tables, graphs, sketches, and photographs as appropriate, and any failures identified;
- l) a statement on test performance uncertainty where relevant;
- m) a signature and title of person(s) accepting technical responsibility for the test report and date of issue;
- n) a statement that the report should not be reproduced, except in full, without the approval of the testing laboratory.

- corrections or additions to a test report after issue should be made only by a further document suitably marked, e.g., "Supplement to test report serial number or as otherwise identified," and should meet the relevant requirements of the preceding paragraphs.

D.3.5 Testing Laboratory Assessment

D.3.5.1 Testing Laboratory Application

Attachment (1) of this annex provides a sample application for a testing laboratory to complete prior to on-site assessment. In accepting an application from a foreign-based laboratory, consideration should be given to the policy of the host government regarding the acceptance of test data from laboratories accredited by other domestic or foreign accreditation systems.

D.3.5.2 On-Site Assessment

Before initial accreditation and about every two years thereafter, an on-site assessment of each laboratory is conducted to determine compliance with the criteria. Assessors use standardized checklists so each laboratory receives a fair assessment in relation to others; however, assessors have considerable latitude in judgments about each laboratory's compliance with the criteria depending on the unique circumstances of each laboratory. The assessors are selected and assigned on the basis of their expertise in the testing techniques to be reviewed. The time needed to conduct an assessment varies, but every effort is made to conduct an assessment with as little disruption as possible to the normal operations of the laboratory.

The assessors:

- meet with management and supervisory personnel responsible for the laboratory's activities for which accreditation is being sought to acquaint the individuals involved and to set the assessment agenda;
- examine the quality system employed by the laboratory, its major equipment, apparatus, and facilities;
- thoroughly review the laboratory's quality manual or equivalent, examine technician notebooks for records pertaining to the samples, check sample identification and tracking procedures, determine whether the appropriate conditions are maintained, and examine copies of completed test reports;
- review records of periodic internal audits;
- review representative records including competency evaluations for all testing laboratory staff members;
- observe demonstrations of testing techniques and discuss them with the technical personnel to assure their understanding of the procedures. If possible the history of one or more samples from receipt to final issue of test reports is traced.

At the conclusion of the assessment, an exit briefing is held to discuss assessment findings with laboratory management and identify any deficiencies uncovered. A written summary of all identified deficiencies is left at the laboratory. Assessment forms and a written report is submitted to the Accreditation Authority for further evaluation. The laboratory is asked to respond within 30 days of the date of the exit briefing and provide documentation or proof that the specific deficiencies have been corrected or that specific actions are being taken. Any laboratory applying for initial accreditation may request a delay in responding. If any deficiencies are noted at laboratories which are currently accredited, such deficiencies should be corrected within 30 days after the exit briefing or the laboratory may face possible suspension, revocation or expiration of its accreditation. When test systems are identified as malfunctioning, they must not be used until corrective action has been completed. Any deficiencies noted for corrective action will be subject to thorough review during subsequent assessments.

D.3.5.3 Monitoring Visits

In addition to regularly scheduled assessments, monitoring visits can be made at any time during the accreditation period. Monitoring visits serve to verify reported changes in the laboratory's personnel, facilities, and operations, or to explore possible reasons for poor performance in proficiency testing. The scope of a monitoring visit may range from checking a few designated items to a complete review. Failure to cooperate with assessors or their representatives may be grounds for adverse accreditation action.

D.3.5.4 Proficiency Testing

Proficiency testing is an integral part of the accreditation process. While the existence of facilities, equipment, and personnel which satisfy the criteria indicates a laboratory's overall capability to obtain good results, an analysis of actual test results for certain test methods is also necessary to determine if the overall capability does in fact produce the desired results. A laboratory's failure to participate fully in the conduct of required proficiency testing is grounds for adverse accreditation action.

D.3.5.5 Evaluation

Evaluation of a laboratory is conducted by technical experts approved by the Accreditation Body who review records on the applicant laboratory and base their decision on:

- information provided on the application;
- on-site assessment reports;
- actions taken by the laboratory to correct deficiencies;

- results of proficiency testing; and
- information from any monitoring visits performed on the laboratory.

If the technical evaluation reveals additional deficiencies, written notification describing them will be made to the laboratory. The laboratory must respond within 30 days of receipt of such notification and provide documentation that the specified deficiencies have been corrected. Clarification of some issues may be requested by telephone. All deficiencies must be corrected before accreditation can be granted or renewed.

NIST-114A (REV. 3-90)	U.S. DEPARTMENT OF COMMERCE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY BIBLIOGRAPHIC DATA SHEET	1. PUBLICATION OR REPORT NUMBER NISTIR-4524
		2. PERFORMING ORGANIZATION REPORT NUMBER -
		3. PUBLICATION DATE FEBRUARY 1991
4. TITLE AND SUBTITLE Raster Graphics Conformance Testing		
5. AUTHOR(S) Frankie E. Spielman		
6. PERFORMING ORGANIZATION (IF JOINT OR OTHER THAN NIST, SEE INSTRUCTIONS) U.S. DEPARTMENT OF COMMERCE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY GAITHERSBURG, MD 20899		7. CONTRACT/GRANT NUMBER 8. TYPE OF REPORT AND PERIOD COVERED
9. SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS (STREET, CITY, STATE, ZIP) 		
10. SUPPLEMENTARY NOTES 		
11. ABSTRACT (A 200-WORD OR LESS FACTUAL SUMMARY OF MOST SIGNIFICANT INFORMATION. IF DOCUMENT INCLUDES A SIGNIFICANT BIBLIOGRAPHY OR LITERATURE SURVEY, MENTION IT HERE.) This publication is a report which evaluates the alternatives for identifying and selecting a conformance testing laboratory for raster graphics in support of the Department of Defense (DoD) Computer-aided Acquisition and Logistic Support (CALs) Program. It discusses and analyzes four different approaches to selecting a conformance testing laboratory. After discussing the approaches, it recommends an alternative for DoD to pursue in selecting a laboratory for conducting conformance testing of raster graphics implementations. The annexes to the report describe the requirements, procedures, forms, and criteria necessary for establishing and managing a raster graphics conformance testing program.		
12. KEY WORDS (6 TO 12 ENTRIES; ALPHABETICAL ORDER; CAPITALIZE ONLY PROPER NAMES; AND SEPARATE KEY WORDS BY SEMICOLONS) accreditation, CALs, conformance testing, laboratory assessment, raster graphics, testing forms, testing laboratories, testing procedures.		
13. AVAILABILITY <input checked="" type="checkbox"/> UNLIMITED FOR OFFICIAL DISTRIBUTION. DO NOT RELEASE TO NATIONAL TECHNICAL INFORMATION SERVICE (NTIS). <input type="checkbox"/> ORDER FROM SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, DC 20402. <input checked="" type="checkbox"/> ORDER FROM NATIONAL TECHNICAL INFORMATION SERVICE (NTIS), SPRINGFIELD, VA 22161.		14. NUMBER OF PRINTED PAGES 53 15. PRICE A04

ELECTRONIC FORM

