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Recreation of the 28-Entity IGES Test File Using the Computervision CADD5 4X

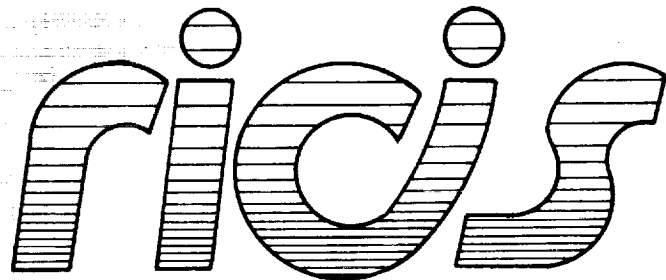
Anchyi Kuan
Saurin Shah
Kevin Smith

University of Houston-Clear Lake

August 1987

Cooperative Agreement NCC 9-16
Research Activity SE.8

NASA Johnson Space Center
Engineering Directorate



Research Institute for Computing and Information Systems
University of Houston - Clear Lake

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(NASA-CR-187403) RECREATION OF THE
28-ENTITY IGES TEST FILE USING THE
COMPUTERVISION CADD5 4X (Houston Univ.)
73 p

The RICIS Concept

The University of Houston-Clear Lake established the Research Institute for Computing and Information systems in 1986 to encourage NASA Johnson Space Center and local industry to actively support research in the computing and information sciences. As part of this endeavor, UH-Clear Lake proposed a partnership with JSC to jointly define and manage an integrated program of research in advanced data processing technology needed for JSC's main missions, including administrative, engineering and science responsibilities. JSC agreed and entered into a three-year cooperative agreement with UH-Clear Lake beginning in May, 1986, to jointly plan and execute such research through RICIS. Additionally, under Cooperative Agreement NCC 9-16, computing and educational facilities are shared by the two institutions to conduct the research.

The mission of RICIS is to conduct, coordinate and disseminate research on computing and information systems among researchers, sponsors and users from UH-Clear Lake, NASA/JSC, and other research organizations. Within UH-Clear Lake, the mission is being implemented through interdisciplinary involvement of faculty and students from each of the four schools: Business, Education, Human Sciences and Humanities, and Natural and Applied Sciences.

Other research organizations are involved via the "gateway" concept. UH-Clear Lake establishes relationships with other universities and research organizations, having common research interests, to provide additional sources of expertise to conduct needed research.

A major role of RICIS is to find the best match of sponsors, researchers and research objectives to advance knowledge in the computing and information sciences. Working jointly with NASA/JSC, RICIS advises on research needs, recommends principals for conducting the research, provides technical and administrative support to coordinate the research, and integrates technical results into the cooperative goals of UH-Clear Lake and NASA/JSC.

**Recreation of the 28-Entity IGES Test
File Using the Computervision
CADD5 4X**

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 354

LECTURE 10

SPIN-1 PARTICLES

PROFESSOR J. JOYNT

WINTER 2011

Preface

This research was conducted under the auspices of the Research Institute for Computing and Information Systems by Anchi Kuan, Saurin Shah, and Kevin Smith. Rick Graves, of Barrios Technology, served as Principle Investigator and Sharon Perkins, Associate Professor of Computer Science, at the University of Houston-Clear Lake, served as the RICIS technical representative.

Funding has been provided by the Engineering Directorate, NASA/JSC through Cooperative Agreement NCC 9-16 between NASA Johnson Space Center and the University of Houston-Clear Lake. The NASA technical monitor for this activity was Dave Howes, Information Systems Manager, Engineering Directorate, NASA/JSC.

The views and conclusions contained in this report are those of the author and should not be interpreted as representative of the official policies, either express or implied, of NASA or the United States Government.

Section 1: Introduction and Overview

Section 2: Detailed Analysis and Findings

Section 3: Conclusions and Recommendations

Section 4: Appendix A

Section 5: Appendix B



RECREATION OF THE
28-ENTITY IGES TEST FILE
USING THE COMPUTERVISION CADD5 4X

Prepared by :

Anchy Kuan
Saurin Shah
Kevin Smith

In Support of :

CTEC 5939
CAD Systems Analysis
Summer Semester 1987

With Supervision from :

Rick Graves
Dr. Sharon Perkins

INTRODUCTION

An Initial Graphics Exchange Specification (IGES) test file created at the GODDARD Space Flight Center (GSFC) is called the 28 Entity IGES Test File. This file contains 28 geometric and annotation entities which are considered the basic entities that an IGES translator for any CAD system should support.

The purpose of this investigation was to determine how the IGES preprocessor supports the 28 entities through recreation of the 28 Entity IGES Test File on the ComputerVision (hereinafter referred to as CV) CADDs 4X.

TEST PROCEDURE

Our investigation followed the following steps which were documented in a GSFC memorandum dated 12 December 1985 (a copy of this memorandum is provided as Attachment 1) :

1. Based on the information in the listing of the geometric characteristics of all the entities that make up the 28 Entity IGES Test File and using the CAD System's user interface, the test file should be recreated in the native format of the CAD System.
2. A record should be kept as to what geometries were used in the CAD System to create the entities in the 28 entity test file and entities not supported by the CAD System should be noted.
3. Produce a hardcopy of the recreated 28 entity test file as it displays in the CAD System.
4. Output the recreated 28 entity test file in IGES format.
5. Read the output IGES file back into the system and produce a hardcopy of the display.

TEST RESULTS

The following discussion summarizes our investigative activities which supported the test procedure as presented in the previous section of this report. This discussion is partitioned into numbered segments which coincide with the 5 steps which make up the test procedure.

1. The 28 Entity IGES Test File was recreated in the native format of the CV CADDs. All geometries and annotations were first created in the given non-rotated orientation (Figure 1). They were then rotated 30 degrees clockwise about the Z, Y, and X axes, respectively, to generate the desired final file (Figure

2). All dimension, flag note and general label entities are created through the use of a corresponding non-associated geometric entity. After creation, these geometric entities are no longer required and are deleted. For example, a circle is required in order to create a Diameter Dimension Entity (see Attachment 2).

For completeness, hardcopies of the non-rotated file (Figure 3) and the rotated file (Figure 4) are included as attachments.

2. Individual descriptions detailing the types of geometries used in the CV CADDs to recreate the 28 entity IGES Test File are presented in Attachment 2. Any problems encountered during the recreation of this test file are documented within this discussion. A summary of the IGES entities supported by the CV CADDs is presented in Table 1.

Table 1. IGES Entities Supported by CV PUT IGES

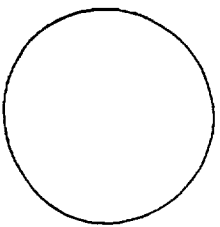
IGES Entity Number	IGES Entity	IGES Form Number	Computer Vision Entity
100	Circular Arc		Arc/circle
102	Composite Curve		Group (relation with composite entities)
104	Conic Arc Ellipse Parabola	1 3	Ellipse Parabola
106	Copious data Linear path 3-D	12	String
108	Plane	1	Plane (unbounded or infinite only)
110	Line		Line
112	Parametric spline curve		B-spline/group of Cpoles
114	Parametric spline surface		B-spline/group of Spoles
116	Point		Point
118	Ruled surface		Ruled surface
120	Surface of revolution		Surface of revolution
122	Tabulated cylinder		Tabulated cylinder

202	Angular dimension	Angular dimension
206	Diameter dimension	Diameter dimension
208	Flag note	Flag note
	Flag note with leader	Label with Feature Control Symbol as flag
210	General label	Label
212	General note	Text
216	Linear dimension	Linear dimension
218	Ordinate dimension	Ordinate dimension
220	Point dimension	Ordinate dimension
222	Radius dimension	Radius dimension
308	Subfigure definition	Subfigure part file
404	Drawing	Drawing
408	Singular subfigure instance	Subfigure instance
410	View	View

3. Hardcopies of the recreated 28 entity file are presented in Figures 1 and 2. Figure 5 presents CV's drawing defined display of the 28 entity test file. Figure 6 presents NASCAD's drawing defined display of the 28 entity test file, for comparison.

4. The recreated 28 entity test file was pre-processed into IGES neutral format. A copy of the output listing is included as Attachment 3.

5. The IGES file was then read back into the system. The result is presented in Figure 7.



CIRCULAR ARC (100)



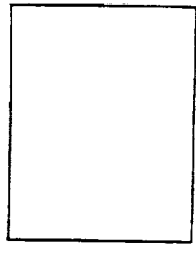
COMPOSITE CURVE (102)



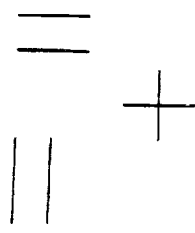
CONIC ARC (104)



LINEAR STRING (106)



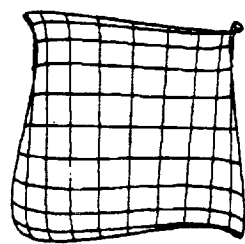
PLANE (108)



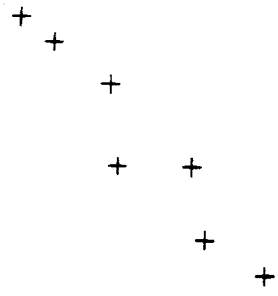
LINE (110)



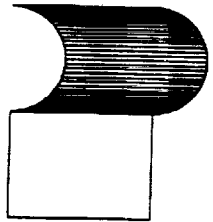
SPLINE (112)



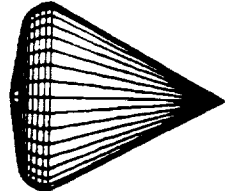
SPLINE SURFACE (114)



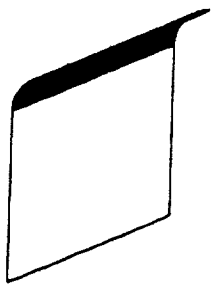
POINT (116)



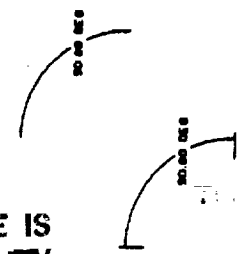
RULED SURFACE (118)



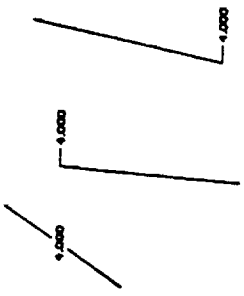
SURF. OF REV. (120)



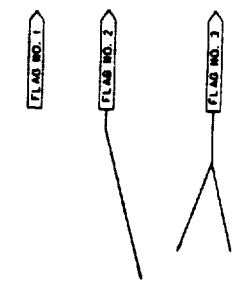
TABULATED CYLINDER (122)



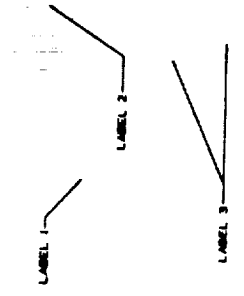
ANGULAR DIMENSION (202)



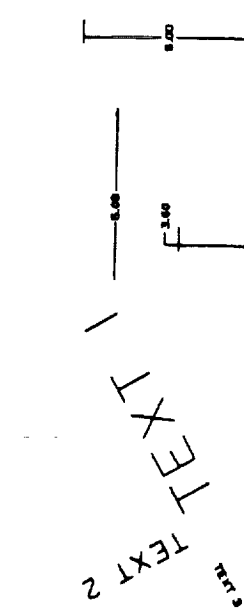
DIAMETER DIMENSION (206)



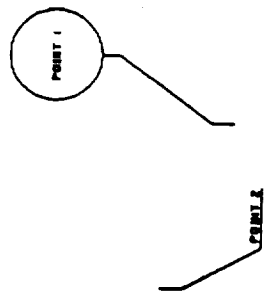
FLAG NOTE (208)



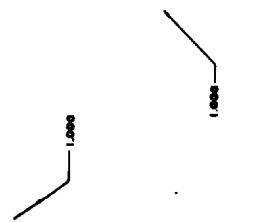
GENERAL LABEL (210)



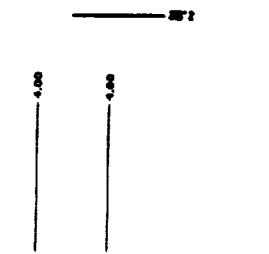
LINEAR DIMENSION (216)



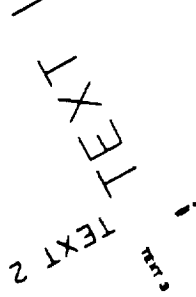
POINT DIMENSION (220)



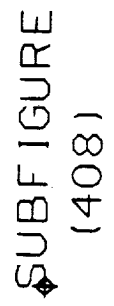
RADIUS DIMENSION (222)



ORDINATE DIMENSION (218)



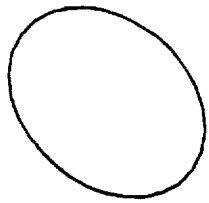
GENERAL NOTE (212)



SUBFIGURE (408)

ORIGINAL PAGE IS OF POOR QUALITY

FIGURE 1



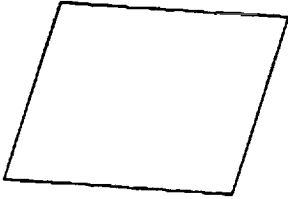
CIRCULAR ARC (100)



COMPOSITE CURVE (102)



CONIC ARC (104)

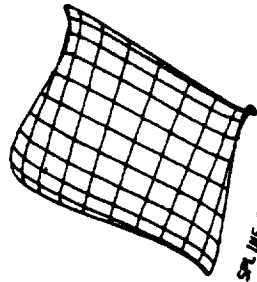


PLANE (108)



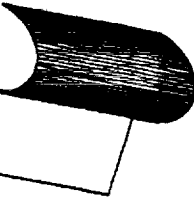
LINE (110)

LINEAR STRING (106)

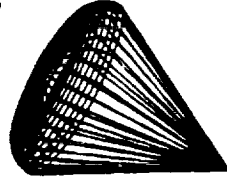


SPLINE SURFACE (114)

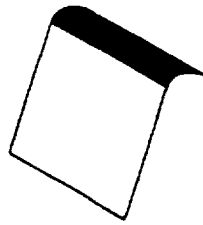
SPLINE (112)



RULED SURFACE (118)



SURF. OF REV. (120)



TABULATED CYLINDER (122)



POINT (116)



GENERAL LABEL (121)



TEXT 2

TEXT 1

GENERAL NOTE (123)

TEXT 1

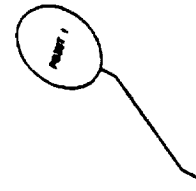
FLAG NOTE (208)



ANGULAR DIMENSION (202)



DIAMETER DIMENSION (206)



POINT DIMENSION (220)

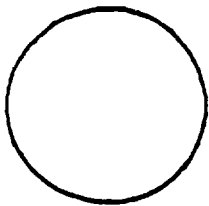
ORDINATE DIMENSION (218)

RADIUS DIMENSION (222)

SUBFIGURE (408)

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FIGURE 2



CIRCULAR ARC (1100)



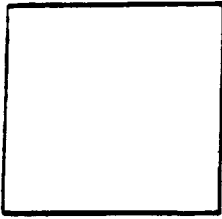
IRREGULAR CURVE (1101)



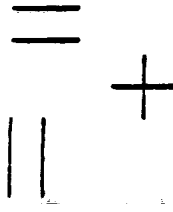
CUBIC ARC (1102)



LINEAR STROKE (1103)



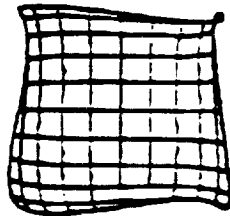
PLANE (1104)



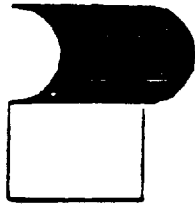
LINE (1105)



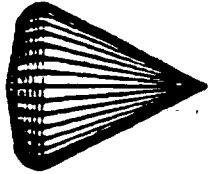
PLANE (1106)



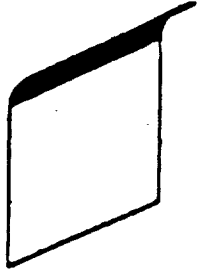
OPEN SURFACE (1107)



