



CTN Report
91-046

UCRL-ID-109110



Prepared for
Air Force Logistics Command



Prepared by
Lawrence Livermore National Laboratory

The CALS Test Network MIL-D-28003 CGM Test Packet

November 25, 1991

DTIC QUALITY INSPECTED

19960826 089

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

The CALS Test Network
MIL-D-28003 CGM
Test Packet

November 25, 1991

Prepared by
Lawrence Livermore
National Laboratory

LLNL Contacts
Bruce Garner
(510) 422-8370

Lisa J. Nafziger
(510) 423-7355

AFLC Contact
Mel Lammers
(513) 257-3085



Prepared for
Air Force Logistics Command



Lawrence Livermore National Laboratory

Contents

Preface	iii
Abstract	iv
1 Introduction	1
2 Scope	2
3 Technical Content of the MIL-D-28003 (CGM) Test Packet	3
4 Technical Content and Creation of the Reference Material	4
4.1 The CTN Graphical Primitive Elements Reference Metafile ...	4
4.2 Development of the Reference CGMs	4
4.3 The Script	4
5 Conclusion	5

ATTACHMENTS

A	Contents of the CTN MIL-D-28003 (CGM) Test Packet Floppy Disk	A-1
B	Illustration of the CTN Graphical Primitive Elements Reference Metafile	B-1
C	Attributes of the CTN Graphical Primitive Elements Reference Metafile	C-1
D	Procedures for Executing the CTN Reference CGM Interpreter Test	D-1
E	CTN Graphical Primitive Elements Reference Metafile Evaluation Script	E-1
F	Clear Text Printout of the Graphical Primitive Elements Reference CGM	F-1
G	Glossary	G-1
H	List of Acronyms and Abbreviations	H-1

Preface

This CALS Test Network MIL-D-28003 (CGM) Test Packet is a document which will have periodic updates. These will occur as the reference images and their associated procedures, scripts, and files are corrected for oversights and/or are updated to new versions of the standards.

We acknowledge the following people for their technical assistance: Phil Andrews, Pittsburgh Supercomputing Center; Lofton Henderson, Henderson Software.

Please use the information contained in this packet at your own risk. Send recommendations for change or comments about the content to:

Lisa J. Nafziger, CGM Lead Analyst
Bruce Garner, CTN Lead Analyst
CALS Test Network Office Test Bed
Lawrence Livermore National Laboratory
P.O. Box 808, L-542
Livermore, CA 94551

Abstract

This CALS Test Network MIL-D-28003 (CGM) Test Packet, together with the floppy disk described in Attachment A, contains information useful in conducting tests of the military specification MIL-D-28003 using CGM interpreters. The use of this material helps evaluate and demonstrate industry's and government's use of MIL-D-28003 in accordance with the CALS initiative. The CALS Test Network (CTN), the organization tasked with testing and demonstrating the CALS digital data interchange standards among industry and government, will use this packet in the tests that it conducts. The results derived from this testing will allow the CTN to suggest modifications to vendors' CGM software, the ANSI/ISO standard for CGM, and most importantly, the MIL-D-28003 military specification. However, the greatest use of this test packet is expected to be by industry and Service components as they test and evaluate their own CALS CGM capabilities independently of the CTN.

1 Introduction

The CALS Test Network (CTN) is a Department of Defense (DoD) and industry consortium within the Computer-aided Acquisition and Logistic Support (CALS) Program. It is tasked with testing and demonstrating the interchange of digital technical information using the CALS standards in user applications.

The CTN will use the Graphical Primitive elements reference Computer Graphics Metafile (CGM) described herein during transfer testing of CGM data. Specifically, this reference CGM (reference metafile) demonstrates the use of the CGM elements identified in the military specification MIL-D-28003. The results derived from this testing will allow the CTN to suggest modifications to vendors' CTN software, the ANSI/ISO standard for CGM, and most importantly, the MIL-D-28003 military specification, itself. However, the greatest use of this test packet is expected to be by industry and Service components as they test and evaluate their own CAL CGM capabilities independently of the CTN.

MIL-D-28003 defines a major subset of the ISO 8632 (CGM) standard format to be used for interchanging 2-dimensional (2-D) graphical data between dissimilar system. The CALS standards indicate that this subset is the preferred format for the interchange of technical publication illustrations; it is also beginning to be used for transferring 2-D engineering drawings.

2 Scope

The CTN Graphical Primitive Elements reference CGM is a metafile which contains instances of the 18 CGM primitives allowed by MIL-D-28003. While each allowable primitive is represented, some attribute elements are not covered. For example, the Graphical Primitive Elements reference metafile does not test an interpreter's ability to handle minimum and maximum values, to render all line types and hatch styles, to handle clipping, bundling, and escape elements, or to parse and skip any elements that the interpreter does not support. Later versions of this test packet will extend the scope.

It cannot be stressed enough that the purpose of CTN testing and of this test packet is to evaluate and demonstrate industry and government use of MIL-D-28003 and not to validate conformance of generators, interpreters, or metafiles to MIL-D-28003. The former testing is really "field" testing of the standard itself in an attempt to discover ambiguities and inconsistencies revealed by implementations. The latter testing validates specific files or interpreters/generators and in effect "guarantees" that they conform to MIL-D-28003; this type of testing is not within the CTN charter.

3 Technical Content of the MIL-D-28003 (CGM) Test Packet

The CTN MIL-D-28003 CGM Test Packet you are currently reading contains a set of reference materials that may be used to execute a test involving a vendor's CGM interpreter. It contains:

1. A listing of the contents of the CGM Test Packet Floppy Disk.
2. An illustration of how the Graphical Primitive Elements reference metafile should look.
3. A chart of the attributes used in the Graphical Primitive Elements reference metafile .
4. Procedures to follow in conducting a CGM interpreter test.
5. A floppy disk containing four different forms of the CTN Graphical Primitive Elements reference metafile.
6. An evaluation script (sets of questions) to complete after the Graphical Primitive Elements reference metafile has appeared on the screen.
7. A paper printout of the clear text forms of the Graphical Primitive Elements reference metafile. This is included for reference only.
8. A glossary listing.
9. A list of Acronyms and Abbreviations used.

With the exception of item 5, the floppy disk, the above-mentioned materials are contained in Attachments A through H.

4 Technical Content and Creation of the Reference Material

4.1 The CTN Graphical Primitive Elements Reference Metafile

The CTN Graphical Primitive Elements reference metafile is comprised of all the geometric and many of the annotation CGM elements identified in the MIL-D-28003 specification. The illustration is organized so the elements reside individually by element within one box of a grid. This grid box is labeled to show which element it should contain.

4.2 Development of the Reference CGMs

Both the real and integer forms of the Graphical Primitive Elements reference metafile were hand-created as clear text files, then translated into binary files via GPLOT, a copyrighted program available at no cost from Pittsburgh Supercomputing Center by downloading it over Internet. This hand-editing produced CGM files that incorporate all MIL-D-28003 graphical primitive elements and pass ValidCGM and MetaCALs CGM analyzers with no accountable errors.

One difficulty with designing a test CGM is the breadth of correct interpretations. For example, the description of the Restricted Text element states that the text must fit into a box, but does not describe how the text must fit. Therefore text which fits inside the box as closely as possible is as legal as text which fits anywhere inside the box. This yields different visual representations from the same CGM, which complicates a visual inspection for correctness. Future versions of the standard will not contain these ambiguities.

4.3 The Script

The test packet contains a script which describes how to evaluate the resulting illustration. The script asks questions that try to address DoD's present requirements for transfer of digital illustration data. Another evaluation aide, the CALS Test Network Transfer Test Procedure Checklist, is available separately from the CTN.

5 Conclusion

By following the procedures described in this CTN MIL-D-28003 (CGM) Test Packet and by referring to the script, plot, and data lists contained within, one can examine digital illustration transfers using CGM and MIL-D-28003. This packet does not validate a vendor's conformance to MIL-D-28003, but instead allows the CALS Test Network to demonstrate and evaluate industry/government use of the MIL-D-28003 specification. The packet is also useful to industry and Service components for independent evaluation of their internal MIL-D-28003 capabilities.

**ATTACHMENT A Contents of the CTN MIL-D-28003
(CGM) Test Packet Floppy Disk**

The floppy disk included with this CTN MIL-D-28003 (CGM) Test Packet contains four files, each a different representation (form) of the same image. These are version "D" of the reference metafiles.

- CTN-01i.clr This is a clear text CGM of the integer version of the Graphical Primitive Elements reference metafile. It is not a legal MIL-D-28003 file because it is not a binary format file. The binary version, CTN-01i.cgm, was translated from this file using GPLOT.
- CTN-01i.cgm This is the binary CGM of the integer version of the Graphical Primitive Elements reference metafile, created by translation from the clear text CGM, CTN-01i.clr. This metafile is a MIL-D-28003 file.
- CTN-01r.clr This is a clear text CGM of the real version of the Graphical Primitive Elements reference metafile. It is not a legal MIL-D-28003 file because it is not a binary format file. The binary version, CTN-01r.cgm, was translated from this file using GPLOT.
- CTN-01r.cgm This is the binary CGM of the real version of the Graphical Primitive Elements reference metafile, created by translation from the clear text CGM, CTN-01r.clr. This metafile is a MIL-D-28003 file.

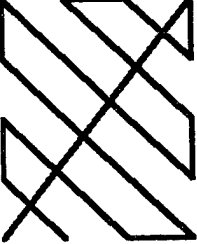
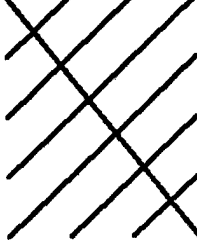
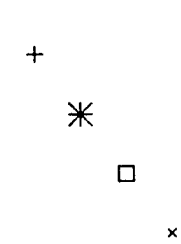
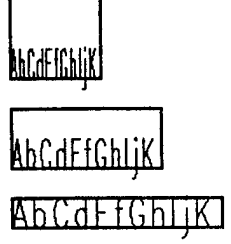
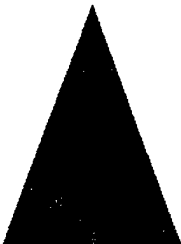
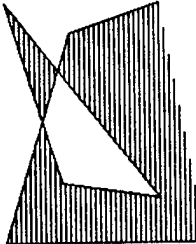
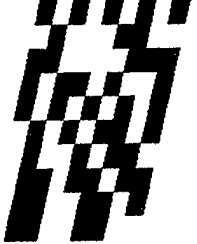
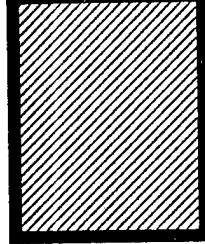
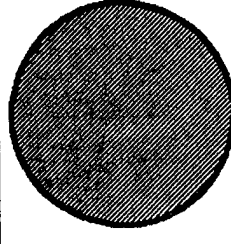
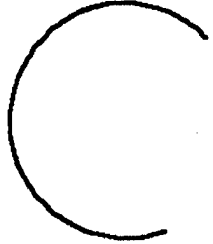
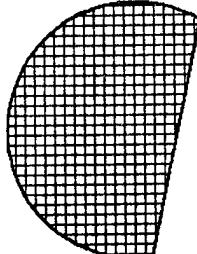
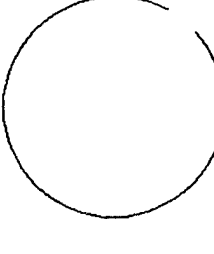
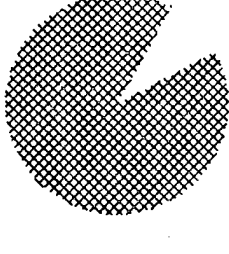
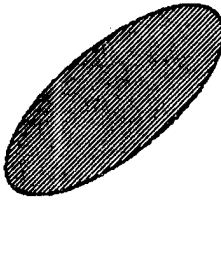

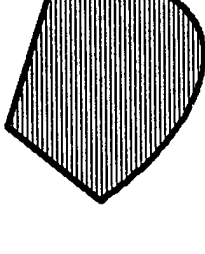
These files include the eighteen graphical primitive elements of CGM that are allowed under MIL-D-28003. Each is displayed in one of eighteen boxes in a three by six array. Only minimal use is made of attribute elements such as LINE WIDTH, LINE COLOUR, LINE TYPE, EDGE WIDTH, EDGE COLOUR, and EDGE TYPE. The eighteen boxes are numbered 1-9 and 11-19. Box 10, corresponding to the GENERALIZED DRAWING PRIMITIVE element, is not included since this element is not permitted by MIL-D-28003.

