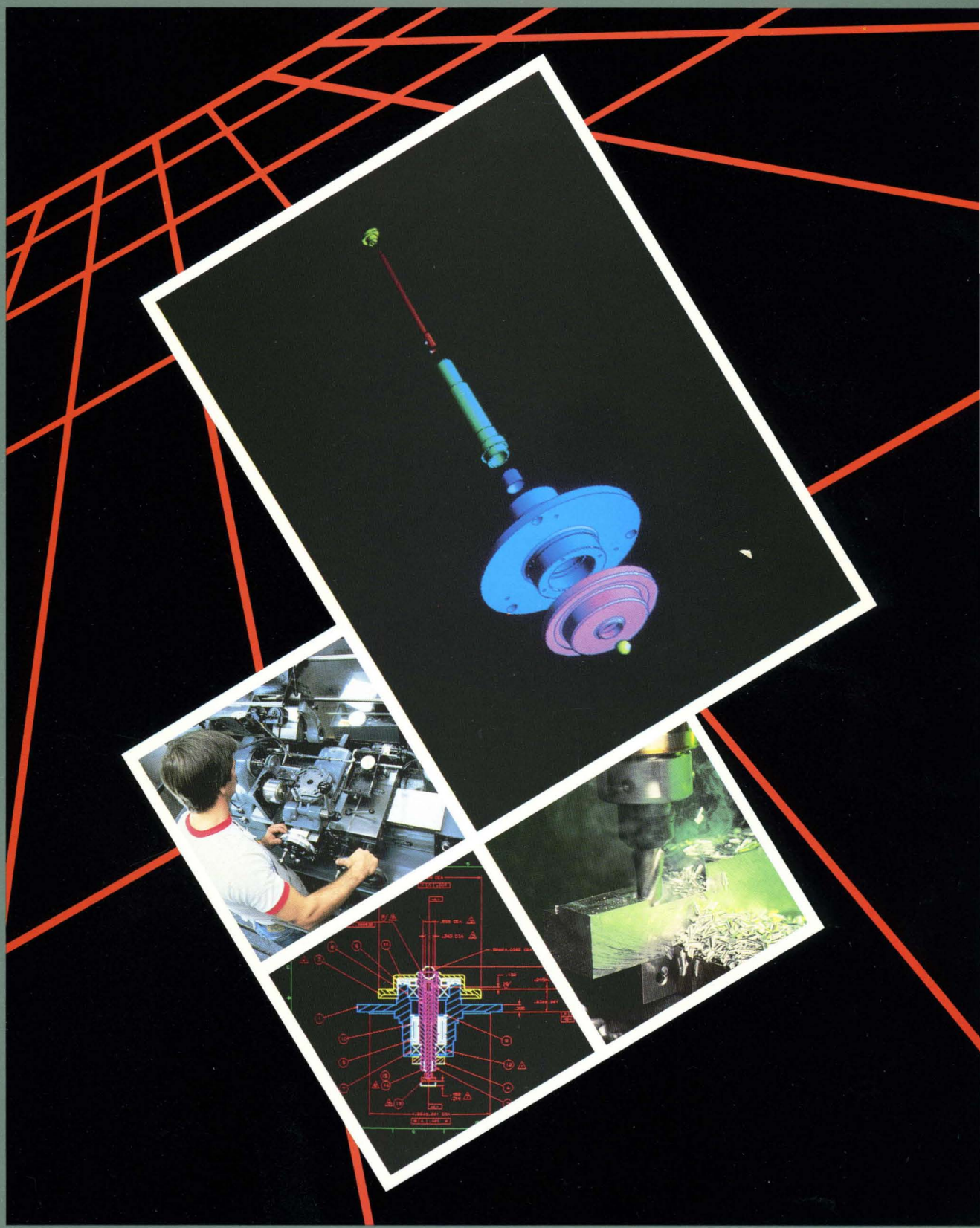
ICEM DDN

System Programmer's Reference Manual for NOS

CONTROL DATA



Reference

60458560

ICEM DDN System Programmer's Reference Manual for NOS

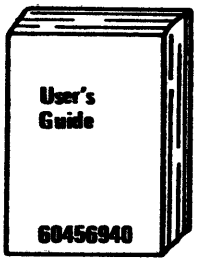
Reference

This product is intended for use only as described in this document. Control Data cannot be responsible for the proper functioning of undescribed features and parameters.

Publication Number 60458560

Related Manuals

Background:



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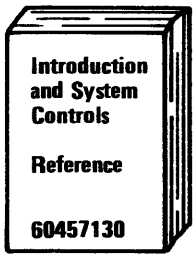

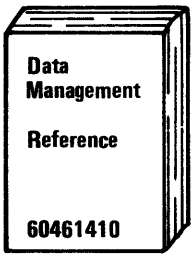

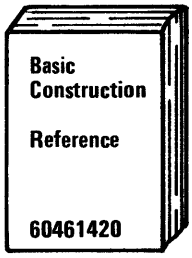

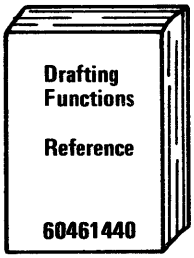

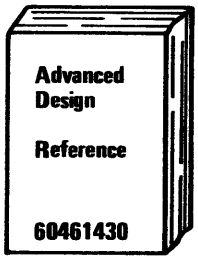

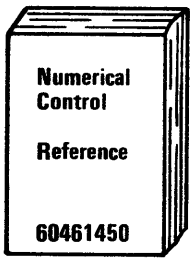

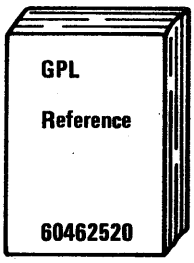

Additional:

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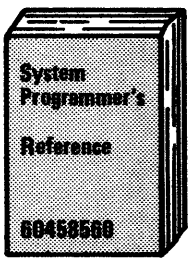

Manual History

Revision C documents ICEM DDN Version 1.60, printed March 1986. Because extensive changes are made, change bars and dots are not used and all pages reflect the latest revision level. This edition obsoletes all previous editions.

Previous Revision	System Version	Date
A	1.4	November 1982
B	1.5	April 1984

Contents

TABLES

About This Manual

This manual contains listings of file formats and data descriptions of use to the systems programmers of the CONTROL DATA® Integrated Computer-aided Engineering and Manufacturing Design/Drafting/Numerical Control (ICEM DDN) software system.

Organization

This manual includes four chapters describing data structure:

- Chapter 1 outlines several I/O files and lists the overlays that make up ICEM DDN.
- Chapter 2 lists the elements of the common arrays used in ICEM DDN.
- Chapter 3 describes each entity type used to construct parts.
- Chapter 4 describes labeled ICEM DDN common that is not saved with a part.

Conventions

When the word system is used, it refers to the ICEM DDN software system. When the Network Operating System is referred to, it is called either NOS or the operating system.

Additional Related Publications

You can find related information in the following publications:

Manual Title	Publication Number
Network Products Interactive Facility Version 1 Reference Manual	60455250
Network Products Interactive Facility Version 1 User's Guide	60455260
NOS Version 1 Reference Manual, Volume 1	60435400
UNIPLOT Version 3 User's Guide/Reference Manual	60454730
Automatically Programmed Tooling System (APT IV)	17326900
XEDIT Version 3 Reference Manual	60455730
Graphics Terminal Assist Version 1 User's Guide/Reference Manual	60476100
NOS Full Screen Editor User's Guide	60460420
Remote Batch Facility Version 1 Reference Manual	60499600
NOS 2 Reference Set, Volume 1 Introduction to Interactive Usage	60459660
NOS 2 Reference Set, Volume 2 Guide to System Usage	60459670
NOS 2 Reference Set, Volume 3 System Commands	60459680
ICEM Design/Drafting GRAPL Programming Language	60461460
ICEM Schematics Reference Manual	60456540
ICEM Schematics User's Guide	60462490
ICEM User-Defined Tablet Overlay	60457650
ICEM Engineering Data Library Reference Manual	60459740
ICEM TEKROUTE Reference Manual	60455880

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Publications and Graphics Division ARH219
4201 Lexington Avenue North
St. Paul, Minnesota 55126-6198

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General Application 1

General Application 1

This section describes the overlays (also referred to as coreloads) that make up ICEM DDN as well as some of the files used by ICEM DDN.

Coreload Assignments

ICEM DDN is subdivided into overlays. Execution of ICEM DDN loads these overlays. The overlay numbers are recorded on the CT file during execution with the trace mode on. The following list relates the decimal overlay number to the functional purpose.

0	INITIALIZE GRAPHICS
1	DEFINE AN ENTITY
2	MAIN MENU
3	DELETE
4	ENTITY SELECTION
5	REGION SELECT
6	PLANAR ELEMENT SAMPLER
7	GENERAL BOUNDARY OFFSET
8	ZOOM/DEPTH
9	VIEW CONTROL
10	AUXILIARY VIEW DEFINITION
11	ARRAY, GROUP, & ARRAY EXPLODE
12	TRANSLATE/ROTATE/DUPLICATE GRAPHICS
13	TRANSLATE/ROTATE/DUPLICATE CORE #1
14	TRANSLATE/ROTATE/DUPLICATE CORE #2
15	STRETCH & MIRROR GRAPHICS, MIRROR CORE
16	** RESERVED FOR DATA VERIFICATION #1
17	DATA VERIFICATION #2
18	DATA VERIFICATION #3
19	CANON
20	MODALS
21	SI/US/RESIZE
22	PART MANAGEMENT
23	PART LIST, FILE, & RETRIEVE
24	COMPUTER INDEPENDENT PART SAVE
25	COMPUTER INDEPENDENT PART MERGE/RESTORE
26	PATTERN MODALS, CREATE, RETRIEVE, DELETE
27	PATTERN CREATE ASSISTANT
28	PATTERN LIST, COPY, CHANGE LIBRARIES
29	PATTERN RETRIEVE ASSISTANT
30	GRAPL MAIN
31	ERROR MESSAGES
32	USER TEXT ENTRY
33	AUTO GRAPL
34	MANAGE USER TECHNOLOGY FILE
35	ATTRIBUTE MANAGEMENT

* Unused - coreload currently not assigned
** Reserved coreload

36	ANALYSIS #1 (CONTROLLER & 2-D)
37	ANALYSIS #2 (CURVE ANALYSIS)
38	ANALYSIS #3 (SPLINE)
39	ANALYTICAL AREA & PERIMETER
40	BULK DATA INPUT
41	VARIABLE CALCULATION
42	POINT & LINE GRAPHICS
43	POINT CORE
44	LINE CORE
45	CIRCLE & FILLET GRAPHICS
46	CIRCLE & FILLET CORE
47	OTHER CURVE GRAPHICS
48	CONIC GRAPHICS & CORE
49	SPLINE CORE
50	OFFSET CURVE CORE #1
51	TRIM CURVE CORE
52	STRING
53	STRETCH CORE #2
54	REGENERATION - BASIC GEOMETRY
55	MISCELLANEOUS CONSTRUCTION
56	NEUTRAL DISPLAY FILE OUTPUT
57	TUTORIAL & ERROR MESSAGES
58	DISPLAY BASIC GEOMETRY
59	DISPLAY WRAP UP
60	BALLOON & ARROWHEAD AT END OF CURVE
61	LABEL/DIMENSION GRAPHICS
62	NOTE, LABEL, DIMENSION CORE, & REGENERATION
63	CROSS-HATCHING, PROJECTED ENTITY, & MODIFY DRAFTING ENTITY GRAPHICS
64	CROSS-HATCHING & PROJECTED ENTITY CORE
65	MODIFY DRAFTING ENTITY CORE
66	RECTANGLES, TRIANGLES, HEXAGONS
67	CENTERLINES
68	USER GENERATED SOFTWARE SYMBOLS
69	* (UNUSED)
70	* (UNUSED)
71	DETAIL MAGNIFICATION GRAPHICS
72	DETAIL MAGNIFICATION CORE
73	FEATURE FRAMES
74	PLOTTER OUTPUT
75	PART MERGE CORE
76	PART MERGE GRAPHICS
77	* (UNUSED)
78	DISPLAY DRAFTING #1
79	DISPLAY DRAFTING #2
80	COMPOSITE CURVE & VECTOR GRAPHICS
81	SURFACES & EXTENDED GEOMETRY CURVES GRAPHICS
82	TABCYL, CURREV, DEVSRF, 3D SPLINE & SURFACE EDGE CORE
83	CURVE MESH SURFACE CORE
84	FILLET SURFACE CORE
85	POINT ON SURFACE CORE
86	DRAFT CURVE CORE
87	PLANE SLICE, DRAFT CURVE, DEVSRF LAYOUT, FEATURE DEVELOPMENT GRAPHICS
88	PLANE SLICING SOLID CORE
89	DEVELOPABLE SURFACE LAYOUT CORE

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* Unused - coreload currently not assigned
** Reserved coreload

90	EXPLICIT SURFACE GRAPHICS
91	EXPLICIT SURFACE CORE
92	COMPOSITE SURFACE CORE
93	PROJECTED SURFACES CORE
94	PART PACK
95	WEIGHT & VOLUME ANALYSIS
96	** RESERVED FOR VOLUME ANALYSIS
97	DATA BASE DUMP & DEBUGGER
98	ATTRIBUTE REPORT
99	DISPLAY EXTENDED GEOMETRY & N/C
100	THICKNESS ANALYSIS
101	DISPLAY & EDIT - COMMAND PROCESSOR, LOCATE, RENUMBER, AND SET FUNCTIONS
102	DISPLAY & EDIT - PRINT AND TOOL DISPLAY FUNCTION
103	DISPLAY & EDIT - ENTRY AND EXIT TO EDITOR
104	POINT-TO-POINT GRAPHICS
105	POINT-TO-POINT CORE GRAPHICS
106	N/C DEFINITIONS
107	PROFILE/POCKET & FLANGE GRAPHICS
108	PROFILE/POCKET CORE
109	3-AXIS FLANGE MACHINING
110	3-AXIS & 5-AXIS GRAPHICS
111	MACHINING DIRECTION & CUT NUMBER
112	MACHINING MANAGEMENT
113	MACHINE ONE CUT
114	CONTAINMENT GRAPHICS
115	CONTAINMENT CORE #1
116	3-SURFACE PROFILE CORE
117	LATHE ROUGHING USER INTERFACE
118	LATHE DRILLING AND THREADING CORE TOOLPATH GENERATION
119	LATHE TOOLPATH DEFINITION
120	ABS PATH & 3-SURFACE PROFILE GRAPHICS
121	ABS PATH CORE & 3-SURFACE PROFILE DEFINITION
122	CLFILE USER INTERFACE
123	CLFILE GENERATION - INTERMEDIATE CONVERSION
124	NAMING TOOL PATH
125	CLFILE GENERATION - OUTPUT
126	CLFILE INTERPRETATION - TOOLPATH GENERATION
127	COMPACT II TRANSLATOR
128	CONTAINMENT CORE #2
129	CONTAINMENT CORE UTILITY
130	MANAGE GRAPL VARIABLES
131	GRAPL COMPILER
132	GRAPL POINT & 2-D CURVES
133	GRAPL MODALS
134	GRAPL 3-D CURVES & GRAPHICS
135	GRAPL DRAFTING
136	GRAPL VECTOR, SURFACES & SOLIDS
137	GRAPL ARRAY, GROUP & MIRROR
138	GRAPL EXECUTION CONTROLLER
139	** RESERVED FOR DISPLAY APPLICATIONS
140	** RESERVED FOR LINKAGE ANALYSIS GRAPHICS
141	** RESERVED FOR LINKAGE ANALYSIS CORE
142	3-D ELEMENT SAMPLER
143	MAP A N/C POINT SET TO A SURFACE

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* Unused - coreload currently not assigned
** Reserved coreload

144 FILLET FOR 3-D SURFACE PROFILE
145 GENERATE CUTTER OFFSET PATH
146 FLAME CUTTING GRAPHICS
147 FLAME CUTTING CORE
148 NESTING
149 ** RESERVED FOR SPRINKLER DESIGN
150 ** RESERVED FOR USER I/O INTERFACE
151 ** RESERVED FOR AUTO GRAPL CONTROL & DRAFTING
152 ** RESERVED FOR AUTO GRAPL POINTS & 2-D CURVES
153 ** RESERVED FOR AUTO GRAPL EXTENDED GEOMETRY
154 COMPOSITE TOOLPATH
155 UPDATE PRE-1.6 N/C AND PP MACROS TO 1.6 FORMAT
156 PART INTEGRITY
157 ** RESERVED FOR MAXIS
158 ** RESERVED FOR SCHEMATICS
159 REVERSE TOOL PATH
160 ** RESERVED FOR PART CONVERSION GRAPHICS
161 DIN LABEL/DIMENSION GRAPHICS
162 DIN LABEL/DIMENSION CORE
163 GRAPHICS FOR MODIFY DIN DIMENSIONS
164 MODIFY DIN DIMENSION CORE
165 DIN DISPLAY
166 DIN MODAL
167 TUTORIAL OVERLAY
168 TUTORIAL OVERLAY
169 IMPLICIT POINTS
170 SEC. ARROWS & PIPE INTER. GRAPHICS
171 SEC. ARROW & PIPE INTER. CORE
172 ** RESERVED FOR PLANER SAMPLER
173 VIEW LAYOUT CONTROL
174 VIEWING MODALS AND DISPLAY NAME MANAGEMENT
175 AUTO MAX/MIN DISPLAY
176 ZOOM CORE
177 TOOL MANAGEMENT
178 MODIFY TOOL PATH
179 PROFILE/POCKET TOOL PATH ENTITY CREATION
180 ** RESERVED FOR ELECTRICAL SYMBOLS
181 BLANK/UNBLANK
182 OFFSET CURVES
183 GRAPHIC CONTROLLER FOR CURVE MESH
184 TRIM CURVES
185 HIDDEN LINE REMOVAL
186 ZT CLIP
187 FEATURE DEVELOPMENT CORE
188 DISPLAY & EDIT - INSERT FUNCTION
189 DISPLAY & EDIT - EDITOR MODALS FUNCTION
190 DISPLAY & EDIT - DELETE, COPY, MOVE, VERIFY, MATRIX COPY, AND MACRO EXECUTION FUNCTIONS
191 DISPLAY & EDIT - REPLACE FUNCTION
192 DISPLAY & EDIT - UPDATE/QUIT FUNCTION
193 ** RESERVED FOR DISPLAY & EDIT
194 CURVE PROJECTION (DRAFT CURVES) GRAPHICS
195 DRAFT CURVE DEFINITION
196 TEMPLATE MANAGEMENT #1