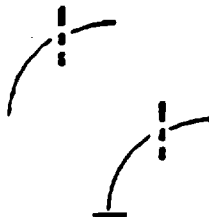
OPEN SURFACE (1108)



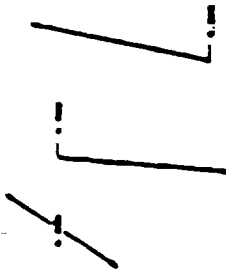
OPEN SURFACE (1109)



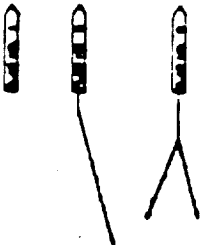
TAPERED CYLINDER (1110)



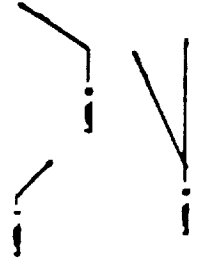
CIRCULAR DEPRESSION (1111)



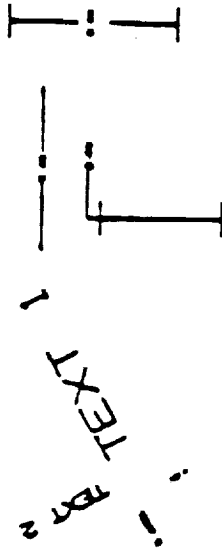
CIRCULAR DEPRESSION (1112)



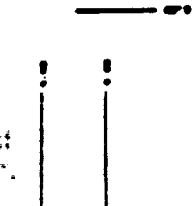
PLANE NOTE (1113)



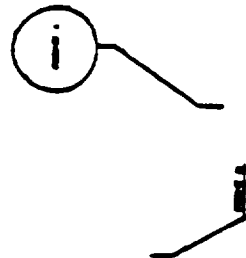
LINEAR LABEL (1114)



GENERAL NOTE (1115)



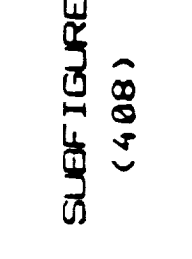
CIRCULAR DEPRESSION (1116)



CIRCULAR DEPRESSION (1117)



PLANE NOTE (1118)

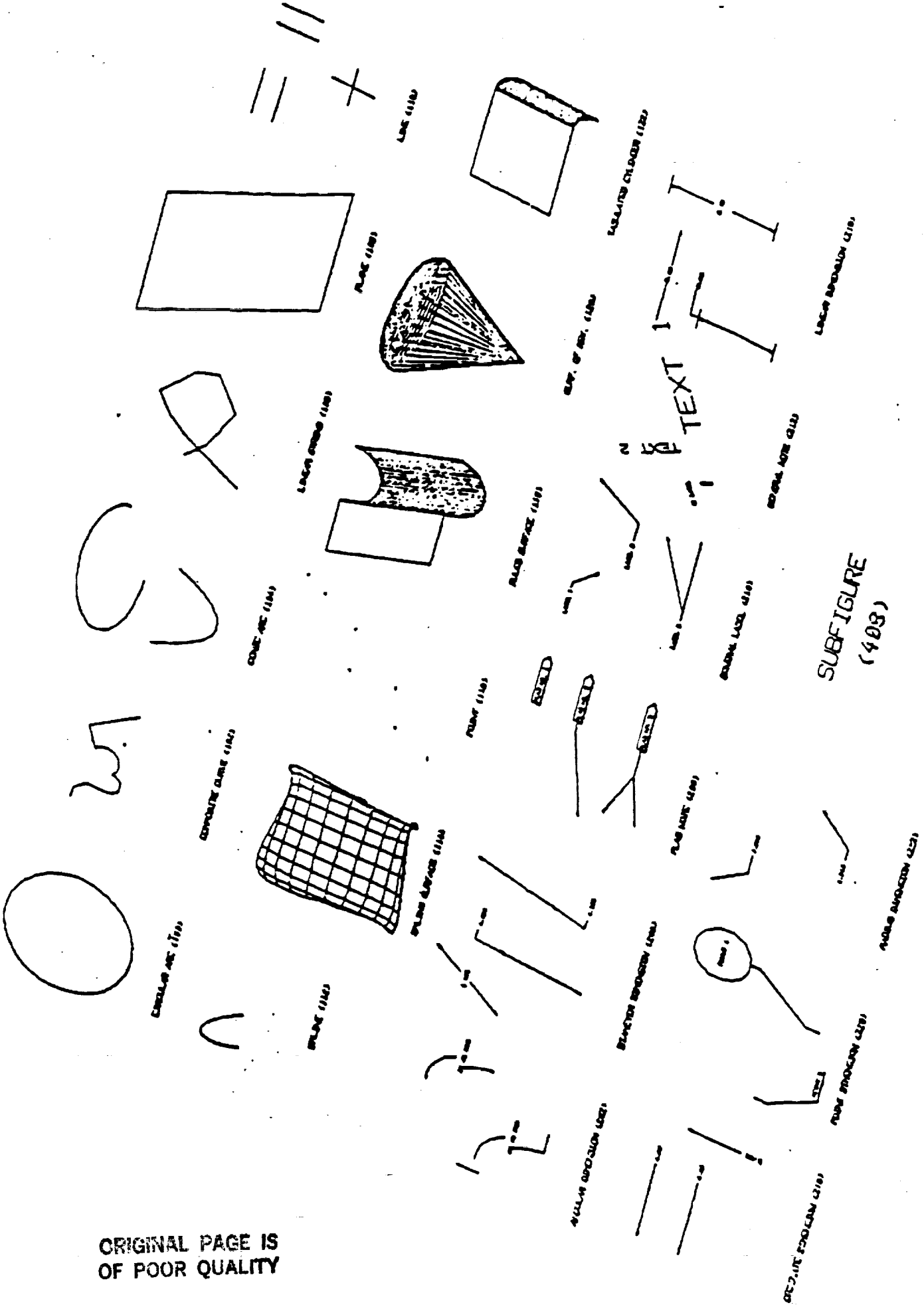


LINEAR LABEL (1119)

SUBFIGURE (408)

FIGURE 3

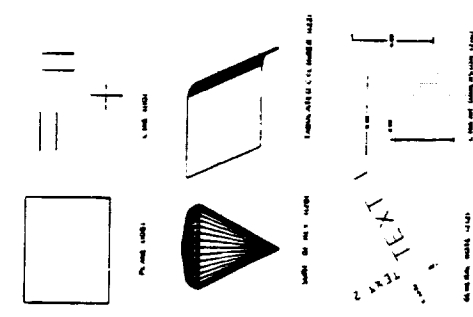
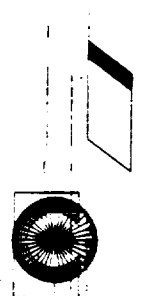
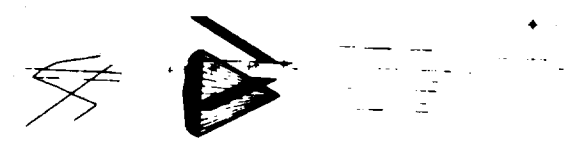
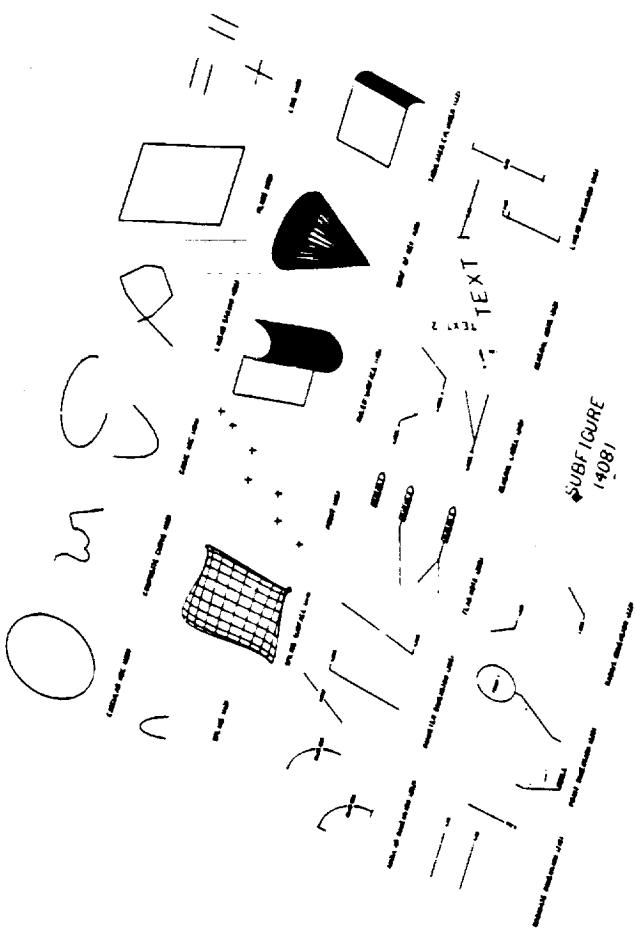
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ORIGINAL PAGE IS OF POOR QUALITY

SUBFIGURE (408)

Figure 4



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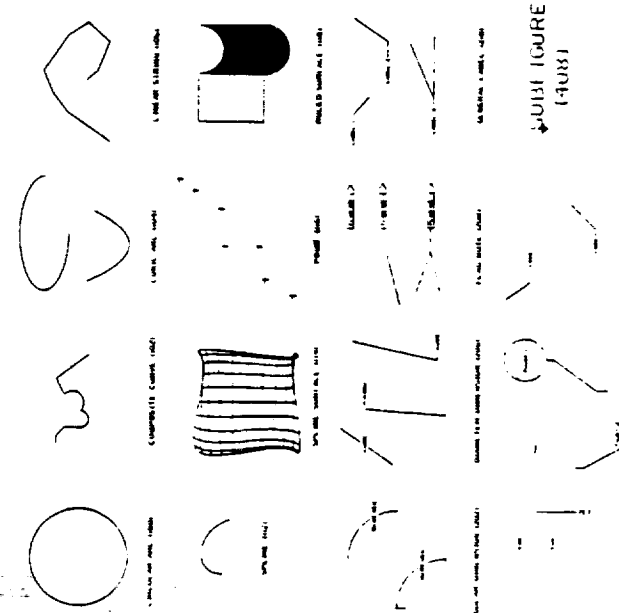
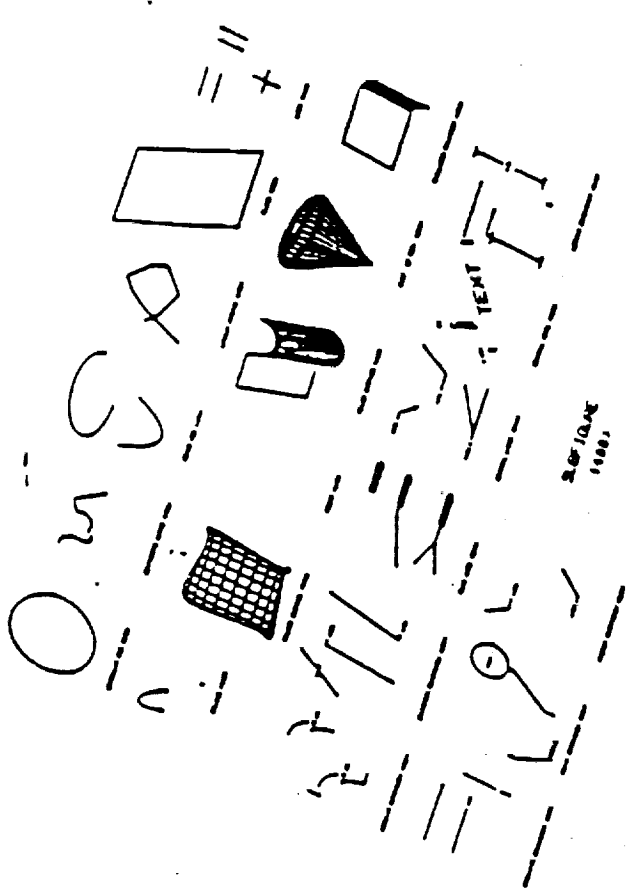
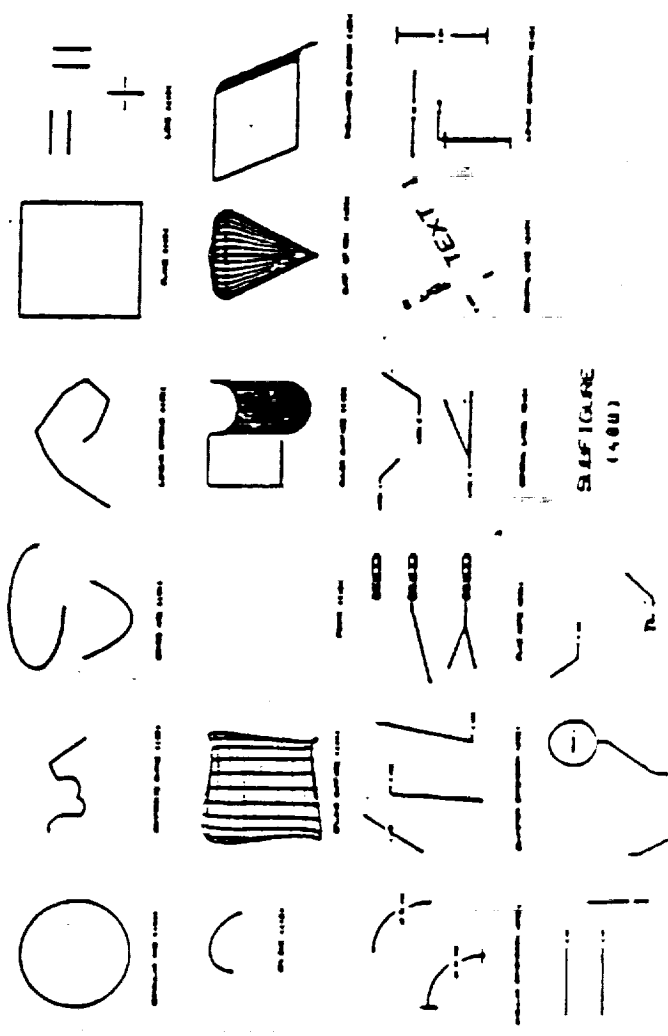


FIGURE 5



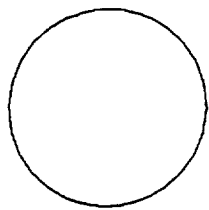
20-10-96
1990



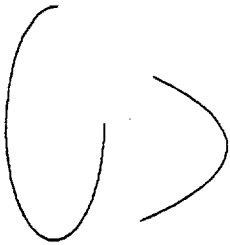
20-10-96
1990

FIGURE 6

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CIRCULAR ARC (100)



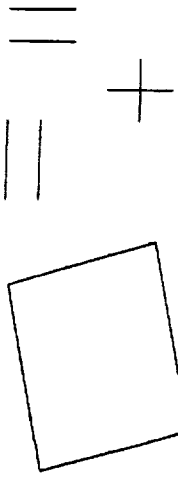
CONIC ARC (104)



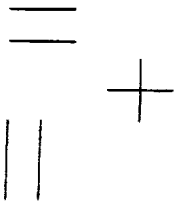
COMPOSITE CURVE (102)



LINEAR STRING (106)



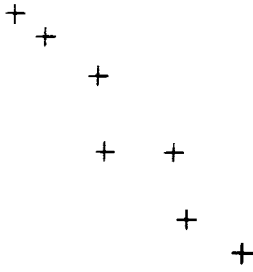
PLANE (108)



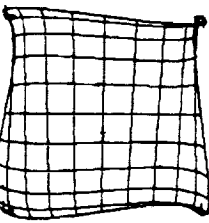
LINE (110)



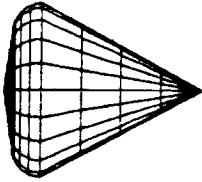
SPLINE (112)



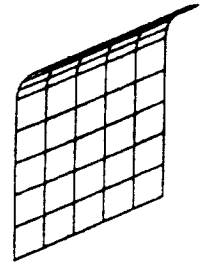
POINT (116)