Text size and spacing were adjusted to give good appearance with one interpreter and may not "fit" as well when viewed with other CGM interpreters.

ATTACHMENT B

**Illustration of the CTN Graphical
Primitive Elements Reference Metafile**

Note: This plot incorrectly shows a square as one of the polymarkers. The square should be a circle. Also, the fill pattern in the circle and the ellipse are incorrect as shown.

 <p>(1) POLYLINE</p>	 <p>(2) DISJOINT POLYLINE</p>	 <p>(3) POLYMARKER</p>	<p>TFEL D O W N</p> <p>.ABCD .ABCD</p> <p>(4) TEXT</p>	 <p>(5) RESTRICTED TEXT</p>	<p>.ABC+D</p> <p>(6) APPEND TEXT</p>
 <p>(7) POLYGON</p>	 <p>(8) POLYGON SET</p>	 <p>(9) CELL ARRAY</p>	 <p>(11) RECTANGLE</p>	 <p>(12) CIRCLE</p>	 <p>(13) CIRCULAR ARC 3 POINT</p>
 <p>(14) CIRCULAR ARC 3 POINT CLOSE</p>	 <p>(15) CIRCULAR ARC CENTRE</p>	 <p>(16) CIRCULAR ARC CENTRE CLOSE</p>	 <p>(17) ELLIPSE</p>	 <p>(18) ELLIPTICAL ARC</p>	 <p>(19) ELLIPTICAL ARC CLOSE</p>
<p>LINE TYPE</p> <p>1. _____</p> <p>2. - - - - -</p> <p>3.</p> <p>4. - . - . - .</p>				<p>CALS TEST NETWORK MIL-D-28003 Computer Graphics Metafile File: CTN-011d, Draft 91-10-03</p>	

ATTACHMENT C

**Attributes of the CTN Graphical
Primitive Elements Reference Metafile**

This plot shows the attributes used in each grid section. It is included to assist visual inspection of the CGM.

<p>OPEN FIGURE: LINE: Type.: solid Width: 4 Color: red</p> <p>(1) POLYLINE</p>	<p>OPEN FIGURE: LINE: Type.: solid Width: 3 Color: green</p> <p>(2) DISJOINT POLYLINE</p>	<p>Marker: Mark Size Color . 1 black + 2 red * 3 green o 2 blue x 1 magenta</p> <p>(3) POLYMARKER</p>	<p>TEXT ELEMENT: Font: SIMPLEX_ROMAN String Orient Color .ABCD Right magenta .ABCD Diag orange LEFT Left cyan DOWN Down blue</p> <p>(4) TEXT</p>	<p>TEXT ELEMENT: Font: SIMPLEX_ROMAN CharHeight 0.02 CharSpace 0.25 Color: blue</p> <p>(5) RESTRICTED TEXT</p>	<p>TEXT ELEMENT: CharSpace 0.25 'ABC' DUPLEX_ROMAN Height: 0.02 Color: red '+D' COMPLEX_ROMAN Height: 0.03 Color: blue</p> <p>(6) APPEND TEXT</p>
<p>CLOSED FIGURE: Edge - Type: solid Width: 2 Color: blue Vis: on Fill - Type: solid Pattern: n/a Color: yellow</p> <p>(7) POLYGON</p>	<p>CLOSED FIGURE: Edge - Type: solid Width: 2 Color: black Fill - Type: hatch Pattern: Vert lines Color: yellow</p> <p>(8) POLYGON SET</p>	<p>r . g . b . y . m . c . . . r r . . g c . . . b r r g . r r . c . . c g . g . b . m . m . r . g . m m . c . g . . y . m g . . b b . y g . b y . y y . . g b . c . m m . . g y . .</p> <p>(9) CELL ARRAY</p>	<p>CLOSED FIGURE: Edge - Type: solid Width: 10 Color: cyan Fill - Type: hatch Pattern: Diag lines // Color: magenta</p> <p>(11) RECTANGLE</p>	<p>CLOSED FIGURE: Edge - Type: solid Width: 4 Color: green Fill - Type: hatch Pattern: Diag lines \\ Color: blue</p> <p>(12) CIRCLE</p>	<p>OPEN FIGURE: LINE: Type.: solid Width: 1 Color: green</p> <p>(13) CIRCULAR ARC 3 POINT</p>
<p>CLOSED FIGURE: Edge - Type: solid Width: 2 Color: yellow Fill - Type: hatch Pattern: Xhatch Vert/Horiz</p> <p>(14) CIRCULAR ARC 3 POINT CLOSE</p>	<p>OPEN FIGURE: LINE: Type.: solid Width: 1 Color: green</p> <p>(15) CIRCULAR ARC CENTRE</p>	<p>CLOSED FIGURE: Edge - Vis: OFF Width: 2 Color: blue Fill - Type: hatch Pattern: Xhatch Diag/Diag</p> <p>(16) CIRCULAR ARC CENTRE CLOSE</p>	<p>CLOSED FIGURE: Edge - Type: solid Width: 2 Color: magenta Fill - Type: hatch Pattern: Diag lines \\\</p> <p>(17) ELLIPSE</p>	<p>OPEN FIGURE: LINE: Type.: solid Width: 6 Color: GREEN</p> <p>(18) ELLIPTICAL ARC</p>	<p>CLOSED FIGURE: Edge - Type: solid Width: 4 Color: magenta Fill - Type: hatch Pattern: Vert lines </p> <p>(19) ELLIPTICAL ARC CLOSE</p>
<p>LINE TYPE Line types: 1 solid, 2 dash, 3 dot, 4 dash-dot, 5 dash-dot-dot. Line color: red Line width: 2</p>				<p>CALS TEST NETWORK MIL-D-28003 Computer Graphics Metafile File: CTN-01Rd/key, 91-10-02</p>	

**ATTACHMENT D Procedures for Executing the CTN
Reference CGM Interpreter Test**

1. Receive a floppy disk from the CALS Test Network containing the CTN Graphical Primitive Elements reference CGMs in MIL-D-28003 format.
2. Process the binary files through your CGM interpreter.
3. Inspect the resulting illustrations and answer the questions listed in the evaluation script (Attachment E). If you answer "no" to any of the questions, explain why on the incident report sheets which follow the script. Attach additional sheets if necessary.
4. Generate a hard copy plot of CTN-01i.cgm and CTN-01r.cgm.
5. If you are conducting a self-test, collect the script, plot, and any incident reports for self-evaluation. If you pre-arranged a formal CTN test and obtained CTN approval, send the completed evaluation script, plot, and any incident reports to the CALS Test Network Office Test Bed.
6. Evaluate the data. The CALS Test Network will, and anyone conducting a self-test should:
 - a. Examine the incident reports, plot, and evaluation script.
 - b. Pinpoint processor, CGM standard (ISO 8632), and/or military standard (MIL-D-28003) anomalies.
 - c. Bring the findings to the appropriate parties for correction (vendor, user, CGM Committee, or sponsor of the military standard).

On CTN-arranged tests, the CTN will publicly publish results of findings.

**ATTACHMENT E CTN Graphical Primitive Elements
Reference Metafile Evaluation Script**

For all elements, check visually against the supplied illustration of the CTN Graphical Primitive Elements reference metafile (Attachment B). The following script raises specific questions to assist in this visual inspection. In general, check that shape, size, line width, color (if used), and general text placement (i.e., somewhere in the box on restricted text, at the bottom of the cell on grid labels, etc.) agree between the resulting picture and the supplied illustration. Answer the script's questions. If you answer "No" to any of them, note why on the incident report sheets which follow this script.

The evaluation is numbered to correspond to the reference CGM illustration.

0) **OVERALL**

- _____ a) Is the image divided into a grid with 20 boxes, 18 of which are the same size?
_____ b) Are the grid lines black?

1) **POLYLINE**

- _____ a) Does the shape match the shape of the included plot?
_____ b) Is the line width larger than the width of the lines in the Disjoint Polyline
_____ element, but smaller than the width of the lines in the Elliptical Arc element?
_____ c) Does the text string "(1) POLYLINE" appear near the bottom of the grid box?
_____ d) If in color, are the lines red and the text black?

2) **DISJOINT POLYLINE**

- _____ a) Does the shape match the shape of the included plot?
_____ b) Does the line width match the width of the line in the Circular Arc 3 Point
_____ element?
_____ c) Does the text string "(2) DISJOINT POLYLINE" appear near the bottom of the
_____ grid box?
_____ d) If in color, are the lines green and the text black?

3) **POLYMARKER**

- _____ a) Are the five POLYMARKERS, ".", "+", "*", "o", and "x" present and
_____ appearing in that order on a line running from the top left to the middle right of
_____ the grid? (Note: The illustration of reference metafile in Attachment B
_____ incorrectly shows a small square instead of a circle.)
_____ b) Does the text string "(3) POLYMARKER" appear near the bottom of the grid?
_____ c) Are the "." and "x" smaller than the "+" and " "? Are the "+" and " "
_____ smaller than the "*"?
_____ d) If in color, is the "." black? Is the "+" red? Is the "*" green? Is the "o" blue? Is
_____ the "x" magenta?

4) **TEXT**

- _____ a) Does the text string "LEFT" start near the upper right corner and print from
_____ right to left, so that it appears as "TFEL"? If using color, is the text cyan?
_____ b) Does the text string "DOWN" start near the "L" in "TFEL", and print down,
_____ parallel to the right side of the grid box? If using color, is the text blue?
_____ c) Is the text string ".ABCD" printed on the horizontal, roughly parallel with the N
_____ in "DOWN" ? If using color, is the text magenta?
_____ d) Is the text string ".ABCD" printed on a roughly 45 degree angle with the "."
_____ almost aligned with the "." from the ".ABCD" text string mentioned in the
_____ previous section? If in color, is the string orange?
_____ e) Does the text string "(4) TEXT" appear near the bottom of the grid box? Is the
_____ string black?