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* Unused - coreload currently not assigned
** Reserved coreload

```
197     TEMPLATE MANAGEMENT #2
198     TUTORIAL OVERLAY #4
199     TUTORIAL OVERLAY #5
200     GPL MAIN CONTROLLER
201     GPL MAIN EXECUTIVE
202     AUTO GPL
203
.
.       **  RESERVED FOR GPL
.
225     GPL TERTIARY OVERLAYS FOR TOOLPATH GENERATION
226     GPL TERTIARY OVERLAYS FOR TOOLPATH GENERATION
227     GPL TERTIARY OVERLAYS FOR TOOLPATH GENERATION
228     GPL TERTIARY OVERLAYS FOR TOOLPATH GENERATION
229     GPL TERTIARY OVERLAYS FOR TOOLPATH GENERATION
230     GPL TERTIARY OVERLAYS FOR TOOLPATH GENERATION
231     GRAPL COMPILER
232     *  (UNUSED)
233     **  RESERVED FOR GRAPL
234     GRAPL CONTROLLER FOR INTERACTIVE COMMANDS
235     **  RESERVED FOR GRAPL
236     **  RESERVED FOR GRAPL
237     **  RESERVED FOR GRAPL
238     GRAPL PROGRAM EXECUTIVE
239     **  RESERVED FOR GRAPL
240     **  RESERVED FOR GRAPL
241     DIN TYPE 38
242     DIN TYPE 40
243     TAPER DIMENSION GRAPHICS
244     MODIFICATION OF DATUM
245     **  RESERVED FOR ANSI DRAFTING
246     **  RESERVED FOR ANSI DRAFTING
247     **  RESERVED FOR SYSTEM ERROR PROCESSOR #1
248     **  RESERVED FOR SYSTEM ERROR PROCESSOR #2
249     **  RESERVED FOR DUCT
250     HIDDEN LINE REMOVAL
251     CREATE USER TABLET PAGES
252     UNISTRUC INTERFACE
253     COMMON INITIALIZATION
254     TERMINAL SELECT & SET UP FILE NAME TABLE
255     N/C MISCELLANEOUS FUNCTIONS
256     DISPLAY AND EDIT TOOL PATH TOOL RETRACT
257     N/C MACRO
258     CLFILE INTERPRETATION - DISPLAY
259     DEFINE VARIABLES FOR N/C DISPLAY AND EDIT
260     N/C PUNCHING
261     FRENCH LABEL/DIMENSION GRAPHICS
262     FRENCH LABEL/DIMENSION CORE
263     GRAPHICS FOR MODIFY FRENCH DIMENSIONS
264     MODIFY FRENCH DIMENSION CORE
265     FRENCH DRAFTING DISPLAY
266     FRENCH DRAFTING MODALS
267     FRENCH TRUE POSITION SYMBOLS
268     SECOND FRENCH DISPLAY
```

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* Unused - coreload currently not assigned
** Reserved coreload

269 PART MERGE ENTITY NAMES
270 DRAFT CURVE CORE
271 U.K. LABEL/DIMENSION GRAPHICS
272 U.K. LABEL/DIMENSION CORE
273 GRAPHICS FOR MODIFY U.K. DIMENSIONS
274 MODIFY U.K. DIMENSION CORE
275 U.K. DRAFTING DISPLAY
276 U.K. DRAFTING MODALS
277 U.K. TRUE POSITION SYMBOLS
278 SECOND U.K. DRAFTING DISPLAY
279 ** RESERVED FOR N/C
280 ** RESERVED FOR N/C
281 SWEDISH LABEL/DIMENSIONS GRAPHICS
282 SWEDISH DRAFTING CORE
283 GRAPHICS FOR MODIFY SWEDISH DRAFTING
284 MODIFY SWEDISH DRAFTING CORE
285 SWEDISH DRAFTING DISPLAY
286 SWEDISH DRAFTING MODALS
287 ** RESERVED FOR SWEDISH TRUE POSITION TOLERANCE SYMBOL
288 SECOND SWEDISH DRAFTING DISPLAY
289 DIN SYMBOL
290 DISPLAY DIN DRAFTING
291 JIS LABEL/DIMENSION GRAPHICS
292 JIS DRAFTING CORE
293 JIS MODIFY DRAFTING GRAPHICS
294 MODIFY JIS DRAFTING CORE
295 JIS DRAFTING DISPLAY
296 JIS DRAFTING MODALS
297 JIS TRUE POSITION SYMBOLS
298 SECOND JIS DISPLAY
299 TOOL DISPLAY DEFINITION
300 ICEMDDN TERMINATION
301 BEZIER CURVE DEFINITION I
302 BEZIER CURVE DEFINITION II
303 POINT SET INTERPOLATED BEZIER CURVE
304 BEZIER CURVE DEFINITION - CONVERT EXISTING CURVE
305 BEZIER CURVE DEFINITION - DUPLICATE AND TRUNCATE/EXTEND
306 BEZIER CURVE DEFINITION - ISOPARAMETRIC CURVE
307 BEZIER CURVE DEFINITION - GENERALIZED FILLET
308 ** RESERVED FOR BEZIER CURVE
309 BEZIER CURVE ASSISTANT - DEFINE CURVE THROUGH POINTS
310 BEZIER CURVE ASSISTANT - MISCELLANEOUS UTILITIES
311 BEZIER CURVE MODIFICATION - POLYGON POINTS
312 BEZIER CURVE MODIFICATION - CONSTRAINTS
313 BEZIER CURVE MODIFICATION - DEFORMATION
314 BEZIER CURVE MODIFICATION - CHANGE DEGREE OF POLYNOMIAL
315 BEZIER CURVE MODIFICATION - SEGMENTATION
316 BEZIER CURVE MODIFICATION - CHANGE PARAMETERIZATION
317 BEZIER CURVE MODIFICATION - CURVE END
318 BEZIER CURVE MODIFICATION - MATCHING
319 ** RESERVED FOR BEZIER CURVE MODIFICATION
320 ** RESERVED FOR BEZIER CURVE MODIFICATION
321 WORK SPACE MANAGEMENT
322 WORK SPACE MANAGEMENT
323 WORK SPACE MANAGEMENT

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* Unused - coreload currently not assigned
** Reserved coreload

```
324     WORK SPACE MANAGEMENT
325     WORK SPACE MANAGEMENT
326     PART CONVERSION WITHOUT ENTITIES
327     **  RESERVED FOR ENTITY CONVERSION (EXCLUDING DRAFTING)
328     *  (UNUSED)
329     SURFACE FACETTING
330     BEZIER SURFACE DEFINITION - POLYGON POINTS
331     BEZIER SURFACE DEFINITION - INTERPOLATION/APPROXIMATION (CURVE SET)
332     BEZIER SURFACE DEFINITION - INTERPOLATION/APPROXIMATION (BOUNDARY CURVES)
333     BEZIER SURFACE DEFINITION - BLENDING
334     BEZIER SURFACE DEFINITION - CONVERSION
335     BEZIER SURFACE DEFINITION - DUPLICATE AND TRUNCATE/EXTEND
336     BEZIER SURFACE DEFINITION - PROFILING
337     BEZIER SURFACE DEFINITION - SWEEPING
338     BEZIER SURFACE DEFINITION - INTERPOLATION/APPROXIMATION (CURVE SET) EXECUTION
339     BEZIER SURFACE DEFINITION - INTERPOLATION/APPROXIMATION (BOUNDARY CURVES)
        EXECUTION
340     BEZIER SURFACE DEFINITION - PROFILING (EXEC.)
341     BEZIER SURFACE DEFINITION - MISC. UTILITIES
342     BEZIER SURFACE MODIFICATION - POLYGON POINTS
343     BEZIER SURFACE MODIFICATION - DEFORMATION
344     BEZIER SURFACE MODIFICATION - DEGREE
345     BEZIER SURFACE MODIFICATION - SEGMENTATION
346     BEZIER SURFACE MODIFICATION - PARAMETER
347     BEZIER SURFACE MODIFICATION - SURFACE EDGE
348     BEZIER SURFACE MODIFICATION - MATCHING
349     BEZIER SURFACE DEFINITION - PROFILING (EXEC.)
350     BEZIER SURFACE DEFINITION - SWEEPING (EXEC.)
351     BEZIER SURFACE DEFINITION - SWEEPING (EXEC.)
352     BEZIER SURFACE MODIFICATION - SEGMENTATION (EXEC.)
353     BEZIER SURFACE MODIFICATION - SURFACE EDGE (EXEC.)
354     BEZIER SURFACE MODIFICATION - MATCHING (EXEC.)
355
.
.       *  (UNUSED) RESERVED FOR BEZIER SURFACE FILLET
.
360
361     **  RESERVED FOR DIN
362     **  RESERVED FOR DIN
363
.
.       *  (UNUSED)
.
398
399     LATHE ROUGHING CORE TOOLPATH GENERATION
400     TOOL PATH REGENERATION
401     RESERVED FOR N/C SURFACE EVALUATION
402     N/C PLANAR ELEMENT SAMPLER
403     **  RESERVED FOR ANSI DRAFTING CONVERSION
404     **  RESERVED FOR DIN DRAFTING CONVERSION
405     **  RESERVED FOR NFC DRAFTING CONVERSION
406     **  RESERVED FOR BSI DRAFTING CONVERSION
407     **  RESERVED FOR SMS DRAFTING CONVERSION
408     **  RESERVED FOR JIS DRAFTING CONVERSION
409     **  RESERVED FOR CHINESE DRAFTING CONVERSION
```

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* Unused - coreload currently not assigned
** Reserved coreload

```
410     **  RESERVED FOR DRAFTING CONVERSION
411     TUTORIAL #6
412     TUTORIAL #7
413     LATHE CONTOURING USER INTERFACE
414     LATHE CONTOURING CORE TOOLPATH GENERATION
415     LATHE THREADING USER INTERFACE
416     LATHE DRILLING USER INTERFACE
417
.
.       *  (UNUSED)  RESERVED FOR N/C USE
.
438
439     **  RESERVED FOR EX-APT (GERMAN)
440     **  RESERVED FOR EX-APT (GERMAN)
441     **  RESERVED FOR DIN
442     **  RESERVED FOR DIN
443     SURFACE CURVES CORE
444     ADD A SET OF ENTITIES TO THE DATA POOL
445     USER INTERFACE FOR SURFACE-SURFACE INTERSECTION
446     SURFACE-SURFACE INTERSECTION CONSTRUCTION, PRIMARY OVERLAY
447     SSI SECONDARY OVERLAY, ADAPTIVE GRIDS
448     SSI SECONDARY OVERLAY, PROCESSING AT LABEL 900
449     SSI SECONDARY OVERLAY, PROCESSING AT LABEL 1900
450     SSI SECONDARY OVERLAY, FOLLOW SI CURVE
451     SSI SECONDARY OVERLAY, PROCESSING IN MAIN LOOP
452     SSI SECONDARY OVERLAY, DEFINE ACTUAL CURVE SETS
453     SURFACE-SURFACE INTERSECTION, DELETION OF EXISTING CURVES
454     *  (UNUSED)  RESERVED FOR ADVANCED DESIGN USE
456     *  (UNUSED)  RESERVED FOR ADVANCED DESIGN USE
457     *  (UNUSED)  RESERVED FOR ADVANCED DESIGN USE
458     *  (UNUSED)  RESERVED FOR ADVANCED DESIGN USE
459     *  (UNUSED)  RESERVED FOR ADVANCED DESIGN USE
460     MODIFY SURFACE PATHS GRAPHICS
461
.
.       *  (UNUSED)  RESERVED FOR ADVANCED DESIGN USE
.
470
471     ARC THROUGH THREE POINTS
472     ENTITY SELECTION CONSTRAINT SET HANDLING
473     ATTRIBUTE MODIFY
474     *  (UNUSED)
475     *  (UNUSED)
476     PATTERN UPDATE NUMBER ONE
477     PATTERN UPDATE NUMBER TWO
478     LEVEL MANAGEMENT CORELOAD
479     CORELOAD FOR DRAFTING MODALS
480     CORELOAD FOR N/C AND AD MODALS
481     SECOND CORELOAD FOR TABLET MANAGEMENT
482     SECOND CORELOAD FOR ATTRIBUTE MODIFY
483
.
.        *  (UNUSED)  RESERVED FOR DESIGN/DRAFTING USE
.
511
```

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* Unused - coreload currently not assigned
** Reserved coreload

ICEM DDN CLFILE Formats

Logical Format

The CL file consists of a sequential set of records with each record defined by a major word code, a major word subcode and further instructions. The major word code groups similar record types together.

Record Type 2000: Postprocessor Commands

Word	Description
1	Record sequence number
2	2000
3	Major word subcode (see postprocessor library, major word codes)
4	Minor word codes and/or parameters (see postprocessor library, minor word codes)

Specific Formats:

PPRINT,PARTNO,INSERT:W4... = up to 66 characters of text, blank-filled on the right

ARCSLP:

Word	Description
3	1029 (default)
4	START
5	s,slope
6	ENDARC
7	e,slope
8	RADIUS
9	r
10	CCLW or CLW

Record Type 3000: Surface Data

NOTE

Circle records are the only surface data supported by ICEM DDN.

Word	Description	
1	Record sequence number	
2	3000	
3	Surface Use Indicator (drive surface) (= 2)	
4	Surface Condition Indicator (to) (= 1)	
5	Surface Type Indicator (circle) (= 4)	
6	Number of words in canonical form (= 9)	
7	Surface name (blank)	
8	Surface name subscript (= 0)	
9	xc	Coordinates of the circle center
10	yc	
11	zc	
12	i	Circle plane normal
13	j	
14	k	
15	r	Circle radius

Record Type 5000: Directions, Points, and Parameters

Word	Description			
1	Record sequence number			
2	5000			
3	=3 FROM	= 4 GODLTA	= 5 GOTO	= 6 Continuation

NOTE

Additional point coordinate sets for word 3 = 5 or 6 only. A maximum number of 240 reals is written out in a GOTO or continuation record.

4	Point or vector name (= blank)			
5	Name subscript (= 0)			
6	xp	xv	xp(1)	xp(n+1)
7	yp	yv	yp(1)	yp(n+1)
8	zp	zv	zp(1)	zp(n+1)
9	i	i	ip(1)	ip(n+1)
10	j (MULTAX only)	j (id.)	jp(1) (id.)	jp(n+1) (id.)
11	k	k	kp(1)	kp(n+1)
•				
•				
•				
5+n			xp(n)	xp(2n)
6+n			yp(n)	yp(2n)
7+n			zp(n)	zp(2n)
8+n			ip(n)	ip(2n)
9+n			jp(n) (id.)	jp(2n) (id.)
10+n		k	kp(n)	kp(2n)

Record Type 6000: ARELEM Flags, Specifications, and Parameters

Word	Description
1	Record sequence number
2	6000
3	INTOL (= 4)
4	OUTTOL (= 5)
5	tolerance (t)

Record Type 9000: ARELEM Parameters

Word	Description
1	Record sequence number
2	9000
3	MULTAX (= 2)
4	Off On

Record Type 14000: Termination

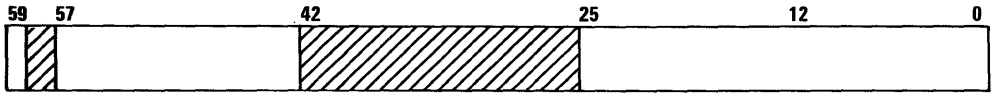
Word	Description
1	Record sequence number
2	14000, FINI

Physical Structure

APT III

The APT III CL file can be a single record or a multiple record file. For a multiple record file, an end-of-record (EOR) is put at the end of each statement.

Word	Description
1	APT III CL file characteristics:

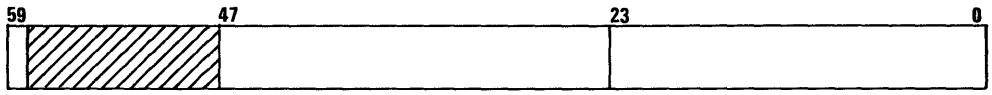


Bit	Description
0-12	Number of words in this record (including this word)
13-25	Number of words in the previous record
26-42	Unused
43-57	Record number for this record
58	Unused
59	APT logical end-of-file bit

2	Major word class
3	Major word subclass
4	Unused

APT IV

Word	Description
1	APT IV CL file characteristics:

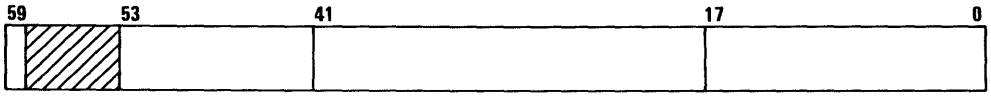


Bit	Description
0-23	Number of words in this record (excluding this word)
24-47	Number of words in the last record (including this word)
48-58	Reserved
59	Parity bit (maintain odd parity)

2	Number of words that follow in this record
3	Record number for this record
4	Major word class
5	Unused
6	Unused

In addition, 1_8, 1000_8, 2000_8,.... words are block headers supplied by the record manager.

Block control word format for I type blocks:



Bit	Description
0-17	000 0018 Word Offset
18-41	Current record number
42-53	Block ordinal
54-58	Reserved
59	Parity bit

IBM - 360 CLFILE Format

The IBM-360 CL file format contains blocks of maximum size 2980 bytes.

Bytes	Description	
1-2	Number of bytes in the block	
3-4	Zero	
1-2	Number of bytes in this record (24)	
3-4	Zero	
5-8	Record number	First record in the first block
9-16	C1D7E3C4 C1E3C102 (APTDATA)02	
17-24	Zero	
1-2	Number of bytes in this record (32)	
3-4	Zero	
5-8	Record number	
9-10	Zero	
11-12	03E8 (1000_{10})	Second record in the first block
13-15	Zero	
16	01	
17-24	Zero	
25-32	C9C3C5D4 40C4C4D5 (ICEM DDN)	
1-2	Number of bytes in this record	
3-4	Zero	
5-8	Record number	Third and subsequent records
9-16	Integer class	
•		
•		
•		
1-2	Number of bytes in this record (24)	
3-4	Zero	
5-8	Sequence number	Last record in the final block
9-12	C1D7E3C5 (APTE)	
13-16	C6C9D3C5 (FILE)	
17-22	404040404040	
23-24	Zero	

APT/AC CLFILE Format

The APT/AC CL file format contains blocks of maximum size 3228 bytes.

Bytes	Description	
1-2	Number of bytes in the block	
3-4	Zero	
1-2	Number of bytes in this record (24)	
3-4	Zero	First record in the first block
5-8	Sequence number	
9-16	D561C3C4 C1E3C140 (N/CDATA)02	
17-24	Zero	
1-2	Number of bytes in this record (32)	
3-4	Zero	
5-8	Sequence number	
9-10	Zero	
11-12	03E8 (1000_{10})	Second record in the first block
13-15	Zero	
16	01	
17-24	Zero	
25-32	C9C3C5D4 40C4C4D5 (ICEM DDN)(CD20)	
1-2	Number of bytes in this record	
3-4	Zero	
5-8	Sequence number	Third and subsequent records
9-16	Integer class	
•		
•		
•		
1-2	Number of bytes in this record (24)	
3-4	Zero	
5-8	Sequence number	Last record in the final block
9-12	C5D5C4D6 (ENDO)	
13-16	C6C9D3C5 (FILE)	
17-22	404040404040	
23-24	Zero	

In APT-360 and APT/AC all floating point numbers are double precision (64 bits). Integers are stored right-justified in 64-bit words. All alphanumeric literals are left-justified in the first 6 bytes with blanks in the right two bytes.

Each block is stored in a NOS type record. The IBM formatted bytes are stored sequentially in the CDC word file, with word boundaries ignored.

1.3 ICEM DDN TAPE3 Format

The file TAPE3 includes part storage, pattern storage (pre-version 1.6), User Technology File (UTF) storage, and working part storage (in that order).

For a TAPE3 file initialized by an ICEM DDN version with a number less than 1.4, the scratch areas 1 through 4 and the Neutral Display File (NDF) follow the working part storage.

For a TAPE3 file initialized by an ICEM DDN version number equal to or greater than 1.4, the scratch areas are stored in files TAP31 and TAP32.

For a TAPE3 file initialized by an ICEM DDN version number equal to or greater than 1.6, patterns are stored in pattern library files. They are no longer stored on TAPE3.

Sector Zero

The following describes the data format for sector zero.

Word	Description
1	Date (the year is 7 bits, the month is 4 bits, and the day is 5 bits)
2	Sequence number
•	
•	
•	
42	Coreload zero GOTO switch (initially set to one)
43–50	Mask to check if file is initialized equal to 13, 3, 19, 0, 9, 14, and 3
51	Number of sectors in file
52	Number of sectors for part storage
53	Number of sectors for pattern storage
54	Number of sectors for User Technology File storage
55	Number of sectors for working part (PAGE) storage
56	Number of sectors for scratch area #1
57	Number of sectors for scratch area #2
58	Number of sectors for scratch area #3
59	Number of sectors for scratch area #4
60	Reserved for future system use
61	Save area for IMODE(15)
62	Save area for IMODE(16) and IMODE(18)
63	Save area for terminal type
64	Save area for IMODE(6)
65	Swap flag:

0 Normal entry to ICEM DDN
ABS Overlay number to load and execute upon reentry
< 0 ICEM DDN suspended, load and execute overlay number upon reentry
> 0 ICEM DDN suspended, repaint then load and execute given overlay number

Word	Description
66	Unused
67	Unused
68	Unused
69	Unused
70	Unused
71	Unused
72	Reserved for saving ISMOD(20)

Disk Part Storage

Parts are filed starting at sector MADD(5) and proceeding positively. The part index starts at sector MADD(5)+MADD(6)-1 and proceeds negatively. The part index, which is the CYBER PRU address, can be obtained by multiplying word 52 of sector zero by 2 and adding 1.