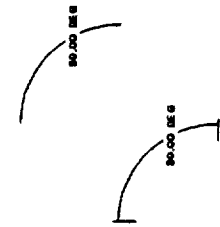
RULED SURFACE (118)



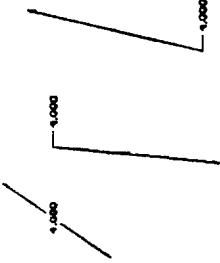
SURF. OF REV. (120)



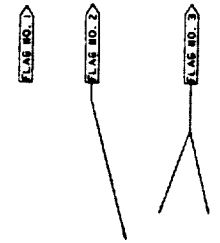
TABULATED CYLINDER (122)



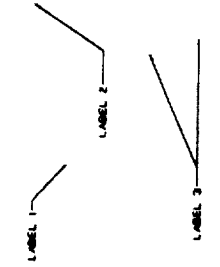
ANGULAR DIMENSION (202)



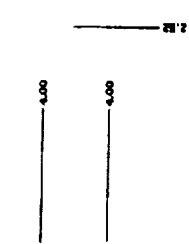
DIAMETER DIMENSION (206)



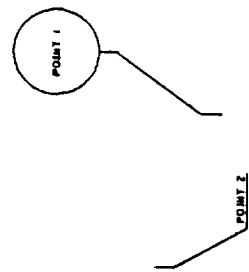
FLAG NOTE (208)



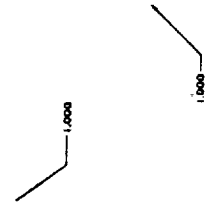
GENERAL LABEL (210)



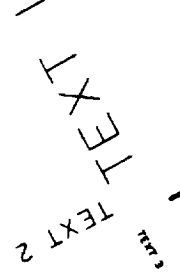
ORDINATE DIMENSION (218)



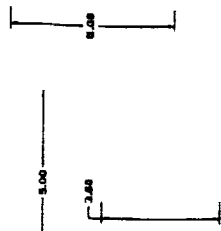
POINT DIMENSION (220)



RADIUS DIMENSION (222)



GENERAL NOTE (212)



LINEAR DIMENSION (216)

SUBFIGURE (408)

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FIGURE 7

ATTACHMENT 1

Goddard Space Flight Center
Greenbelt, Maryland
20771

December 12, 1985

Reply to Airm 0731.4

TO: Distribution

FROM: Engineering Directorate
Applied Engineering Division

SUBJECT: Recreation of 28 Entity Test File

The enclosed listing provides a labeled description of the geometric characteristics of all the entities that make up the 28 Entity Initial Graphics Exchange Specification (IGES) Test File. Each separate entity in the file is identified and the geometric information necessary for a user to recreate that entity in his Computer Aided Design (CAD) System is listed below it. The entities are listed in numerical order based on IGES entity type number.

The geometric information listed for the entities in the file is given for the entities in a non-rotated position. This was done because many of the entities are easier to describe and create in a non-rotated orientation. In creating the final file in your CAD System, all the geometric and annotation entities must be rotated 30 degrees clockwise about the X, Y, and Z axis respectively. This information is also given at the top of the listing along with any characteristic values used in the creation of the file.

In order to perform the second phase of this test, the following steps should be performed:

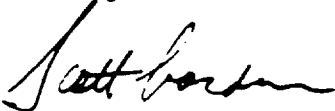
- a. Based on the information in the listing and using the CAD System's user interface, the 28 entity file should be recreated in the native format of the CAD System.
- b. A record should be kept as to what geometries were used in the CAD System to create the entities in the 28 entity test file and entities not supported by the CAD System should be noted.
- c. Produce a hardcopy of the recreated 28 entity test file as it displays in the CAD System.
- d. Output the recreated 28 entity test file in IGES format.

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e. Read the output IGES file back into the system and produce a hardcopy of the display.

f. Send all hardcopies of displays, the output IGES file, and the record of how the file was created (step b) to Goddard.

The results of this test should reveal precisely how the 28 IGES entities are supported by the pre-processor independent of the post-processor's ability to read them into the CAD System from the IGES format. These results, along with the information you have supplied identifying how the 28 IGES entities are mapped into the internal formats of the CAD Systems at each of the centers, should allow us to formulate a fairly accurate picture of how the IGES translators support the 28 entities selected for testing.



Scott Gordon
Mechanical Engineering Branch

Enclosure

Distribution: Mr. R. Wesenberg/KSC/DL-NED-1
Mr. B. Anderson/JSC/ES
Mr. F. Enemoto/ARC/227-2
Mr. K. Fernandez/MSFC/EB44
Mr. H. Sonnemann/HQ/D
Mr. G. Whitehurst/LaRC/5542
Mr. J. Yuska/LeRC/86-2
Mr. L. Purves/GSFC/730.1

DISCRIPTION OF 28 ENTITY IGES TEST FILE

----- FILE CHARACTERISTICS -----

ALL GEOMETRIES LISTED BELOW MUST BE ROTATED:

- 30 DEGREES ABOUT THE Z AXIS
- 30 DEGREES ABOUT THE Y AXIS
- 30 DEGREES ABOUT THE X AXIS

TEXT CHARACTERISTICS (UNLESS OTHERWISE NOTED):

- TEXT IS FONT TYPE 1 (STANDARD BLOCK)
- GENERAL NOTES HAVE A TEXT HEIGHT OF 0.3
- DIMENSION TEXT HAVE A TEXT HEIGHT OF 0.2

ARROWHEAD CHARACTERISTICS (UNLESS OTHERWISE NOTED):

- ARROWHEAD LENGTH IS 0.2
- ARROWHEAD WIDTH IS 0.025
- SOLID ARROWHEAD (FORM 1)

TEXT AND ANNOTATION VISIBLE IN VIEWS 1 AND 4 ONLY

ALL UNITS ARE INCHES UNLESS SPECIFIED

----- GEOMETRIC INFORMATION -----

CIRCULAR ARC (100)

ARC				
X Y Z	-22.00	25.00	1.00	START
X Y Z	-25.00	25.00	1.00	CENTER
X Y Z	3.00	0.00	0.00	MAJOR AXIS
X Y Z	0.00	3.00	0.00	MINOR AXIS
X Y Z	-22.00	25.00	1.00	END

GENERAL NOTE (212)

TEXT:	"CIRCULAR ARC (100)"			
X Y Z	-28.00	20.48	0.00	TEXT LOCATION

COMPOSITE CURVE(102)

COMPOSITE CURVE

LINE 1

X Y Z	-18.00	26.50	1.00	START
X Y Z	-17.50	26.50	1.00	END

LINE 2

X Y Z	-17.50	26.50	1.00	START
X Y Z	-17.00	26.00	1.00	END

LINE 3

X Y Z	-17.00	26.00	1.00	START
X Y Z	-17.00	25.00	1.00	END

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ARC 1				
X Y Z	-17.00	25.00	1.00	START
X Y Z	-16.50	25.00	1.00	CENTER
X Y Z	0.50	0.00	0.00	MAJOR AXIS
X Y Z	0.00	0.50	0.00	MINOR AXIS
X Y Z	-16.00	25.00	1.00	END

ARC 2				
X Y Z	-16.00	25.00	1.00	START
X Y Z	-15.50	25.50	1.00	CENTER
X Y Z	0.71	0.00	0.00	MAJOR AXIS
X Y Z	0.00	0.71	0.00	MINOR AXIS
X Y Z	-15.00	26.00	1.00	END

LINE 4				
X Y Z	-15.00	26.00	1.00	START
X Y Z	-14.00	26.50	1.00	END

LINE 5				
X Y Z	-14.00	26.50	1.00	START
X Y Z	-12.50	24.50	1.00	END

GENERAL NOTE (212)				
TEXT:	"COMPOSITE CURVE (102)"			
X Y Z	-18.00	20.50	0.00	TEXT LOCATION

CONIC ARC (104)				
ELLIPSE (FORM 1)				
X Y Z	-1.44	27.32	1.50	START
X Y Z	-5.00	27.32	1.50	CENTER
X Y Z	3.56	0.00	0.00	MAJOR AXIS
X Y Z	0.00	1.50	0.00	MINOR AXIS
X Y Z	-5.00	25.82	1.50	END

CONIC ARC (104)				
PARABOLA (FORM 3)				
X Y Z	-7.98	24.75	1.50	
X Y Z	-5.68	22.11	1.50	
X Y Z	0.00	0.50	0.00	
X Y Z	0.50	0.00	0.00	
X Y Z	-3.55	24.38	1.50	

GENERAL NOTE (212)				
TEXT:	"CONIC ARC (104)"			
X Y Z	-8.00	20.50	0.00	

COPIOUS DATA (106)				
3-D LINEAR STRING (FORM 12)				
X Y Z	0.70	23.40	0.00	STRING POINT
X Y Z	2.50	26.00	0.50	STRING POINT
X Y Z	3.70	26.90	1.00	STRING POINT

X Y Z	5.10	27.50	1.50	STRING POINT
X Y Z	7.30	26.00	2.00	STRING POINT
X Y Z	8.10	24.80	2.50	STRING POINT
X Y Z	6.90	23.50	3.00	STRING POINT
X Y Z	5.10	24.20	3.50	STRING POINT
X Y Z	4.50	24.90	4.00	STRING POINT

GENERAL NOTE (212)

TEXT:	"LINEAR STRING (106)"			
X Y Z	2.00	20.50	0.00	TEXT LOCATION

PLANE (108)

BOUNDING CURVE

X Y Z	11.63	21.98	0.00
X Y Z	18.21	21.98	0.00
X Y Z	18.21	28.50	5.00
X Y Z	11.63	28.50	5.00
X Y Z	11.63	21.98	0.00

PLANE NORMAL

X Y Z	11.63	21.98	0.00	START
X Y Z	11.63	54.88	-42.90	END

GENERAL NOTE (212)

TEXT:	"PLANE (108)"			
X Y Z	13.50	20.50	0.00	TEXT LOCATION

LINE (110)

LINE 1

X Y Z	21.00	27.00	1.00	START
X Y Z	23.50	27.00	1.00	END

LINE 2

X Y Z	21.00	26.00	1.00	START
X Y Z	23.50	26.00	1.00	END

LINE 3

X Y Z	26.00	27.00	1.00	START
X Y Z	26.00	25.00	1.00	END

LINE 4

X Y Z	27.00	27.00	1.00	START
X Y Z	27.00	25.00	1.00	END

LINE 5

X Y Z	24.50	24.00	1.00	START
X Y Z	24.50	22.00	1.00	END

LINE 6

X Y Z	23.50	23.00	1.00	START
X Y Z	25.50	23.00	1.00	END

	GENERAL NOTE (212)			
TEXT:	"LINE (110)"			
X Y Z	22.00	20.50	0.00	TEXT LOCATION
	SPLINE (112)			
SPLINE POINT 1				
X Y Z	-26.02	16.18	1.92	POSITION VECTOR
DX DY DZ	0.035	0.856	0.518	TANGENT VECTOR
SPLINE POINT 2				
X Y Z	-26.00	16.41	2.06	POSITION VECTOR
DX DY DZ	0.107	0.828	0.549	TANGENT VECTOR
SPLINE POINT 3				
X Y Z	-25.92	16.73	2.29	POSITION VECTOR
DX DY DX	0.288	0.735	0.617	TANGENT VECTOR
SPLINE POINT 4				
X Y Z	-25.83	16.92	2.47	POSITION VECTOR
DX DY DX	0.394	0.658	0.642	TANGENT VECTOR
SPLINE POINT 5				
X Y Z	-25.64	17.15	2.73	POSITION VECTOR
DX DY DX	0.541	0.523	0.662	TANGENT VECTOR
SPLINE POINT 6				
X Y Z	-25.40	17.33	2.99	POSITION VECTOR
DX DY DX	0.664	0.366	0.654	TANGENT VECTOR
SPLINE POINT 7				
X Y Z	-25.21	17.41	3.17	POSITION VECTOR
DX DY DX	0.733	0.250	0.634	TANGENT VECTOR
SPLINE POINT 8				
X Y Z	-24.90	17.48	3.41	POSITION VECTOR
DX DY DX	0.811	0.073	0.583	TANGENT VECTOR
SPLINE POINT 9				
X Y Z	-24.56	17.47	3.63	POSITION VECTOR
DX DY DX	0.856	-0.107	0.509	TANGENT VECTOR
SPLINE POINT 10				
X Y Z	-24.22	17.39	3.81	POSITION VECTOR
DX DY DX	0.867	-0.283	0.414	TANGENT VECTOR
SPLINE POINT 11				
X Y Z	-23.88	17.25	3.96	POSITION VECTOR
DX DY DX	0.843	-0.447	0.303	TANGENT VECTOR
SPLINE POINT 12				
X Y Z	-23.55	17.04	4.05	POSITION VECTOR
DX DY DX	0.786	-0.595	0.180	TANGENT VECTOR
SPLINE POINT 13				

X Y Z	-23.25	16.78	4.19	POSITION VECTOR
DX DY DX	0.697	-0.718	0.050	TANGENT VECTOR

SPLINE POINT 14				
X Y Z	-23.00	16.47	4.09	POSITION VECTOR
DX DY DX	0.580	-0.814	-0.083	TANGENT VECTOR

SPLINE POINT 15				
X Y Z	-22.79	16.13	4.04	POSITION VECTOR
DX DY DX	0.440	-0.870	-0.210	TANGENT VECTOR

SPLINE POINT 16				
X Y Z	-22.65	15.78	3.93	POSITION VECTOR
DX DY DX	0.284	-0.918	-0.338	TANGENT VECTOR

GENERAL NOTE (212)				
TEXT:	"SPLINE (112)"			
X Y Z	-26.00	13.50	0.00	TEXT LOCATION

SPLINE SURFACE (114)				
SPLINE 1				
X Y Z	-18.40	11.78	0.00	POSITION VECTOR
DX DY DZ	2.44	2.83	0.116	TANGENT VECTOR
X Y Z	-18.40	17.78	0.00	POSITION VECTOR
DX DY DZ	2.44	2.83	0.116	TANGENT VECTOR

SPLINE 2				
X Y Z	-12.40	11.78	0.00	POSITION VECTOR
DX DY DZ	-2.44	-2.83	-0.116	TANGENT VECTOR
X Y Z	-12.40	17.78	0.00	POSITION VECTOR
DX DY DZ	-2.44	-2.83	-0.116	TANGENT VECTOR

SPLINE 3				
X Y Z	-18.40	11.78	0.00	POSITION VECTOR
DX DY DZ	-2.44	-2.83	-0.116	TANGENT VECTOR
X Y Z	-12.40	11.78	0.00	POSITION VECTOR
DX DY DZ	-2.44	-2.83	-0.116	TANGENT VECTOR

SPLINE 4				
X Y Z	-18.40	17.78	0.00	POSITION VECTOR
DX DY DZ	2.44	2.83	0.116	TANGENT VECTOR
X Y Z	-12.40	17.78	0.00	POSITION VECTOR
DX DY DZ	2.44	2.83	0.116	TANGENT VECTOR

GENERAL NOTE (212)				
TEXT:	"SPLINE SURFACE (114)"			
X Y Z	-18.00	10.50	0.00	

POINT (116)				
POINT 1				
X Y Z	-8.80	12.10	0.10	

POINT 2
X Y Z -7.80 13.80 0.20

POINT 3
X Y Z -5.76 14.22 0.30

POINT 4
X Y Z -5.76 16.31 0.40

POINT 5
X Y Z -3.44 16.54 0.50

POINT 6
X Y Z -2.28 18.16 0.60

POINT 7
X Y Z -1.58 19.09 0.70

GENERAL NOTE (212)
TEXT: "POINT (116)"
X Y Z -6.70 10.50 0.00 TEXT LOCATION

RULED SURFACE (118)
CURVE 1
LINE
X Y Z 2.00 18.00 3.00 START
X Y Z 5.00 18.00 3.00 END
ARC
X Y Z 5.00 18.00 3.00 START
X Y Z 6.50 18.00 3.00 CENTER
X Y Z 1.50 0.00 0.00 MAJOR AXIS
X Y Z 0.00 1.50 0.00 MINOR AXIS
X Y Z 8.00 18.00 3.00 END