- 5) **RESTRICTED TEXT**
- _____ a) Is the text string "AbCdEfGhIjK" printed inside the separate boxes within the grid box?
- _____ b) Is the box at the top of the grid box roughly square?
- _____ c) Does the middle box start even with the others on the left hand side and extend to just past half of the grid box width?
- _____ d) Does the last box start even with the others on the left hand side and extend to the right hand side of the grid box?
- _____ e) Does the text string fit within the box? Descenders may hang below the box.
- _____ f) Does the text string "(5) RESTRICTED TEXT" appear near the bottom of the grid box? Is this text black?
- _____ g) If in color, are the text boxes black? Is the text blue?
- 6) **APPEND TEXT**
- _____ a) Does the text string ".ABC+D" appear near the middle of the grid box?
- _____ b) Is the ".ABC" a smaller font than the "+D"? (*Note: the supplied plot does not correctly represent the relative size of the two test strings.*)
- _____ c) Does the text string "(6) APPEND TEXT" appear near the bottom of the grid box?
- _____ d) If in color, is the ".ABC" red? Is the "+D" in blue?
- 7) **POLYGON**
- _____ a) Does the large isosceles triangle match the shape of the triangle in the supplied plot?
- _____ b) Does the edge width match the edge width for the grid?
- _____ c) Does the text string "(7) POLYGON" appear near the bottom of the grid box?
- _____ d) If in color, is the triangle outline blue? Is the fill pattern yellow? Is the text black?
- 8) **POLYGON SET**
- _____ a) Does the polygon shape match the shape in the supplied plot?
- _____ b) Does the fill pattern consist of vertical equally-spaced parallel lines?
- _____ c) Is the rightmost edge line invisible?
- _____ d) Is the edge width narrower than the edge width for the grid?
- _____ e) Does the text string "(8) POLYGON SET" appear near the bottom of the grid box?
- _____ f) If in color, is the polygon edge black and is the fill pattern red? Is the text black?
- 9) **CELL ARRAY**
- _____ a) Does the cell array pattern match the pattern in the supplied plot? If in color, check that all colors match the chart which appears after question c.
- _____ b) Is the cell array skewed?
- _____ c) Does the text string "(9) CELL ARRAY" appear near the bottom of the grid box? Is the text black?

Color

r	.	g	.	b	.	y	.	m
.	c	.	.	.	r	r	.	.
g	c	.	.	.	b	r	r	.
g	.	r	r	.	c	.	.	c
g	.	g	.	b	.	m	.	m
.	r	.	g	.	m	m	.	c
.	g	.	.	y	.	m	g	.
.	b	b	.	y	g	.	b	y
.	y	y	.	.	g	b	.	c
.	m	m	.	.	g	y	.	.

Key:

X	Black
.	White
b	blue
c	cyan
g	green
y	yellow
m	magenta
r	red

Black and White

X	.	X	.	X	.	X	.	X
.	X	.	.	.	X	X	.	.
X	X	X	X	X
X	.	X	X	.	X	.	.	X
X	.	X	.	X	.	X	.	X
.	X	.	X	.	X	X	.	X
.	X	.	.	X	.	X	X	.
.	X	X	.	X	X	.	X	X
.	X	X	.	.	X	X	.	X
.	X	X	.	.	X	X	.	.

10) GENERALIZED DRAWING PRIMITIVE

This element is not allowed by MIL-D-28003 and is not included in the reference CGM.

11) RECTANGLE

- a) Does the rectangle shape match the shape in the supplied plot?
- b) Is the edge width larger than the edge widths anywhere else in the plot?
- c) Does the fill pattern consist of positive-slope equally-spaced parallel lines?
- d) Are the fill pattern lines thinner than the rectangle edge lines?
- e) Does the text string "(11) RECTANGLE" appear near the bottom of the grid box?
- f) If in color, is the rectangle outline cyan? Is the text black? Is the fill pattern magenta?

12) CIRCLE

- a) Does the circle shape match the shape in the supplied plot?
- b) Does the edge width match the width of the edges in the Elliptical Arc Close element?
- c) Does the fill pattern consist of negative slope equally spaced parallel lines?
(Note: The fill pattern in the supplied plot is not correct.)
- d) Does the text string "(12) CIRCLE" appear near the bottom of the grid box?
- e) If in color, is the circle outline green? Is the fill pattern blue? Is the text black?

13) CIRCULAR ARC 3 POINT

- _____ a) Does the circular arc shape match the shape in the supplied plot? Does the arc
_____ start and stop in the correct places?
_____ b) Does the line width match the width of the lines in the Disjoint Polyline
_____ element?
_____ c) Does the text string "(13) CIRCULAR ARC 3 POINT" appear near the bottom of
_____ the grid box?
_____ d) If in color, is the arc green? Is the text black?

14) CIRCULAR ARC 3 POINT CLOSE

- _____ a) Does the arc shape match the shape in the supplied plot? Is the arc closed with a
_____ chord closure?
_____ b) Does the edge width match the width of the edges in the Polygon element?
_____ c) Does the fill pattern consist of a horizontal and vertical crosshatch?
_____ d) Does the text string "(14) CIRCULAR ARC 3 POINT CLOSE" appear near the
_____ bottom of the grid box?
_____ e) If in color, is the arc outline orange? Is the fill pattern yellow? Is the text black?

15) CIRCULAR ARC CENTRE

- _____ a) Does the arc shape match the shape in the supplied plot?
_____ b) Is the edge width narrower than the width of the grid lines?
_____ c) Does the text string "(15) CIRCULAR ARC CENTRE" appear near the bottom of
_____ the grid box?
_____ d) If in color, is the arc outline green? Is the text black?

16) CIRCULAR ARC CENTRE CLOSE

- _____ a) Does the arc shape match the shape in the supplied plot?
_____ b) Is the closure a pie closure? Does the pie slice to the centre of the circle?
_____ c) Is the edge invisible?
_____ d) Does the fill pattern consist of positive-slope/negative-slope crosshatch?
_____ e) Does the text string "(16) CIRCULAR ARC CENTRE CLOSE" appear near the
_____ bottom of the grid box?
_____ f) If in color, is the fill pattern red? Is the text black?

17) ELLIPSE

- _____ a) Does the ellipse shape match the shape in the supplied plot?
_____ b) Is the ellipse slanted at roughly 45 degrees from the lower left to the upper right?
_____ c) Does the edge width match the width of the edges of the Circular Arc 3 Point
_____ Close element?
_____ d) Does the fill pattern consist of negative slope equally spaced parallel lines?
_____ (Note: The fill pattern in the supplied plot is not correct.)
_____ e) Does the text string "(17) ELLIPSE" appear near the bottom of the grid box?
_____ f) If in color, is the ellipse outline magenta? Is the fill pattern orange? Is the text
_____ black?

18) ELLIPTICAL ARC

- _____ a) Does the arc shape match the shape in the supplied plot?
_____ b) Does the line width match the larger than the lines in the Polyline element?
_____ c) Does the text string "(18) ELLIPTICAL ARC" appear near the bottom of the grid
_____ box?
_____ d) If in color, is the arc outline green? Is the text black?

19)

ELLIPTICAL ARC CLOSE

- _____ a) Does the circle shape match the shape in the supplied plot?
- _____ b) Does the edge width match the width of the edges of the Circle element?
- _____ c) Does the fill pattern consist of vertical equally spaced parallel lines?
- _____ d) Does the text string "(19) ELLIPTICAL ARC CLOSE" appear near the bottom of the grid box?
- _____ e) If in color, is the arc outline magenta? Is the fill pattern green? Is the text black?

20)

LINE TYPE

- _____ a) Are 5 distinct line types displayed?
- _____ b) Is the first a solid line?
- _____ c) Is the second a dashed line with long dashes?
- _____ d) Is the third a dashed line with short dashes?
- _____ e) Is the fourth a dashed line which alternates long and short dashes?
- _____ f) Is the fifth a dashed line which alternates a long and 2 short dashes?
- _____ g) If in color, are the lines red?

Incident Report

Incident Report

Incident Report

ATTACHMENT F Clear Text Printout of the Graphical Primitive Elements Reference CGM

The following clear text listings were translated into binary to create MIL-D-28003 CGMs. The different element names used in each file (for example, LineType and line_type) represent different ways to specify the same element in a clear text file. The effect in the binary files is the same, so testers should not be confused by or concerned about the differences in syntax.

Listing for CTN-01i.clr

```
BegMF "CTN-01id";                                     % 91-10-03 11:00 %
  MFVersion 1;
  MFDesc "CTN-01id, 91-10-03, MIL-D-28003/BASIC-1";
  MFElemList "DRAWINGPLUS";
  VDCType INTEGER;
  MaxColrIndex 255;
  IntegerPrec -32768, 32768;
  ColrPrec 255;
  ColrIndexPrec 255;
  FontList "HERSHEY:SIMPLEX_ROMAN" "HERSHEY:DUPLEX_ROMAN"
           "HERSHEY:COMPLEX_ROMAN";
```

```
BegPic "All Graphical Primitive Elements";
  ColrMode INDEXED;
  LineWidthMode SCALED;
  MarkerSizeMode SCALED;
  EdgeWidthMode SCALED;
  VDCExt 0,0,32767, 32767;
  BackColr 255 255 255;    % white %
```

% MODE	SUMMARY	-----			%
%	COLOUR	LINE WIDTH	MARKER SIZE	EDGE WIDTH	%
% SCALING	SELECTION	SECIFICATION	SPECIFICATION	SPECIFICATION	%
% default	INDEXED	SCALED	SCALED	SCALED	%

```
BegPicBody;
  ColrTable
```

	0			%	index	color	%
	255	255	255	%	0	white	%
	0	0	0	%	1	black	%
	255	0	0	%	2	red	%
	0	255	0	%	3	green	%
	0	0	255	%	4	blue	%
	255	255	0	%	5	yellow	%
	255	0	255	%	6	magenta	%
	0	255	255	%	7	cyan	%
	255	255	255	%	8	white	%
	255	155	0;	%	9	orange	%

% Box Grid %

EdgeVis ON;
 EdgeWidth 2.0;
 LineType 1;
 LineWidth 2.0;
 LineColr 1;
 % box and horizontal grid lines %

% LINE Parameter Summary -----				%
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	1	3.0	2 black	%
% -----				%

Line (0,0) (0,32767) (32767,32767) (32767,0) (0,0);
 Line (0,22937) (32767,22937);
 Line (0,13107) (32767,13107);
 Line (0,3277) (32767,3277);

% vertical grid lines %

Line (5461,3277) (5461,32767);
 Line (10922,3277) (10922,32767);
 Line (16384,3277) (16384,32767);
 Line (21845,0) (21845,32767);
 Line (27306,3277) (27306,32767);