First Sector of Part Index

Word	Description
1	Subscript of next available word in this sector
2	Subscript of part entries in this sector = 7
3	Part index sector sequence number (starts at 1)
4	Next sector for part storage relative to MADD(5) (starts at 0)
5	Number of words per part index entry = 15
6	Number of part index sectors
7	Start of part entry number 1

Subsequent Sectors

Word	Description
1	Subscript of next available word in this sector
2	Subscript of part entries in this sector = 4
3	Part index sector sequence number

Part Entry Format

Word	Description
1-7	70-character part name
8	Sheet number
9	Security status
10	Date (left to right: year - 7 bits, month - 4 bits, day - 5 bits)
11	File number
12	Relative DLOC of the beginning of the part
13	Number of total sectors in the part
14	Check sum of resident COMMON data
15	Check sum of pages (i.e., TAB1...TAB5 data)

Disk Pattern Storage

Beginning with ICEM DDN V1.6, patterns are no longer stored on file TAPE3. Refer to the Pattern Library File section for a description of pattern libraries. This change makes the Disk Pattern Storage section obsolete.

Disk User Technology File

Word	Description
1	Number of items (initially 0)
2	Next available word (initially 4)
3	Number of words per name (8)

Each Item Format:

Word	Description
i	Type: 1 Tool Cycle 2 Character Set 3 Variable List 4 GRAPL Source 5 Graph Template 6 Level Table 7 GRAPL Object 8 Forms 9 User Text Statements 10 MACRO Sequence 11 Pen Number Table 12 Template 13 Post Processor Words 14 Post Processor Codes
i+1 . . . i+8	Name of the item
i+9	Integer Count (c)
i+10	Real Count (d)
i+11 . . . i+c+10	Integer list
i+c+11 . . . i+c+d+10	Real List

Release Independent Part File (IPARTD Format)

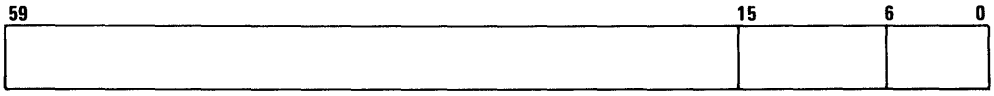
The ICEM DDN input or output release independent part file is named IPARTD.

1. No header

2. Part information record (repeated for each part)

2.1 Part identification

Word	Description
1	Number of words in part identification = 11
2-8	Part name
9	Sheet number
10	Metric - English flag:

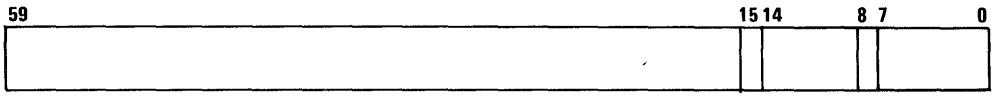


Bit	Description
0-6	Units (Metric/English/Feet-Inches)
6-15	Format View Number (0 if none)

11 Drafting standard flag:

0	1973 ANSI
1	DIN
2	FRENCH
3	BRITISH
4	SWEDISH
5	JIS (Japanese)
6	1982 ANSI
16	1973 ANSI (mixed)
22	1982 ANSI (mixed)

12 Release and revision numbers:



Bit	Description
0-7	System revision number
8	System release number
9-14	Drafting revision number
15	Drafting release number

2.2 TAB4 data

Word	Description
1	Number of TAB4 words
2-13	TAB4 for view 1
14-25	TAB4 for view 2
12(n-1)+2...	TAB4 for view n
12n+1	

This only includes the transformation matrix and translation vector for each view defined in the part.

2.3 Entity information (repeated for each entity)

2.3.1 TAB1 data

Word	Description
1	Number of TAB1 words, n
2...(n+1)	TAB1 data for this entity

TAB1 Data Format:

Byte	Value
1	EC(1)
2	EC(2)
3	EC(5)
4	
5	EC(6)
6	
7	EC(7)
8	
9	EC(9)
10	EC(10)
11	EC(11)
12	
13	
14	EC(12)
15	EC(13)
16	EC(14)
17	EC(17)
18	EC(19)
19	EC(20)
20	EC(21)
21	EC(30)
22	
23	EC(31)
24	EC(33)
25	EC(35)
26	EC(24)
27	EC(28)

2.3.2 TAB2 data

Word	Description
1	Number of TAB2 words, n
2...(n+1)	TAB2 data for this entity

2.3.3 TAB3 data

Word	Description
1	Number of TAB3 words, n
2...(n+1)	TAB3 data for this entity

2.3.4 TAB5 data

Word	Description
1	Number of TAB5 words (always = 1)
2	Entity name (= 0 if not named)

End of record for each part.

3. Directory

Word	Description
1	Directory identifier 770000160000000000000B
2	IPARTD
3-15	Zero
16	Lowest 4 bytes contains the number of directory entries after this word, highest byte = 7
17	Directory
18	Next available PRU
19-200	The remaining words of the directory consist of two-word entries for each part in the same order as the part record in the file

Directory Entry Format:

Bytes	Description
1-13	First 13 characters of the part name
14-15	Sheet number
16-20	PRU location of part record

Global Part File

1. No header

2. Part information record

2.1 Part identification

Word	Description
1-7	Part name
8	Sheet number
9	Security status
10	Date (left to right: year - 7 bits, month - 4 bits, day - 5 bits)
11	File number
12	Relative disk location of the beginning of the part
13	Number of total sectors in the part
14	Check sum of resident common data
15	Check sum of TAB1-TAB5 data

2.2 Common data

2.3 TAB1 through TAB5 data

End of record for each part.

3. Directory

Word	Description
1	Directory identifier 770000160000000000000B
2	GPARTS left-justified
3	Zero
4	0 for pre-version 1.4, 140B for post-version 1.4 format
5-15	Zero
16	Number of words following
17	DIRECTORY
18	PRU of start of the directory

Pre-Version 1.4 Format

Word	Description
19-200	The remaining words of the directory consist of two-word entries for each part in the same order as the part information

Directory Entry Format:

Bytes	Description
1-13	First 13 characters of the part name
14-15	Sheet number
16-20	PRU location of part information (PRU count starts at 1)

Post-Version 1.4 Format

Word	Description
19-818	The remaining 800 words of the directory consist of 8-word entries for each part

Directory Entry Format:

Bytes	Description
1-70	Part name
71-75	PRU location of part information (PRU count starts at 1)
76-80	Sheet number

Pattern Library File (Implemented for V1.6)

NOTE

Prior to ICEM DDN Version 1.6, patterns were stored in two different places. Local patterns were stored on the TAPE3 file; global patterns were stored on a separate global pattern file.

Beginning with ICEM DDN Version 1.6, all patterns will be stored in pattern library files. This change makes both local and global patterns obsolete.

The structure of a pattern library file consists of three main parts: a HEADER for the library, individual patterns stored sequentially, and a directory for the library. Pattern libraries can contain up to 2048 individual patterns. Individual patterns can contain up to 2048 entities.

```
HEADER FOR PATTERN LIBRARY
INDIVIDUAL PATTERN FORMAT
    Pattern A
    Pattern B
    Pattern C
    Pattern D
        .
        .
        .
    Pattern X
    Pattern Y
    Pattern Z
DIRECTORY FOR PATTERN LIBRARY
```

Header for Pattern Library

This section describes the format of the pattern library.

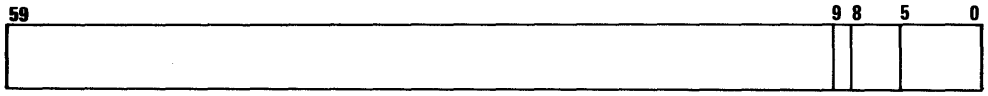
Word	Description
1	Pattern library identification code number (21845)
2	Number of patterns in this pattern library (NP)
3	Word number where pattern library directory begins
4	Word number where the next pattern entry can be added to the pattern library directory
5	System release/revision level for all patterns in library: -1 If not uniform for all patterns in this library (= rel/rev if all patterns have same rel/rev level)
6	Drafting release/revision level for all patterns in library: -1 If not uniform for all patterns in this library (= rel/rev if all patterns have same rel/rev level) (ANSI 82 does not use this - rel/rev is 0)
7	Number of words in pattern library directory header (SYWPLH = 14 on 170 systems)
8	Number of characters allocated for each pattern name in pattern library directory (abbreviated pattern name); (SYCPND = 10 on 170 systems)
9	Number of words required for individual pattern header (SYWPH = 16 on 170 systems)
10	Number of words in individual pattern header allocated to pattern name (SYWPNH = 7 on 170 systems)
11	Maximum number of characters allowed for pattern name (SYCPNH = 64 on 170 systems)
12	Number of words in individual pattern needed per TAB4 view entry (SYWPT4 = 9 on 170 systems)
13	Number of words in individual pattern needed per TAB1 entity entry (SYWPT1 = 4 on 170 systems)
14	Number of characters in individual pattern needed per TAB5 entity name entry (SYENL = 10 on the CYBER 170)

Individual Pattern Format

Each pattern contains information for the pattern header, views, entity location, entity names and entity data. The abbreviation DIR(n) below refers to the nth word in the pattern library header (refer to the previous section).

A. Header information
B. View information (TAB4 data)
C. Entity location within pattern (reference table for pseudo-pointers)
D. Entity name information (TAB5 data)
E. Entity data (TAB1, TAB2, and TAB3 data for each entity)

Header Information

Word	Description
1	Pattern name, left justified and blank filled. The number of words (i) required for the pattern name is specified by DIR(10) in the pattern library directory (i = 7 on the CYBER 170). The maximum number of characters allowed in pattern name is specified by DIR(11) in the pattern library directory.
i+1	Date pattern was created
i+2	Time pattern was created
i+3	Number of entities in pattern (NE)
i+4	Size of pattern (number of words = NW)
i+5	

Bit	Description
0-5	Drafting standard: 0 ANSI 1973 1 DIN 2 French 3 British 4 Swedish 5 JIS (Japanese) 6 1982 ANSI
6-8	Unit of measure: 1 Metric 2 English 3 Feet/inches
9	Mixed ANSI drafting standard: 0 Not mixed 1 Mixed (both ANSI 73 and ANSI 82)

i+6	System release/revision level for this pattern
i+7	Drafting release/revision level for this pattern
i+8	Number of views in this pattern (NV) (includes pattern view of definition, and (NV-1) entity support views)
i+9	Number of named entities in this pattern (NN)

View Information (TAB4 Data)

This section begins immediately after the pattern header. View information for the pattern's view of definition is stored first (all patterns have this entry). Any other views which are needed to support pattern entities follow after the pattern view of definition. The location of view information from the beginning of the pattern is determined by j = DIR(7), and its size is ST4 = NV * VS, where NV = word (i+8) above and VS = DIR(12).

Word	Description
j+1...j+VS	View info for pattern view of definition (9 element rotation matrix)
j+1+VS...j+2*VS	First view needed to support entities (9 element rotation matrix)
j+1+2*VS...j+3*VS	Second view needed to support entities (9 element rotation matrix)
.	
.	
.	
j+1+n*VS...j+(n+1)*VS	Nth view needed to support entities (9 element rotation matrix)
.	
.	
.	
j+1+(NV-1)*VS...j+NV*VS	Last view needed to support entities (9 element rotation matrix)

Entity Location within Pattern

This section begins immediately after the view information for the pattern. It is a table, in which the ith entry is the starting location of TAB1-TAB3 data for the ith entity in the pattern. Its address from the beginning of the pattern is determined by k = DIR(7) + NV*DIR(12), and its size is ST1 = NE, where NE = word (i+3) above.

Word	Description
k+1	Address of TAB1-3 data for first pattern entity
k+2	Address of TAB1-3 data for second pattern entity
.	
.	
.	
k+n	Address of TAB1-3 data for nth pattern entity
.	
.	
.	
k+NE	Address of TAB1-3 data for last pattern entity

Entity Name Information

This section begins immediately after the entity address information for the pattern. It is a table, containing the names of all entities in the pattern that have names. Each named entity has a pointer to the location in this table where its name is stored. The table's address from the beginning of the pattern is determined by m = DIR(7) + NV*DIR(12) + NE, and its size is ST5 = DIR(14) * NN, where NN = word (i+9) above.

Word	Description
m+1	Entity name of first named entity
m+2	Entity name of second named entity
•	
•	
•	
m+n	Entity name of nth named entity
•	
•	
•	
m+NN	Entity name of last named entity

Entity Data (TAB1, TAB2, and TAB3 Data)

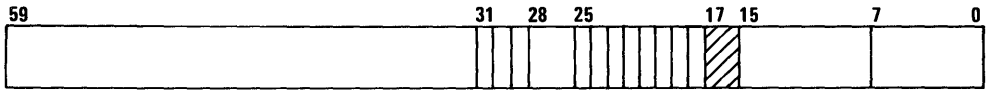
This section begins immediately after the entity name information for the pattern. It consists of TAB1, TAB2 and TAB3 data (in that order) for each entity in the pattern. Its address is determined by n = DIR(7) + NV*DIR(12) + NE + NN*DIR(14), and its size is variable (see word (i+4) above).

TAB1 Information

Each entry is bit-packed into n words (specified by DIR(13)) which closely resembles part TAB1 data.

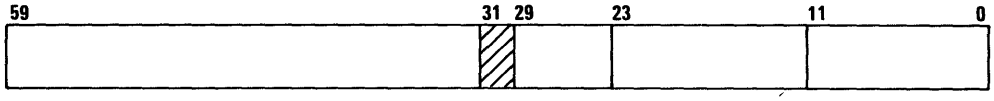
Word Description

n+1



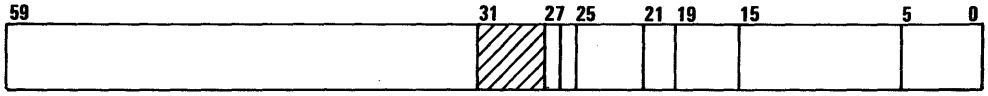
Bit	Description
0-7	Entity type
8-15	Entity subtype
16-17	Unused
18	Blanked (= 1)
19	Cannot be deleted (= 1)
20	Associative (= 1)
21	Display in view of definition only (= 1)
22	Dormant (= 1)
23	If line is clipped line, or dimension is true or key-in dimension (= 1)
24	Named (= 1)
25	Dimension type: 0 Normal 1 Basic
26-28	Display mode: 0 Solid 1 Dashed 2 Phantom 3 Centerline
29	Alternate character set used for drafting entities (= 1)
30	Format view entity (= 1)
31	Selective view blanking (= 1)

n+2



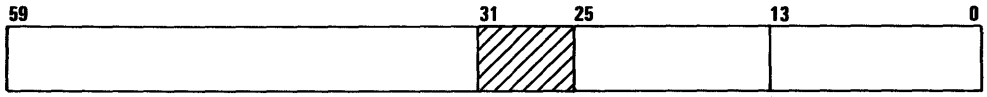
Bit	Description
0-11	Number of TAB2 words
12-23	Number of TAB3 words
24-29	Group membership counter
30-31	Unused

n+3



Bit	Description
0-5	Attribute counter
6-15	Level
16-19	Pen number
20-21	Unassigned
22-25	Color number
26	Unassigned
27	Composite curve membership flag
28-31	Unused

n+4



Bit	Description
0-13	Position of entity name in table (if named)
14-25	View of definition in table
26-31	Unused

TAB2 Information

The number of words is NT2 = IAND(TAB1(n+2),O"7777").

Word	Description
n+5 • • • n+4+NT2	TAB2 data is entity specific. Refer to the TAB2 description of entity type in chapter 3.

TAB3 Information

The number of words is (NT3 = IAND(ISHFTR(TAB1(n+2),12),O"7777").

Word	Description
n+5+NT2 • • • n+4+NT2+NT3	TAB3 data is entity specific. Refer to TAB3 description of entity type in chapter 3.

Directory for Pattern Library

The pattern library directory consists of a two-part entry for each pattern on the library. The first part is an 'n' word abbreviation of the pattern name (the number of characters is given by DIR(8)). The second part is the word address where the pattern begins on this pattern library.

Word	Description
i+1	Name (partial) of pattern 1, left justified, blank filled
i+1 + n	Word address where pattern 1 begins
i+2 + n	Name (partial) of pattern 2, left justified, blank filled
i+2 + 2*n	Word address where pattern 2 begins
i+3 + 2*n	Name (partial) of pattern 2, left justified, blank filled
i+3 + 3*n	Word address where pattern 2 begins
.	
.	
.	
i+k + (k-1)*n	Name (partial) of pattern k, left justified, blank filled
i+k + k*n	Word address where pattern k begins
.	
.	
.	
i+NP + (NP-1)*n	Name (partial) of (last) pattern NP (left justified, blank filled), where NP = DIR(2)
i+NP + NP*n	Word address where pattern NP (the last pattern) begins

Table 1-1 shows the ICEM DDN internal drafting character code. Table 1-2 describes the ICEM DDN entity selection masks.

Table 1-1. ICEM DDN Internal Drafting Character Code

ICEM DDN DISPLAY Symbol & Name	TAB2 DATA (octal)	ICEM DDN DISPLAY Symbol & Name	TAB2 DATA (octal)	ICEM DDN DISPLAY Symbol & Name	TAB2 DATA (octal)
: Colon	00	$	53	v	6126
A	01	=	54	w	6127
B	02	Space	55	x	6130
C	03	, Comma	56	y	6131
D	04	. Period	57	z	6132
E	05	# Number Sign	60	unused	6133
F	06	Prefix Character	61	unused	6134
G	07	Reserved	62	unused	6135
H	10	% Percent	63	unused	6136
I	11	" Quote	64	[L. Bracket	6137
J	12	° Degree	65	] R. Bracket	6140
K	13	! Exclamation Point	66	Ø Diameter	6141
L	14	& Ampersand	67	↧ Depth	6142
M	15	' Single Quote	70	□ Square	6143
N	16	? Question Mark	71	_ Underline	6144
O	17	< Left Arrow	72	@	6145
P	20	> Right Arrow	73	— Straightness	6146
Q	21	± Plus-minus	74	▱ Flatness	6147
R	22	\ Reverse Slant	75	○ Circularity	6150
S	23	End of Line	76	⌭ Cylindricity	6151
T	24	; Semicolon	77	⌒ Profile of a Line	6152
U	25	unused	6100	⌓ Profile of a Surface	6153
V	26	a	6101	∠ Angularity	6154
W	27	b	6102	⊥ Perpendicularity	6155
X	30	c	6103	// Parallelism	6156
Y	31	d	6104	⌖ Position	6157
Z	32	e	6105	◎ Concentricity	6160
0	33	f	6106	{ Left Brace	6161
1	34	g	6107	} Right Brace	6162
2	35	h	6110	⌯ Symmetry	6163
3	36	i	6111	↗ Circular Runout	6164
4	37	j	6112	⌰ Total Runout	6165
5	40	k	6113	Ⓜ MMC	6166
6	41	l	6114	Ⓢ RFS	6167
7	42	m	6115	Ⓛ LMC	6170
8	43	n	6116	Ⓟ PROJ TOL ZONE	6171
9	44	o	6117	⌴ Counterbore	6172
+	45	p	6120	⌵ Countersink	6173
-	46	q	6121	` Accent Grave	6174
*	47	r	6122	| Vertical Line	6175
/	50	s	6123	~ Tilde	6176
(	51	t	6124		
)	52	u	6125		

Table 1-2. ICEM DDN Entity Selection Masks

Octal Value Stored in GC Array	Entity Type					
1	0	16	32	48	64	80
2	1	17	33	49	65	81
4	2	18	34	50	66	82
10	3	19	35	51	67	83
20	4	20	36	52	68	84
40	5	21	37	53	69	85
100	6	22	38	54	70	86
200	7	23	39	55	71	87
400	8	24	40	56	72	88
1 000	9	25	41	57	73	89
2 000	10	26	42	58	74	90
4 000	11	27	43	59	75	91
10 000	12	28	44	60	76	92
20 000	13	29	45	61	77	93
40 000	14	30	46	62	78	94
100 000	15	31	47	63	79	95
Position in GC Array	GC(3)	GC(4)	GC(5)	GC(6)	GC(7)	GC(8)

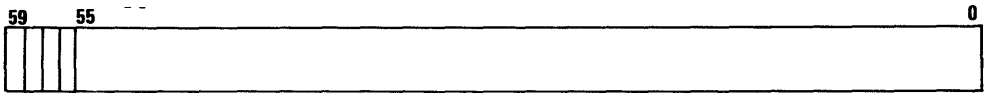
Example:

1-5, 15	18	32-38, 40
2		1
4		2
10		4
20		10
40		20
+100 000		40
GC(3)=100 076B	GC(4)= 4B	100
		+400
		GC(5)= 577B

Tablet File (TFILE Format)

Page Record Format

Word	Description
1	Page name in display code, left-justified and zero filled
2	Tablet square, row 1, column 1



Bit	Description
0-55	Text strings are stored in ASCII 7 bit characters. The first byte is the character count for long strings. MSTRING names are stored in display code, 7 characters, blank filled.
56	Set if MSTRING name
57	Set if the string preceded by control F
58	Set if first word of long string
59	Set if continuation word in long string

3	Tablet square, row 2, column 1
•	
•	
•	
11	Tablet square, row 10, column 1
12	Tablet square, row 1, column 2
•	
•	
•	
201	Tablet square, row 10, column 20

Each page record is separated by an end of record.