CURVE 2
LINE
X Y Z 2.00 14.00 1.00 START
X Y Z 5.00 14.00 1.00 END
ARC
X Y Z 5.00 14.00 1.00 START
X Y Z 6.50 14.00 1.00 CENTER
X Y Z 1.50 0.00 0.00 MAJOR AXIS
X Y Z 0.00 1.50 0.00 MINOR AXIS
X Y Z 8.00 14.00 1.00 END

GENERAL NOTE (212)
TEXT: "RULED SURFACE (118)"
X Y Z 2.00 10.50 0.00 TEXT LOCATION

SURFACE OF REVOLUTION (120)

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DRIVEN CURVE

LINE

X Y Z	15.25	12.25	2.00	START
X Y Z	17.87	17.13	2.00	END

ARC

X Y Z	17.87	17.13	2.00	START
X Y Z	17.00	17.13	2.00	CENTER
X Y Z	0.87	0.00	0.00	MAJOR AXIS
X Y Z	0.00	0.87	0.00	MINOR AXIS
X Y Z	17.00	18.00	2.00	END

LINE

X Y Z	17.00	18.00	2.00	START
X Y Z	15.25	18.25	2.00	END

DRIVE CURVE

ARC

X Y Z	17.87	17.13	2.00	START
X Y Z	15.25	17.13	2.00	CENTER
X Y Z	2.62	0.00	0.00	MAJOR AXIS
X Y Z	0.00	0.00	-2.62	MINOR AXIS
X Y Z	17.87	17.13	2.00	END

TEXT:

	GENERAL NOTE (212)			
	"SURF. OF REV. (125)"			
X Y Z	13.00	10.50	0.00	TEXT LOCATION

TABULATED CYLINDER (122)

CURVE 1

ARC

X Y Z	27.50	12.50	0.00	START
X Y Z	26.50	12.50	0.00	CENTER
X Y Z	1.00	0.00	0.00	MAJOR AXIS
X Y Z	0.00	1.00	0.00	MINOR AXIS
X Y Z	26.50	13.50	0.00	END

LINE

X Y Z	26.50	13.50	0.00	START
X Y Z	21.50	13.50	0.00	END

CURVE 2

ARC

X Y Z	25.50	17.00	-2.67	START
X Y Z	24.50	17.00	-2.67	CENTER
X Y Z	1.00	0.00	0.00	MAJOR AXIS
X Y Z	0.00	1.00	0.00	MINOR AXIS
X Y Z	24.50	18.00	-2.67	END

LINE

X Y Z	24.50	18.00	-2.67	START
X Y Z	19.50	18.00	-2.67	END

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GENERAL NOTE (212)
 TEXT: "TABULATED CYLINDER (122)"
 X Y Z 22.00 10.50 0.00

TEXT LOCATION

ANGULAR DIMENSION (202)

LEADER 1 (ARC)

X Y Z -22.00 5.50 0.65
 X Y Z -25.00 5.50 0.65
 X Y Z 3.00 0.00 0.65
 X Y Z 0.00 3.00 0.65
 X Y Z -22.29 6.80 0.65

LEADER 2 (ARC)

X Y Z -25.00 8.50 0.65
 X Y Z -25.00 5.50 0.65
 X Y Z 3.00 0.00 0.65
 X Y Z 0.00 -3.00 0.65
 X Y Z -22.53 7.20 0.65

DIMENSION TEXT: "90.00 DEG"

X Y Z -23.30 6.85 0.65

ANGULAR DIMENSION (202)

LEADER 1 (ARC)

X Y Z -25.00 2.50 0.65
 X Y Z -28.00 2.50 0.65
 X Y Z 3.00 0.00 0.65
 X Y Z 0.00 3.00 0.65
 X Y Z -25.29 3.80 0.65

LEADER 2 (ARC)

X Y Z -28.00 5.50 0.65
 X Y Z -28.00 2.50 0.65
 X Y Z 3.00 0.00 0.65
 X Y Z 0.00 -3.00 0.65
 X Y Z -25.53 4.20 0.65

DIMENSION TEXT: "90.00 DEG"

X Y Z -26.30 3.85 0.65

WITNESS LINE

X Y Z -24.50 2.50 0.65
 X Y Z -25.50 2.50 0.65

WITNESS LINE

X Y Z -28.00 6.00 0.65
 X Y Z -28.00 5.00 0.65

GENERAL NOTE (212)
 TEXT: "ANGULAR DIMENSION (202)"
 X Y Z -29.00 0.50 0.00

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DIAMETER DIMENSION (205)

LEADER 1					
X Y Z	-19.12	5.85	1.25		LEADER POINT
X Y Z	-18.07	7.40	1.25		LEADER POINT
X Y Z	-18.07	7.40	1.25		LEADER POINT
LEADER 2					
X Y Z	-16.88	9.15	1.25		LEADER POINT
X Y Z	-17.76	7.85	1.25		LEADER POINT
X Y Z	-17.76	7.85	1.25		LEADER POINT
DIMENSION TEXT: "4.000"					
X Y Z	-18.50	7.50	1.25		TEXT LOCATION

DIAMETER DIMENSION (206)

LEADER 1					
X Y Z	-15.84	6.49	1.25		LEADER POINT
X Y Z	-16.16	2.57	1.25		LEADER POINT
X Y Z	-16.16	2.57	1.25		LEADER POINT
LEADER 2					
X Y Z	-16.16	2.57	1.25		LEADER POINT
X Y Z	-15.75	7.63	1.25		LEADER POINT
X Y Z	-15.75	7.63	1.25		LEADER POINT
X Y Z	-15.25	7.63	1.25		LEADER POINT
DIMENSION TEXT: "4.000"					
X Y Z	-15.00	7.50	1.25		TEXT LOCATION

DIAMETER DIMENSION (206)

LEADER 1					
X Y Z	-12.43	4.55	1.25		LEADER POINT
X Y Z	-11.57	8.45	1.25		LEADER POINT
X Y Z	-11.57	8.45	1.25		LEADER POINT
LEADER 2					
X Y Z	-11.57	8.45	1.25		LEADER POINT
X Y Z	-12.75	3.13	1.25		LEADER POINT
X Y Z	-12.75	3.13	1.25		LEADER POINT
X Y Z	-12.25	3.13	1.25		LEADER POINT
DIMENSION TEXT: "4.000"					
X Y Z	-12.00	3.00	1.25		TEXT LOCATION

GENERAL NOTE (212)

TEXT: "DIAMETER DIMENSION (206)"					
X Y Z	-19.00	0.50	0.00		TEXT LOCATION

FLAG NOTE (208)

DIMENSION TEXT: "FLAG NO. 1"					
X Y Z	-4.50	8.50	-1.25		TEXT LOCATION

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FLAG CURVE

X Y Z	-4.54	3.40	-1.25	FLAG POINT
X Y Z	-2.14	3.40	-1.25	FLAG POINT
X Y Z	-1.85	3.60	-1.25	FLAG POINT
X Y Z	-2.14	3.80	-1.25	FLAG POINT
X Y Z	-4.54	3.80	-1.25	FLAG POINT
X Y Z	-4.54	3.40	-1.25	FLAG POINT

FLAG NOTE (208)

LEADER 1				
X Y Z	-9.30	5.50	-1.25	LEADER POINT
X Y Z	-5.10	6.60	-1.25	LEADER POINT
X Y Z	-4.54	6.60	-1.25	LEADER POINT

DIMENSION TEXT: "FLAG NO. 2"

X Y Z	-4.50	6.50	-1.25	TEXT LOCATION
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FLAG CURVE

X Y Z	-4.54	6.40	-1.25	FLAG POINT
X Y Z	-2.14	6.40	-1.25	FLAG POINT
X Y Z	-1.85	6.60	-1.25	FLAG POINT
X Y Z	-2.14	6.80	-1.25	FLAG POINT
X Y Z	-4.54	6.80	-1.25	FLAG POINT
X Y Z	-4.54	6.40	-1.25	FLAG POINT

FLAG NOTE (208)

LEADER 1				
X Y Z	-8.50	3.00	-1.25	LEADER POINT
X Y Z	-6.00	3.60	-1.25	LEADER POINT
X Y Z	-4.54	3.60	-1.25	LEADER POINT

LEADER 2

X Y Z	-8.50	4.50	-1.25	LEADER POINT
X Y Z	-6.00	3.60	-1.25	LEADER POINT

DIMENSION TEXT: "FLAG NO. 3"

X Y Z	-4.50	3.50	-1.25	TEXT LOCATION
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FLAG CURVE

X Y Z	-4.54	3.40	-1.25	FLAG POINT
X Y Z	-2.14	3.40	-1.25	FLAG POINT
X Y Z	-1.85	3.60	-1.25	FLAG POINT
X Y Z	-2.14	3.80	-1.25	FLAG POINT
X Y Z	-4.54	3.80	-1.25	FLAG POINT
X Y Z	-4.54	3.40	-1.25	FLAG POINT

GENERAL NOTE (212)

TEXT: "FLAG NOTE (208)"				
X Y Z	-8.00	0.50	0.00	TEXT LOCATION

GENERAL LABEL (210)

LEADER 1

X Y Z	3.60	7.50	-1.25	LEADER POINT
X Y Z	2.50	8.50	-1.25	LEADER POINT
X Y Z	2.20	8.50	-1.25	LEADER POINT

DIMENSION TEXT: "LABEL 1"				
X Y Z	0.70	8.40	-1.25	TEXT LOCATION

GENERAL LABEL (210)

LEADER 1				
X Y Z	8.50	8.50	-1.25	LEADER POINT
X Y Z	7.10	6.40	-1.25	LEADER POINT
X Y Z	6.10	6.40	-1.25	LEADER POINT

DIMENSION TEXT: "LABEL 2"				
X Y Z	4.50	6.30	-1.25	TEXT LOCATION

GENERAL LABEL (210)

LEADER 1				
X Y Z	7.50	3.50	-1.25	LEADER POINT
X Y Z	3.00	3.50	-1.25	LEADER POINT

LEADER 2				
X Y Z	7.00	5.00	-1.25	LEADER POINT
X Y Z	3.50	3.50	-1.25	LEADER POINT

DIMENSION TEXT: "LABEL 3"				
X Y Z	1.40	3.39	-1.25	TEXT LOCATION

GENERAL NOTE (212)

TEXT: "GENERAL LABEL (210)"				
X Y Z	2.00	0.50	0.00	TEXT LOCATION

GENERAL NOTE (212)

TEXT: "TEXT 1"				
X Y Z	15.00	4.00	1.00	TEXT LOCATION
TEXT SIZE:	1.0			

TEXT: "TEXT 2"				
X Y Z	14.00	5.00	1.00	TEXT LOCATION
TEXT SIZE:	0.5			

TEXT: "TEXT 3"				
X Y Z	13.00	4.00	2.00	TEXT LOCATION
TEXT SIZE:	0.2			

TEXT: "TEXT 4"				
X Y Z	14.00	3.00	3.00	TEXT LOCATION
TEXT SIZE:	0.1			

GENERAL NOTE (212)

TEXT: "GENERAL NOTE (212)"				
----------------------------	--	--	--	--

X Y Z	12.00	0.50	0.00	TEXT LOCATION
LINEAR DIMENSION (216)				
LEADER 1				
X Y Z	28.01	3.01	2.50	LEADER POINT
X Y Z	28.01	3.21	2.50	LEADER POINT
X Y Z	28.01	5.05	2.50	LEADER POINT
LEADER 2				
X Y Z	28.01	8.01	2.50	LEADER POINT
X Y Z	28.01	7.81	2.50	LEADER POINT
X Y Z	28.01	5.97	2.50	LEADER POINT
DIMENSION TEXT: "5.00"				
X Y Z	27.60	5.50	2.50	TEXT LOCATION
WITNESS LINE				
X Y Z	28.51	8.01	2.50	START
X Y Z	27.51	8.01	2.50	END
WITNESS LINE				
X Y Z	28.51	3.01	2.50	START
X Y Z	27.51	3.01	2.50	END
LINEAR DIMENSION (216)				
LEADER 1				
X Y Z	25.97	6.99	2.50	LEADER POINT
X Y Z	25.77	6.99	2.50	LEADER POINT
X Y Z	24.01	6.99	2.50	LEADER POINT
LEADER 2				
X Y Z	21.00	6.99	2.50	LEADER POINT
X Y Z	21.20	6.99	2.50	LEADER POINT
X Y Z	23.03	6.99	2.50	LEADER POINT
DIMENSION TEXT: "5.00"				
X Y Z	23.10	6.90	2.50	TEXT LOCATION
LINEAR DIMENSION (216)				
LEADER 1				
X Y Z	22.00	1.60	2.50	LEADER POINT
X Y Z	22.00	1.80	2.50	LEADER POINT
X Y Z	22.00	5.60	2.50	LEADER POINT
X Y Z	23.40	5.60	2.50	LEADER POINT
LEADER 2				
X Y Z	22.00	5.20	2.50	LEADER POINT
X Y Z	22.00	5.00	2.50	LEADER POINT
X Y Z	22.00	1.60	2.50	LEADER POINT
DIMENSION TEXT: "3.60"				
X Y Z	23.50	5.50	2.50	TEXT LOCATION

WITNESS LINE

X Y Z	22.51	1.60	2.50	START
X Y Z	21.51	1.60	2.50	END

WITNESS LINE

X Y Z	22.51	5.20	2.50	START
X Y Z	21.51	5.20	2.50	END

GENERAL NOTE (212)

TEXT:	"LINEAR DIMENSION (216)"			
X Y Z	22.00	0.50	0.00	TEXT LOCATION

ORDINATE DIMENSION (218)

LEADER 1

X Y Z	-28.50	-2.00	-0.50	LEADER POINT
X Y Z	-24.50	-2.00	-0.50	LEADER POINT

DIMENSION TEXT: "4.00"

X Y Z	-24.30	-2.10	-0.50	TEXT LOCATION
-------	--------	-------	-------	---------------

ORDINATE DIMENSION (218)

LEADER 1 (NO ARROWHEAD)

X Y Z	-28.50	-4.00	-0.50	LEADER POINT
X Y Z	-24.50	-4.00	-0.50	LEADER POINT

DIMENSION TEXT: "4.00"

X Y Z	-24.30	-4.10	-0.50	TEXT LOCATION
-------	--------	-------	-------	---------------

ORDINATE DIMENSION (218)

LEADER 1

X Y Z	-22.00	-3.00	-0.50	LEADER POINT
X Y Z	-22.00	-5.50	-0.50	LEADER POINT

DIMENSION TEXT: "2.52"

X Y Z	-21.90	-6.50	-0.50	TEXT LOCATION
-------	--------	-------	-------	---------------

GENERAL NOTE (212)

TEXT:	"ORDINATE DIMENSION (218)"			
X Y Z	-28.00	-9.50	0.00	TEXT LOCATION

POINT DIMENSION (220)

LEADER 1 (NO ARROWHEAD)

X Y Z	-12.70	-3.60	-1.00	LEADER POINT
X Y Z	-12.70	-4.10	-1.00	LEADER POINT
X Y Z	-14.60	-7.70	-1.00	LEADER POINT
X Y Z	-14.60	-7.40	-1.00	LEADER POINT

POINT SYMBOL (ARC)

X Y Z	-11.50	-2.30	-1.00	START
X Y Z	-12.80	-2.30	-1.00	CENTER

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X Y Z	1.30	0.00	0.00	MAJOR AXIS
X Y Z	0.00	1.30	0.00	MINOR AXIS
X Y Z	-11.50	-2.30	-1.00	END

DIMENSION TEXT: "POINT 1"				
X Y Z	-13.40	-2.40	-1.00	TEXT LOCATION

POINT DIMENSION (220)

LEADER 1 (NO ARROWHEAD)

X Y Z	-16.40	-8.10	-1.00	LEADER POINT
X Y Z	-18.10	-8.10	-1.00	LEADER POINT
X Y Z	-19.30	-5.90	-1.00	LEADER POINT
X Y Z	-19.30	-5.30	-1.00	LEADER POINT