% Elements %

% Box 1 - POLYLINE %

% LINE Parameter Summary -----				%
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	1	4.0	2 red	%
% -----				%

Line (655,26869) (4806,32112) (4806,30801) (3386,32112)
 (2021,32112) (4806,29490) (4806,28180) (655,32112)
 (655,30801) (4806,26869) (3386,26869) (655,29490)
 (655,28180) (2021,26869);

% Box 2 - DISJOINT POLYLINE %

% LINE Parameter Summary -----				%
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	1	3.0	3 green	%
% -----				%

DisjtLine (10267,26869) (6117,32112) (6117,30801) (7482,32112)
 (8847,32112) (6117,29490) (6117,28180) (10267,32112)
 (10267,30801) (6117,26869) (7482,26869) (10267,29490)
 (10267,28180) (8847,26869);

% Box 3 - POLYMARKER %

MarkerType 1;
MarkerSize 1.0;
MarkerColr 1;

% MARKER PARAMETER SUMMARY -----				%
% BUNDLE				%
% INDEX	TYPE	SIZE	COLOUR	%
% default = 1	1	1.0	1 black	%
% -----				%

Marker (11468,32112);

MarkerType 2;
MarkerSize 2.0;
MarkerColr 2;

% MARKER PARAMETER SUMMARY -----				%
% BUNDLE				%
% INDEX	TYPE	SIZE	COLOUR	%
% default = 1	2	2.0	2 red	%
% -----				%

Marker (12451,30801);

MarkerType 3;
MarkerSize 3.0;
MarkerColr 3;

% MARKER PARAMETER SUMMARY -----				%
% BUNDLE				%
% INDEX	TYPE	SIZE	COLOUR	%
% default = 1	3	3.0	3 green	%
% -----				%

Marker (13434,29490);

MarkerType 4;
MarkerSize 2.0;
MarkerColr 4;

% MARKER PARAMETER SUMMARY -----				%
% BUNDLE				%
% INDEX	TYPE	SIZE	COLOUR	%
% default = 1	4	2.0	4 blue	%
% -----				%

Marker (14417,28180);

MarkerType 5;
MarkerSize 1.0;
MarkerColr 6;

% MARKER PARAMETER SUMMARY -----				%
% BUNDLE				%
% INDEX	TYPE	SIZE	COLOUR	%
% default = 1	5	1.0	6 magenta	%
% -----				%

Marker (15400,26869);

% Box 4 - TEXT %

TextFontIndex 1;
 TextColr 6;
 CharHeight 655;
 CharExpan 0.8;
 CharSpace 0.25;
 CharOri 0,1,1,0;

% TEXT PARAMETER SUMMARY						
% BUNDLE	FONT	TEXT	EXPAN	CHAR.	TEXT	%
% INDEX	INDEX	PRECISION	FACTOR	SPACE	COLOUR	%
% default	set	default	set	set	set	%
% 1	1	1	0.8	0.25	6 magenta	%
%						
% CHAR	CHAR.	TEXT	TEXT	CHAR SET	ALT CHAR	%
% HEIGHT	ORIENT	PATH	ALIGN	INDEX	SET INDEX	%
% set	set	default	default	default	default	%
% 655	0,1,1,0	right	normal	1	1	%
%						

Text 17039,26869,final,".ABCD";

TextColr 9;
 CharOri -1,1,1,1;

% TEXT PARAMETER SUMMARY						
% BUNDLE	FONT	TEXT	EXPAN	CHAR.	TEXT	%
% INDEX	INDEX	PRECISION	FACTOR	SPACE	COLOUR	%
% default	set	default	set	set	set	%
% 1	1	1	0.8	0.25	9 orange	%
%						
% CHAR	CHAR.	TEXT	TEXT	CHAR SET	ALT CHAR	%
% HEIGHT	ORIENT	PATH	ALIGN	INDEX	SET INDEX	%
% set	set	default	default	default	default	%
% 655	-1,1,1,1	right	normal	1	1	%
%						

Text 17039,27852,final,".ABCD";

TextColr 7;
 CharOri 0,1,1,0;
 TextPath LEFT;

% TEXT PARAMETER SUMMARY						
% BUNDLE	FONT	TEXT	EXPAN	CHAR.	TEXT	%
% INDEX	INDEX	PRECISION	FACTOR	SPACE	COLOUR	%
% default	set	default	set	set	set	%
% 1	1	1	0.8	0.25	7 cyan	%
%						
% CHAR	CHAR.	TEXT	TEXT	CHAR SET	ALT CHAR	%
% HEIGHT	ORIENT	PATH	ALIGN	INDEX	SET INDEX	%
% set	set	set	default	default	default	%
% 655	0,1,1,0	left	normal	1	1	%
%						

Text 20971,31456,final,"LEFT";

```
TextColr 4;
TextPath DOWN;
% TEXT PARAMETER SUMMARY ----- %
% BUNDLE  FONT  TEXT  EXPAN  CHAR.  TEXT  %
% INDEX   INDEX  PRECISION  FACTOR  SPACE  COLOUR  %
% default set  default  set  set  set  %
% 1       1     1         0.8    0.25  4 blue  %
%                                     %
% CHAR    CHAR.  TEXT  TEXT  CHAR SET  ALT CHAR  %
% HEIGHT  ORIENT  PATH  ALIGN  INDEX  SET INDEX  %
% set     set    set   default  default  default  %
% 655    0,1,1,0  down  normal  1      1         %
% ----- %
Text 20971,31456,final,"DOWN";
```

% Box 5 - RESTRICTED TEXT %

```
LineType 1;
IntStyle EMPTY;
TextColr 4;
CharHeight 655;
TextPath RIGHT;
% CLOSED FIGURE PARAMETER SUMMARY ----- %
% INTERIOR  FILL  HATCH  PATTERN  EDGE  EDGE  EDGE  %
% STYLE     COLOUR  INDEX  INDEX  BUNDLE  TYPE  WIDTH  %
% EMPTY     set    default  default  INDEX  default  default  %
%           4 blue  1=      1      def = 1  1         %
%                                     %
% EDGE      EDGE  FILL REF  %
% COLOUR    VISIBIL.  POINT  %
%           set    default  %
%           on    ll corn  %
% ----- %
Rect 22282,26869,26869,27524;
Rect 22282,28180,25558,29490;
Rect 22282,30146,24248,32112;
```

```
% TEXT PARAMETER SUMMARY ----- %
% BUNDLE  FONT  TEXT  EXPAN  CHAR.  TEXT  %
% INDEX   INDEX  PRECISION  FACTOR  SPACE  COLOUR  %
% default set  default  set  set  set  %
% 1       1     1         0.8    0.25  4 blue  %
%                                     %
% CHAR    CHAR.  TEXT  TEXT  CHAR SET  ALT CHAR  %
% HEIGHT  ORIENT  PATH  ALIGN  INDEX  SET INDEX  %
% set     set    set   default  default  default  %
% 655    0,1,1,0  right  normal  1      1         %
% ----- %
RestrText 4587,1311,22282,26869,final,"AbCdEfGhIjK";
RestrText 3277,1638,22282,28180,final,"AbCdEfGhIjK";
RestrText 1966,1966,22282,30146,final,"AbCdEfGhIjK";
```

% Box 6 - APPEND TEXT %

TextFontIndex 2;
 TextColr 2;
 CharHeight 666;
 CharExpan 0.8;
 CharSpace 0.10;
 CharOri 0,1,1,0;

% TEXT PARAMETER SUMMARY						%
% BUNDLE	FONT	TEXT	EXPAN	CHAR.	TEXT	%
% INDEX	INDEX	PRECISION	FACTOR	SPACE	COLOUR	%
% default	set	default	set	set	set	%
% 1	2	1	0.8	0.10	2 red	%
-----						%
% CHAR	CHAR.	TEXT	TEXT	CHAR SET	ALT CHAR	%
% HEIGHT	ORIENT	PATH	ALIGN	INDEX	SET INDEX	%
% set	set	default	default	default	default	%
% 666	0,1,1,0	right	normal	1	1	%
-----						%
Text 27961,27852,notfinal,".ABC";						

TextFontIndex 3;
 TextColr 4;
 CharHeight 1000;

% TEXT PARAMETER SUMMARY						%
% BUNDLE	FONT	TEXT	EXPAN	CHAR.	TEXT	%
% INDEX	INDEX	PRECISION	FACTOR	SPACE	COLOUR	%
% default	set	default	set	set	set	%
% 1	3	1	0.8	0.10	4 blue	%
-----						%
% CHAR	CHAR.	TEXT	TEXT	CHAR SET	ALT CHAR	%
% HEIGHT	ORIENT	PATH	ALIGN	INDEX	SET INDEX	%
% set	set	set	default	default	default	%
% 1000	0,1,1,0	right	normal	1	1	%
-----						%
ApndText final,"+D";						

% Box 7 - POLYGON %

EdgeWidth 2.0;
 EdgeColr 4;
 IntStyle SOLID;
 HatchIndex 1;
 FillColr 5;

% CLOSED FIGURE PARAMETER SUMMARY							%
% INTERIOR	FILL	HATCH	PATTERN	EDGE	EDGE	EDGE	%
% STYLE	COLOUR	INDEX	INDEX	BUNDLE	TYPE	WIDTH	%
% set	set	set	default	INDEX	default	set	%
% SOLID	5 yellow	1=	1	def = 1	1	2.0	%
-----							%
% EDGE	EDGE	FILL REF	CHAR SET	ALT CHR			%
% COLOUR	VISIBIL.	POINT	INDEX	SET NDX			%
% set	set	default	default	default			%
% 4 blue	on	ll corn	1	1			%
-----							%
Polygon (655,17039) (2731,22282) (4587,17039);							

% Box 8 - POLYGON SET %

IntStyle HATCH;
FillColr 2;
HatchIndex 2;
EdgeWidth 1.0;
EdgeColr 1;

% CLOSED FIGURE PARAMETER SUMMARY							%
% INTERIOR	FILL	HATCH	PATTERN	EDGE	EDGE	EDGE	%
% STYLE	COLOUR	INDEX	INDEX	BUNDLE	TYPE	WIDTH	%
% set	set	set	default	INDEX	default	set	%
% HATCH	2 red	2	1	def = 1	1	1.0	%
%							%
% EDGE	EDGE	FILL REF	CHAR SET	ALT CHR			%
% COLOUR	VISIBIL.	POINT	INDEX	SET NDX			%
% set	set	default	default	default			%
% 4 blue	on	ll corn	1	1			%
%							%

PolygonSet (6117,17039),vis,(7536,21626),vis, (9502,22282),invis, (10485,17039),closevis,
(7373,18350),vis, (6117,22282),vis, (9502,18022),closevis;