Directory

This directory is at the end of the TFILE after all of the page records.

Word	Description
1	Directory identifier (7700001600000000000B)
2	Name, left-justified, zero filled
3-15	Zero

16	Byte	Description
	0-4	Number of words in directory after this one
	5	7

17-EOR	Two word entries for each page record in their order of occurrence; the last entry is for the directory

1	Page name
2	Sector where page begins

Data Pool

The data pool can provide local storage of data sets during construction operations. The data pool is a large integer array that can be divided into as many as 5 separate regions. Currently, the surface-surface intersection algorithm, 15.2.3, uses the data pool for store the two surface entities. Routines are available to evaluate the curves or surfaces stored in the data pool.

Data Pool Entity Types

Tables 1-3 and 1-4 provide a cross-reference between the entity type and form numbers used in the standard ICEM DDN product and in the data pooling code.

Table 1-3. Data Pool Information for Curves

Entity	Standard Type	ICEM DDN Form	Data Type	Pool Form
Composite	6	0	1	0
Line	2	1-19	2	0
Conics				
Arc	3	1-11	3	1
Ellipse	4	1,2		2
Parabola	4	3		3
Hyperbola	4	4		4
Point Set				
Planar	8	1-2	4	1
Spatial	10	1-6		2
Bezier	31	1-5	5	0
Cubic Spline				
W-F 2-D	5	1,2,3,10	6	1
C2 3-D	9	11-20		2
C1 3-D	not yet available			3

Table 1-4. Data Pool Information for Surfaces

Entity	Standard Type	ICEM DDN Form	Data Type	Pool Form
Composite				
Edge Connect	29	1	21	1
Infinite Plane	18	1-8	22	0
Bilinear Patch				
Triangular			23	0
Planar			24	0
Spatial			25	0
Sphere	19	1-2	26	0
Cylinder	19	11-15	27	0
Cone	19	31-33	28	0
Torus	19	21-22	29	0
Revolution	19	0	30	0
Tabulated Cylinder	20	0	31	0
Ruled Surface				
Ruled	21	1	32	1
Developable	21	2		2
Curve Mesh				
Bicubic	22	1	33	1
Bilinear	22	2		2
Fillet				
Constant radius	23	0	34	1
Variable radius				2
Bezier	26	1-7	35	0
Curve Driven				
Implicit arc	30	1	36	1
General	30	2		2

General Description of Entity Data

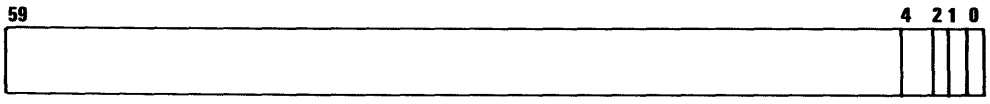
The representation of entities in data pooling vary from the standard representations. The BIT PACKED DATA, INTEGER DATA, and REAL DATA are derived from TAB1, TAB2, and TAB3 data, respectively. The entities are all originally stored in the same work space (see ISMOD(47)). Tables 1-5 through 1-10 show the general formats for curves and surfaces. Each entity representation contains the following data plus entity specific information.

Table 1-5. General Curve Format for Bit Packed Data

Word	Description
1	CTYPE:

Byte	Description
0	Curve type
1	Curve form

2 BITPCK:



Bit	Description
0	Reverse curve tangent: 1 Reverse
1	Offset curve: 1 Offset
2	Closed curve flag: 1 Closed
3-4	Curve space description: 0 Curve is a point 1 Curve is linear 2 Curve is planar 3 Curve is spatial

3 NUMINT (number of integers)
4 NUMREL (number of reals)

Table 1-6. General Curve Format for Integer Data

Word	Description	
i	NPLA	Number of points in approximation of curve†
i+2	IPLA	DP pointer to approximation of curve†
•		•
•		•
•		•
		Remaining curve dependent data

Table 1-7. General Curve Format for Real Data

Word	Description	
j	TO	Initial parameter
j+1	DT	Delta parameter
j+2	OD	Offset distance
j+3	CRT	Curve refinement tolerance for approximation†
j+4	UNV	Unit normal vector to plane of curve (I,J,K)
j+7	PPT	Point on plane of curve (X,Y,Z)
•		•
•		•
•		•
		Remaining curve dependent data

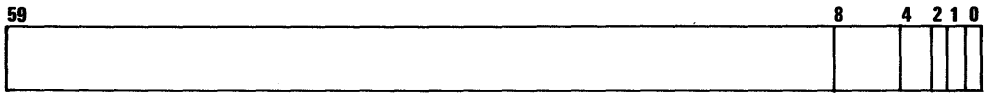
†Not currently used

Table 1-8. General Surface Format for Bit Packed Data

Word	Description
1	STYPE:

Byte	Description
0	Surface type
1	Surface form

2 BITPCK:



Bit	Description
0	Reverse surface normal flag: 1 If normal must be reversed
1	Offset curve: 1 If point must be offset
2	Planar surface flag: 1 Surface is planar
3-4	Surface closure description: 0 Open 1 Closed along edges 1 and 3 2 Closed along edges 2 and 4 3 Closed along edges 1/3 and 2/4
	Degenerate edge mask:
5	Edge 1 is a point (= 1)
6	Edge 2 is a point (= 1)
7	Edge 3 is a point (= 1)
8	Edge 4 is a point (= 1)

3 NUMINT (number of integers)
4 NUMREL (number of reals)

Table 1-9. General Surface Format for Integer Data

Word	Description	
i	NBPP	Number of points in approximation of surface†
i+2	IBPP	DP pointer to approximation of surface†
.		.
.		.
.		.
	Remaining surface dependent data	

Table 1-10. General Surface Format for Real Data

Word	Description	
j	UMIN	U minimum parameter
j+1	VMIN	V minimum parameter
j+2	UMAX	U maximum parameter
j+3	VMAX	V maximum parameter
j+4	OD	Offset distance
j+5	SRT	Surface refinement tolerance for approximation†
j+6	DIAG	Diagonal of the bounding box
j+7	CORN1	Corner of the bounding box (X,Y,Z)
j+10	CORN2	Corner of the opposite bounding box corner (X,Y,Z)
j+13	UA3	Unit normal vector to plane of surface (I,J,K)
j+16	PTO	Point on plane of surface (X,Y,Z)
.		.
.		.
.		.
	Remaining surface dependent data	

†Not currently used

Common Arrays 2

Common Arrays 2

This section describes the ICEM DDN common block named COMMON. The block is made up of variables and arrays that are stored with each part. Each array has a general purpose. The arrays and variables can be grouped by general purpose as follows:

- Paged data. Arrays for which data is read or written directly to TAPE3. These arrays include TAB1, TAB2, TAB3, TAB4, and TAB5.
- Graphics data. Arrays or variables used for menu output or user input response. This includes GC, GI, GR, GSW, MMP.
- Modal and configuration data. Arrays used to store modals, part constants, or system constants. These include ENTSEL, GCA, IMODE, ISMOD, IXMODE, MATH, RMODE, and RSMOD.
- Display data. Arrays used to store viewing variables. These include VSW, MVIEW, RVIEW, ZOOM, IVIEW.
- Temporary storage data. Arrays used to store data only while a function is in progress, without consideration of the previous values. These include DBUF, TEMR, STAB1, STAB2.
- Evaluation data. Arrays used to transfer data or an evaluated entity. These include EC, ECURV, ESURF.
- Disk access data. Arrays used to control disk access. These include MADD, PAGE.
- Color data. Arrays used to hold the graphics and display color tables, level and pen color numbers, color model, color spectrum flag, and temporary color. These include COLDIA, COLMOD, COLSPE, LEVCOL, PENCOL, AND TMPCOL.

2.1 Common Declarations

```
INTEGER COLMOD,COLSPE,DBUF(256),EC(35),ENTSEL(128),GC(49)
INTEGER GCA(30),GI(26),GOSW(20),GSW,IMODE(128),ISMOD(58)
INTEGER IVIEW(256),IXMODE(128),LEVCOL(69),LMNO,MADD(20),MMP(48)
INTEGER MVIEW(64),PAGE(512),PENCOL(2),PRTNA(8),STAB1(256)
INTEGER TAB1(1024),TAB2(512),TAB5(128),TMPCOL,VSW(12)

REAL        COLDIA(3,2),COLGRA(3,16),DEPTH,ECURV(7),ESURF(14)
REAL        GR(10),MATH(16),RMODE(128),RSMOD(58),RVIEW(64)
REAL        STAB2(64),TAB3(1024),TAB4(256),TEMR(256),ZOOM(34)

COMMON  /COMMON/TAB1,TAB2,TAB3,TAB4,TAB5,DBUF,EC,GCA,IMODE,RMODE
COMMON  /COMMON/DEPTH,ECURV,ESURF,GC,GOSW,GI,GR,GSW,LMNO,MADD,MATH
COMMON  /COMMON/MMP,PAGE,PRTNA,ZOOM,IVIEW,IXMODE,ENTSEL,TEMR,STAB1
COMMON  /COMMON/STAB2,VSW,MVIEW,RVIEW,ISMOD,RSMOD
COMMON  /COMMON/COLDIA,COLMOD,COLSPE,COLGRA,LEVCOL,PENCOL,TMPCOL

                    WORDS TOTAL -   5760
WORDS AFTER TAB5----------------------2816


INITIALIZATION LOCATIONS

     INIT:  ICOM        Total COMMON

     INITC: INIT1(1)    Total COMMON
                (2)     COMMON after TAB5 machine words
            INIT5(2)    PAGE size
                (8)     TAB1 machine words
                (9)     TAB2 machine words
                (10)    TAB3 machine words
                (11)    TAB4 machine words
                (12)    TAB5 machine words
            INIT6(1)    TEMI size
                (2)     TEMR size
                (3)     COMMON after TAB5
```

2.2 COLDIA - Background and Text Color in HLS (Hue, Lightness, and Saturation) Format

This two-dimensional array contains values for describing background and foreground colors in the HLS format.

Word	Description
1,1	Hue for background color
2,1	Lightness for background color
3,1	Saturation for background color
1,2	Hue for text (foreground) color
2,2	Lightness for text color
3,2	Saturation for text color

2.3 COLGRA - HLS Format for 16 Graphics Colors

This two-dimensional array contains values for describing 16 colors in the HLS format.

Word	Description
1,1	Hue for color 1
2,1	Lightness for color 1
3,1	Saturation for color 1
1,2	Hue for color 2
2,2	Lightness for color 2
3,3	Saturation for color 2
.	
.	
.	
1,16	Hue for color 16
2,16	Lightness for color 16
3,16	Saturation for color 16

2.4 COLMOD - Color Model

COLMOD is a value describing the color model scheme.

Word	Description
1	Color model value 1 HLS (Hue-lightness-saturation) 2 RGB (Red-green-blue) 3 CMY (Cyan-magenta-yellow)

2.5 COLSPE - Color Spectrum Display Flag

COLSPE is a value describing whether the color spectrum display is on or off.

Word	Description
1	Color spectrum display flag 1 ON 2 OFF

2.6 DBUF - Neutral Display File (NDF) Buffer

This array is used for temporary storage of integer values during the display process.

Word	Description
1	Word subscript for next DBUF store
.	
.	NDF display data
.	

2.7 DEPTH - Depth

DEPTH is a single real value containing the current ZT value of work view.

2.8 EC - Entity Common

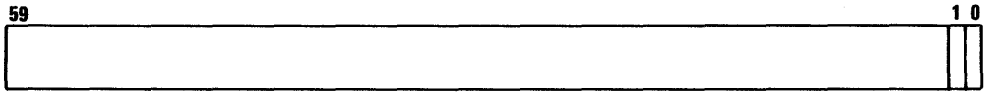
This array is used to transfer the TAB1 information of a particular entity in expanded form. Table 2-1 describes the data format for 2.8 EC - Entity Common.

Table 2-1. Data Format for 2.8 EC - Entity Common

Word	Description
1	Entity type
2	Form number
3	TAB2 subscript \ if there is no data, these words are = 0
4	TAB3 subscript /
5	TAB4 pointer to work view space when entity was defined
6	Number of TAB2 words
7	Number of TAB3 words
8	Entity on/off screen: = 0 Some part of entity on screen ≠ 0 Entity totally off screen
9	Entity blanked/not blanked: 0 Entity not blanked 1 Entity blanked 2 Entity selectively blanked 3 Entity blanked and selectively blanked
10	Entity can/cannot be deleted: = 0 Entity may be deleted ≠ 0 Entity cannot be deleted
11	Sequence number
12	View display: = 0 Display in all views ≠ 0 Display only in view of definition
13	Display font: 0 Solid display font 1 Dashed display font 2 Phantom display font 3 Centerline display font
14	Group membership count: = 0 Not a member of a group > 0 Number of groups entity is a member of

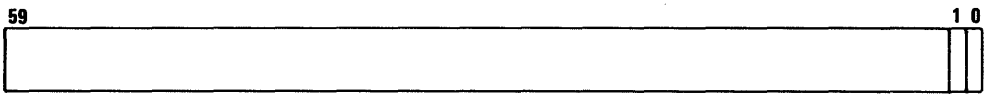
Table 2-1. Data Format for 2.8 EC - Entity Common (Continued)

Word	Description
15	Attention point U coordinate
16	Attention point V coordinate
17	Dimension



Bit	Description
0	Named dimension (= 1)
1	Basic dimension (= 1)

18 Entity selection



Bit	Description
0	Entity is marked (= 1)
1	Entity is highlighted (= 1)

19 Attribute flag:

0	No attributes
1	Attributes present

20 Normal/dormant entity:

= 0	Normal entity
≠ 0	Dormant entity

21 Line:

0	Finite line
1	Infinite line

Drafting text:

0	Automatic drafting text	types 32-36 only
1	User-modified drafting text	

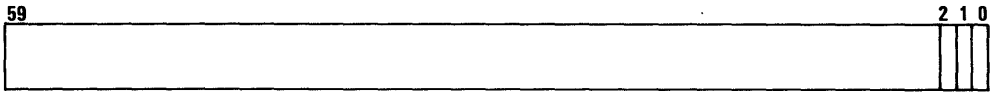
Slanted text:

0	Text not slanted	type 37 only
1	Text slanted	

Bezier polygon:

0	Do not display Bezier polygon
1	Display Bezier polygon

Table 2-1. Data Format for 2.8 EC - Entity Common (Continued)

Word	Description
22 23	First U,V plotted of current entity
24	Format view entity (= 1)
25	Current entity location with respect to the graphics cursor: 0 Current entity not closest entity to cursor 1 Current entity closer to cursor than any previous entity
26	TAB1 pointer for last entity defined or replaced
27	Next sequence number for entity definitions (set in EU11)
28	Composite curve membership status: 0 Entity is not a member of a composite curve 1 Entity is a member of a composite curve
29	Associative entity: 0 Entity being defined is associative 1 Entity being defined is not associative
30	Entity level of EC(1) entity
31	Pen number
32	Pointer to most immediate ancestor (0 if none)
33	Surface normal: 0 Leave surface normal as defined 1 Reverse surface normal } surfaces entity types 18-30 Character set: 0 Standard character set 1 Character set in TAB2 } drafting only
34	Entity display  Bit — Description 0 — 0 Entity is not currently in a segment in the LDF; 1 Entity is currently in a segment in the LDF 1 — 0 Entity should be displayed in storage; 1 Entity should be displayed in refresh 2 — Reserved for future use in 411x LDF
35	Color number from 1 to 16

2.9 ECURV - Curve Evaluation

This array is used to transfer real curve data in the view of definition.

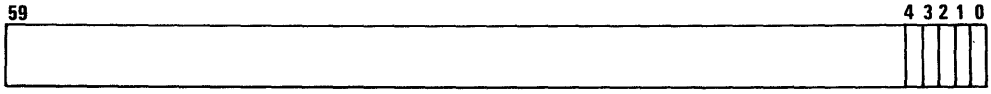
Word	Description	
1	t	Input parameter value
2	XT	Point output
3	YT	
4	ZT	
5	XT	First derivative WRT t output
6	YT	
7	ZT	

2.10 ENTSEL - Entity Selection

This array is used to facilitate entity selection. Table 2-2 describes the data format for 2.10 ENTSEL - Entity Selection.

Table 2-2. Data Format for 2.10 ENTSEL - Entity Selection

Word	Description
1	Current constraint set entity pointer and flag: = 0 No current constraint set in use < 0 Additional constraints are defined > 0 Entity pointer to current constraint set
2	Level for saving constraint sets if constraint set level mode is SPECIFY (GC(11), bits 7 and 8)
3	Bit flags indicating whether or not INCLUDES and EXCLUDES have been defined for that type of constraint



Bit	Description
0	Level
1	Pen
2	Color
3	Type
4	Font

4-67	Bits for which levels to include (1) or exclude (0)

NOTE

Bits 4-67 are packed as in GC(3)-GC(8).

68	Bits for which pens to include (1) or exclude (0)
69	Bits for which colors to include (1) or exclude (0)
70-74	Bits for which types to include (1) or exclude (0)
75	Bits for which fonts to include (1) or exclude (0)
76-80	Entity selection go switches (similiar to GOSW)
81	Number of preselected disallowed curves
82-91	Array for preselected curve entity pointers

Table 2-2. Data Format for 2.10 ENTSEL - Entity Selection (Continued)

Word	Description
	NOTE The following three variables are returned by selection and are used for looping through and returning pointers to entities which have been selected. They are completely maintained by the selection routines.
92	Number of the next selected entity pointer to return (numbers run from 1 to ENTSEL(94))
93	Selection storage location: 1 GSW 2 TEMI 3 SCRATCH 4 SELECTED ENTITIES ARE MARKED
94	Number of selected entities
95-127	Buffer used for buffering entity pointer writes to scratch
128	Temporary integer storage for entity selection

2.11 ESURF - Surface Evaluation

This array is used to transfer real surface data in model space.