DIMENSION TEXT: "POINT 2"				
X Y Z	-17.90	-8.00	-1.00	TEXT LOCATION

GENERAL NOTE (212)

TEXT: "POINT DIMENSION (220)"				
X Y Z	-18.00	-9.50	0.00	TEXT LOCATION

RADIUS DIMENSION (222)

LEADER 1

X Y Z	-8.40	-1.80	-0.75	LEADER POINT
X Y Z	-9.00	-1.00	-0.75	LEADER POINT
X Y Z	-7.90	-2.50	-0.75	LEADER POINT
X Y Z	-7.00	-2.50	-0.75	LEADER POINT

DIMENSION TEXT: "1.000"				
X Y Z	-6.80	-2.60	-0.75	TEXT LOCATION

RADIUS DIMENSION (222)

LEADER 1

X Y Z	-3.00	-5.00	-0.75
X Y Z	-4.50	-6.50	-0.75
X Y Z	-5.00	-6.50	-0.75

DIMENSION TEXT: "1.000"				
X Y Z	-6.30	-6.60	-0.75	

GENERAL NOTE (212)

TEXT: "RADIUS DIMENSION (222)"				
X Y Z	-8.00	-9.50	0.00	

SUBFIGURE DEFINITION (308)

TEXT 1: SUBFIGURE

X Y Z	0.00	0.00	0.00	TEXT LOCATION
TEXT SIZE:	0.8			

TEXT 2: (408)

X Y Z	1.50	-1.50	0.00	TEXT LOCATION
-------	------	-------	------	---------------

TEXT SIZE: 0.8

DRAWING ENTITY (404)
 LOCATION OF VIEW 1 (DRAWING SPACE)
 X Y 35.0 35.0

LOCATION OF VIEW 2 (DRAWING SPACE)
 X Y 35.0 105.0

LOCATION OF VIEW 3 (DRAWING SPACE)
 X Y 105.0 35.0

LOCATION OF VIEW 4 (DRAWING SPACE)
 X Y 105.0 105.0

SUBFIGURE INSTANCE (408)
 X Y Z 1.69 -3.15 -3.19

SUBFIGURE LOCATION

VIEW ENTITY (410)
 VIEW = 1 VIEW WIDTH = 70.00

CENTER OF VIEW (MODEL SPACE)
 X Y Z 5.69 14.34 -2.24

VIEW ROTATION (DEGREES CLOCKWISE)
 X Y Z 30.00 30.00 30.00

VIEW ENTITY (410)
 VIEW = 2 VIEW WIDTH = 88.75

CENTER OF VIEW (MODEL SPACE)
 X Y Z 3.19 11.24 -1.61

VIEW ROTATION (DEGREES CLOCKWISE)
 X Y Z -76.10 25.66 -33.69

VIEW ENTITY (410)
 VIEW = 3 VIEW WIDTH = 100.50

CENTER OF VIEW (MODEL SPACE)
 X Y Z 3.19 11.24 -1.61

VIEW ROTATION (DEGREES CLOCKWISE)
 X Y Z -19.11 -48.59 40.89

VIEW ENTITY (410)
 VIEW = 4 VIEW WIDTH = 88.75

CENTER OF VIEW (MODEL SPACE)
 X Y Z 3.19 11.24 -1.61

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VIEW ROTATION (DEGREES CLOCKWISE)
X Y Z 0.0 0.0 0.0

ATTACHMENT 2

The following individual descriptions present the CV CADDs entities used to recreate the 28 entity IGES test file. Each heading is in the form : * IGES Entity (number) : CV Entity.

The primary purpose of this appendix is to present the specific CV commands used to recreate the appropriate entities. Additional information on each of these recreations is available through Dr. Sharon Perkins with the University of Houston at Clear Lake. Dr. Perkins is the custodian of the detailed notes and illustrations written/drawn up by the authors of this report during the performance of this investigation. These notes would be of great help to a person interested in the details of the recreation of the 28 entity IGES test file. However, we felt that it would not be appropriate to present these details as part of this report. Dr. Perkins can be reached through the School of Natural and Applied Sciences.

* CIRCULAR ARC (100) : Arc/Circle -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS CIRCLE RADIUS 3.0 :  
MODEL LOC X-25 Y25 Z1 [RETURN]
```

Comments: Well supported.

* COMPOSITE CURVE (102) : Group -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS LINE (4 LINES)  
#n#INS ARC (3 ARCS)  
#n#CONSTRUCT GROUP : d1 d2 .....
```

Note : The use of dn represents a digitization.

Comments : Supported through Group.

* CONIC ARC (104) ELLIPSE (FORM 1) : Ellipse -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS ELLIPSE HMAJ 3.56 HMIN 1.5 ANGA 0 ANGB 270 :  
Model Loc X-5.0 Y27.32 Z1.5 [RETURN]
```

Comments : Well supported.

* CONIC ARC (104) PARABOLA (FORM 3) : Parabola -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS PARABOLA XFOC 0.5 YHI 2.3 YLO -2.13 ROT 90.0 :  
MODEL LOC X-5.68 Y22.11 Z1.5 [RETURN]
```

Comments : Well supported.

* COPIOUS DATA (106) 3D LINEAR STRING (FORM 12) : String -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS STRING : d1 d2 d3 d4..... [RETURN]
```

Comments : Well supported.

* PLANE (108) : Plane -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS PLANE BOUND 3.275 : Model LocX14.92  
Y25.24 Z2.5, X11.63 Y21.98 Z0, X18.21 Y21.98 Z0  
[RETURN]
```

Comments : Only unbounded planes are supported.

* LINE (110) : Line -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS LINE : d1 d2 [RETURN]
```

Comments : Well supported.

* SPLINE (112) : B-spline -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS BSPLINE DEG 3 TANA TANB : d1d2 d3d4 ;
d5d6d7.....dn [RETURN]
```

Comments : Well supported.

* SPLINE SURFACE (114) : B-spline surface -

Given : Reference Attachment 1.

CV Implementation :

Comments : This was the most complex of the recreations. Therefore it is not practical to attempt a summary of commands here. Please reference the original recreation notes if interested.

* POINT (116) : Point -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS POINT : Model Loc d1d2.....dn [RETURN]
```

Comments : Well supported.

* RULED SURFACE (118) -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS LINE : Model Loc X2.0 Y18.0 Z3.0,
                X5.0 Y18.0 Z3.0 [RETURN]
#n#INS LINE : Model Loc X2.0 Y14.0 Z1.0,
                X5.0 Y14.0 Z1.0 [RETURN]
#n#INS RSURF : Model Ent d1 d2 [RETURN]
              (where d1 = digitize line near one of its end,
                d2 = digitize 2nd line near the same end
                as line 1)
#n#INS ARC RADIUS 1.5 : Model Loc d1d2d3 [RETURN]
              (whered1 = center of arc, d2 = start and d3= end)
#n#INS RSURF MESH 5X5 : Model Ent d1d2 [RETURN]
```


Comments : Well supported ; two separate rules surfaces are created.

* SURFACE OF REVOLUTION (120) : Surface of Revolution -

Given : Reference Attachment 1.

CV Implementation :

```
Insert the 3 entities of the Driven Curve,  
##INS LINE, ##INS ARC RAD, ##INS LINE  
Then,  
##INS SREV MESH NXN : Model ent d1d2d3 ;  
Model end d4d5 [RETURN]
```

d1d2d3 = digitize the above 3 entities
d4d5 = digitize or location of 2 end points
which define an axis about which the revolution
takes places. For our case, d4 = X15.25 Y12.25
Z2.0, and d5 = X15.25 Y18.25 Z2.0.

Comments : Well supported ; three separate surfaces of revolution are created.

* TABULATED CYLINDER (122) : Tabulated Cylinder -

Given : Reference Attachment 1.

CV Implementation :

```
First insert the Arc and Line of curve 1.  
##INS ARC RAD : and  
##INS LINE .  
Then,  
##INS TCYLINDER LOWBND 0.0 HIBND 5.4397  
MESH5X5:Modelent d1d2; Modelendd3d4 [RETURN]  
d1d2 = digitize arc and line.  
d3d4 = 2 endpoints to define the direction of the  
translation for Tcylinder (vector). For our case,  
d3 = X27.5 Y12.5 Z0 = start of arc 1, and  
d4 = X25.5 Y17.0 Z-2.67 = start of arc 2.
```

Comments : Well supported ; two separate tabulated cylinders are created.

* ANGULAR DIMENSION (202) -

Given : Reference Attachment 1.

CV Implementation :

a) Angular dimension without extension lines
(witness lines)

```
#n#INS LINE VERTICAL : Model loc X-25 Y5.5 Z.65,  
IY3 [RETURN]  
#n#INS LINE HORIZONTAL : Model loc X-25 Y5.5 Z.65,  
IX3 [RETURN]  
#n#INS ADIMENSION TEXT MAIN/90.00 DEG/HEIGHT 0.2  
LOCATION RADIUS 3.0 SUPPRESS EXTENSION BOTH :  
Model loc X-22.3737 Y6.95 Z0.65 [RETURN]  
where : d1 = digitize first line near its upper  
end
```

b) Angular dimension with extension lines.

```
#n#INS LINE VERTICAL : Model loc d1d2 [RETURN]  
where : d1 = X-25.5936 Y4.9064 Z0.65,  
d2 = X-28 Y2.5 Z0.65  
  
#n#INS LINE HORIZONTAL : Model loc d1d2 [RETURN]  
where : d1 = X-25.5936 Y2.5 Z0.65  
d2 = X-28 Y2.5 Z0.65  
  
#n#INS ADIMENSION TEXT MAIN/90.0 DEG/HEIGHT 0.2  
LOCATION RADIUS 3.0 : Model end d1d2 Model loc  
X-25.3737 Y3.95 Z0.65 [RETURN]
```

Comments : Well supported.

* DIAMETER DIMENSION (206) : Diameter dimension -

Given : Reference Attachment 1.

CV Implementation :

- a) #n#INS CIRCLE DIAM : Model loc d1d2 [RETURN]
d1d2 = end points of the diameter,
where d1 = X-19.12 Y5.85 Z1.25, and
d2 = X-16.88 Y9.15 Z1.25 .
#n#INS LINE : Model loc d1d2 [RETURN]
#n#INS LINE HORIZONTAL : Model loc (digitize 2
points)
#n#INS DDIMENSION TEXT MAIN /4.000/HEIGHT 0.2
: Model entity d (digitize circle at d1) ;
Modelloc Int of d1d2 (digitize the two lines)
[RETURN]
Then delete the circle and the two lines.
- b) #n#INS CIRCLE DIAM : d1d2 [RETURN]
d1d2 = start of header 1 and header 2,
where d1 = X-15.84 Y6.49 Z1.25, and
d2 = X-16.16 Y2.57 Z1.25
#n#INS DDIMENSION TEXT MAIN /4.000/HEIGHT 0.2

LEADER HEAD : Model ent d1 (digitize circle)
Model loc d2d3 (digitize the required headers)
where d2 = X-15.75 Y7.62 Z1.25,
and d3 = X-15.25 Y7.62 Z1.25.

- c) #n#INS CIRCLE DIAM : d1d2 [RETURN]
d1d2 = start of headers,
where d1 = X-11.57 Y8.45 Z1.25,
and d2 = X-12.43 Y4.55 Z1.25.
#n#INS DDIM TEXT MAIN /4.000/HEIGHT 0.2 LEADER
HEAD : Model ent d1 (digitize circle anywhere)
Model loc d2d3 [RETURN]
where d2 = X-12.75 Y3.13 Z1.25, and
d3 = X-12.25 Y3.13 Z1.25

Comments : Well supported.

* FLAG NOTE (208) : Flag/Label -

Given : Reference Attachment 1.

CV Implementation :

- a) #n#INS FLAG / FLAG NO. 1 / HEIGHT 0.2 : Model loc
d1 [RETURN]
where d1 = X-4.54 Y8.4 Z-1.25
- b) #n#INS POINT : Model loc X-9.3 Y5.5 Z-1.25
[RETURN]
#n#INS LABEL /[B5] FLAG NO. 2 [X]/ HEIGHT 0.2 :
Model ent d1 Model loc d2d3 [RETURN]
where d1 = digitize point, d2 = X-5.1 Y6.6Z-1.25,
and d3 = X-4.54 Y6.6 Z-1.25
- c) #n#INS POINT : Model loc d1d2 [RETURN]
where d1 = X-8.5 Y3 Z-1.25, and
d2 = X-8.5 Y4.5 Z-1.25
#n#INS LABEL /[B5] FLAG NO. 3 [X]/ HEIGHT 0.2 :
Model ent d1 Model loc d2d3 ; Model ent d4
Model loc d5d6 [RETURN]
where d2=d5= X-6 Y3.6 Z-1.25, and
d3=d6= X-4.54 Y3.6 Z-1.25. d1 and d4 are
digitized.

Comments : Flag note with leaders is supported through label
with Feature Control Symbol as flag.

* GENERAL LABEL (210) : Label -

Given : Reference Attachment 1.

CV Implementation :

- #n#INS POINT : Model loc d1d2d3d4 [RETURN]
- a) #n#INS LABEL /LABEL 1/ HEIGHT 0.2 : Model ent d1 Model loc d2d3 [RETURN]
 - b) #n#INS LABEL /LABEL 2/ HEIGHT 0.2 : Model ent d1 Model loc d2d3 [RETURN]
 - c) #n#INS LABEL /LABEL 3/ HEIGHT 0.2 : Model ent d1 Model loc d2 ; Model ent d3 Model loc d4d5 [RETURN]

Comments : Well supported.

* GENERAL NOTE (212) : Text -

Given : Reference Attachment 1.

CV Implementation :

- a) #n#INS TEXT /TEXT 1/ HEIGHT 1.0 ANGLE 30 : Model loc X15.0 Y4.0 Z1 [RETURN]
- b) #n#INS TEXT /TEXT 2/ HEIGHT 0.5 ANGLE 120 : Model loc X14.0 Y5.0 Z1 [RETURN]
- c) #n#INS TEXT /TEXT 3/ HEIGHT 0.2 ANGLE 210 : Model loc X13.0 Y4 Z2 [RETURN]
- d) #n#INS TEXT /TEXT 4/ HEIGHT 0.1 ANGLE 300 : Model loc X14.0 Y3 Z3 [RETURN]

Comments : Well supported.

* LINEAR DIMENSION (216) : Linear Dimension -

Given : Reference Attachment 1.

CV Implementation :

- a) #n#INS LINE : Model loc d1d2 [RETURN]
#n#INS LDIMENSION VERTICAL TEXT MAIN /5.00/
HEIGHT 0.2 Model end d1d2 Model loc X28.01
Y5.6 Z2.5 [RETURN]
- b) #n#INS POINT : Model loc X21 Y6.44 Z2.5,
X25.97 Y6.44 Z2.5 [RETURN]
#n#INS LDIMENSION TEXT MAIN /5.00/ HEIGHT 0.2
LOCATION AUTOCENTER SUPPRESS EXTENSION BOTH :
Model end d1d2 Model loc X23.485 Y6.99 Z2.5

[RETURN]

- c) #n#INS LINE : Model loc d1d2 [RETURN]
#n#INS LDIM VERTICAL : Model end d1d2 Model loc
d3 [RETURN]
#n#INS LDIMENSION TEXT MAIN /3.60/ HEIGHT 0.2
LOCATION HEAD ALIGN : Model end d1d2 Model ent
d3 Model loc d4 [RETURN]

Comments : Well supported.

* ORDINATE DIMENSION (218) : Ordinate dimension -

Given : Reference Attachment 1.

CV Implementation :

- a) #n#INS LINE VERTICAL : Model loc X-28.5 Y-2
Z-0.5, IY-4 [RETURN]
#n#INS ODIMENSION VERTICAL ARROWHEAD TEXT MAIN
/4.00/ HEIGHT 0.2 : Digitize datum reference
point d1 Model loc d2 Model end d3 Model loc
d4 [RETURN]
- b) #n#INS LINE VERTICAL : Model loc X-28.5 Y-4
Z-0.5, IY-4 [RETURN]
#n#INS ODIMENSION VERTICAL TEXT MAIN /4.00/
HEIGHT 0.2 : Digitize datum reference point d1
Model loc d2 Model end d3 Model loc d4
[RETURN]
- c) #n#INS LINE HORIZONTAL : Model loc X-22 Y-3
Z-0.5, IX-2.52 [RETURN]
#n#INS ODIMENSION HORIZONTAL ARROWHEAD TEXT
MAIN /2.52/ HEIGHT 0.2 : Digitize datum
reference point d1 Model loc d2 Model end d3
Model loc d4 [RETURN]

Comments : Well supported.