% Box 9 - CELL ARRAY %

CellArray

%	P	Q	R	nx	ny	CI	%
(12468,22282)	(14500,17039)	(15728,22282)	9	10	65535		
2	0	3 0	4 0	5	0	6	%101010101%
0	7	8 0	0 2	2	0	0	%011001100%
3	7	8 0	0 0	4	2	2	%111000111%
3	0	2 2	0 7	0	0	7	%101101001%
3	0	3 0	4 0	6	0	6	%101010101%
0	2	0 3	0 6	6	0	7	%010101101%
0	3	0 0	5 0	6	3	0	%010010110%
0	4	4 0	5 3	0	4	5	%011011011%
0	5	5 0	0 3	4	0	7	%011001101%
0	6	6 0	0 3	5	0	0;	%011001100%

% Box 10 not used; GDP not in MIL-D-28003 %

% Box 11 - RECTANGLE %

FillColr 6;
HatchIndex 3;
EdgeWidth 10.0;
EdgeColr 7;

% CLOSED FIGURE PARAMETER SUMMARY							%
% INTERIOR	FILL	HATCH	PATTERN	EDGE	EDGE	EDGE	%
% STYLE	COLOUR	INDEX	INDEX	BUNDLE	TYPE	WIDTH	%
% set	set	set	default	INDEX	default	set	%
% HATCH	6 magenta	3 ///	def = 1	1	1	10.0	%
%							%
% EDGE	EDGE	FILL REF	CHAR SET	ALT CHR			%
% COLOUR	VISIBIL.	POINT	INDEX	SET NDX			%
% set	set	default	default	default			%
% 7 cyan	on	ll corn	1	1			%
%							%

Rect (17039,17039) (21189,22282);

% Box 12 - CIRCLE %

FillColr 4;
 HatchIndex 4;
 EdgeWidth 4.0;
 EdgeColr 3;

% CLOSED FIGURE PARAMETER SUMMARY -----							%
% INTERIOR	FILL	HATCH	PATTERN	EDGE	EDGE	EDGE	%
% STYLE	COLOUR	INDEX	INDEX	BUNDLE	TYPE	WIDTH	%
% set	set	set	default	INDEX	default	set	%
% HATCH	4 blue	4\\	1	def = 1	1	4.0	%
%							%
% EDGE	EDGE	FILL REF	CHAR SET	ALT CHR			%
% COLOUR	VISIBIL.	POINT	INDEX	SET NDX			%
% set	set	default	default	default			%
% 3 green	on	ll corn	1	1			%
% -----							%

Circle (24575,19660),2458;

% Box 13 - CIRCULAR ARC 3 POINT %

LineType 1;

% LINE Parameter Summary -----				%
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	1	3.0	3 green	%
% -----				%

Arc3Pt (32112,21299) (28398,17694) (31129,17039);

% Box 14 - CIRCULAR ARC 3 POINT CLOSE (CHORD) %

FillColr 5;
 HatchIndex 5;
 EdgeWidth 2.0;
 EdgeColr 9;

% CLOSED FIGURE PARAMETER SUMMARY -----							%
% INTERIOR	FILL	HATCH	PATTERN	EDGE	EDGE	EDGE	%
% STYLE	COLOUR	INDEX	INDEX	BUNDLE	TYPE	WIDTH	%
% set	set	set	default	INDEX	default	set	%
% HATCH	5 yellow	4 ###	1	def = 1	1	2.0	%
%							%
% EDGE	EDGE	FILL REF	CHAR SET	ALT CHR			%
% COLOUR	VISIBIL.	POINT	INDEX	SET NDX			%
% set	set	default	default	default			%
% 9 orange	on	ll corn	1	1			%
% -----							%

Arc3PtClose (4915,11796) (1092,7864) (3823,6553),chord;

% BOX 15 - CIRCULAR ARC CENTRE %

LineWidth 1.0;

LineType 1;

% LINE Parameter Summary ----- %

% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	1	1.0	3 green	%

%

%

%

%

%	x	y	DXs	DYs	DXe	DYe	rad	%
ArcCtr	8192,	9830,	5898,	10485,	9175,	8192,	2458;	%

% Box 16 - CIRCULAR ARC CENTRE CLOSE (PIE) %

HatchIndex 6;

FillColr 2;

EdgeColr 4;

EdgeVis OFF;

% CLOSED FIGURE PARAMETER SUMMARY ----- %

% INTERIOR	FILL	HATCH	PATTERN	EDGE	EDGE	EDGE	%
% STYLE	COLOUR	INDEX	INDEX	BUNDLE	TYPE	WIDTH	%
% set	set	set	default	INDEX	default	set	%
% HATCH	2 red	6 xxx	1	def = 1	1	2.0	%

%

%

%

%

% EDGE	EDGE	FILL REF	CHAR SET	ALT CHR	%
% COLOUR	VISIBIL.	POINT	INDEX	SET NDX	%
% set	set	default	default	default	%
% 4 blue	off	ll corn	1	1	%

%

%

%

%

%	x	y	DXs	DYs	DXe	DYe	rad	type	%
ArcCtrClose	13631,	9830,	5898,	10485,	15728,	8192,	2458,	pie;	%

% Box 17 - ELLIPSE %

FillColr 9;

HatchIndex 4;

EdgeColr 6;

EdgeVis ON;

% CLOSED FIGURE PARAMETER SUMMARY ----- %

% INTERIOR	FILL	HATCH	PATTERN	EDGE	EDGE	EDGE	%
% STYLE	COLOUR	INDEX	INDEX	BUNDLE	TYPE	WIDTH	%
% set	set	set	default	INDEX	default	set	%
% HATCH	9 orange	4\\	1	def = 1	1	2.0	%

%

%

%

%

% EDGE	EDGE	FILL REF	CHAR SET	ALT CHR	%
% COLOUR	VISIBIL.	POINT	INDEX	SET NDX	%
% set	set	default	default	default	%
% 6 magenta	on	ll corn	1	1	%

%

%

%

%

Ellipse (19114,9830) 16973,7864,18022,10485;

% Box 18 - ELLIPTICAL ARC %

LineWidth 6.0;
 LineType 1;

% LINE Parameter Summary -----				%
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	1	6.0	3 green	%
% -----				%

EllipArc (22282,9175)	% centre point	%
(19158,6226)	% 1st CDP endpoint	%
(19551,10158)	% 2nd CDP endpoint	%
(1311,3604)	% DX_start,DY_start	%
(3277,-2949);	% DX_end,DY_end	%

% Box 19 - ELLIPTICAL ARC CLOSE (PIE) %

FillColr 3;
 HatchIndex 2;
 EdgeWidth 4.0;

% CLOSED FIGURE PARAMETER SUMMARY -----							%
% INTERIOR	FILL	HATCH	PATTERN	EDGE	EDGE	EDGE	%
% STYLE	COLOUR	INDEX	INDEX	BUNDLE	TYPE	WIDTH	%
% set	set	set	default	INDEX	default	set	%
% HATCH	3 green	2	1	def = 1	1	4.0	%
% -----							%
% EDGE	EDGE	FILL REF	CHAR SET	ALT CHR			%
% COLOUR	VISIBIL.	POINT	INDEX	SET NDX			%
% set	set	default	default	default			%
% 6 magenta	on	ll corn	1	1			%
% -----							%

EllipArcClose (27852,9175)	% centre point	%
(24575,6226)	% 1st CDP endpoint	%
(24903,10158)	% 2nd CDP endpoint	%
(1311,3932)	% DX_start,DY_start	%
(3277,-2621)	% DX_end,DY_end	%

pie;

% Box "20" - LINE TYPE %

LineColr 2;
 LineWidth 2.0;
 LineType 5;

% LINE Parameter Summary -----				%
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	5 dash-dot-dot	2.0	2 red	%
% -----				%

Line (1638,655) (19660,655);

LineType 4;
 % LINE Parameter Summary ----- %
 % BUNDLE LINE LINE LINE %
 % INDEX TYPE WIDTH COLOUR %
 % default set set set %
 % 1 4 dash-dot 2.0 2 red %
 % ----- %
 Line (1638,983),(19660,983);

LineType 3;
 % LINE Parameter Summary ----- %
 % BUNDLE LINE LINE LINE %
 % INDEX TYPE WIDTH COLOUR %
 % default set set set %
 % 1 3 dot 2.0 2 red %
 % ----- %
 Line (1638,1311)(19660,1311);

LineType 2;
 % LINE Parameter Summary ----- %
 % BUNDLE LINE LINE LINE %
 % INDEX TYPE WIDTH COLOUR %
 % default set set set %
 % 1 2 dash 2.0 2 red %
 % ----- %
 Line (1638,1638)(19660,1638);

LineType 1;
 % LINE Parameter Summary ----- %
 % BUNDLE LINE LINE LINE %
 % INDEX TYPE WIDTH COLOUR %
 % default set set set %
 % 1 1 solid 2.0 2 red %
 % ----- %
 Line (1638,1966)(19660,1966);

% Labels in Boxes %

TextFontIndex 3;
 TextPrec STROKE;
 CharExpan 0.8;
 CharSpace 0.01;
 TextColr 1;
 CharHeight 450;
 CharOri 0,1,1,0;
 TextPath RIGHT;
 % TEXT PARAMETER SUMMARY ----- %
 % BUNDLE FONT TEXT EXPAN CHAR. TEXT %
 % INDEX INDEX PRECISION FACTOR SPACE COLOUR %
 % default set set set set set %
 % 1 3 STROKE 0.8 0.01 1 black %
 % ----- %
 % CHAR CHAR. TEXT TEXT CHAR SET ALT CHAR %
 % HEIGHT ORIENT PATH ALIGN INDEX SET INDEX %
 % set set set default default default %
 % 450 0,1,1,0 right normal 1 1 %
 % ----- %

Text 164,24575, final, "(1) POLYLINE";
Text 5625,24575, final, "(2) DISJOINT";
Text 5625,23920, final, " POLYLINE";
Text 11086,24575, final, "(3) POLYMARKER";
Text 16547,24575, final, "(4) TEXT";
Text 22008,24575, final, "(5) RESTRICTED";
Text 22008,23920, final, " TEXT";
Text 27470,24575, final, "(6) APPEND";
Text 27470,23920, final, " TEXT";
Text 164,14745, final, "(7) POLYGON";
Text 5625,14745, final, "(8) POLYGON";
Text 5625,14090, final, " SET";
Text 11086,14745, final, "(9) CELL";
Text 11086,14090, final, " ARRAY";
% Not Included - - - (10) GENERALIZED DRAWING PRIMITIVE (GDP) - %
Text 16547,14745, final, "(11) RECTANGLE";
Text 22008,14745, final, "(12) CIRCLE";
Text 27470,14745, final, "(13) CIRCULAR";
Text 27470,14090, final, " ARC 3 POINT";
Text 164,4915, final, "(14) CIRCULAR";
Text 164,4260, final, " ARC 3 POINT";
Text 164,3604, final, " CLOSE";
Text 5625,4915, final, "(15) CIRCULAR";
Text 5625,4260, final, " ARC CENTRE";
Text 11086,4915, final, "(16) CIRCULAR";
Text 11086,4260, final, " ARC CENTRE";
Text 11086,3604, final, " CLOSE";
Text 16547,4915, final, "(17) ELLIPSE";
Text 22008,4915, final, "(18) ELLIPTICAL";
Text 22008,4260, final, " ARC";
Text 27470,4915, final, "(19) ELLIPTICAL";
Text 27470,4260, final, " ARC CLOSE";
Text 1638,2359, final, "LINE TYPE";