Word	Description	
1	U	Input parameter values
2	V	
3	X	Point output (model space)
4	Y	
5	Z	
6	X	Unit surface normal
7	Y	
8	Z	
9	XU	First partial derivative WRT U
10	YU	
11	ZU	
12	XV	First partial derivative WRT V
13	YV	
14	ZV	

2.12 GC - Graphic Common

This array is used to facilitate entity selection and menu I/O. Table 2-3 describes the data format for 2.12 GC - Graphic Common.

Table 2-3. Data Format for 2.12 GC - Graphic Common

Word	Description
1	User response: < 0 No interrupt override 0 Operation reject 1 Operation complete 2 Tutorial requested (see IMODE(51)) 3 Other Options requested 4 CTRL-E to return to the Entity Selection menu (valid only in selection coreloads)
2	Selectable entities (bit n=1 means entity type n can be selected) 0 Entity found 1 No legal entity found
3	Type 0-15
4	Type 16-31
5	Type 32-47
6	Type 48-63
7	Type 64-79
8	Type 80-95

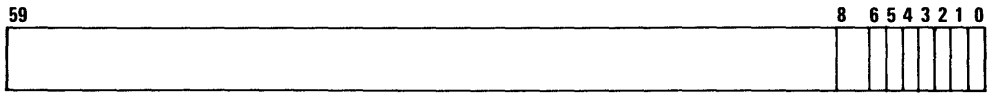
NOTE

GC (3+j) bit i means the selectable type is (16xj)+i where $0 \leq i \leq 15$.

9	U,V cursor coordinates
10	

Table 2-3. Data Format for 2.12 GC - Graphic Common (Continued)

Word	Description
11	Selection bits



Bit	Description
0	Return XT, YT position from selection: 0 Return XT, YT of last entity 1 Return XT, YT of all entities in OOBUF
1	Unused
2	Selection of dormant entities: 0 Disallow selection of dormant entities 1 Allow selection of dormant entities
3	Highlight selected entities modal: 0 Yes 1 No
4	INCLUDE/EXCLUDE construction modal: 0 Repeat INCLUDE/EXCLUDE 1 Return after one INCLUDE/EXCLUDE
5	CONSTRAINT SET DURATION modal: 0 Turn constraint off when selection is done 1 Leave constraint on after selection
6	SELECTION MODIFICATION modal: 0 Do not allow user to modify selection 1 Allow user to add/remove from the selection
7-8	Constraint set level modal: 0 Save csets on current level 1 Save csets on given level (ENTSEL(2)) 2 Prompt user for level when saving cset

12	Number of entities currently marked
13	Number of entities currently highlighted
14	Coreload to load after repaint (also used as a tutorial flag in repaint)
15 16	Function button enable (bit n=1 allows function button n)

Table 2-3. Data Format for 2.12 GC - Graphic Common (Continued)

Word	Description
17 . . . 22	Save area for GC(3...8)
23	Count of entities selected so far
24	Pointer to last entity selected
25	Pointer to last entity rejected
26	Maximum number of entities to select
27	MACRO switch: 0 None 1 Create 2 Execute
28	Primary entry switch - MACRO control coreload: 1 MACRO 2 User text
29	Secondary entry switch - MACRO control coreload
30	Current variable name save index
31 . . . 39	Variable names (or zero) for MACRO definition
40	Number of ICEMDDN sectors allocated for NDF on disk
41	NDF start disk address
42	Current page number
43	Maximum number of pages in NDF
44	Page where current entity starts
45	DBUF word subscript for current entity start
46	Last absolute U
47	Last absolute V
48	DBUF subscript to current display command (0 = new entity)
49	Entity set position: 0 Entity set position not yet generated 1 Entity set position has been generated < 1 NDF overflow

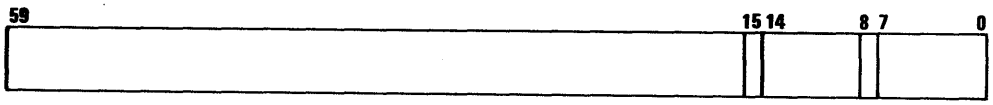
2.13 GCA - General Configuration Array

This array is used to store system integer configuration constants and system process switches. Table 2-4 describes the data format for 2.13 GCA - General Configuration Array.

Table 2-4. Data Format for 2.13 GCA - General Configuration Array

Word	Description
1	Number of words in COMMON (total)
2	Number of words in COMMON (after TAB5)
3	Break interupt: 0 Interrupt allowed 1 Break interrupt not allowed 2 Break causes ICEMDDN to terminate
4	Number of machine words per real word
5	Number of machine words per high-precision real word
6	Number of characters per word (= 10 for 60-bit machine)
7	Number of bits per character (= 6 for 60-bit machine)
8	Maximum number of allowed entities: 1 The pointer returned in GSW
9	A value less than 0 implies set attention but do not save pointers Absolute Value IABS [GCA(9)]: 1 Single only 2 Chain only 3 Single or chain 4 Single or chain or both 5 All within a region 6 All outside a region 7 User chooses mode
10	Count pointers in GSW: 0 Pointers in disk scratch 1 N Pointers in start TEMI(n)
11	Point sets: 0 Point set only if first selected 1 Point sets are not special
12	Current selected entity count

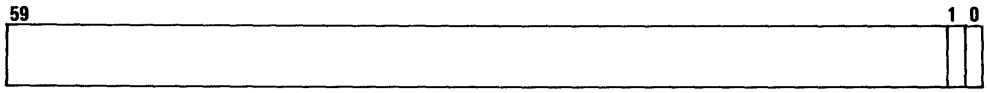
Table 2-4. Data Format for 2.13 GCA - General Configuration Array (Continued)

Word	Description
13	Groups or composite entities: = 0 Do not divide groups or composite entities < 0 Groups or composites can be separated Absolute Value |ABS [GCA(13)]: 1 Select entity 2 User enter pointer 3 User enter sequence number 4 User's choice
14	Entity selection method currently in use
15	Current color number from 1 to 16
16	Maximum number of key-in characters allowed
17	Control coreload for BATCH or GRAPHIC: = 138 GRAPL = 238 GRAPL = 201 GPL
18	Number of words in TAB4 per view
19	Pointer to simple variable list
20	Pointer to subscripted variable list
21	Pointer to literal list
22	Pointer to MACRO list } entity type 16
23	Release and revision numbers:  Bit — Description 0-7 System revision number 8 System release number 9-14 Drafting revision number 15 Drafting release number
24	Current pen number
25	Current level
26	TAB1 page store switch
27	TAB2 page store switch
28	TAB3 page store switch
29	TAB4 page store switch
30	TAB5 page store switch } do not store if = 0

2.14 GI - Graphic Procedure Common (Integer)

This array is used to save integer data while executing certain graphics procedures.

Word	Description
1 . . . 10	Integer data for graphic procedures
11	Allow character entry in IG02 (not equal to 0)
12	Entity selection:



Bit	Description
0	Allow entities to be selected more than once: 0 Yes 1 No
1	Used for the removal of entities during selection: 0 Add (allow selection of any entities) 1 Remove (allow selection of only marked entities)

13	Input to identification routines
14 15 16	GC(3) save for group identify
17 18	Unused
19 20	U V Origin of attention symbol or text string being entered

2.15 GR - Graphic Procedure Common (Real)

This array is used to transfer real data for execution of certain graphics procedures.

1
.
.
. } Real data for graphics procedures
.
10

2.16 GOSW - GOTO Control Switch

This integer array is used to control the flow of the program.

Word	Description
1	Location switch in graphics procedure
2	Pattern and view control
3	Coreload 2 entry switch
4	Menu choice
5	Menu subchoice
6	New definition; also planar element sampler GOTO switch (= 0) Replacement (not equal to 0)
7	Menu sub-subchoices; also IDENT coreload GOTO switch
8	Next coreload number
9	Auto rescale switch
10	Coreload in core
11	Coreload save for ZOOM
12	Menu choice for ZOOM, view control, and change depth
13	Menu subchoice for ZOOM, view control
14	Tutorial message number in IDENT
15	Location switch for local utility graphics
16	Location switch for utility graphics
17	Coreload number of ZOOM/DEPTH
18	NDF display coreload number
19	Core coreload #1 for current application
20	Core coreload #2 for current application

2.17 GSW - Graphic Return Switch

This integer variable transfers data from the graphics routine to the calling routine.

For IG02 calls GSW = menu choice.

For IG04 calls GSW =

1	Yes
2	No

For IG05, IG05A calls GSW = number of characters entered.

For IG10(1,1,1,1) calls GSW = pointer to selected entity.

For IG10(n,m,p,q) where n is not equal to 1, GSW = number of entities selected.

2.18 IMODE - Integer Modals

This array is used to store integer modals. Table 2-5 describes the data format for 2.18 IMODE - Integer Modals.

Table 2-5. Data Format for 2.18 IMODE - Integer Modals

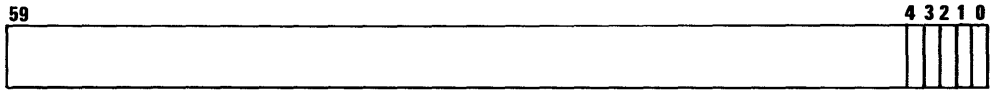
Word	Description
1	Construction modal status: 0 Construction modal off 1 Construction modal on
2	Units of measure: 1 Metric (mm) 2 English (inches) 3 English (feet/inches)
3	GRAPL/GPL: 1 GRAPL/GPL compilation and execution 2 Graphic input 3 GRAPL editor
4	Menu display:  Bit — Description 0 Display choices: 0 Do not display choices 1 Display choices 1 Intermediate heading display: 0 Do not display intermediate headings 1 Display intermediate headings 2 Display the next menu, then reset this bit to 0 3 Other Options: 0 Do not allow Other Options 1 Allow Other Options 4 CTRL-E enable bit (valid only in entity selection, returns user to the main Entity Selection menu): 0 Do not allow CTRL-E 1 Allow CTRL-E

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

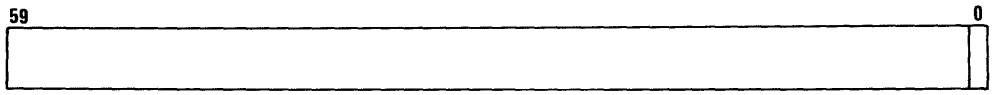
Word	Description
5	Output device: 1 CRT output 2 Plotter output
6	Line thickness:  Bit — Description 0 — Heavy line modal: 0 Heavy line modal off 1 Heavy line modal on
7	Curve font: 0 Solid 1 Dashed 2 Phantom 3 Centerline
8	New entity view display: 0 All views 1 One view only
9	Deletable status: 0 Nondeletable 1 Delete; check TAB1 for nondeletable
10	Forced repaint: 0 Forced repaint allowed 1 Forced repaint not allowed; CTRL-D is also not allowed. The screen is automatically cleared and MMP values reset if menus fill the screen and if dialog is displayed in the graphics area of the screen (Tektronix 40xx, IST III). 2 Disallow any response that exchanges coreloads and returns to the current function (e.g., Z,R,CNTL-D,D,?). If this modal is set, a repaint is not automatically executed when menus fill screen. Automatic repaint applies only to terminals which display dialog in the graphics area (Tektronix 40xx, IST III).

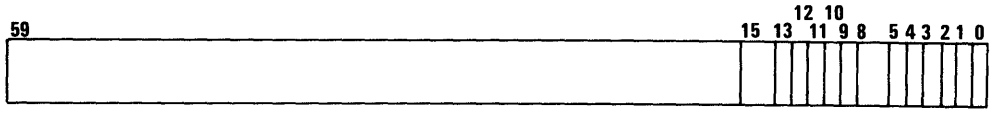
Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

Word	Description
11	Reject/operation complete: 0 Allowed 1 Not allowed
12	Display/identify: 0 Display 1 Identify
13	Display: 0 Standard display 1 Zoomed display
14	Toolpath display: 0 Nontoolpath display 1 Toolpath display
15	Refresh/interactive: 0 All terminals except Tektronix model 4014 and 4016 with refresh or interactive 1 Refresh with a Tektronix model 4014 terminal 2 Interactive with a Tektronix model 4014 terminal
16	Text input: 0 Keyboard used for text input 1 Tablet or keyboard used for text input
17	Rescale prompt suppression flag: 0 Do not display rescale prompt when entities are defined off of the screen 1 Display rescale prompt when entities are defined off of the screen
18	Graphic input: 0 CRT cursor used for graphic input 1 Tablet cursor used for graphic input 2 Large tablet (digitizer)

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

Word	Description

19 Display parameters:



Bit	Description
0	Coordinate system display: 0 Do not display coordinate system 1 Display coordinate system
1	Mapping page input record: 0 Mapping page input record = 128 1 Mapping page input record = 130
2	Mapping construction: 0 Off 1 On
3	Dimensioning: 0 Single dimensioning 1 Dual dimensioning
4	Double precision modal: 0 Off 1 On
5	Double precision allowed for current entity: 0 No 1 Yes
6-8	Dual dimension decimal places
9	Chain select: 0 Normal chain select 1 Preselect disallowed curves
10	Single select from group: 0 Single select from group not allowed 1 Single select from group allowed

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

Word	Description
19	Display parameters

Bit	Description
11	Attention indicator display: 0 Display attention points of lines at midpoint 1 Display attention points of lines at the point nearest cursor
12	Select entities: 0 Select first entity and direction 1 Select first and second entities
13	Unused
14-15	Global parts overwrite mode: 0 Prompt mode (prompt if the part exists) 1 Overwrite mode (overwrite existing part) 2 No overwrite mode (do not overwrite existing part)

Word	Description
20	Trim fillets or chamfers: 0 Auto trim fillets or chamfers 1 Selective trim fillets or chamfers 2 No trim fillets or chamfers 3 Fixed line fillets
21	Dimensioning: 1 Automatic dimensioning 2 Key-in dimensioning
22	Extension line suppression: 1 No extension line suppression 2 First extension line suppressed 3 Second extension line suppressed 4 Both first and second extension lines suppressed 5 First extension and dimension line suppressed 6 Second extension and dimension line suppressed 7 Both extension and first dimension line suppressed 8 Both extension and second dimension line suppressed

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

Word Description

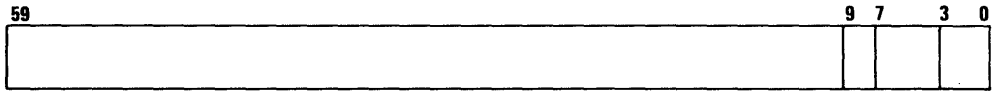
23 Arrows:

1 Automatic
2 Arrows in
3 Arrows out

24 Dimension text origin:

1 Screen position text origin
2 Key-in
3 Delta
4 Automatic (linear dimension only)
5 Screen position, parallel to line or arc
6 Key-in, parallel to line or arc
7 Delta, parallel to line or arc
8 Automatic (parallel to line or arc)

25 System modal for numeric data display:



Bit	Description
0-3	Number of places after decimal point
4-7	Fractions rounding: 0 1/64 inch rounding 1 1/32 inch rounding 2 1/16 inch rounding 3 1/8 inch rounding 4 1/4 inch rounding 5 1/2 inch rounding 6 1 inch rounding 7 1 foot rounding
8-9	Decimal/fraction: 0 Decimal 1 Fraction

26 Decimal/fraction mode:

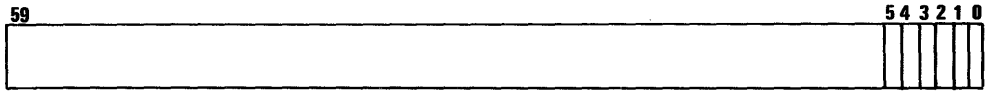
1 Decimal mode
2 Fraction mode

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

Word 27 — Sectioning materials:

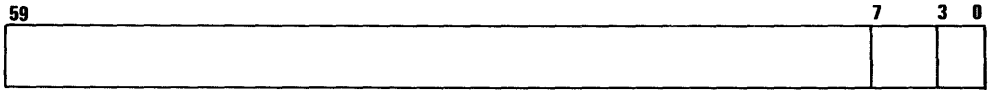
0	Iron
1	Steel
2	Bronze, brass, copper
3	Rubber, plastic
4	Refractory material
5	Marble, slate, glass
6	Zinc, lead, babbitt
7	Magnesium, aluminum, aluminum alloys

Word 28 — Normal horizontal and vertical dimension (= 0):



Bit	Description
0	Arrowhead alignment on horizontal and vertical dimension (= 1)
1	Ask for text angle (= 1)
2	Arrow-leader to middle (= 1)
3	Tutorial suppress in text input (= 1)
4	Force planar entity selection (= 1)
5	Text direction automatic (= 1)

Word 29 — Drafting modal for dimension display:



Bit	Description
0-3	Dimensioning decimal places
4-7	Fractions rounding:

0	1/64 inch rounding
1	1/32 inch rounding
2	1/16 inch rounding
3	1/8 inch rounding
4	1/4 inch rounding
5	1/2 inch rounding
6	1 inch rounding
7	1 foot rounding

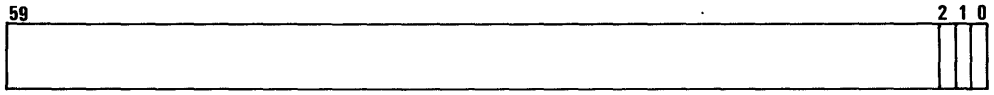
Words 30-31 — User-defined symbol set name (four characters)

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

Word Description

31-32 Character type:

ANSI standard:



Bit	Description
0	Upright/slanted (= 1)
1	Standard/user (= 1)
2	Fine/course (= 1)

Non-ANSI standard:

0	Upright standard character set
1	Slanted standard
2	Upright fast
3	Slanted fast
6	Upright, user-defined
7	Slanted, user-defined

33-34 Level table name (four characters)

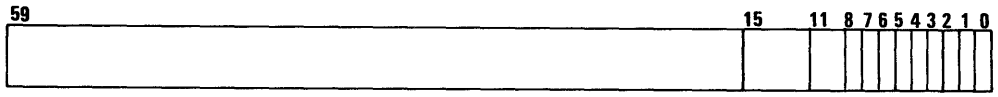
35 Part status:

0	Part in progress
7	Part released

36 Display status:

1	Vector
2	Point display status
3	Application character display status

37



Bit	Description
0	Function button interrupt enable (= 1)
1	Keyboard interrupt enable (= 1)
2	Cursor or tablet graphic interrupt enable (= 1)
3	Tablet interrupt enable (= 1)
4	ZOOM interrupt enable (= 1)
5	Change depth interrupt enable (= 1)
6	Two menu selection characters to follow (= 1)
7	Menu show enable (= 1)
8	Character entry mode (= 1)
9-11	Reserved
12-15	Reserved for allowed input response (= 1)

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

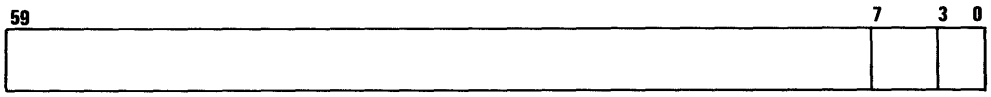
Word	Description
38	Current entity TAB4 pointer to view of definition
39	Blank/unblank switch: 0 All views 1 Selected views
40	ZCLIP switch for current view
41	ZCLIP initialization: 0 ZCLIP not initialized 1 ZCLIP initialized
42	Default selection methods:  Bit — Description 0-3 Default method for general selection (user modal): 0 Screen select 1 Set when used 2 Name 3 Sequence number 4 Pointer number 4-7 Default method for selecting entities defining a chain (user modal): 0 Screen select 1 Name 2 Sequence number 3 Pointer number 4 Set when used
43	Boundary: 1 Closed boundary 2 Open boundary 3 Noncontiguous set of curves
44	Line definition: 0 Normal definition 1 Define lines as infinite
45	Data modification: 0 Index 1 No index

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

Word	Description
46	Number of surface display paths in the U-direction (of constant V)
47	Number of surface display paths in the V-direction
48	Number of points used for each path in the U-direction
49	Number of points used for each path in the V-direction
50	Repaint/rescale: 0 Repaint suppression 1 Rescale suppression
51	System error message switch set by ERMES (also used as a tutorial switch for HELP messages): = 0 No tutorial available > 0 Tutorial message number < 0 Individual tutorial available

NOTE

At request "?" GC(1) = 2 is returned.