* POINT DIMENSION (220) : Ordinate dimension -

Given : Reference Attachment 1.

CV Implementation :

- a) #n#INS POINT : Model loc X-14.6 Y-7.4 Z-1
[RETURN]
#n#INS ODIMENSION TEXT MAIN / POINT 1 /
HEIGHT 0.2 CIRCLE : Digitize datum reference
point d1 Model loc d2 Model end d3 Model loc
d4d5d6 [RETURN]

```
b) #n#INS LINE : Model loc d1d2d3d4 [RETURN]
#n#INS TEXT /POINT 2/ HEIGHT 0.2 : Model loc
d5 [RETURN]
#n#CONSTRUCT GROUP : d1d2d3d4 [RETURN]
```

Comments : Supported through ordinate dimension.

* RADIUS DIMENSION (222) : Radial dimension -

Given : Reference Attachment 1.

CV Implementation :

```
a) #n#INSCIRCLERADIUS1.0: Modellocd1 [RETURN]
#n#INS RDIMENSION TEXT MAIN /1.000/ HEIGHT 0.2
: Model ent d1 Model loc d2d3 [RETURN]

b) #n#INS CIRCLERADIUS1.0:Modellocd1 [RETURN]
#n#INS RDIMENSION ARROW OUT TEXT MAIN /1.000/
HEIGHT 0.2 : Model ent d1 Model loc d2d3
[RETURN]
```

Comments : Well supported.

* SUBFIGURE DEFINITION (308) : Subfigure part file -

Given : Reference Attachment 1.

CV Implementation :

```
#ACT PART <PART NAME> [RETURN]
#n#INS TEXT /SUBFIGURE/ HEIGHT 0.8 : Model loc
X0 Y0 Z0 [RETURN]
#n#INS TEXT /(408)/ HEIGHT 0.8 : Model loc
X1.5 Y-1.5 Z0 [RETURN]
#n#EXIT PART FILE SFIG [RETURN]
```

Comments : Well supported.

* DRAWING ENTITY (404) : Drawing -

Given : Reference Attachment 1.

CV Implementation :

```
#ACT DRAWING D1 HGT 125 WDT 150 [RETURN]
#ROTATE ENTITY MODEL AZ-30AY-30AX-30 : Model
```

```
ent : Window d1d2 ; Model loc X0Y0Z0 [RETURN]
#DEF CPL V1 AX30AY30AZ30 : Model loc X5.69 Y14.34
Z-2.24 [RETURN]
#DEF VIEW V1 CPL V1 : Draw loc X35Y35 [RETURN]

#DEF CPL V2 AX-76.1AY25.66AZ-33.69 : Model loc
X3.19 Y11.24 Z-1.61 [RETURN]
#DEF VIEW V2 CPL V2 : Draw loc X35 Y105 [RETURN]
#DEF CPL V3 AX-19.11AY-48.59AZ40.89 : Model loc
X3.19 Y11.24 Z-1.61 [RETURN]
#DEF VIEW V3 CPL V3 : Draw loc X105 Y35 [RETURN]
#DEF CPL V4 : Model loc X3.19 Y11.24 Z-1.61
[RETURN]
#DEF VIEW V4 CPL V4 : Draw loc X105 Y105 [RETURN]
```

Comments : Well supported.

* SUBFIGURE INSTANCE (408) : Subfigure instance -

Given : Reference Attachment 1.

CV Implementation :

```
#n#INS SFIGURE <NAME> : Model loc d1... [RETURN]
#n#INS SFIGURE SUBFIG : Model loc X1.69 Y-3.15
Z-3.19 [RETURN]
```

Comments : Well supported.

ATTACHMENT 3

Entity ID	Entity Name	Material	Quantity	Unit	Volume	Weight	Area	Perimeter	Color
1	RECREATED 28-ENTITY TESTFILE ON CV-CADDS-4X								S
2	..2HDI.3HNO5.46HCOMPUTERVISION CADDS4X REV 4.1 GRAPHIC SYSTEM .16HIGES VG								
3	VERSION 3.0.16.3.24.8.50.2HDI.1.0.1.4HINCH.32767.32.767.13H87 320.133302.3								
4	0.000001..19HSAURIN.ANDY & KEVIN.22HATC-BARRIOS TECHNOLOGY;								G
5	124	1	1	0	0	0	0	0	1D
6	124	0	0	1	0				D
7	124	2	1	0	0	0	0	0	1D
8	124	0	0	1	0				D
9	124	3	1	0	0	0	0	0	1D
10	124	0	0	1	0				D
11	124	4	1	0	0	0	0	0	1D
12	124	0	0	1	0				D
13	124	5	1	0	0	0	0	0	1D
14	124	0	0	1	0				D
15	124	6	1	0	0	0	0	0	1D
16	124	0	0	1	0				D
17	212	7	1	1	0	0	0	0	10101D
18	212	0	0	1	0				D
19	212	8	1	1	0	0	0	0	10101D
20	212	0	0	1	0				D
21	308	9	1	0	0	0	0	0	20201D
22	308	0	0	1	0				D
23	124	10	1	0	0	0	0	0	1D
24	124	0	0	1	0				D
25	124	11	1	0	0	0	0	0	1D
26	124	0	0	1	0				D
27	124	12	1	0	0	0	0	0	1D
28	124	0	0	1	0				D

89!	108	47	1	0	0	0	0	0	100010
	85								
90!	100	0	0	1	0				
	86								
91!	410	48	1	0	0	0	77	0	102010
	57								
92!	410	0	0	1	0				
	88								
93!	100	49	1	1	0	0	31	0	10
	59								
94!	100	0	0	1	0				
	90							ARC	10
95!	110	50	1	1	0	0	0	0	200010
	91								
96!	110	0	0	1	0				
	92							LINE	10
97!	110	51	1	1	0	0	0	0	200010
	93								
98!	110	0	0	1	0				
	94							LINE	20
99!	110	52	1	1	0	0	0	0	200010
	95								
100!	110	0	0	1	0				
	96							LINE	30
101!	100	53	1	1	0	0	31	0	200010
	97								
102!	100	0	0	1	0				
	98							ARC	20
103!	100	54	1	1	0	0	31	0	200010
	99								
104!	100	0	0	1	0				
	100							ARC	30
105!	110	55	1	1	0	0	0	0	200010
	101								
106!	110	0	0	1	0				
	102							LINE	40
107!	110	56	1	1	0	0	0	0	200010
	103								
108!	110	0	0	1	0				
	104							LINE	50
109!	124	57	1	0	0	0	31	0	10
	105								
110!	124	0	0	1	0				
	106								
111!	104	58	1	1	0	0	105	0	10
	107								
112!	104	0	0	2	0				
	100							CONIC	10
113!	124	60	1	0	0	0	31	0	10
	109								
114!	124	0	0	2	0				
	110								
115!	104	62	1	1	0	0	109	0	10
	111								
116!	104	0	0	1	0				
	112							CONIC	20
117!	116	63	1	1	0	0	0	0	10
	113								
118!	116	0	0	1	0				
	114							POINT	40

389!	110 385	264	1	0	0	0	0	0	100010
390!	110 386	0	0	1	0				0
391!	100 387	265	1	0	0	0	31	0	200010
392!	100 388	0	0	1	0				0
393!	406 389	266	1	0	0	0	0	0	102010
394!	406 390	0	0	1	5558				0
395!	120 391	267	1	1	0	0	0	0	10
396!	120 392	0	0	1	0			SREV	20
397!	110 393	268	1	0	0	0	0	0	100010
398!	110 394	0	0	1	0				0
399!	110 395	269	1	0	0	0	0	0	200010
400!	110 396	0	0	1	0				0
401!	406 397	270	1	0	0	0	0	0	102010
402!	406 398	0	0	1	5558				0
403!	120 399	271	1	1	0	0	0	0	10
404!	120 400	0	0	1	0			SREV	10
405!	110 401	272	1	0	0	0	0	0	200010
406!	110 402	0	0	1	0				0
407!	406 403	273	1	0	0	0	0	0	102010
408!	406 404	0	0	1	5558				0
409!	122 405	274	1	1	0	0	0	0	10
410!	122 406	0	0	1	0			TBCYL	20
411!	100 407	275	1	0	0	0	31	0	200010
412!	100 408	0	0	1	0				0
413!	406 409	276	1	0	0	0	0	0	102010
414!	406 410	0	0	1	5558				0
415!	122 411	277	1	1	0	0	0	0	10
416!	122 412	0	0	1	0			TBCYL	10
417!	406 413	278	1	0	0	0	0	0	102010
418!	406 414	0	0	1	5558				0

419!	114	279	1	1	0	0	0	0	10
420!	415 114	0	0	75	0			SPLSUR	0
421!	416 110	354	1	0	0	0	0	0	100010
422!	417 110	0	0	1	0				0
423!	418 110	355	1	0	0	0	0	0	200010
424!	419 110	0	0	1	0				0
425!	420 406	356	1	0	0	0	0	0	102010
426!	421 406	0	0	1	5558				0
427!	422 120	357	1	1	0	0	0	0	10
428!	423 120	0	0	1	0			SREV	30
429!	424 402	358	1	0	0	0	0	0	2010
430!	425 402	0	0	1	1				0
431!	426 402	359	1	0	0	0	0	0	2010
432!	427 402	0	0	1	1				0
433!	428 406	360	1	0	0	0	0	0	102010
434!	429 406	0	0	1	15				0
435!	430 406	361	1	0	0	0	0	0	102010
436!	431 406	0	0	1	17				0
437!	432 406	362	1	0	0	0	0	0	102010
438!	433 406	0	0	1	16				0
439!	434 404	363	1	0	0	0	0	0	2010
440!	435 404	0	0	2	0				0
441!	436 124	1	0	0	0	0	0	0	1
442!	124	1	0	0	0	0	0	0	-1
443!	124	0	0	0	1	0	0	0	1
444!	124	1	0	0	0	0	0	0	-1
445!	124	0	0	0	0	-1	0	0	0
446!	124	-1	0	0	0	0	0	0	1
447!	212	1	9	3	16	0	8	1	1
448!	212	1	5	3	68	0	8	1	1

1P
3P
5P
7P
9P
11P
13P
15P

449!303.0.6HSURFIG.2.13.15;	17P
9	
450!124.1.0.0.0.0.0.0.0.0.0.1.0.0.0.0.0.0.0.0.0.0.1.0.0.0;	19P
10	
451!124.1.0.0.0.0.0.0.0.0.0.0.0.-1.0.0.0.0.0.0.1.0.0.0.0.0;	21P
11	
452!124.0.0.0.0.1.0.0.0.1.0.0.0.0.0.0.0.0.0.0.0.1.0.0.0.0.0;	23P
12	
453!124.1.0.0.0.0.0.0.0.0.0.-1.0.0.0.0.0.0.0.0.0.0.-1.0.0.0;	25P
13	
454!124.0.0.0.0.-1.0.0.0.-1.0.0.0.0.0.0.0.0.0.0.1.0.0.0.0.0;	27P
14	
455!124.-1.0.0.0.0.0.0.0.0.0.0.0.1.0.0.0.0.0.1.0.0.0.0.0;	29P
15	
456!124.0.75.0.433013.-0.5.0.0.-0.216506.0.575.0.433013.0.0.0.625,	31P
16	
457!-0.216506.0.75.0.0;	31P
17	
458!406.1.2HV4;	33P
18	
459!124.1.0.0.0.0.0.6.5705.0.0.1.0.0.0.-17.6376.0.0.0.0.1.0.1.61;	35P
19	
460!108.1.0.0.0.0.0.-111.571;	37P
20	
461!108.0.0.1.0.0.0.37.6376;	39P
21	
462!108.1.0.0.0.0.0.38.4295;	41P
22	
463!108.0.0.1.0.0.0.-37.3624;	43P
23	
464!410.19.1.0.37.39.41.43.0.0.0.1.33;	45P
24	
465!406.1.2HV3;	47P
25	
466!124.0.500029.-0.432918.-0.750035.27.1401.0.432986.0.875038,	49P
26	
467!-0.216407.-17.9906.0.749996.-0.216545.0.624992.2.17228;	49P
27	
468!108.0.500029.-0.432918.-0.750035.-132.14;	51P
28	
469!108.0.432986.0.875038.-0.216407.107.991;	53P
29	
470!108.0.500029.-0.432918.-0.750035.17.8599;	55P
30	
471!108.0.432986.0.875038.-0.216407.-17.0094;	57P
31	
472!410.13.1.0.51.53.55.57.0.0.0.1.47;	59P
32	
473!406.1.2HV2;	61P
33	
474!124.0.749994.-0.216498.0.625011.1.33975E-03.-0.499995.0.433049,	63P
34	
475!0.749994.2.22796.-0.43303.-0.874984.0.216537.-3.34481;	63P
35	
476!108.0.749994.-0.216498.0.625011.-35.0013;	65P
36	
477!108.-0.499995.0.433049.0.749993.17.772;	67P
37	
478!108.0.749994.-0.216498.0.625011.114.999;	69P
38	

- 479!108, ³⁹ -0.499995,0.433049,0.749933,-107.228;	110
480!410, ⁴⁰ 17,1.0,55,67,69,71,0,0,0,1,61;	73P
- 481!406, ⁴¹ 1,24VI;	75P
482!124, ⁴² 0.75,-0.216506,0.625,0.139143,0.433013,0.875,-0.216506.	77D
- 483!-13, ⁴³ 0.0175,-0.5,0.433013,0.75,6.1644;	77P
- 484!108, ⁴⁴ 0.75,-0.216506,0.625,-35.1391;	79P
485!108, ⁴⁵ 0.433013,0.875,-0.216506,108.017;	31P
- 486!108, ⁴⁶ 0.75,-0.216506,0.625,114.861;	83P
- 487!108, ⁴⁷ 0.433013,0.875,-0.216506,-16.9825;	85P
- 488!410, ⁴⁸ 16,1.0,79,51,83,85,0,0,0,1,75;	87D
- 489!100, ⁴⁹ 1.0,-25.0,25.0,-22.0,25.0,-22.0,24.9992;	89P
490!110, ⁵⁰ -2.52516,27.5176,-16.2374,-2.15016,27.4094,-15.9249,1.427;	91P
- 491!110, ⁵¹ -2.15016,27.4094,-15.9249,-1.99167,26.8636,-15.5042,1.427;	93P
- 492!110, ⁵² -1.99167,26.8636,-15.5042,-2.42468,25.9886,-15.2877,1.427;	95P
- 493!100, ⁵³ 1.0,-16.5,25.0,-17.0,25.0,-16.0,25.0,1,427;	97P
- 494!100, ⁵⁴ 1.0,-15.5,25.5,-16.002,24.998,-14.998,26.002,1,427;	99D
- 495!110, ⁵⁵ -0.49167,26.4306,-14.2542,0.474837,26.6516,-13.7374,1,427;	101P
- 496!110, ⁵⁶ 0.474837,26.6516,-13.7374,0.73381,24.5768,-12.3669,1,427;	103P
497!124, ⁵⁷ 1.0,0.0,0.0,-5.0,0.0,1.0,0.0,27.32,0.0,0.0,1.0,1.5;	105P
- 498!104, ⁵⁸ 2.26014,0.0,12.6523,0.0,0.0,-28.5959,0.0,3.557,0.0,	107P
- 499!-4.50165E-03, ⁵⁹ -1.50337;	107P
500!124, ⁶⁰ 1.94707E-07,-1.0,0.0,-5.68,1.0,1.94707E-07,0.0,22.11,0.0,	109P
- 501!0.0, ⁶¹ 1.0,1.5;	109P
- 502!104, ⁶² 0.0,0.0,1.0,-2.0,0.0,0.0,0.0,2.27001,-2.13073,2.64,2.29783;	111P
503!116, ⁶³ 2.54244,15.6915,-6.83122;	113D
- 504!116, ⁶⁴ 1.68744,13.8195,-6.45372;	115P
505!116, ⁶⁵ 0.0255747,13.8504,-7.71279;	117P
- 506!116, ⁶⁶ -1.41055,12.5361,-8.04473;	119D
- 507!108, ⁶⁷ -0.660267,-0.18836,0.726898,-13.3756,0,20.7404,19.2282,	121P
508!7.73225, ⁶⁸ 5.7857;	121P