CharHeight 200;

% TEXT PARAMETER SUMMARY -----						%
% BUNDLE	FONT	TEXT	EXPAN	CHAR.	TEXT	%
% INDEX	INDEX	PRECISION	FACTOR	SPACE	COLOUR	%
% default	set	set	set	set	set	%
% 1	3	STROKE	0.8	0.01	1 black	%
%						%
% CHAR	CHAR.	TEXT	TEXT	CHAR SET	ALT CHAR	%
% HEIGHT	ORIENT	PATH	ALIGN	INDEX	SET INDEX	%
% set	set	set	default	default	default	%
% 200	0,1,1,0	right	normal	1	1	%
-----						%

Text 750,1966,final,"1."
Text 750,1638,final,"2."
Text 750,1311,final,"3."
Text 750,983,final,"4."
Text 750,655,final,"5.";

% Figure Label %

CharHeight 450;

% TEXT PARAMETER SUMMARY -----							%
% BUNDLE	FONT	TEXT	EXPAN	CHAR.	TEXT		%
% INDEX	INDEX	PRECISION	FACTOR	SPACE	COLOUR		%
% default	set	set	set	set	set		%
% 1	3	STROKE	0.8	0.01	1 black		%
-----							%
% CHAR	CHAR.	TEXT	TEXT	CHAR SET	ALT CHAR		%
% HEIGHT	ORIENT	PATH	ALIGN	INDEX	SET INDEX		%
% set	set	set	default	default	default		%
% 450	0,1,1,0	right	normal	1	1		%
-----							%

Text 22063,2621,final,"CALSTEST NETWORK";

Text 22063,1868,final,"MIL-D-28003";

Text 22063,1114,final,"Computer Graphics Metafile";

Text 22063,360,final,"File: CTN-01Id, Draft 91-10-03";

EndPIC;

EndMF;

Listing for CTN-01r.clr

BEGMF "CTN-01rd"; % 91-10-03 11:00 %
 MFVersion 1;
 MFDesc "CTN-01rd, 91-10-03, MIL-D-28003/BASIC-1";
 MFElemList "DRAWINGPLUS";
 VDCTYPE REAL; % more usual: INTEGER %
 MaxColrIndex 255;
 RealPrec -32767.,32767.,6;
 ColrPrec 255;
 ColrIndexPrec 255;
 Fontlist "HERSHEY:SIMPLEX_ROMAN","HERSHEY:DUPLEX_ROMAN",
 "HERSHEY:COMPLEX_ROMAN";

BegPic "All Graphical Primitive Elements";
 ColrMode INDEXED;
 LineWidthMode SCALED;
 MarkerSizeMode SCALED;
 EdgeWidthMode SCALED;
 VDCExt (0.0,0.0),(1.0,1.0);
 BackColr 255 255 255; % white %

% MODE	SUMMARY	-----			%
%	COLOUR	LINE WIDTH	MARKER SIZE	EDGE WIDTH	%
% SCALING	SELECTION	SECIFICATION	SPECIFICATION	SPECIFICATION	%
% default	INDEXED	SCALED	SCALED	SCALED	%

BegPicBody;
 ColrTable

			%	index	color	%
0			%	0	white	%
255	255	255	%	1	black	%
0	0	0	%	2	red	%
255	0	0	%	3	green	%
0	255	0	%	4	blue	%
0	0	255	%	5	yellow	%
255	255	0	%	6	magenta	%
255	0	255	%	7	cyan	%
0	255	255	%	8	white	%
255	255	255	%	9	orange	%
255	155	0;	%			

% Box grid %
 EdgeVis ON;
 EdgeWidth 2.0;
 LineType 1;
 LineWidth 2.0;
 LineColr 1;

% Box and horizontal grid lines %
 % LINE Parameter Summary ----- %

% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	1	3.0	1 black	%
%	-----			%

Line (0.0,0.0),(0.0,1.0),(1.0,1.0),(1.0,0.0),(0.0,0.0);
 Line (0.0,0.7000000),(1.0,0.7000000);
 Line (0.0,0.4000000),(1.0,0.4000000);
 Line (0.0,0.1000000),(1.0,0.1000000);

% Vertical grid lines %

Line (.1666666,0.1),(0.1666666,1.0);
 Line (.3333333,0.1),(0.3333333,1.0);
 Line (.5000000,0.1),(0.5000000,1.0);
 Line (.6666666,0.0),(0.6666666,1.0);
 Line (.8333333,0.1),(0.8333333,1.0);

% Elements %

% Box 1 - POLYLINE %

LineWidth 4.0;

LineColr 2;

% LINE Parameter Summary -----				%
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	1	4.0	2 red	%
% -----				%

Line (0.0200000,0.82),(0.1466666,0.98),(0.1466666,0.94),
 (0.1033333,0.98),(0.0616666,0.98),(0.1466666,0.90),
 (0.1466666,0.86),(0.0200000,0.98),(0.0200000,0.94),
 (0.1466666,0.82),(0.1033333,0.82),(0.0200000,0.90),
 (0.0200000,0.86),(0.0616666,0.82);

% Box 2 - DISJOINT POLYLINE %

LineWidth 3.0;

LineColr 3;

% LINE Parameter Summary -----				%
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	1	3.0	3 green	%
% -----				%

DisjtLine (0.3133333,0.82),(0.1866666,0.98),(0.1866666,0.94),(0.2283333,0.98),
 (0.2700000,0.98),(0.1866666,0.90),(0.1866666,0.86),(0.3133333,0.98),
 (0.3133333,0.94),(0.1866666,0.82),(0.2283333,0.82),(0.3133333,0.90),
 (0.3133333,0.86),(0.2700000,0.82);

% Box 3 - POLYMARKER %

MarkerType 1;

MarkerSize 1.0;

MarkerColr 1;

% MARKER PARAMETER SUMMARY -----				%
% BUNDLE				%
% INDEX	TYPE	SIZE	COLOUR	%
% default = 1	1	1.0	1 black	%
% -----				%

Marker (0.35,0.980);

MarkerType 2;
 MarkerSize 2.0;
 MarkerColr 2;
 % MARKER PARAMETER SUMMARY ----- %
 % BUNDLE %
 % INDEX TYPE SIZE COLOUR %
 % default = 1 2 2.0 2 red %
 % ----- %

Marker (0.38,0.940);

MarkerType 3;
 MarkerSize 3.0;
 MarkerColr 3;
 % MARKER PARAMETER SUMMARY ----- %
 % BUNDLE %
 % INDEX TYPE SIZE COLOUR %
 % default = 1 3 3.0 3 green %
 % ----- %

Marker (0.41,0.900);

MarkerType 4;
 MarkerSize 2.0;
 MarkerColr 4;
 % MARKER PARAMETER SUMMARY ----- %
 % BUNDLE %
 % INDEX TYPE SIZE COLOUR %
 % default = 1 4 2.0 4 blue %
 % ----- %

Marker (0.44,0.860);

MarkerType 5;
 MarkerSize 1.0;
 MarkerColr 6;
 % MARKER PARAMETER SUMMARY ----- %
 % BUNDLE %
 % INDEX TYPE SIZE COLOUR %
 % default = 1 5 1.0 6 magenta %
 % ----- %

Marker (0.47,0.820);

% Box 4 - TEXT %
 TextFontIndex 1;
 TextColr 6;
 CharHeight 0.02;
 CharExpan 0.8;
 CharSpace 0.10;
 CharOri 0.0,1.0,1.0,0.0;

```

% TEXT PARAMETER SUMMARY ----- %
% BUNDLE  FONT  TEXT  EXPAN  CHAR.  TEXT  %
% INDEX   INDEX  PRECISION  FACTOR  SPACE  COLOUR  %
% default set  default  set  set  set  %
% 1       1     1         0.8   0.10  6 magenta  %
%
% CHAR    CHAR.  TEXT  TEXT  CHAR SET  ALT CHAR  %
% HEIGHT  ORIENT  PATH  ALIGN  INDEX  SET INDEX  %
% set     set    default  default  default  default  %
% 0.02   0,1,1,0  right  normal  1     1         %
% ----- %
Text 0.5200000,0.8200000,final,".ABCD";

```

```

TextColr 9;
CharOri -1.0,1.0,1.0,1.0; %
% TEXT PARAMETER SUMMARY ----- %
% BUNDLE  FONT  TEXT  EXPAN  CHAR.  TEXT  %
% INDEX   INDEX  PRECISION  FACTOR  SPACE  COLOUR  %
% default set  default  set  set  set  %
% 1       1     1         0.8   0.10  9 orange  %
%
% CHAR    CHAR.  TEXT  TEXT  CHAR SET  ALT CHAR  %
% HEIGHT  ORIENT  PATH  ALIGN  INDEX  SET INDEX  %
% set     set    default  default  default  default  %
% 0.02   -1,1,1,1  right  normal  1     1         %
% ----- %
Text 0.5200000,0.8500000,final,".ABCD";

```

```

TextColr 7;
CharOri 0.0,1.0,1.0,0.0;
TextPath LEFT;
% TEXT PARAMETER SUMMARY ----- %
% BUNDLE  FONT  TEXT  EXPAN  CHAR.  TEXT  %
% INDEX   INDEX  PRECISION  FACTOR  SPACE  COLOUR  %
% default set  default  set  set  set  %
% 1       1     1         0.8   0.10  7 cyan  %
%
% CHAR    CHAR.  TEXT  TEXT  CHAR SET  ALT CHAR  %
% HEIGHT  ORIENT  PATH  ALIGN  INDEX  SET INDEX  %
% set     set    set    default  default  default  %
% 0.02   0,1,1,0  left   normal  1     1         %
% ----- %
Text 0.6400000,0.9600000,final,"LEFT";

```

```

TextColr 4;
TextPath DOWN;
% TEXT PARAMETER SUMMARY ----- %
% BUNDLE  FONT  TEXT  EXPAN  CHAR.  TEXT  %
% INDEX   INDEX  PRECISION  FACTOR  SPACE  COLOUR  %
% default set   default  set     set     set     %
% 1       1     1       0.8    0.10   4 blue  %
%
% CHAR    CHAR.  TEXT  TEXT  CHAR SET  ALT CHAR  %
% HEIGHT ORIENT  PATH  ALIGN  INDEX    SET INDEX  %
% set     set   set   default  default  default  %
% 0.02   0,1,1,0  down  normal  1       1       %
% ----- %
Text 0.6400000,0.9600000,final,"DOWN";
  