52	Repaint: -1 Normal repaint, and set IMODE(52) = 0 0 Normal repaint 1 Suppress repaint after erase and MMP initialization
53	Count of input points at MADD(9) for general curve offset coreload
54	Side of boundary switch
55	Analysis: 1 Simple 2 Moderate 3 Complex
56	IGO3 entry switch
57	Neutral display file: 0 Do not use neutral display file 1 Use neutral display file
58	Build neutral display file: 0 While displaying entities 1 Without displaying entities

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

Word	Description
59	N/C menu pick
60	TAB1 pointer to tool used
61	3-D toolpath coordinate space mode: = 0 Use current work space for all 3-D toolpath coordinates > 0 TAB4 pointer for space selected for all 3-D toolpath coordinates
62	Coolant: 1 On 2 None 3 Flood 4 Mist 5 Tap
63	Spindle direction: 1 Clockwise 2 Counterclockwise
64	Spindle speed
65	Tool number of the current tool
66	Tool TAB1 pointer used in tool management routines
67	Tool form number used in tool management routines
68	Number of tool test points
69	Last tool path type created
70	1 Plunge 2 xt,yt from retract height 3 xt,yt at part depth
71	1 Straight retract 2 Go to xt,yt at retract height 3 xt,yt
72	Use same parameters TEMR subscript to path start (= 1)

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

Word	Description
73	

Bit	Description
0	Rapid feed mode (= 1)
1	Command suppression mode (= 1)
2	APT or COMPACT II mode (= 1)
3	Reserved
4	Tool reference: 0 Tool reference is tip 1 Tool reference is lip
5-8	Unused
9	Set after a repaint or zoom has been done by GRU03 (= 1). Calling routines that want to check the value of this flag should initialize it before calling GRU03 and clear it after checking it.

Word	Description
74	Unused
75	Tool path type: 0 Point-to-point 1 Profile 2 Pocket 3 3-axis 4 5-axis
76	Current composite tool path pointer
77	FROM switch
78	TAB1 pointer to the N/C modals and GPG pointer entity
79	SETPT switch
80	TLAXIS switch: 0 MULTAX/off > 0 MULTAX/on 1 TLAXIS/constant 2 TLAXIS/normal part surface 3 TLAXIS/parallel drive surface (future)
81	Surface feet per minute
82 . . . 97	N/C modals

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

Word	Description
98	Current GRAPL entity name during execution GPL - number of words in data file
99	Current GRAPL entity name during execution GPL - number of words in program file
100	Current GRAPL entity name during execution GPL - number of words in external file
101	GRAPL logical record length GPL - number of words in reserved files
102	GRAPL logical sequence index
103	GRAPL
104	GRAPL GPL - program counter absolute
105	GRAPL GPL - program counter offset
106	GRAPL GPL - data counter offset
107	GRAPL GPL - statement unpack switch
108	GRAPL current simple variable table number (> 0) GPL - words used in local page buffer
109	GRAPL real number variable table number (> 0) GPL - reserved
110	GRAPL program start address on disk during write GPL - GPL error number
111	GRAPL program start address on disk during read GPL - GPL program line which caused error
112	GRAPL total word count during compilation GPL - current view pointer save area
113	GRAPL total word count during execution GPL - pointer to current entity
114	GRAPL execute after compile switch (= 1) GPL - GPL flags
115	GRAPL program name GPL - user's six-character GPL library name
116	GRAPL program name

Table 2-5. Data Format for 2.18 IMODE - Integer Modals (Continued)

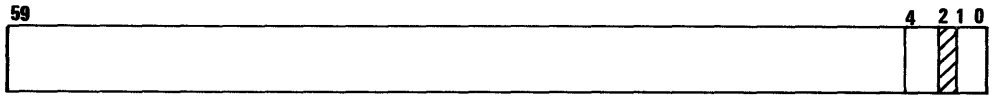
Word	Description
117	GRAPL program name GPL - reserved for release number
118	GRAPL mode display: = 1 Slow GRAPL mode display during execution ≠ 0 Fast GRAPL mode display after execution GPL - six character name of GPL subroutine
119	GRAPL program register GPL - second word of name
120	Number of words per variable name GPL - re-entry switch
121	Auto GRAPL temporary save of IMODE(4) GPL - lfn and status for I/O files
122	GRAPL - number of statements executed
123	GRAPL statement label flag
124	GRAPL - number of words per entity name
125	GRAPL major word code GPL - IMF user name
126	GRAPL subprogram nesting count GPL - IMF pfn
127	GRAPL statement flags: < 0 Continuation > 0 Remark
128	GRAPL

2.19 ISMOD - Integer System Modals

This array is used to store integer modals as IMODE and integer system constants. Table 2-x describes the data format for 2.19 ISMOD - Integer System Modals.

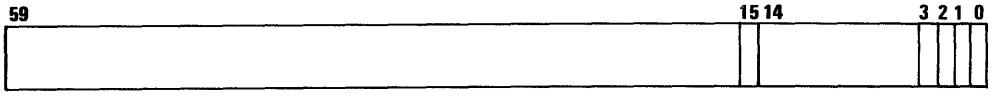
Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals

Word 1



Bit	Description
0-1	Entry: 0 Combination 1 Transform space 2 Model space
3-4	GOTO switch for IG03B

Word 2

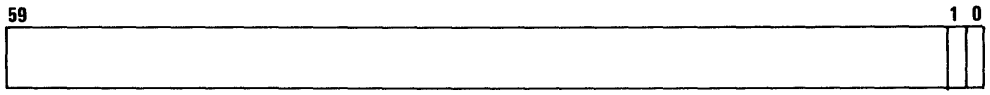


Bit	Description
0-1	Implicit point definition method: 0 Define as blanked 1 Define as dormant 2 Display when defined 3 Disallow implicit points
2	Define an implicit point (= 1)
3	Define on preset level
5-14	Level if defined on preset level
15	Implicit point status: 0 Enabled 1 Disabled

Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

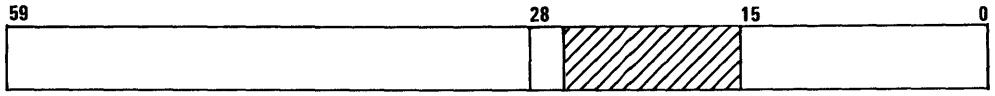
Word Description

3



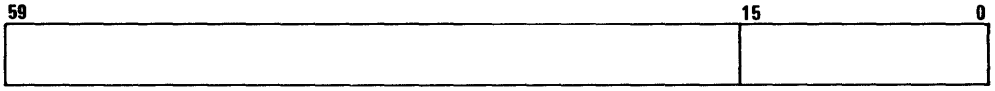
Bit	Description
0	New entity: 0 New entity not named 1 New entity named
1	New drafting entity: 0 New drafting entity not basic 1 New drafting entity basic

4



Bit	Description
0-15	Input segment number for 411x LDF
16-27	Unused
28	Storage/refresh

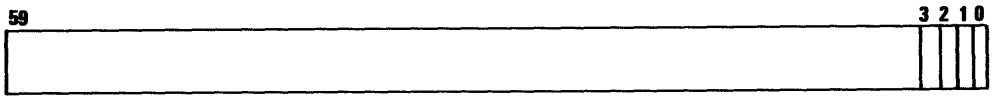
5



Bit	Description
0-15	Current segment number for 411x LDF

Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

Word 6

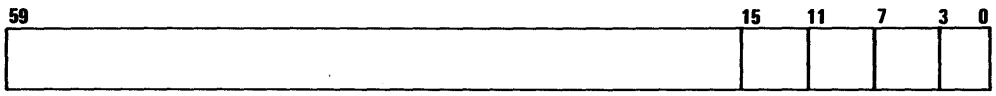


Bit	Description
0	411x LDF: 0 41xx LDF is off 1 41xx LDF is on
1	Storage/refresh: 0 Put new entities in storage 1 Put new entities in refresh
2	Reserved for future use in 411x LDF
3	Alpha text: 0 Alpha text to 411x dialog area 1 Alpha text to 411x split screen

Word 7

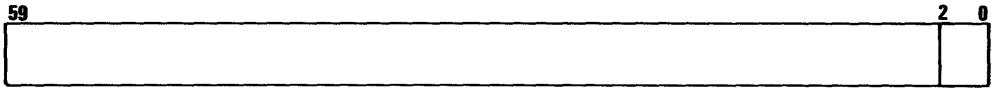
Reserved for the number of words in the selective view mask

Word 8



Bit	Description
0-3	Next graphics color
4-7	Current graphics color
8-11	Next menu color
12-15	Current menu color

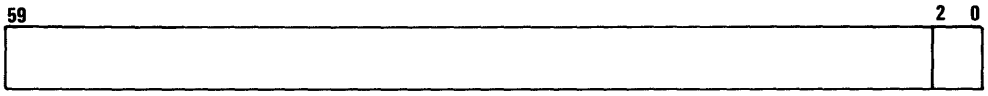
Word 9



Bit	Description
0-2	Current color display mode: 0 Temporary entity color (entities are not put in segments for LDF terminal) 1 Color by entity type 2 Pen color 3 Level color 4 Entity color

Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

Word 10



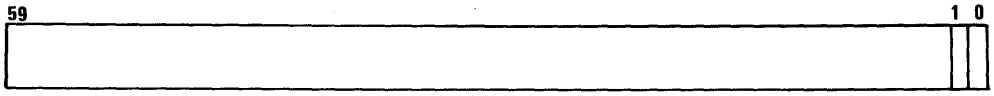
Bit	Description
0-2	Saved display mode (used when ISMOD(9)=0, must save here and restore it after complete function): 0 Temporary entity color (entities are not put in segments for LDF terminal) 1 Color by entity type 2 Pen color 3 Level color 4 Entity color

Word 11 Maximum pen number (15)

Word 12 Maximum level number (1023)

Word 13 Maximum color number (16)

Word 14



Bit	Description
0	Dragging on/off flag: 0 Off 1 On
1	Scaling of local segment: 0 No scaling 1 Scaling

Word 15 LASTV in GRUD2

Word 16 U coordinate of software generated cursor

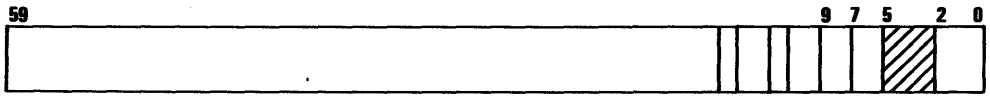
Word 17 V coordinate of software generated cursor

Word 18 Echo character used for erasing software cursor

Word 19 Cutoff value for foot symbol display (used for FOOT SYMBOL ON VALUE in the drafting modals)

Word 20 Reserved for facetting

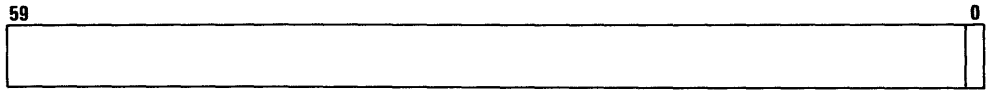
Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

Word	Description
21	

Bit	Description
0-2	Text justification: 0 Lower left 1 Center 2 Right
3-5	Reserved
6-7	Method for dual dimensioning
8-9	Text dimension placement: 0 Middle (between dimension line) 1 Above dimension line 2 Below dimension line
10-11	Angle fraction: 0 Decimal 1 Degrees 2 Degrees and minutes 3 Degrees, minutes, and seconds
12	Diameter sign before linear dimension: 0 No 1 Yes
13-14	Dimension text angle: 0 Horizontal 1 Parallel (linear dimensions only) 2 Parallel (all dimensions)
15	Reading direction: 0 Normal 1 Reversed

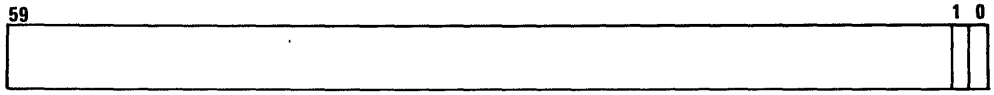
Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

Word 22



Bit	Description
0	Japanese character input: 0 Do not allow Japanese character input 1 Allow Japanese character input

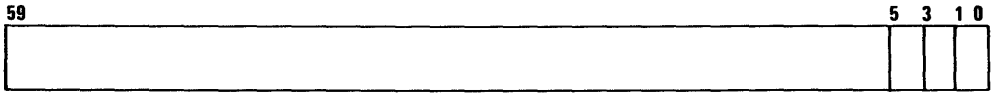
Word 23



Bit	Description
0	Isometric drafting: 0 Off 1 On (display in the view of definition only) 2 On (display in all views)
1	Reference depth

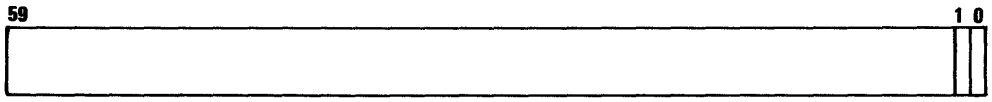
Word 24: DIN modal entity pointer

Word 25



Bit	Description
0-1	First dimension arrowhead: 0 Open triangle 1 Open circle
2-3	Second dimension arrowhead: 0 Open triangle 1 Open circle
4-5	Dimension origin mode: 0 None 1 First 2 Second

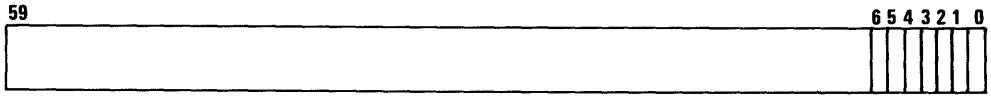
Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

Word	Description
26	

Bit	Description
0	Section lining visibility: 0 View of definition 1 All views
1	Section lining alignment: 0 Off 1 On

Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

Word 27

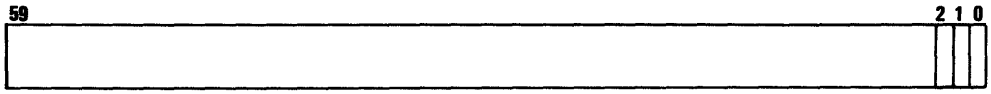


Bit	Description
0	DIA/diameter symbol: 0 Use DIA 1 Use diameter symbol
1	Repetitive features text: 0 No prompting for addition of repetitive features text 1 Prompt for addition of repetitive features text
2	Radius and diameter symbols: 0 Place radius and diameter symbols after the value 1 Place radius and diameter symbols before the value
3	Automatic tolerance: 0 Automatic tolerance at creation time off 1 Automatic tolerance at creation time on
4	Enter tolerance value: 0 User enters tolerance value at creation time 1 Tolerance values are set in RSMOD(18)
5	Tolerancing method: 0 User enters tolerancing method at creation time 1 Tolerancing method is set in bit 6
6	Limits/tolerance: 0 Tolerancing method is limits 1 Tolerancing method is tolerance

28 Special character set prefix character

29 Number of features for repetitive features text

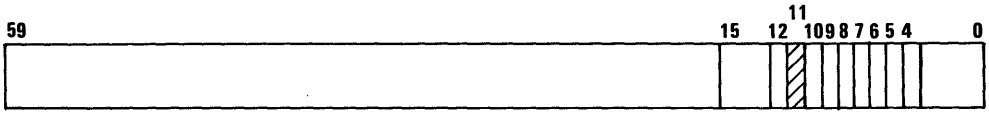
Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

Word	Description
30	

Bit	Description
0	Diameter symbol: 0 No diameter symbol with automatic linear dimension text 1 Diameter symbol with automatic linear dimension text
1	Radius symbol: 0 No radius symbol with automatic linear dimension text 1 Diameter symbol with automatic linear dimension text
2	Spherical diameter/radius symbol: 0 No spherical diameter/radius symbol with automatic linear dimension text 1 Spherical diameter/radius symbol with automatic linear dimension text

Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

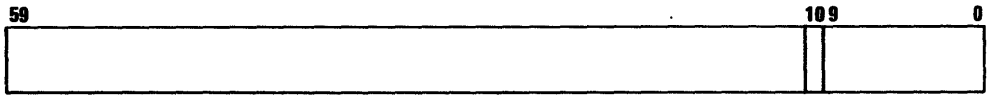
Word 31



Bit	Description
0-4	Transformation mode: 0 Rescale 1 Translate 2 Rotate 3 Translate and then rotate 4 Rotate and then translate 5 Mirror
5	Duplicate mode: 1 Duplicate
6	Scaling mode: 1 Scale
7	Scale text string mode: 0 Do not modify text string of dimensions 1 Modify dimension to reflect size change
8	Regeneration mode: 1 Eliminate regeneration data and form
9	Selective view blanking mode: 1 Eliminate selective view blanking data
10	Attribute mode: 1 Eliminate attributes
11	Unused
12	Dimension text string decimal places (bit 7 equal to 1): 0 Use number of places stored with dimension 1 Redefine the text string using bits 13-15
13-15	Number of decimal places for dimension text string (bit 12 equal to 1)

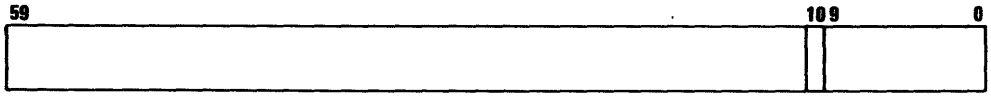
Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

Word 32



Bit	Description
0-9	Specified level
10	Level: 0 Use specified level 1 Retain original level

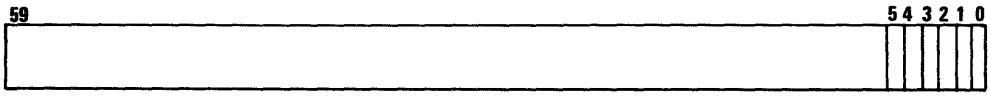
Word 33



Bit	Description
0-9	Specified pen number
10	Pen number: 0 Use specified pen number 1 Retain original pen

Word 34 Reserved

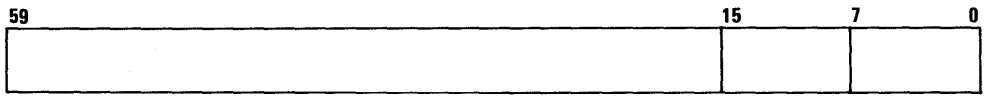
Word 35 Tangential cutting modals:



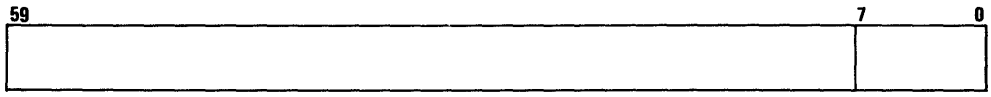
Bit	Description
0	Entry tangential cutting (= 1)
1	Exit tangential cutting (= 1)
2	Finish tangential cutting (= 1)
3	Rough tangential cutting (= 1)
4	Finish internal corner arc cutting (= 1)
5	Rough internal corner arc cutting (= 1)

Word 36 Reserved for N/C

Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

Word	Description
37	Reserved for N/C
37	Reserved for N/C
39	Total number of 60-bit words read by bulk data input
40	Total number of lines read by bulk data input
41	

Bit	Description
0-7	Save GOSW(1) for CTRL-D processing
8-15	Save GOSW(4) for CTRL-D processing