509!	110, 26.9413, 19.5114, 8.02933, 28.8163, 18.9701, 9.59183; 69	123P
510!	110, 26.5083, 18.6364, 8.24584, 28.3833, 15.0951, 9.80834; 70	125P
511!	110, 30.6913, 18.4288, 11.1543, 29.6253, 16.6788, 11.5873; 71	127P
512!	110, 31.4413, 18.2123, 11.7793, 30.5753, 16.4623, 12.2123; 72	129P
513!	110, 28.2673, 16.1286, 10.8663, 27.4013, 14.3786, 11.2994; 73	131P
514!	110, 27.0843, 15.4701, 10.4579, 28.5843, 15.0371, 11.7079; 74	133P
515!	116, 4.23203, 15.4238, -5.35602; 75	135P
516!	116, 5.35351, 16.6434, -4.90676; 76	137P
517!	116, 6.73121, 17.3489, -4.59561; 77	139P
518!	110, -16.5298, -1.41694, -11.5351, -16.27, -0.89194, -11.665, 1.425; 78	141P
519!	110, -16.5824, -3.60175, -10.3089, -16.5298, -1.41694, -11.5351, 1.425; 79	143P
520!	110, -15.3074, -3.96981, -9.2463, -16.5824, -3.60175, -10.3083, 1.425; 80	145P
521!	106, 2.9, 10.6575, 20.3234, -4.62875, 12.8933, 22.4252, -3.69167, 81	147P
522!	13.923, 23.1694, -2.76152, 14.9829, 23.6078, -1.64142, 15.7333, 82	147P
523!	22.0355, 0.433335, 15.5637, 21.0288, 1.56814, 13.8508, 20.3676, 1.4746, 83	147P
524!	12.5539, 21.5864, 0.573047, 12.157, 22.5453, 0.421492; 84	147P
525!	112, 3.1, 3, 15, 0, 0, 1, 0, 2, 0, 3, 0, 4, 0, 5, 0, 6, 0, 7, 0, 8, 0, 9, 0, 10, 0, 11, 0, 85	149P
526!	12, 0, 13, 0, 14, 0, 15, 0, -13.4689, 0.137913, -0.184143, 0.0908248, 86	149P
527!	20.6224, 0.965727, -1.29414, 0.535957, -18.3256, 0.225042, -0.315768, 87	149P
528!	0.158429, -13.4243, 0.0421021, 0.0883319, -0.0468724, 20.8799, 88	149P
529!	0.135311, 0.463723, -0.236765, -18.2579, 0.0687938, 0.15952, 89	149P
530!	-0.0750979, -13.3407, 0.0781488, -0.0522852, 0.0339081, 21.2422, 90	149P
531!	0.352473, -0.246566, 0.118798, -18.1047, 0.162539, -0.065774, 91	149P
532!	0.0533479, -13.2809, 0.0753026, 0.049439, -0.0126473, 21.4669, 92	149P
533!	0.215736, 0.109829, -0.0528708, -17.9545, 0.191035, 0.0942698, 93	149P
534!	-0.0213505, -13.1688, 0.136239, 0.011497, -0.0197913, 21.7396, 94	149P
535!	0.276732, -0.0487833, -9.87657E-03, -17.6906, 0.315523, 0.0302181, 95	149P
536!	-0.039712, -13.0409, 0.0998588, -0.0478768, 0.0351594, 21.9577, 96	149P
537!	0.149586, -0.078413, 0.0356363, -17.3846, 0.256824, -0.0839177, 97	149P
538!	0.0685244, -12.9537, 0.109583, 0.0576015, -0.024375, 22.0645, 98	149P

539!0.0206685,0.0284958,-0.0301081,-17.1481,0.284561,0.116555, 149P
 99
 540!-0.0425203,-12.3109,0.151661,-0.0155234,4.52964E-03,22.1626, 149D
 100
 541!0.0563357,-0.0618286,3.39011E-03,-16.7895,0.390011,-0.0112057, 149P
 101
 542!8.59261E-04,-12.5703,0.134203,-1.93453E-03,-1.90608E-03,22.1755, 149P
 102
 543!-0.0521512,-0.0566585,3.14109E-03,-16.4099,0.370177, 149D
 103
 544!-8.52739E-03,3.27222E-03,-12.5399,0.124616,-7.65276E-03, 149P
 104
 545!2.41264E-03,22.1093,-0.0960445,-0.027235,-7.88148E-03,-16.045, 149P
 105
 546!0.362738,1.18576E-03,-3.61756E-03,-12.4205,0.116549, 149D
 106
 547!-4.14543E-04,-4.56476E-03,21.9737,-0.174159,-0.0508795, 149P
 107
 548!8.31322E-03,-15.6897,0.339263,-0.0246639,4.61737E-03,-12.309, 149P
 108
 549!0.102025,-0.0141091,-4.97977E-04,21.7624,-0.249478,-0.0244398, 149D
 109
 550!3.11883E-03,-15.3705,0.303757,-0.0103118,-0.0116839,-12.2215, 149P
 110
 551!0.0723124,-0.0156031,1.55433E-03,21.4916,-0.289001,-0.0150833, 149P
 111
 552!-0.0256233,-15.0892,0.247112,-0.0458636,0.0146194,-12.1633, 149P
 112
 553!0.0457592,-0.0109401,4.4532E-04,21.1419,-0.396038,-0.0919533, 149P
 113
 554!0.123374,-14.8734,0.109243,-2.00558E-03,-0.029875,-12.128, 149P
 114
 555!0.025228,-9.60112E-03,-7.17847E-03,20.7973,-0.209822,0.278169, 149D
 115
 556!-0.45254,-14.706,0.105607,-0.0916305,0.0668022,-12.1196, 149P
 116
 557!-0.0155026,-0.062273,-0.0430708,20.4131,-1.0111,-2.1589, 149P
 117
 558!-2.71524,-14.6252,0.122752,0.217552,0.400813, 149D
 118
 559!212.1,9.1,36,0.2,1,1.5708,0.0,0.0,-26.2737,3.85,0.0,9H90.00 DEG, 151P
 119
 560!214.1,0.2,0.025,0.0,-28.0,5.5,-25.5112,4.17501, 153P
 120
 561!214.1,0.2,0.025,0.0,-25.0,2.5,-25.2615,3.725, 155D
 121
 562!106.1,3,0.0,-28.0,4.8487,-26.0,4.9687,-28.0,5.6625, 157P
 122
 563!106.1,3,0.0,-25.6512,2.5,-25.5312,2.5,-24.8375,2.5, 159P
 123
 564!202.151,157,159,-28.0,2.5,3.0,155,153, 161P
 124
 565!212.1,9.1,36,0.2,1,1.5708,0.0,0.0,-23.2737,6.85,0.0,9H90.00 DEG, 163P
 125
 566!214.1,0.2,0.025,0.0,-25.0,8.5,-22.5112,7.175, 165P
 126
 567!214.1,0.2,0.025,0.0,-22.0,5.5,-22.2615,6.725, 167D
 127
 568!202.163,0.0,-25.0,5.5,3.0,167,165, 169P
 128

569!212,1.5,1.0,0.2,1,1.5708,0.0,0.0,-15.125,7.53,0.0,5H4.000; 129	171P
570!214,1.0,2.0,0.025,0.0,-15.8419,6.49016,-16.0,4.53; 130	173P
571!214,3.0,2.0,0.025,0.0,-16.1581,2.56984,-16.0,4.53,-15.75,7.63, 131	175P
572!-15.25,7.63; 132	175P
573!206,171,173,175,-16.0,4.53; 133	177P
574!212,1.5,0.92,0.2,1,1.5708,0.0,0.0,-5.965,-6.6,0.0,5H1.000; 134	179P
575!214,2.0,2.0,0.025,0.0,-3.0,-5.0,-4.5,-6.5,-5.0,-6.5; 135	181P
576!222,179,181,-1.5,-3.5; 136	183P
577!212,1.4,0.78,0.2,1,1.5708,0.0,0.0,22.51,5.5,0.0,4H3.60; 137	185P
578!214,1.0,2.0,0.025,0.0,22.01,5.2,22.01,1.6; 138	187P
579!214,3.0,2.0,0.025,0.0,22.01,1.6,22.01,5.2,22.01,5.6,22.385,5.6; 139	189P
580!106,1.3,0.0,22.6612,5.2,22.5412,5.2,21.8475,5.2; 140	191P
581!106,1.3,0.0,22.6612,1.6,22.5412,1.6,21.8475,1.6; 141	193P
582!216,185,187,189,191,193; 142	195P
583!212,1.4,0.78,0.2,1,1.5708,0.0,0.0,22.75,6.9,0.0,4H5.00; 143	197P
584!214,1.0,2.0,0.025,2.5,21.0,7.0,22.625,7.0; 144	199P
585!214,1.0,2.0,0.025,2.5,25.97,7.0,23.575,7.0; 145	201P
586!106,1.3,2.5,21.0,6.9636,21.0,7.0836,21.0,7.1625; 146	203P
587!106,1.3,2.5,25.97,6.9636,25.97,7.0836,25.97,7.1625; 147	205P
588!216,197,199,201,203,205; 148	207P
589!212,1.5,1.0,0.2,1,1.5708,0.0,0.0,-16.3921,7.5,0.0,5H4.000; 149	209P
590!214,1.0,2.0,0.025,0.0,-16.88,9.15,-17.7794,7.325; 150	211P
591!214,1.0,2.0,0.025,0.0,-19.12,5.35,-18.0849,7.375; 151	213P
592!206,209,211,213,-18.0,7.5; 152	215P
593!212,1.4,0.78,0.2,1,1.5708,0.0,0.0,-24.375,-4.1,0.0,4H4.00; 153	217P
594!214,1.0,0.0,0.0,0.0,-28.5312,-4.0,-24.5,-4.0; 154	219P
595!218,217,219; 155	221P
596!212,1.5,0.92,0.2,1,1.5708,0.0,0.0,-6.375,-2.6,0.0,5H1.000; 156	223P
597!214,3.0,2.0,0.025,0.0,-8.40864,-1.8064,-9.0,-1.0,-7.9,-2.5,-7.0, 157	225P
598!-2.5; 158	225P

599!	222,223,225,-9.0,-1.0;	227P
	159	
600!	212,1,4,0.74,0.2,1,1.5708,1.5708,0,0,-21.9,-6.285,0.0,4H2.52;	229P
	160	
601!	214,1,0.2,0.025,0.0,-22.0,-2.9064,-22.0,-5.5;	231P
	161	
602!	213,229,231;	233P
	162	
603!	212,1,4,0.78,0.2,1,1.5708,0.0,0,0,27.66,5.5,0.0,4H5.00;	235P
	163	
604!	214,1,0.2,0.025,2.5,28.01,8.01,28.01,5.825;	237P
	164	
605!	214,1,0.2,0.025,2.5,28.01,3.01,28.01,5.375;	239P
	165	
606!	106,1,3,2.5,28.63,8.01,28.51,8.01,27.8475,8.01;	241P
	166	
607!	106,1,3,2.5,28.63,3.01,28.51,3.01,27.8475,3.01;	243P
	167	
608!	216,235,237,239,241,243;	245P
	168	
609!	212,1,13,2.5,0.2,1,1.5708,0.0,0,0,-13.95,-2.37493,0.0,13H POIN	247P
	169	
610!	T 1 ;	247P
	170	
611!	100,0.0,-12.7,-2.27493,-11.4061,-2.27493,-11.4061,-2.27493;	249P
	171	
612!	214,3,0.0,0.0,0.0,-14.6,-7.3064,-14.6,-6.6683,-12.7,-4.0688,	251P
	172	
613!	-12.7,-3.5688;	251P
	173	
614!	220,247,251,249;	253P
	174	
615!	212,1,5,1.0,0.2,1,1.5708,0.0,0,0,-12.125,3.03,0.0,5H4.000;	255P
	175	
616!	214,1,0.2,0.025,0.0,-12.4333,4.55084,-12.0,6.5;	257P
	176	
617!	214,3,0.2,0.025,0.0,-11.5662,8.44916,-12.0,6.5,-12.75,3.13,	259P
	177	
618!	-12.25,3.13;	259P
	178	
619!	206,255,257,259,-12.0,6.5;	261P
	179	
620!	212,1,4,0.78,0.2,1,1.5708,0.0,0,0,-24.375,-2.1,0.0,4H4.00;	263P
	180	
621!	214,1,0.2,0.025,0.0,-28.5936,-2.0,-24.5,-2.0;	265P
	181	
622!	213,263,265;	267P
	182	
623!	212,1,18,5.55,0.3,1,1.5708,0.0,0,0,-28.0,20.48,0.0,18HCIRCULAR A	269P
	183	
624!	RC (100);	269P
	184	
625!	212,1,21,6.63,0.3,1,1.5708,0.0,0,0,-18.0,20.5,0.0,21HCOMPOSITE C	271P
	185	
626!	URVE (102);	271P
	186	
627!	212,1,15,4.5,0.3,1,1.5708,0.0,0,0,-8.0,20.5,0.0,15HCONIC ARC (10	273P
	187	
628!	4);	273P
	188	

629!	212,1,11,3.03,0.3,1,1.5708,0.0,0.0,-6.7,10.5,0.0,114POINT (116);	275P
	139	
630!	212,1,11,3.27,0.3,1,1.5708,0.0,0.0,13.5,20.5,0.0,11HPLANE (108);	277P
	190	
631!	212,1,19,5.76,0.3,1,1.5708,0.0,0.0,2.0,20.5,0.0,19HLINEAR STRING	279P
	191	
632!	(106);	279P
	192	
633!	212,1,10,2.7,0.3,1,1.5708,0.0,0.0,22.0,20.5,0.0,10HLINE (110);	281P
	193	
634!	212,1,12,3.33,0.3,1,1.5708,0.0,0.0,-26.0,13.5,0.0,12HSPLINE (112	283P
	194	
635!);		283P
	195	
636!	212,1,24,7.62,0.3,1,1.5708,0.0,0.0,-19.0,0.5,0.0,24HDIAMETER DIM	285P
	196	
637!	ENSION (206);	285P
	197	
638!	212,1,19,5.91,0.3,1,1.5708,0.0,0.0,2.0,10.5,0.0,19HRULED SURFACE	287P
	198	
639!	(118);	287P
	199	
640!	212,1,19,5.55,0.3,1,1.5708,0.0,0.0,13.0,10.5,0.0,19HSURF. OF REV	289P
	200	
641!	(120);	289P
	201	
642!	212,1,24,7.59,0.3,1,1.5708,0.0,0.0,22.0,10.5,0.0,24HTABULATED CY	291P
	202	
643!	LINDER (122);	291P
	203	
644!	212,1,23,7.26,0.3,1,1.5708,0.0,0.0,-29.0,0.5,0.0,23HANGULAR DIME	293P
	204	
645!	ENSION (202);	293P
	205	
646!	212,1,12,2.38,0.2,1,1.5708,0.0,0.0,-4.5,8.5,0.0,12H FLAG NO. 1 ;	295P
	206	
647!	106,1,6.0,0,-4.54,8.4,-4.54,8.8,-2.08,8.8,-1.79437,8.6,-2.08,	297P
	207	
648!	8.4,-4.54,3.4;	297P
	208	
649!	228,295,1,297,0;	299P
	209	
650!	212,1,19,5.97,0.3,1,1.5708,0.0,0.0,2.0,0.5,0.0,19HGENERAL LABEL	301P
	210	
651!	(210);	301P
	211	
652!	212,1,21,6.48,0.3,1,1.5708,0.0,0.0,-15.0,-9.5,0.0,21HPOINT DIMEN	303P
	212	
653!	SION (220);	303P
	213	
654!	212,1,6.6,3,1,0,1,1.5708,0.523599,0.0,15.0,4.0,1,0,6HTEXT 1;	305P
	214	
655!	212,1,7,1.58,0.2,1,1.5708,0.0,0.0,1.375,3.4,0.0,7HLABEL 3;	307P
	215	
656!	214,1,0,2,0,025,0,0,7,5,3,5,3,0,3,5;	309P
	216	
657!	214,1,0,2,0,025,0,0,7,0,5,0,3,5625,3,5;	311P
	217	
658!	210,307,2,309,311;	313P
	218	