```

% Box 5 - RESTRICTED TEXT %

```

LineType 1;
IntStyle EMPTY;
TextColr 4;
CharHeight 0.020;
TextPath RIGHT;
% CLOSED FIGURE PARAMETER SUMMARY ----- %
% INTERIOR  FILL  HATCH  PATTERN  EDGE  EDGE  EDGE  %
% STYLE     COLOUR  INDEX  INDEX    BUNDLE  TYPE  WIDTH  %
% set       set   default  default  INDEX  default  set     %
% EMPTY    4 blue  1=     1       def = 1  1     2.0    %
%
% EDGE     EDGE  FILL REF  %
% COLOUR   VISIBIL.  POINT  %
% default  set     default  %
% 1 black  on     ll corn  %
% ----- %
Rect 0.68,0.82,0.82,0.84;
Rect 0.68,0.86,0.78,0.90;
Rect 0.68,0.92,0.74,0.98;
  
```

```

% TEXT PARAMETER SUMMARY ----- %
% BUNDLE  FONT  TEXT  EXPAN  CHAR.  TEXT  %
% INDEX   INDEX  PRECISION  FACTOR  SPACE  COLOUR  %
% default set   default  set     set     set     %
% 1       1     STROKE  0.8    0.10   4 blue  %
%
% CHAR    CHAR.  TEXT  TEXT  CHAR SET  ALT CHAR  %
% HEIGHT ORIENT  PATH  ALIGN  INDEX    SET INDEX  %
% set     set   set   default  default  default  %
% 0.02   0,1,1,0  right  normal  1       1       %
% ----- %
RestrText 0.14,0.04,0.68,0.82,final,"AbCdEfGhIjK";
RestrText 0.10,0.05,0.68,0.86,final,"AbCdEfGhIjK";
RestrText 0.06,0.06,0.68,0.92,final,"AbCdEfGhIjK";
  
```

% Box 6 - APPEND TEXT %

TextFontIndex 2;
TextColr 2;
CharHeight 0.02;
CharExpan 0.8;
CharSpace 0.10;
CharOri 0.0,1.0,1.0,0.0;

% TEXT PARAMETER SUMMARY						%
% BUNDLE	FONT	TEXT	EXPAN	CHAR.	TEXT	%
% INDEX	INDEX	PRECISION	FACTOR	SPACE	COLOUR	%
% default	set	default	set	set	set	%
% 1	2	1	0.8	0.10	2 red	%
% -----						
% CHAR	CHAR.	TEXT	TEXT	CHAR SET	ALT CHAR	%
% HEIGHT	ORIENT	PATH	ALIGN	INDEX	SET INDEX	%
% set	set	set	default	default	default	%
% 0.02	0,1,1,0	right	normal	1	1	%
% -----						

Text 0.8533333,0.8500000,notfinal,".ABC";

TextFontIndex 3;
TextColr 4;
CharHeight 0.03;

% TEXT PARAMETER SUMMARY						%
% BUNDLE	FONT	TEXT	EXPAN	CHAR.	TEXT	%
% INDEX	INDEX	PRECISION	FACTOR	SPACE	COLOUR	%
% default	set	default	set	set	set	%
% 1	3	1	0.8	0.10	4 blue	%
% -----						
% CHAR	CHAR.	TEXT	TEXT	CHAR SET	ALT CHAR	%
% HEIGHT	ORIENT	PATH	ALIGN	INDEX	SET INDEX	%
% set	set	set	default	default	default	%
% 0.03	0,1,1,0	right	normal	1	1	%
% -----						

ApndText final,"+D";

% Box 7 - POLYGON %

EdgeWidth 2.0;
EdgeColr 4;
IntStyle SOLID;
HatchIndex 1;
FillColr 5;

% CLOSED FIGURE PARAMETER SUMMARY							%
% INTERIOR	FILL	HATCH	PATTERN	EDGE	EDGE	EDGE	%
% STYLE	COLOUR	INDEX	INDEX	BUNDLE	TYPE	WIDTH	%
% set	set	set	default	INDEX	default	set	%
% SOLID	5 yellow	1=1	1	def=1	1	2.0	%
% -----							
% EDGE	EDGE	FILL REF	CHAR SET	ALT CHR			%
% COLOUR	VISIBIL.	POINT	INDEX	SET NDX			%
% set	set	default	default	default			%
% 4 blue	on	ll corn	1	1			%
% -----							

Polygon 0.02,0.52,0.0833333,0.68,0.14,0.52;

% Box 8 - POLYGON SET %

IntStyle HATCH;
 FillColr 2;
 HatchIndex 2;
 EdgeWidth 1.0;
 EdgeColr 1;

% CLOSED FIGURE PARAMETER SUMMARY -----							%
% INTERIOR	FILL	HATCH	PATTERN	EDGE	EDGE	EDGE	%
% STYLE	COLOUR	INDEX	INDEX	BUNDLE	TYPE	WIDTH	%
% set	set	set	default	INDEX	default	set	%
% HATCH	2 red	2	1	def = 1	1	1.0	%
%							%
% EDGE	EDGE	FILL REF	CHAR SET	ALT CHR			%
% COLOUR	VISIBIL.	POINT	INDEX	SET NDX			%
% set	set	default	default	default			%
% 1 black	on	ll corn	1	1			%
-----							%

PolygonSet 0.1866666,0.52,vis,
 0.23,0.66,vis,
 0.29,0.68,invis,
 0.32,0.52,closevis,
 0.225,0.56,vis,
 0.1866666,0.68,vis,
 0.29,0.55,closevis;

% Box 9 - CELL ARRAY %

CellArray									
% P	Q	R	nx	ny	CI	%			%
(.38,.68)	(.44,.52)	(.48,.68)	9	10	65535				
2 0	3 0	4 0	5 0	6	%	101010101	%		
0 7	8 0	0 2	2 0	0	%	011001100	%		
3 7	8 0	0 0	4 2	2	%	111000111	%		
3 0	2 2	0 7	0 0	7	%	101101001	%		
3 0	3 0	4 0	6 0	6	%	101010101	%		
0 2	0 3	0 6	6 0	7	%	010101101	%		
0 3	0 0	5 0	6 3	0	%	010010110	%		
0 4	4 0	5 3	0 4	5	%	011011011	%		
0 5	5 0	0 3	4 0	7	%	011001101	%		
0 6	6 0	0 3	5 0	0;	%	011001100	%		

% Box 10 not used; GDP not in MIL-D-28003 %

%Box 11 - RECTANGLE %

FillColr 6;
 HatchIndex 3;
 EdgeWidth 10.0;
 EdgeColr 7;

```

% CLOSED FIGURE PARAMETER SUMMARY ----- %
% INTERIOR  FILL    HATCH  PATTERN  EDGE  EDGE  EDGE  %
% STYLE     COLOUR  INDEX  INDEX    BUNDLE TYPE  WIDTH  %
% set       set     set    default  INDEX  default set   %
% HATCH     6 magenta  3 /// 1      def = 1  1     10.0  %
%          %          %          %          %          %          %
% EDGE      EDGE    FILL REF CHAR SET  ALT CHR  %
% COLOUR    VISIBIL. POINT  INDEX    SET NDX  %
% set       set     default default  default  %
% 7 cyan    on      ll corn  1        1        %
% ----- %
Rect (0.5200000,0.5200000),(0.6466666,0.6800000);

```

% Box 12 - CIRCLE %

FillColr 4;
HatchIndex 4;
EdgeWidth 4.0;
EdgeColr 3;

```

% CLOSED FIGURE PARAMETER SUMMARY ----- %
% INTERIOR  FILL    HATCH  PATTERN  EDGE  EDGE  EDGE  %
% STYLE     COLOUR  INDEX  INDEX    BUNDLE TYPE  WIDTH  %
% set       set     set    default  INDEX  default set   %
% HATCH     4 blue   4 \\ \ 1      def = 1  1     4.0   %
%          %          %          %          %          %          %
% EDGE      EDGE    FILL REF CHAR SET  ALT CHR  %
% COLOUR    VISIBIL. POINT  INDEX    SET NDX  %
% set       set     default default  default  %
% 3 green   on      ll corn  1        1        %
% ----- %
Circle (0.7500000,0.6000000),0.075;

```

% Box 13 - CIRCULAR ARC 3 POINT %

LineType 1;

```

% LINE Parameter Summary ----- %
% BUNDLE  LINE    LINE    LINE    %
% INDEX   TYPE    WIDTH   COLOUR  %
% default set     set     set     %
% 1       1      3.0    3 green %
% ----- %
Arc3Pt (0.9800000,0.6500000) (0.8666666,0.5400000) (0.9500000,0.5200000);

```

% Box 14 - CIRCULAR ARC 3 POINT CLOSE (CHORD) %

FillColr 5;
HatchIndex 5;
EdgeWidth 2.0;
EdgeColr 9;

```

% CLOSED FIGURE PARAMETER SUMMARY ----- %
% INTERIOR  FILL    HATCH  PATTERN  EDGE    EDGE    EDGE    %
% STYLE     COLOUR  INDEX  INDEX    BUNDLE  TYPE    WIDTH  %
% set       set     set    default  INDEX  default set    %
% HATCH     5 yellow 5 ###   1        def = 1  1      2.0   %
%
% EDGE      EDGE    FILL REF CHAR SET  ALT CHR  %
% COLOUR    VISIBIL. POINT  INDEX    SET NDX  %
% set       set     default default  default  %
% 9 orange  on      ll corn  1        1        %
% ----- %
Arc3PtClose (0.150000,0.360000) (0.0333333,0.240000) (0.1166666,0.200000),chord;
  
```

% Box 15 - CIRCULAR ARC CENTRE %

LineWidth 1.0;

LineType 1;

```

% LINE Parameter Summary ----- %
% BUNDLE  LINE          LINE          LINE          %
% INDEX   TYPE          WIDTH         COLOUR        %
% default set          set           set           %
% 1       1            1.0          3 green      %
% ----- %
  
```

```

%      x      y      DXs  DYs  DXe  DYe  rad  %
ArcCtr ( 0.25, 0.3), 0.18, 0.32, 0.28, 0.25, 0.075;
  
```

% Box 16 - CIRCULAR ARC CENTRE CLOSE (PIE) %

HatchIndex 6;

FillColr 2;

EdgeColr 4;

EdgeVis OFF;

```

% CLOSED FIGURE PARAMETER SUMMARY ----- %
% INTERIOR  FILL    HATCH  PATTERN  EDGE    EDGE    EDGE    %
% STYLE     COLOUR  INDEX  INDEX    BUNDLE  TYPE    WIDTH  %
% set       set     set    default  INDEX  default set    %
% HATCH     2 red   6 xxx   1        def = 1  1      2.0   %
%
% EDGE      EDGE    FILL REF CHAR SET  ALT CHR  %
% COLOUR    VISIBIL. POINT  INDEX    SET NDX  %
% set       set     default default  default  %
% 4 blue   off      ll corn  1        1        %
% ----- %
%      x      y      DXs  DYs  DXe  DYe  rad  type %
ArcCtrClose ( 0.416, 0.3), 0.18, 0.32, 0.48, 0.25, 0.075, pie;
  
```

% Box 17 - ELLIPSE %

FillColr 9;

HatchIndex 4;

EdgeColr 6;