42 

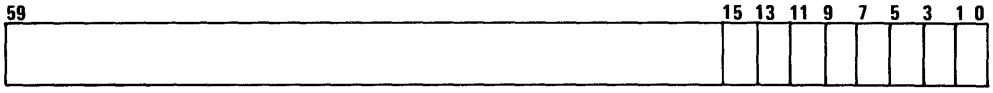
Bit	Description
0-7	Save GOSW(10) for CTRL-D processing

43 N/C circular interpolation mode:

1	No circle records
2	Circle records with all points
3	Circle records with only two points (start and end)

44 TAB1 pointer to accumulation of 3-dimensional analysis data entity
45
46 Disk location of data pooling scratch area
47 TAB4 pointer to coordinate system for data pooling data
48 Overlay number for adding entities to data pool

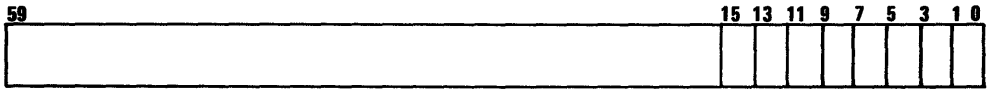
49 Maximum number of iterations for spline tolerance
50 Used in CLINK routine (not documented)

51 

Bit	Description
0-1	Line thickness for pen #0
2-3	Line thickness for pen #1
4-5	Line thickness for pen #2
6-7	Line thickness for pen #3
8-9	Line thickness for pen #4
10-11	Line thickness for pen #5
12-13	Line thickness for pen #6
14-15	Line thickness for pen #7

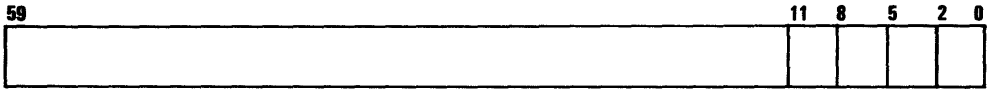
Table 2-6. Data Format for 2.19 ISMOD - Integer System Modals (Continued)

Word 52



Bit	Description
0-1	Line thickness for pen #8
2-3	Line thickness for pen #9
4-5	Line thickness for pen #10
6-7	Line thickness for pen #11
8-9	Line thickness for pen #12
10-11	Line thickness for pen #13
12-13	Line thickness for pen #14
14-15	Line thickness for pen #15

Word 53



Bit	Description
0-2	Fan Points - Start Condition: 0 Specify angle 1 Screen position 2 Existing point 3 Open 4 Set when used
3-5	Fan Points - End Condition: 0 Specify angle 1 Screen position 2 Existing point 3 Open 4 Set when used
6-8	Incremental Points - Start Condition: 0 Specify value (xt/yt coordinates, curve ratio) 1 Screen position 2 Existing point 3 Open 4 Set when used
9-11	Incremental Points - End Condition: 0 Specify value (xt/yt coordinates, curve ratio) 1 Screen position 2 Existing point 3 Open 4 Set when used

Word 54 Reserved for SUB/ADD select

Words 55, 56, 57, 58 Reserved for digitizer

2.20 IVIEW - Integer View Data

This array is used to store integer view display data. Table 2-7 describes the data format for 2.20 IVIEW - Integer View Data.

Table 2-7. Data Format for 2.20 IVIEW - Integer View Data

Word	Description
1	Number of defined views
2	Number of view areas in current display
3	Work view area number (1-32)
4	TAB4 pointer to last entity displayed that was not defined in current work view or model space
5	Current view area number
6	Work space number
7	Work space TAB4 pointer
8	Model space TAB4 pointer
9	UMIN } of CRT screen display area (RU)
10	VMIN
11	UMAX
12	VMAX
13	UMIN } of current display entity
14	VMIN
15	UMAX
16	VMAX
17	TAB4 pointer to first view area: < 0 View is off screen in current display
18	UMIN } of first view area
19	VMIN
20	UMAX
21	VMAX
22 . . . 176	Repeat (17)...(21) for up to 32 view areas
177	Entity display: < 1 Entity not displayed in current view 0 Entity completely off screen 1 Some part of entity on screen
178	Reserved for view control

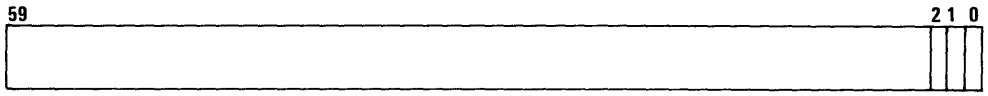
Table 2-7. Data Format for 2.20 IVIEW - Integer View Data (Continued)

Word	Description
179	Call to entity display: 0 First call to entity display 1 Successive call to entity display
180	New entity display: 0 New entity entirely on screen 1 New entity partially off screen
181	= 0 Normal TAB1 processing > 0 Recompute max/mins
182	= 0 New item added for first time to display = 1 Repaint all entities
183	Entity sequencing: 0 Sequence through entities on screen; do not process blanked, dormant, or off-screen entities in EU01 1 Sequence through all entities; process all entities in EU01
184	Present distance (RU) from current closest entity and U,V of cursor
185	TAB1 pointer to current entity being displayed
186	Repaint: 0 Normal repaint 1 Build new NDF during repaint
187	Count of entities to be displayed (or pointer to a single entity)
188	
189	Menu modal switched; menus need displaying
190	
191	
192	
193	
194	
195	
196	
197	
198	
199	View placment method: 0 ISO A 1 ISO E
200	Work view number
201	Work view TAB4 pointer

Table 2-7. Data Format for 2.20 IVIEW - Integer View Data (Continued)

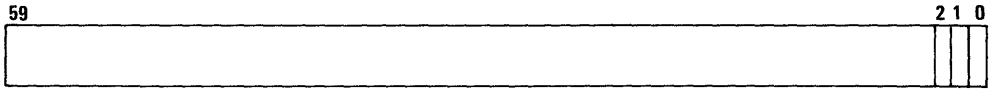
Word	Description

202 Work space status word:



Bit	Description
0	Work view perpendicular status: 0 Work plane is not perpendicular to work view 1 Work plane is perpendicular to work view
1	Work view alignment status: 0 Work space is aligned with work view 1 Work space is not aligned with work view
2	New view associated status: 0 Do not associate new views with current work space, for example, new view will be aligned 1 Associate new views with current work space

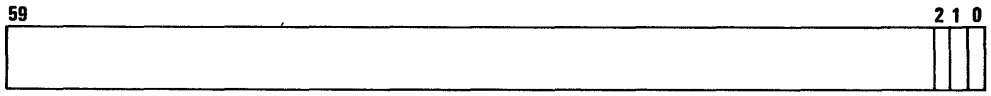
203 Full screen entity select switch:



Bit	Description
0-1	Calculate max/mins on repaint switch: 2 Calculate max/mins, not yet doing display 1 Calculate max/mins, currently displaying 0 Do not calculate max/mins
2	Full screen entity select is in effect

Table 2-7. Data Format for 2.20 IVIEW - Integer View Data (Continued)

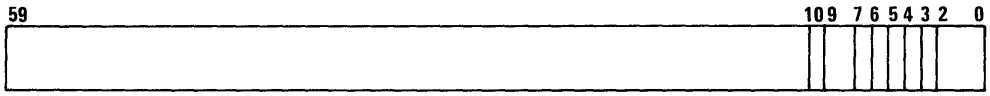
Word	Description
204	Size of selection target area in 4K raster space
205	UMIN of selection window
206	VMIN of selection window
207	UMAX of selection window
208	VMAX of selection window
216	Process blanked entities in repaint, zoom (= 1)
217	Process offscreen entities in repaint, zoom (= 1)
218	Capture distance for entity selection (RU)
219	Number of steps to divide the dynamic rotation into
220	The amount of time delay in between each dynamic rotation step
242	Unused
244	Grid switch:



Bit	Description
0	Grid on (= 1)
1	Grid scale display on (= 1)
2	Grid display on (= 1)

245	UMIN grid
246	VMIN grid
247	UMAX grid
248	VMAX grid
249	

Table 2-7. Data Format for 2.20 IVIEW - Integer View Data (Continued)

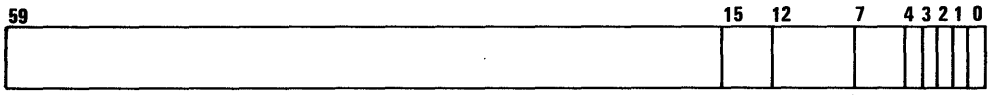
Word	Description
250	

Bit	Description
0-2	Drafting standard 0 1973 ANSI 1 DIN 2 NF (French) 3 British 4 Swedish 5 JIS (Japanese) 6 1982 ANSI
3	Reserved
4	Command allowed on next line of bulk data input (= 1)
5	Coordinate line allowed on next line of bulk data input (= 1)
6	Break encountered on last line processed in bulk data input (= 1)
7	Text line for general note allowed on next line of bulk data input (= 1)
8-9	Reserved for bulk data input
10	Drafting standards used on part: 0 Only one drafting standard used on part 1 Both ANSI drafting standards used on part

Table 2-7. Data Format for 2.20 IVIEW - Integer View Data (Continued)

Word	Description

251 721 video modals:

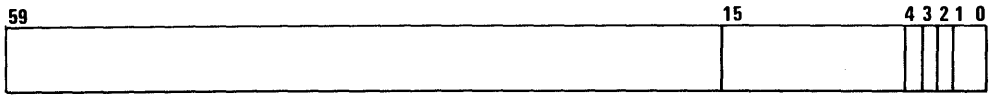


Bit	Description
0	721 cursor: 0 Output 721 cursor 1 Suppress 721 cursor
1	Coreload: 0 Coreload is not a display coreload 1 Coreload is a display coreload
2	Graphics area: 0 Graphics area is in normal video mode 1 Graphics area is in inverse video mode
3	Dialog area: 0 Dialog area is in normal video mode 1 Dialog area is in inverse video mode
4	Entity display: 0 Entities are being displayed normally 1 Entities are being erased
5-7	Last terminal configuration sequence sent: 0 No sequence has been sent 1 ESC DC1 (inverse video write mode) 2 ESC DC2 (overstrike write mode) 3 ESC DC3 (overstrike erase mode) 4 ESC DC4 (clear write mode)
8-12	Temporary storage location: 0 Base state of graphics area is normal video mode 1 Base state of graphics area is inverse video mode
13-15	Tablet type

2.21 IXMODE - Integer Modals

This array is used to store integer modals.

Word 1



Bit	Description
0-1	Tablet square overwrite mode: 0 User is prompted for overwrite decision 1 Squares are automatically overwritten 2 Squares are not to be overwritten
2	Tablet page display status: 0 Page grid is automatically displayed 1 Page grid is not automatically displayed
3	Tablet screen page display area: 0 Page is displayed in upper screen 1 Page is displayed in lower screen
4	Tablet command string display format: 0 Strings are displayed unpacked 1 Strings are displayed packed
5	Tablet file status: 0 If tablet command and edit file are same file 1 If tablet command and edit files are separate
6-15	Reserved for future tablet management modals

2 Advanced Design modal:

1 Created curve type is machining
2 Created curve type is 3-D spline

3 TAB1 pointer to origin point for rectangular coordinate dimensioning

4 TAPE9 file identifier set by OPENF in ECPPL (used for subsequent file I/O (WRITEA, READA, CLOSEF, and so on))

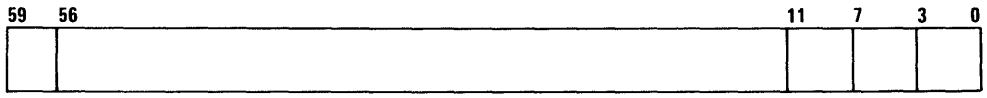
5 Reserved for future Advanced Design modal

Word	Description
6	Graphtext color display flag: 0 Graphtext is to be displayed in white 1 Graphtext is to be display in color specified by ISMOD(8), bits 0-3
7 . . . 128	Reserved for future use - new integer modals

2.22 LEVCOL - Color Number of Levels

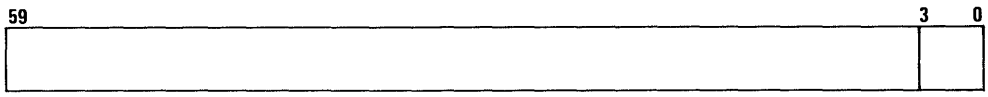
This array contains values describing the color number of levels.

Word 1



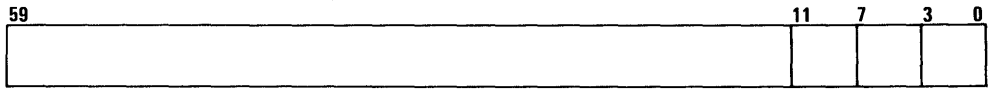
Bit	Description
0-3	Color number between 0-15 for level number 0
4-7	Color number between 0-15 for level number 1
8-11	Color number between 0-15 for level number 2
.	.
.	.
.	.
56-59	Color number between 0-15 for level number 14

Word 2



Bit	Description
0-3	Color number between 0-15 for level number 15
4-59	Unused
.	.
.	.
.	.

Word 69



Bit	Description
0-3	Color number between 0-15 for level number 1021
4-7	Color number between 0-15 for level number 1022
8-11	Color number between 0-15 for level number 1023
12-59	Unused

2.23 LMNO - Load Module Number

Current load module number.

2.24 MADD - Mass Access Device Data

This array is used to store data pertaining to file reading and writing.

Disk is used in the following explanation, but the table is for any mass access device.

Word	Description
1	Disk sector size
2	TEMI size
3	TEMR size
4	Number of machine words in COMMON less TAB1 through TAB5
5	Disk location for beginning of part storage
6	Number of sectors for part storage
7	Disk address for patterns and pattern catalog
8	Number of sectors for pattern storage
9	Disk location for application scratch area 1
10	Number of sectors in application scratch area 1
11	Disk location for application scratch area 2
12	Number of sectors in application scratch area 2
13	Disk location for application scratch area 3
14	Number of sectors in application scratch area 3
15	Disk location for application scratch area 4
16	Number of sectors in application scratch area 4
17	Disk location for special definition area
18	Number of words in special definition area

2.25 MATH - Math Constants

This array is used to store mathematical constants and system tolerances.

Word	Description
1	Ratio of units in use per English unit
2	Proximity epsilon
3	Proximity epsilon squared
4	Display tolerance
5	Drafting tolerance
6	Approximation epsilon (INTOL)
7	Approximation epsilon (OUTOL)
8	Rough machining intol
9	Rough machining outol
10	Finish machining intol
11	Finish machining outol
12	Pi (3.1415926535898)
13	Radians per degree
14	Degrees per radian
15	Round off epsilon
16	Ratio of metric units per English unit

2.26 MMP - Message-Menu-Macro Parameters

This array is used to store information necessary for writing messages to a terminal. Table 2-8 describes the data format for 2.26 MMP - Message-Menu-Macro Parameters.

Table 2-8. Data Format for 2.26 MMP - Message-Menu-Macro Parameters

Word	Description
1	Maximum size of each menu item (40 for 401x, 411x)
2	Number of menu lines per column (65 for 401x, 20 for 411x)
3	Number of menu columns (3 for 401x, 1 for 411x)
4	Maximum total number of menu lines (195 for 401x, 20 for 411x, 30 for IST III)
5	Current menu line number
6	Current menu column number
7	U menu area origin (leftmost) (5 for 401x)
8	V menu area origin (topmost) (2655 for 401x)
9	Maximum size of a primary message line (40 for 401x, 411x)
10	Number of characters in 1/4 of full primary message line (10 for 401x, 411x)
11	Number of primary message lines per column (65 for 401x, 20 for 411x)
12	Size of line needed for current primary message: 0 Quarter line 1 Half line 2 Three-quarter line 3 Full line
13	Current primary message line number
14	Next character segment position (3,2,1,0,-1)
15	U primary message origin (leftmost) (5 for 401x)
16	V primary message origin (topmost) (2655 for 401x)
17	Maximum size of a secondary message line (40 for 401x, 411x)
18	Number of characters in 1/4 of full secondary message line (10 for 401x, 411x)
19	Number of secondary message lines per column (10 for 401x, 411x)
20	Size of line needed for current secondary message: 0 Quarter line 1 Half line 2 Three-quarter line 3 Full line
21	Current secondary message line number
22	Next character segment position (3,2,1,0,-1)
23	U secondary message origin (leftmost) (5 for 401x)
24	V secondary message origin (topmost) (3086 for 401x)

Table 2-8. Data Format for 2.26 MMP - Message-Menu-Macro Parameters (Continued)

Word	Description
25	Number of U rasters per character (30 for 401x, 51 for 411x, 48 for IST III)
26	Number of V rasters per character (41 for 401x, 75 for 411x, 85 for IST III)
27	Delta U for menu cross-out
28	V for entire vector
29	Delta U for primary message cross-out
30	V for entire vector
31	Delta U for secondary message cross-out
32	V for entire vector
33	Character count of secondary message
34 . . . 48	Secondary message

2.27 MVIEW - Integer Multi-View Values

This array is used to store view modal information for multiple view display and layout. Table 2-9 describes the data format for 2.27 MVIEW - Integer Multi-View Values.