~	659!212,1,15.4.71,0.3,1,1.5703,0.0,0,0,-8.0,0.5,0.0,15HFLAG NOTE (20 219 660!8);	315D
	220	315P
-	661!212,1,7.1.5,0.2,1,1.5708,0.0,0,0,0.675,8.4,0.0,7HLABEL 1;	317P
	221	
-	662!214,2,0.2,0.025,0.0,3.6,7.5,2.5,8.5,2.2,8.5;	319D
	222	
-	663!210,317,1,319;	321P
	223	
-	664!212,1,7.1.56,0.2,1,1.5708,0.0,0,0,4.495,6.3,0.0,7HLABEL 2;	323P
	224	
-	665!214,2,0.2,0.025,0.0,8.5,8.5,7.1,6.4,6.1,6.4;	325D
	225	
~	666!210,323,1,325;	327P
	226	
-	667!212,1,6.3,3,0.5,1,1.5708,2.0944,0.0,14.0,5.0,1.0,6HTEXT 2;	329P
	227	
-	668!212,1,6,1.34,0.2,1,1.5708,3.66519,0.0,13.0,4.0,2.0,6HTEXT 3;	331D
	228	
-	669!212,1,6,0.67,0.1,1,1.5708,5.23599,0.0,14.0,3.0,3.0,6HTEXT 4;	333P
	229	
-	670!212,1,18,5.61,0.3,1,1.5708,0.0,0,0,12.0,0.5,0.0,18HGENERAL NOTE	335P
	230	
-	671!(212);	335D
	231	
-	672!212,1,7,1.48,0.2,1,1.5708,0.0,0,0,-17.9,-8.0,-1.0,7HPOINT 2,1,	337P
	232	
-	673!425;	337P
	233	
-	674!212,1,22,6.75,0.3,1,1.5708,0.0,0,0,-8.0,-9.5,0.0,22HRADIUS DIMEN	339D
	234	
-	675!SION (222);	339P
	235	
-	676!212,1,12,2.44,0.2,1,1.5708,0.0,0,0,-4.5,6.5,0.0,12H FLAG NO. 2 ;	341P
	236	
-	677!214,2,0.2,0.025,0.0,-9.3,5.5,-5.1,6.6,-4.54,6.6;	343P
	237	
-	678!106,1,6,0.0,-4.54,6.4,-4.54,6.8,-2.02,6.8,-1.73437,6.6,-2.02,	345P
	238	
-	679!6.4,-4.54,6.4;	345P
	239	
-	680!228,341,1,345,1,343;	347D
	240	
-	681!212,1,22,6.75,0.3,1,1.5708,0.0,0,0,22.0,0.5,0.0,22HLINEAR DIMENS	349P
	241	
-	682!ION (216);	349P
	242	
-	683!212,1,12,2.46,0.2,1,1.5708,0.0,0,0,-4.5,3.5,0.0,12H FLAG NO. 3 ;	351P
	243	
-	684!214,2,0.2,0.025,0.0,-8.5,3.0,-6.0,3.6,-4.54,3.6;	353P
	244	
-	685!214,1,0.2,0.025,0.0,-8.5,4.5,-6.0,3.6;	355P
	245	
-	686!106,1,6,0.0,-4.54,3.4,-4.54,3.6,-2.0,3.6,-1.71437,3.6,-2.0,3.4,	357P
	246	
-	687!-4.54,3.4;	357P
	247	
-	688!228,351,1,357,2,353,355;	359P
	248	

689!212,1,24,7.47,0.3,1,1.5708,0.0,0.0,-28.0,-9.5,0.0,24	HORDINATE DI	351P
249		
690!MENSION (218);		361P
250		
691!212,1,20,6.09,0.3,1,1.5708,0.0,0.0,-18.0,10.5,0.0,20	HSPLINE SURF	363P
251		
692!ACE (114);		363P
252		
693!124,0.75,0.433013,-0.5,1.49851,-0.216506,0.875,0.433013,		365P
253		
694!-4.50346,0.625,-0.216506,0.75,-0.654255;		365P
254		
695!403,17,0.0,0.0,0.0,1,0;		367P
255		
696!100,3,0.6,5,18,0,5,0,18,0,8,0,18,0;		369P
256		
697!100,1,0.5,5,14,0,5,0,14,0,5,0,14,0;		371P
257		
698!406,3,36,1,0;		373P
258		
699!118,369,371,0,0,0,1,373;		375P
259		
700!110,7.79423,16.816,-0.397114,10.0442,15.9665,1.47789;		377P
260		
701!110,7.06218,12.25,-1.03109,9.31218,11.6005,0.843912;		379P
261		
702!406,3,1,1,0;		381P
262		
703!118,377,379,0,0,0,1,381;		383P
263		
704!110,18.34,13.5331,7.08001,15.7419,8.23305,8.37905;		385P
264		
705!100,2,0,17,0,17,13,17,37,17,13,17,0,18,0;		387P
265		
706!406,3,8,36,0;		389P
266		
707!120,385,387,0,0,6.28319,0,1,389;		391P
267		
708!110,18.34,13.5331,7.08001,15.7419,8.28305,8.37905;		393P
268		
709!110,15.7419,8.28305,8.37905,19.82,11.9858,8.96;		395P
269		
710!406,3,1,36,0;		397P
270		
711!120,393,395,0,0,6.28319,0,1,397;		399P
271		
712!110,25.7207,6.07508,13.6397,21.9707,7.15761,10.5147;		401P
272		
713!406,3,1,1,0;		403P
273		
714!122,401,27.5042,9.28946,9.41283,0,1,403;		405P
274		
715!100,0,0,26.5,12.5,27.5,12.5,26.5,13.5;		407P
275		
716!406,3,18,1,0;		409P
276		
717!122,407,27.8212,8.19795,10.2544,0,1,409;		411P
277		
718!406,3,10,10,0;		413P
278		

- 719! 114,6,1,1,4,0,0,1,0,0,0,1,0,2,0,3,0,4,0,-6,10104,-2,99756, 415P
 279
 720! 1,19845,-0,793964,0,775759,-0,749388,-2,18585,1,45723,0,258302, 415D
 280
 - 721! -1,50204E-05,3,37866,-2,25243,-0,0427499,0,749399,-2,81572, 415P
 281
 722! 1,87714,19,5412,-1,99829,-9,75513,6,50342,0,528723,-0,499552, 415P
 282
 - 723! -1,32847,0,885033,-0,649134,-2,14577E-05,2,20266,-1,46544, 415D
 283
 724! 0,108942,0,499579,-1,5727,1,24347,-15,3495,-0,999341,6,89512, 415P
 284
 - 725! -4,59674,0,211907,-0,24981,-0,574285,0,382851,0,546987, 415P
 285
 - 726! -3,43823E-05,0,980804,-0,653855,-0,0914004,0,249847,-0,911973, 415D
 286
 727! 0,607975,-5,10972,-2,99756,-0,424453,0,28297,1,16411,1,49878, 415P
 287
 - 728! -3,57567,2,58378,0,130052,2,24318,-5,06840,3,37899,-0,0427448, 415P
 288
 729! -0,749396,1,68065,-1,12043,19,5298,-1,99828,-10,7536,7,16909, 415D
 289
 730! -0,442719,0,909142,-2,54124,1,69416,-0,322308,1,49871,-3,41542, 415P
 290
 - 731! 2,27695,0,10894,-0,499568,1,12475,-0,74984,-14,682,-0,999338, 415P
 291
 732! 6,38967,-4,25977,1,03168,0,499663,-1,3486,0,399067,0,272784, 415D
 292
 - 733! 0,749511,-1,75512,1,17008,-0,0913923,-0,249839,0,53706, 415P
 293
 734! -0,391372,-3,8583,-1,43051E-06,-7,68797,5,12531,1,29598,3,74695, 415P
 294
 735! -8,97071,5,98047,1,01854E-03,-7,39098E-06,-0,0265505,0,0177014, 415P
 295
 - 736! -0,0427473,-0,749385,1,68062,-1,12042,18,8737,5,72205E-06, 415P
 296
 737! -15,5855,10,3904,-0,760513,2,49786,-5,99781,3,99854,4,51231E-03, 415P
 297
 - 738! 8,58307E-06,-0,0411451,0,0274251,0,108937,-0,49958,1,1248, 415D
 298
 739! -0,749301,-13,4689,-2,86102E-06,3,373,-2,582,1,30307,1,24917, 415P
 299
 740! -3,09757,2,06511,-0,0013926,-4,29153E-06,6,05178E-03, 415P
 300
 - 741! -4,03547E-03,-0,0913923,-0,249832,0,587027,-0,39135,-2,60325, 415P
 301
 742! 2,99755,-15,0046,10,0031,1,17138,1,49878,-3,98194,2,65462, 415D
 302
 - 743! -0,126423,-2,24816,5,01532,-3,34355,-0,0427462,0,749386, 415P
 303
 744! -2,81568,1,87712,18,2266,1,9983,-20,4997,13,6665,-0,424678, 415P
 304
 - 745! 0,999141,-2,70571,1,30381,0,331523,-1,49873,3,33323,-2,22215, 415P
 305
 746! 0,108937,0,499589,-1,87269,1,24845,-12,2586,0,99933,1,36842, 415P
 306
 - 747! -0,912277,1,02611,0,499665,-1,32443,0,882988,-0,275569, 415P
 307
 748! -0,749502,1,75714,-1,17809,-0,0913923,0,249832,-0,911943, 415D
 308

749!	0.607962, -1.50104, 2.99756, -16.7869, 11.1913, 0.790295, -0.749389,	415P
	309	
750!	-2.39352, 1.59887, -2.37088, 2.24617, 7.19497, -4.79662, 1.58059,	415P
	310	
751!	-1.49873, -4.79664, 3.19775, 13.2422, 1.9983, -21.7449, 14.4966,	415P
	311	
752!	0.564777, -0.499552, -1.55733, 1.10483, -1.69433, 1.49366, 4.97199,	415P
	312	
753!	-3.31454, 1.12955, -0.999104, -3.31466, 2.20976, -11.5995, 0.999324,	415P
	313	
754!	0.399131, -0.59942, 0.200792, -0.249845, -0.526031, 0.35069,	415P
	314	
755!	-0.602377, 0.749534, 1.57809, -1.05207, 0.401585, -0.499689, -1.05206,	415P
	315	
756!	0.70133, -8.69911, -2.99756, 8.99267, -5.99511, -0.70225, -0.749405,	415P
	316	
757!	2.24321, -1.49831, 1.33452, 2.57492E-05, -7.72476E-05, 5.14984E-05,	415P
	317	
758!	-0.231931, 0.749379, -2.24814, 1.40876, 14.2912, -1.99828, 5.99485,	415P
	318	
759!	-3.99657, -0.413661, -0.499576, 1.49873, -0.999155, 0.0850663,	415P
	319	
760!	-1.93119E-05, 5.79357E-05, -3.36233E-05, -0.0157094, 0.499585,	415P
	320	
761!	-1.49876, 0.999171, -14.0504, -0.999335, 2.99801, -1.99867, -0.229337,	415P
	321	
762!	-0.249327, 0.749482, -0.499655, 0.373902, 9.29832E-06, -2.7695E-05,	415P
	322	
763!	1.85966E-05, -0.145551, 0.249827, -0.74943, 0.499653, -8.24377,	415P
	323	
764!	-2.99756, 8.99267, -5.99511, 1.371, 1.49878, -4.49635, 2.99757,	415P
	324	
765!	0.688731, 2.24616, -0.74449, 4.49633, -0.231923, -0.749389, 2.24617,	415P
	325	
766!	-1.49878, 13.9469, -1.9933, 5.99439, -3.99659, -0.290657, 0.99914,	415P
	326	
767!	-2.99742, 1.99328, 0.0379381, 1.49873, -4.49619, 2.99746, -0.0157123,	415P
	327	
768!	-0.499577, 1.49873, -0.999154, -13.5514, -0.999327, 2.99798, -1.99865,	415P
	328	
769!	1.08181, 0.499671, -1.49901, 0.999342, 0.437249, 0.749496, -2.24849,	415P
	329	
770!	1.49809, -0.145543, -0.249835, 0.749506, -0.499671, -6.42096,	415P
	330	
771!	2.86102E-06, -8.58307E-06, 5.72205E-06, 2.0527, 3.74695, -11.2408,	415P
	331	
772!	7.49389, -0.007038, -4.29153E-06, 1.28746E-05, -8.58307E-06,	415P
	332	
773!	-0.231925, -0.749386, 2.24816, -1.49877, 13.6785, -2.86102E-06,	415P
	333	
774!	8.58307E-06, -5.72205E-06, -0.261917, 2.49787, -7.49361, 4.99574,	415P
	334	
775!	-9.19914E-03, -6.4373E-06, 1.93119E-05, -1.28746E-05, -0.015708,	415P
	335	
776!	-0.49957, 1.49871, -0.999139, -12.1779, 5.72205E-06, -1.71661E-05,	415P
	336	
777!	1.14441E-05, 1.51968, 1.24916, -3.74745, 2.49832, 6.19411E-04,	415P
	337	
778!	-7.15256E-06, 2.14577E-05, -1.43051E-05, -0.145547, -0.249827,	415P
	338	

779!	0.749452,-0.499655,-4.60722,2.99756,-3.99268,5.99512,1.34285, 339	415D
780!	1.49873,-4.49634,2.99756,-0.702812,-2.24816,6.74449,-4.49633, 340	415P
781!	-0.231921,0.749381,-2.24814,1.49876,13.3917,1.99829,-5.99487, 341	415P
782!	3.99653,-0.327439,0.999147,-2.99744,1.99829,-0.0563231,-1.49871, 342	415D
783!	4.49512,-2.99742,-0.0157137,0.499564,-1.49869,0.999128,-10.3032, 343	415P
784!	0.99933,-2.99799,1.09856,1.08428,0.499662,-1.49899,0.999324, 344	415P
785!	-0.436023,-0.749496,2.24849,-1.49899,-0.145542,0.249832, 345	415D
786!	-0.749495,0.499663,-4.19911,2.99755,-3.99266,5.99511,-0.758542, 346	415P
787!	-0.749409,2.24823,-1.49882,2.27562,2.24823,-6.74468,4.49646, 347	415P
788!	-1.51708,-1.49832,4.49646,-2.99764,12.9922,1.99829,-5.99488, 348	415D
789!	3.99659,-0.487227,-0.499578,1.49873,-0.999155,1.46168,1.49873, 349	415P
790!	-4.4962,2.99747,-0.974453,-0.999155,2.99747,-1.99831,-10.3004, 350	415P
791!	0.999327,-2.99799,1.99865,-0.224393,-0.249836,0.749508, 351	415D
792!	-0.499672,0.673179,0.749508,-2.24852,1.49902,-0.448786, 352	415P
793!	-0.499672,1.49902,-0.999344,0,1,413; 353	415P
794!	110,18.34,13.5331,7.08001,15.7419,8.23305,8.37905; 354	417D
795!	110,19.5442,12.9354,8.22789,18.34,13.5331,7.08001; 355	419P
796!	406,3,1,36,0; 356	421P
797!	120,417,419,0,0,6.28319,0,1,421; 357	423D
798!	402,4,141,143,145,337; 358	425P
799!	402,7,91,93,95,97,99,101,103; 359	427P
800!	406,1,2HD1; 360	429D
801!	406,1,1; 361	431P
802!	406,2,150,0,125,0; 362	433D
803!	404,4,87,35,0,35,0,75,35,0,105,0,59,105,0,35,0,45,105,0,105,0,0, 363	435D
804!	0,3,429,431,433; 364	435P
805!	S 1G 3D 436P 364	Г