EdgeVis ON;

```

% CLOSED FIGURE PARAMETER SUMMARY ----- %
% INTERIOR  FILL    HATCH  PATTERN  EDGE    EDGE    EDGE    %
% STYLE     COLOUR  INDEX  INDEX    BUNDLE  TYPE    WIDTH   %
% set       set     set    default  INDEX   default set    %
% HATCH     9 orange 4\\ \  1        def = 1  1      2.0    %
%
% EDGE     EDGE    FILL REF CHAR SET  ALT CHR  %
% COLOUR   VISIBIL. POINT  INDEX    SET NDX  %
% set      set     default default  default  %
% 6 magenta on     ll corn  1        1        %
% ----- %
Ellipse (0.5833331,0.30),0.518,0.24,0.55,0.32;

```

% Box 18 - ELLIPTICAL ARC %

```

LineWidth 6.0;
LineType 1;
% LINE Parameter Summary ----- %
% BUNDLE  LINE      LINE      LINE      %
% INDEX   TYPE      WIDTH     COLOUR    %
% default set      set       set       %
% 1       1        6.0      3 green   %
% ----- %
EllipArc (0.6800000,0.28),      % centre point %
         (0.5846666,0.19),      % 1st CDP endpoint %
         (0.5966666,0.31),      % 2nd CDP endpoint %
         (0.04, 0.11),          % DX_start,DY_start %
         (0.10,-0.09);          % DX_end,DY_end %

```

% Box 19 - ELLIPTICAL ARC CLOSE (PIE) %

```

FillColr 3;
HatchIndex 2;
EdgeWidth 4.0;
% CLOSED FIGURE PARAMETER SUMMARY ----- %
% INTERIOR  FILL    HATCH  PATTERN  EDGE    EDGE    EDGE    %
% STYLE     COLOUR  INDEX  INDEX    BUNDLE  TYPE    WIDTH   %
% set       set     set    default  INDEX   default set    %
% HATCH     3 green  2 | |  1        def = 1  1      4.0    %
%
% EDGE     EDGE    FILL REF CHAR SET  ALT CHR  %
% COLOUR   VISIBIL. POINT  INDEX    SET NDX  %
% set      set     default default  default  %
% 6 magenta on     ll corn  1        1        %
% ----- %
EllipArcClose (0.85,0.28),      % centre point %
              (0.75,0.19),      % 1st CDP endpoint %
              (0.76,0.31),      % 2nd CDP endpoint %
              (0.04, 0.12),      % DX_start,DY_start %
              (0.10,-0.08),      % DX_end,DY_end %
              pie;

```

% Box "20" - LINE TYPE %

LineColr 2;
 Linewidth 2.0;
 LineType 5;

% LINE Parameter Summary ----- %				
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	5 dash-dot-dot	2.0	2 red	%
% ----- %				

Line (0.05,0.02),(0.6,0.02);

LineType 4;

% LINE Parameter Summary ----- %				
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	4 dash-dot	2.0	2 red	%
% ----- %				

Line (0.05,0.03),(0.6,0.03);

LineType 3;

% LINE Parameter Summary ----- %				
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	3 dot	2.0	2 red	%
% ----- %				

Line (0.05,0.04),(0.6,0.04);

LineType 2;

% LINE Parameter Summary ----- %				
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	2 dash	2.0	2 red	%
% ----- %				

Line (0.05,0.05),(0.6,0.05);

LineType 1;

% LINE Parameter Summary ----- %				
% BUNDLE	LINE	LINE	LINE	%
% INDEX	TYPE	WIDTH	COLOUR	%
% default	set	set	set	%
% 1	1 solid	2.0	2 red	%
% ----- %				

Line (0.05,0.06),(0.6,0.06);

% Labels in Boxes %

TextFontindex 3;
TextPrec STROKE;
CharExpan 0.8;
CharSpace 0.10;
TextColr 1;
CharHeight 0.015;
CharOri 0.0,1.0,1.0,0.0;
TextPath RIGHT;

% TEXT PARAMETER SUMMARY -----

% BUNDLE	FONT	TEXT	EXPAN	CHAR.	TEXT	%
% INDEX	INDEX	PRECISION	FACTOR	SPACE	COLOUR	%
% default	set	set	set	set	set	%
% 1	3	STROKE	0.8	0.10	1 black	%
%						%
% CHAR	CHAR.	TEXT	TEXT	CHAR SET	ALT CHAR	%
% HEIGHT	ORIENT	PATH	ALIGN	INDEX	SET INDEX	%
% set	set	set	default	default	default	%
% 0.015	0,1,1,0	right	normal	1	1	%
%						%

Text	0.0050000,0.7500000,	final,	"(1) POLYLINE";
Text	0.1716666,0.7500000,	final,	"(2) DISJOINT";
Text	0.1716666,0.7300000,	final,	" POLYLINE";
Text	0.3383333,0.7500000,	final,	"(3) POLYMARKER";
Text	0.5050000,0.7500000,	final,	"(4) TEXT";
Text	0.6716666,0.7500000,	final,	"(5) RESTRICTED";
Text	0.6716666,0.7300000,	final,	" TEXT";
Text	0.8383333,0.7500000,	final,	"(6) APPEND";
Text	0.8383333,0.7300000,	final,	" TEXT";
Text	0.0050000,0.4500000,	final,	"(7) POLYGON";
Text	0.1716666,0.4500000,	final,	"(8) POLYGON";
Text	0.1716666,0.4300000,	final,	" SET";
Text	0.3383333,0.4500000,	final,	"(9) CELL";
Text	0.3383333,0.4300000,	final,	" ARRAY";
% Not Included - - - - - (10) GENERALIZED DRAWING PRIMITIVE (GDP) - %			
Text	0.5050000,0.4500000,	final,	"(11) RECTANGLE";
Text	0.6716666,0.4500000,	final,	"(12) CIRCLE";
Text	0.8383333,0.4500000,	final,	"(13) CIRCULAR";
Text	0.8383333,0.4300000,	final,	" ARC 3 POINT";
Text	0.0050000,0.1500000,	final,	"(14) CIRCULAR";
Text	0.0050000,0.1300000,	final,	" ARC 3 POINT";
Text	0.0050000,0.1100000,	final,	" CLOSE";
Text	0.1716666,0.1500000,	final,	"(15) CIRCULAR";
Text	0.1716666,0.1300000,	final,	" ARC CENTRE";
Text	0.3383333,0.1500000,	final,	"(16) CIRCULAR";
Text	0.3383333,0.1300000,	final,	" ARC CENTRE";
Text	0.3383333,0.1100000,	final,	" CLOSE";
Text	0.5050000,0.1500000,	final,	"(17) ELLIPSE";
Text	0.6716666,0.1500000,	final,	"(18) ELLIPTICAL";
Text	0.6716666,0.1300000,	final,	" ARC";
Text	0.8383333,0.1500000,	final,	"(19) ELLIPTICAL";
Text	0.8383333,0.1300000,	final,	" ARC CLOSE";
Text	0.05,0.072,	final,	"LINE TYPE";

```

CharHeight 0.007;
% TEXT PARAMETER SUMMARY ----- %
% BUNDLE  FONT  TEXT  EXPAN  CHAR.  TEXT  %
% INDEX   INDEX PRECISION FACTOR SPACE COLOUR %
% default set   set   set   set   set   set   %
% 1       3     STROKE 0.8   0.10 1 black %
%
% CHAR    CHAR.  TEXT  TEXT  CHAR SET ALT CHAR %
% HEIGHT ORIENT PATH  ALIGN  INDEX  SET INDEX %
% set    set   set   default default default %
% 0.007 0,1,1,0 right normal 1 1 %
% ----- %
Text (.0229,.060),final,"1.";
Text (.0229,.050),final,"2.";
Text (.0229,.040),final,"3.";
Text (.0229,.030),final,"4.";
Text (.0229,.020),final,"5.";
  
```

% Figure Label %

```

CharHeight 0.015;
% TEXT PARAMETER SUMMARY ----- %
% BUNDLE  FONT  TEXT  EXPAN  CHAR.  TEXT  %
% INDEX   INDEX PRECISION FACTOR SPACE COLOUR %
% default set   set   set   set   set   set   %
% 1       3     STROKE 0.8   0.10 1 black %
%
% CHAR    CHAR.  TEXT  TEXT  CHAR SET ALT CHAR %
% HEIGHT ORIENT PATH  ALIGN  INDEX  SET INDEX %
% set    set   set   default default default %
% 0.015 0,1,1,0 right normal 1 1 %
% ----- %
Text 0.67333333,0.0800000,final,"CAL5 TEST NETWORK";
Text 0.67333333,0.0570000,final,"MIL-D-28003";
Text 0.67333333,0.0340000,final,"Computer Graphics Metafile";
Text 0.67333333,0.0110000,final,"File: CTN-01Rd, 91-10-03";
  
```

EndPic;
 EndMF;

ATTACHMENT G

Glossary

- Clear Text:** One method for encoding a CGM, the other two being character encoding and binary. Of the three encodings, clear text is the most like English, and is thus easier for people to read than the number-oriented binary and character encodings. Multiple encodings exist as trade-offs between short file size and human readability. To be compatible with MIL-D-28003, a CGM must eventually be in binary format.
- Computer Graphics Metafile:** The specification, as designated in ANSI/ISO 8632, for storing and transferring two-dimensional picture (lines and shapes) data.
- Element:** A functional item that can be used to construct a picture or convey information. Examples are a circle, a line, a color, a linewidth, and text.
- MIL-STD-1840A:** Military Standard, "Automated Interchange of Technical Information." This standard defines methods for the digital transmission of technical information necessary for the logistic support of weapons systems throughout their life cycle. MIL-STD-1840A acts as the "parent" standard for a suite of specifications, including MIL-D-28003 (CGM).
- MIL-D-28003:** Military Specification, "Digital Representation for Communication of Illustration Data: CGM Application Profile." This specification establishes requirements for digital delivery of 2-dimensional vector images via the digital format of the CGM (Computer Graphics Metafile). MIL-D-28003 is a subset of the ANSI/ISO 8632 standard.
- Pixel:** Picture Element. A computer screen displays a picture as a series of discrete rectangles or squares called pixels. Each pixel, the smallest unit of picture display, contains only one color-shaded value. Complex images can be formed, building upon the simple pixel, since the human eye tends to blend the colors into a continuous image.
- Raster Data:** Image data stored (and transmitted) as a regular 2-D array of pixels.
- Vector Data:** Image data stored (and transmitted) as lines. In the case of CGM, vector image data need not be limited to straight line segments, but may also consist of graphical elements such as circles, and arcs, defined by mathematical equations.

ATTACHMENT H List of Acronyms and Abbreviations

ANSI:	American National Standards Institute
ASCII:	American Standard Code for Information Interchange
CALS:	Computer-aided Acquisition and Logistic Support
CGM:	Computer Graphics Metafile
CTN:	CALS Test Network
DoD:	Department of Defense
ISO:	International Organization for Standardization, commonly known as International Standards Organization in the United States
MIL-STD-1840A:	Military Standard, "Automated Interchange of Technical Information"
MIL-D-28003:	Military Specification, "Digital Representation for Communication of Illustration Data: CGM Application Profile"
Pixel:	Picture Element
2-D:	Two-dimensional