Table 2-9. Data Format for 2.27 MVIEW - Integer Multi-View Values

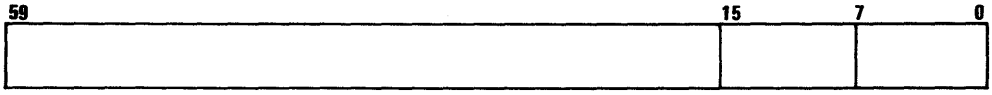
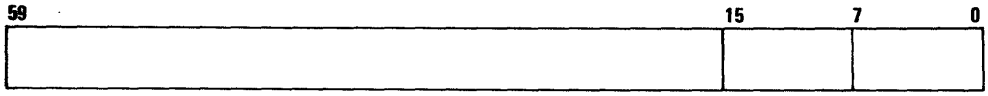
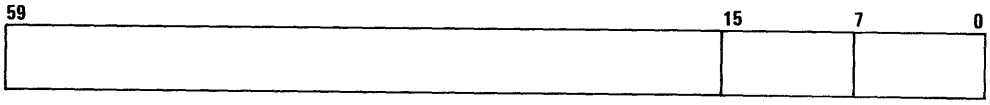
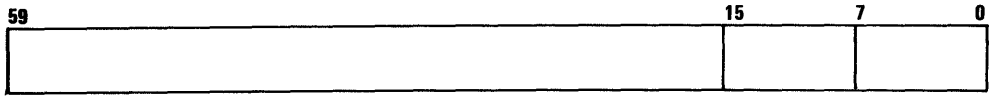
Word	Description
1	Number of characters per view name and ZOOM scale name
2	Number of characters per view layout name
3	Maximum number of views that can be displayed at once
4	View border display mode: 0 Do not display view borders 1 Display on some views 2 Always display
5	 Bit — Description 0-7 View name display mode: 0 Do not display (default) 1 Display in some views 2 Display in all views 8-15 Work name display mode: 0 Do not display (default) 1 Display in some views 2 Display in all views
6	 Bit — Description 0-7 View vectors display mode: 0 Do not display (default) 1 Display in some views 2 Display in all views 8-15 Work axes display mode: 0 Do not display (default) 1 Display in some views 2 Display in all views

Table 2-9. Data Format for 2.27 MVIEW - Integer Multi-View Values (Continued)

Word	Description
7	ZOOM extent mode
8	Current display mode: 0 Single view 1 View layout 2 Top - bottom or previous multiview 3 Left - right 4 Four quadrant 5 Views 1 and 6 6 Views 1 and 3 7 Views 6, 1, 3, and 8 8 Views 1 through 8
9	View movement mode
10	Pointer to view currently being modified
11	Corner of view currently being modified
12	View area number currently being modified
13	Temporary storage
14	Temporary storage
15	

Bit	Description
0-7	Depth mode: 0 Data entry (default) 1 Indicate point 2 Delta from curve 3 User chooses mode
8-15	View association mode: 0 All views (default) 1 Select views 2 Work view 3 User chooses mode

Table 2-9. Data Format for 2.27 MVIEW - Integer Multi-View Values (Continued)

Word	Description
16	

Bit	Description
0-7	View selection mode:

0 By view number (default)
1 By view name
2 By screen select
3 By view of selected curve
4 User chooses mode

Bit	Description
8-15	Work space selection mode:

0 By work space number (default)
1 By work space name
2 By screen select
3 By work space of selected curve
4 Use the work view
5 By selected view
6 User chooses mode

17 Zooming center or origin indication:

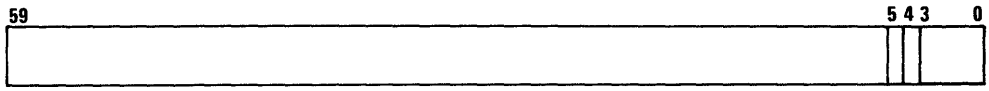
0 Screen position
1 Enter coordinates
2 Existing point
3 Delta from a curve
4 Delta from current origin
5 User chooses mode

18 Rescaling mode:

0 Ask scale and ratio
1 Ask scale
2 Ask ratio

Table 2-9. Data Format for 2.27 MVIEW - Integer Multi-View Values (Continued)

Word	Description
19	Layout units of measurements:



Bit		Description
0-3	0	Screen inches
	1	Paper size
	2	Rasters
	3	User chooses mode
4	0	Display entities after view change
	1	Do not display until repaint
5	0	Rescale alignment view to match reference view
	1	Do not rescale alignment view

20 21	Temporary viewing storage
22	Number of selected windows for ZOOM
23 24	Indicate window areas (1-16) Indicate window areas (17-32) } for bits 0-15

25 Layout construction mode:

- 0 Do not display modified views
- 1 Redisplay modified views

26 User entity selection allowance (not used yet):

- = 0 Select from any displayed view
- > 0 Select from view area given only

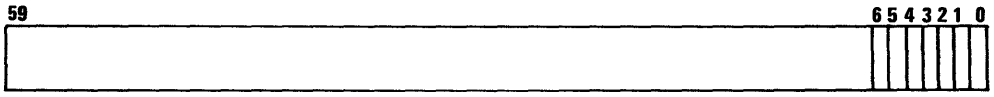
27 Single view fast auto MAX-MINS enable (not used yet):

- 0 Recalculate MAX-MINS
- 1 Correct MAX-MINS correct

28 Selectable views:

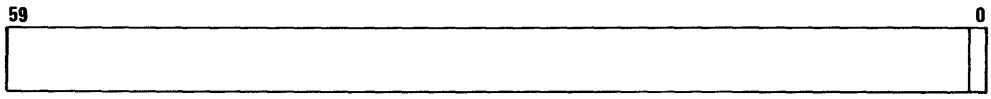
- 0 All views selected
- 1 Displayed views only are selectable
- 2 Only views in specified layout are selectable
- 3 Only blanked views are selectable

Table 2-9. Data Format for 2.27 MVIEW - Integer Multi-View Values (Continued)

Word	Description
29	Current ZOOM mode: 1 Single view 2 Entire layout 3 Work view window 4 All windows 5 Selected windows [refer to MVIEW(22-24)]
30	Pointer to format view (= 0 if not defined)
31	= 0 Add entities from STAB1 ≠ 0 Number of entities whose attentions are on to add to the display
32	-1 Current entity is to be displayed from model space data (ZOOM (9...16)) 0 Current entity is to be displayed using ZOOM(17...24) matrix 1 Current entity is to be displayed from display transfer data (ZOOM(26...29))
33	Save area for GOSW(7)
34 35 36 37 38 39	Save area for GC(51...56) and view position indications. Temporary storage when not selecting entities in viewing and zooming.
40	Save area for GC(3)
41 42 43 44	Save area for GC(23...26)
45	Equal to 0 or TAB4 pointer to original work view if in entity select in any view
46	

Bit	Description
0	Work view has been temporarily changed during entity select (= 1)
1	Work view not to be reset in IG09 after selection (= 1)
2	Entities must be selected in one view only (= 1)
3	Entities may only be selected in work view (= 1)
4	Suppress message put out in select coreload (= 1)
5	Screen position allowed outside of work view (= 1)
6	N-key used for selection (= 1)

Table 2-9. Data Format for 2.27 MVIEW - Integer Multi-View Values (Continued)

Word	Description
47	Temporary storage in IG10A
48	Pointer to previous multiview configuration entered: -1 For never used
49	Number of view layouts defined
50	Pointer to last view layout used
51 52 53 54 55 56 57 58	Name of current view layout
59	 Bit — Description 0 — For entities not to be considered part of design for view alignment (= 1)
60	Last view area processed for matrix calculation
61	X MIN — Horizontal minimum raster count for display device used
62	Y MIN — Vertical minimum raster count for display device used
63	X MAX — Horizontal maximum raster count for display device used
64	Y MAX — Vertical maximum raster count for display device used

2.28 PAGE - Paging Data

This array is used to store relative disk locations of all data pages for the current part. Table 2-10 describes the data format for 2.28 PAGE - Paging Data.

Table 2-10. Data Format for 2.28 PAGE - Paging Data

Word	Description
1	Next available PAGE word
2	Size of PAGE array
3	TAB1 current page
4	TAB2 current page
5	TAB3 current page
6	TAB4 current page
7	TAB5 current page
8	TAB1 page size - number of machine words
9	TAB2 page size - number of machine words
10	TAB3 page size - number of machine words
11	TAB4 page size - number of machine words
12	TAB5 page size - number of machine words
13	TAB1 page list subscript
14	TAB2 page list subscript
15	TAB3 page list subscript
16	TAB4 page list subscript
17	TAB5 page list subscript
18	Disk location for beginning of page storage
19	Number of sectors available
20	Next available page block - sector number relative to DLOC
21	Page pointer subscript mask
22	Page pointer page shift count
23	Number of 15-bit numbers per word
24	Paging error switch
25	Number of TAB1 pages
26	Next TAB1 page to load in EU01, EU02B
27	Shift (PAGE(26), PAGE(22))
28	Current TAB1 subscript

Table 2-10. Data Format for 2.28 PAGE - Paging Data (Continued)

Word	Description
29	Page store switch: 0 Store page 1 Do not store page
30 • • •	Page list for TAB1 through TAB5 Page list form for TAB1-TAB5 data: Page list for TABn (n = 1,2,3,4,5) (i = PAGE(12+n) The following numbers are packed as specified by PAGE(23): (i) Number of TABn pages (i+1:0-14) Disk location of first page (i+1:15-27) Number of words available on this page (i+1:28-29) Unused (i+1:30-44) Disk location of second page (i+1:45-57) Number of words available on this page (i+1:58-59) Unused (i+2:0-14) Disk location of third page • • • • • •

2.29 PENCOL - Color Number of Pens

This array contains values describing the color number of pens.

Word	Bit	Description
1	0-3	Color number between 0-15 for pen number 0
	4-7	Color number between 0-15 for pen number 1
	8-11	Color number between 0-15 for pen number 2
	•	•
	•	•
	•	•
	56-59	Color number between 0-15 for pen number 14
2	0-3	Color number between 0-15 for pen number 15
	4-59	Unused

2.30 PRTNA - Part Name

This array is used to store the current part name in display code. For name table lookup, this array may contain a name other than the current name. The name is blank- or zero-filled.

2.31 RMODE - Real Modals

This array is used to store real modal values. Table 2-11 describes the data format for 2.31 RMODE - Real Modals.

Table 2-11. Data Format for 2.31 RMODE - Real Modals

Word	Description
1	Drafting scale factor
2	Fillet radius
3	DX
4	DY
5	DZ
6	Major axis half length
7	Minor axis half length
8	Spline point movement
9	Distance, for lines parallel to lines, cross-hatching, and so on
10	Section lining angle
11	Current label/dimension character size
12	Distance from text to dimension line
13	Distance extension line is offset from reference point
14	Distance extension line extends past dimension line
15	XC } Key-in center point for arcs, conics, and so on
16	YC }
17	
18	Balloon radius
19	ZT MAX for current view for ZCLIP
20	ZT MIN for current view for ZCLIP
21	X }
22	Y } Base position for scaling
23	Z }
24	X }
25	Y } Base position for rotation
26	Z }
27	
28	Pattern scale factor
29	Character size ratio for tolerances and fractions
30	Text angle in degrees
31	Grid DX
32	Grid DY
33	Grid scale DX
34	Grid scale DY

Table 2-11. Data Format for 2.31 RMODE - Real Modals (Continued)

Word	Description	
35	Rotation angle	Translate/duplicate
36	DX	
37	DY	
38	DZ	
39	Scale factor	
40	Paper X-MAX	Plotter output
41	Paper Y-MAX	
42	Plot scale	
43	XT offset	
44	YT offset	
45	YT of arrowheads for last horizontal dimension	
46	XT of arrowheads for last vertical dimension	
47	Arrowhead length	
48	Spacing ratio between characters	
49	Aspect ratio for characters	
50	Downspace ratio for characters	

N/C Data RMODE (51-124)

The following describes the part of the array used to store N/C data. Table 2-12 describes the data format for N/C Data RMODE.

Table 2-12. Data Format for N/C Data RMODE

Word	Description	
51		
52	Current tolerance	
53		
54	Surface step size	
55	Surface tolerance	
56	Clearance distance	
57	Retract plane	
58	Last walking parameter	
58	Cutting plane (PRO/POK)	
59	Minimum bite	
59	Base distance (PRO/POK)	
60	Tool radius	
61	Tool flat in parameter	
61	Pseudo tool radius (PRO/POK)	
62	Tool flat	
63	1/2 tool flat	These positions may be used for any tool parameters that are specific to the particular operation.
64	Gage length	
65	Miscellaneous tool data	
66	Miscellaneous tool data	
67	Last constant parameter	
68-69	XT, YT for canted approach	
70-71	XT, YT for withdrawal point	
72-74	Last point, postprocessor home position (CL)	
75-77	Last normal, postprocessor transvector (CL)	
78	Minimum U; scale factor (CL)	Base rough distances (PRO/POK)
79	Minimum V; rapid feed (CL)	
80	Maximum U; current feed (CL)	
81	Maximum V	
82	Minimum sweep; initial spindle vector (CL)	XT of tool side (PRO/POK)
83	Maximum sweep	YT of tool side (PRO/POK)
84	Initial parameter value	Side rough distances (PRO/POK)
85	Final parameter value	
86	Constant parameter value	
87	Maximum scallop height	

Table 2-12. Data Format for N/C Data RMODE (Continued)

Word	Description
88	Step-over offset (POK)
89	Rough cut distance - current cut depth (PRO/POK)
90	1.0 constant parameter is minimum to maximum, -1.0 if reverse step-over (POK)
91	Surface normal: 1 Leave surface normal as defined -1 Reverse surface normal for N/C
92	Base stock amount left on part
93	Side stock amount left on part
93	Surface normal direction
94	Pull/re-entry feed
96	Rough feed
97	Finish feed
98	Rapid feed
99	
100	
101-106	
107-112	FROM
113-118	SETPT
119-124	TAXIS

2.32 RSMOD - Real System Modals

This array is used to store real modals as RMODE.

Word	Description
1	A
2	B
3	C
4	D
	Mirror plane coefficients
5	Entry radius ($\geq$ 0)
6	Entry line length ($\geq$ 0)
7	Entry number of arc points ($\geq$ 6)
8	Exit radius ($\geq$ 0)
9	Exit line length ($\geq$ 0)
10	Exit number of arc points ($\geq$ 6)
11	
12	
13	Model space coefficients of current work plane, Ax+By+Cz+D=0
14	
15	
16	Model space values of the vector normal to the current view, (DX, DY, DZ)
17	
18	Upper drafting dimension tolerance
19	Lower drafting dimension tolerance
20	Spline tolerance (maximum allowable difference in curvature)
21	Projected entity delta depth
22	Reserved for N/C
23	Offset surface curve starting angle
24	Offset surface curve ending angle
25	Offset surface curve starting distance
26	Offset surface curve ending distance
27	Same point tolerance (Advanced Design modal)
.	
.	
.	
49	
50	
51	
52	
53	Reserved for digitizer
54	
55	
56	
57	
58	

2.33 RVIEW - Real Viewing Values

This array is used to store real entity and current view display parameters. Table 2-13 describes the data format for 2.33 RVIEW - Real Viewing Values.

Table 2-13. Data Format for 2.33 RVIEW - Real Viewing Values

Word	Description
1 . . . 4	Temporary values used during viewing and zooming
5 . . . 8	XT,YT max/mins Calculations for auto maximizing the display
9	ZT minimum
10	ZT maximum
11 . . . 22	Matrix to map current entity display into display transform space
23	Ratio of empty space between view borders per entire display
24	Delta U raster expansion for view borders
25	Delta V raster expansion for view borders
26	Screen XT units for page overlap
27	Screen YT units for page overlap
28	
29	XT,YT,ZT minimum of geometry in current work view
30	
31	
32	XT,YT,ZT maximum of geometry in current work view
33	
34 . . . 42	Matrix to map entity into display transform for view alignment calculations
43	
44	XYZ base position for scaling dragging cursor
45	
46	Scale factor for X,Y,Z direction for dragging cursor

Table 2-13. Data Format for 2.33 RVIEW - Real Viewing Values (Continued)

Word	Description
47 . . . 60	Reserved for future system use
61	UMIN
62	VMIN
63	UMAX
64	VMAX
	Current display view values

2.34 STAB1 - Integer System Table

This integer array is used as a temporary storage array. It is used for storing pointers during multiple entity display.

Contains pointers for multiple entity display.

Word	Description	
1		
.		
.		
.		
3	Ident in/out flag	
4	Region ident U position	9 values used by ZOOM
5	Region ident V position	
.		
.		
.		
9		

Routines ECPCG and PFMIU have hard coded values for the length of STAB1. Therefore, if the STAB1 length is changed, the hard coded STAB1 lengths in these routines must also be changed.

2.35 STAB2 - Real System Table

This real array is used as a temporary storage array.

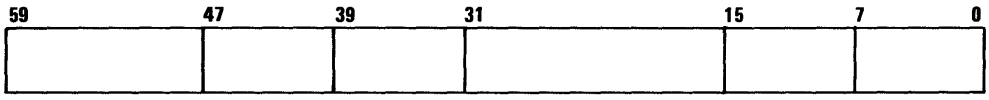
Word	Description
1	
.	Used by ZOOM/VIEW control
.	
23	
24	
.	Used in PLOT to store current view scale data when plotting the entire plot
.	
37	
38	
39	Saved center and scale of parts encountered during view display that have
40	no dimensions

2.36 TAB1 - Master Entity List

This is an integer paged array containing bit packaged header information about entities. Upon evaluation, the header information for an entity is put into the EC array.

Word	Description
1	Subscript of next available TAB1 word in this page
2	Subscript of first TAB1 word, i
3	Number of TAB1 words per entity
4	Nonzero when entities have been deleted since the last table pack

Master Data Format

Word	Description
i	

Bit	Description
0-7	Entity type
8-15	Entity subtype
16-31	Definition sequence number
32-39	Byte 1:

Bit	Description
0	Entity is marked (= 1)
1	Totally off screen (= 1)
2	Blanked (= 1)
3	Cannot be deleted (= 1)
4	Associative (= 1)
5	Display in view of definition only (= 1)
6	Dormant (= 1)
7	Clipped line if true or key-in dimension (= 1)

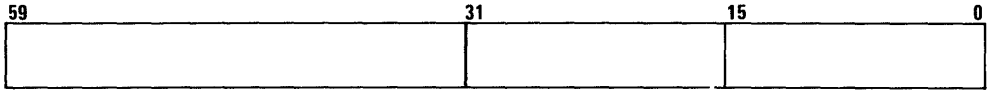
40-47 Byte 2:

Bit	Description
0	Named (= 1)
1	Dimension type: 0 Normal 1 Basic
2-4	Display mode: 0 Solid 1 Dashed 2 Phantom 3 Centerline
5	Alternate character set used for drafting entities (= 1)
6	Unassigned (= 1)
7	View display: 0 Normal 1 Selective view blanking

48-59 Number of TAB2 words

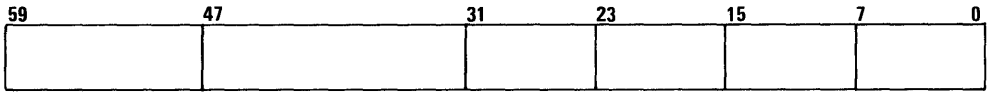
Word	Description

i+1 If 3-word format:



Bit	Description
0-15	Pointer to TAB2
16-31	Pointer to TAB3

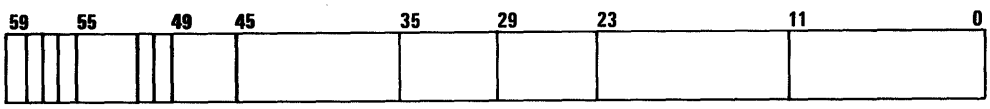
If 4-word format:



Bit	Description
0-7	VMAX of entity
8-15	UMAX of entity
16-23	VMIN of entity
24-31	UMIN of entity
32-47	Pointer to view of definition
48-59	Number of TAB3 words

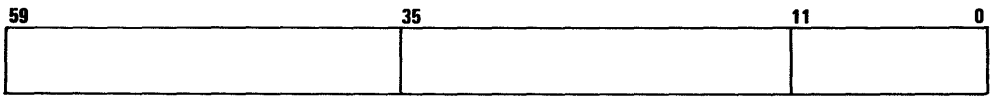
Word Description

i+2



Bit	Description
0-11	Attention point U
12-23	Attention point V
24-29	Group membership counter
30-35	Attribute counter
36-45	Level
46-49	Pen number
50	Unassigned
51	Entity is highlighted (= 1)
52-55	Color number
56	Unassigned
57	Composite curve membership status
58	Local display file (LDF):
	0 Entity not in the LDF
	1 Entity in the LDF
59	Storage/refresh:
	0 Entity in storage
	1 Entity in refresh

i+3



Bit	Description	
0-11	Unassigned	four-word format is denoted by TAB1(3)=4
12-35	Pointer to TAB2	
36-59	Pointer to TAB3	

2.37 TAB2 - Entity Dependent Integer Data

This is a paged array containing integer data associated with entities. The actual data carried in this array depends on the entity type stored (refer to chapter 3 of this manual). The position of the integer data for an evaluated entity is specified by EC(3).

Word	Description
1	Subscript of next available TAB2 word in this page
2 . . .	Entity dependent data (listed by type and form in Entity Types, section 3)

Entity data format

Word	Description
i	First word of entity dependent data
i+n	Last word of entity dependent data
i+n+1 i+n+7	View mask for entities with selective view blanking (if any) where: i+n+1 = First word of viewing mask (m=0 if no view mask) i+n+7 = Last word of viewing mask (m=7 if view mask exists)
i+n+m+1 i+n+m+2 . . .	Attribute list for entities with attributes (if any) where: i+n+m+1 = Number of attributes for this entity i+n+m+2 = First attribute character count
	First attribute name (32 character maximum) . . . Number of subattribute numbers TAB3 relative subscript where the first number begins Number of subattribute names First subattribute character count First subattribute name (if subattribute names exist) . . . Subsequent subattribute name data . . . Subsequent attribute data . . . Relative TAB2 subscript for the start of the attribute information

2.38 TAB3 - Entity Dependent Real Data

This is a paged array containing real data associated with entities. The actual data carried in this array depends on the entity type store (refer to chapter 3 of this manual). The position of the real data for an evaluated entity is specified by EC(4).

Word	Description
1	Subscript of next available TAB3 word in this page
2 • • •	Entity dependent data

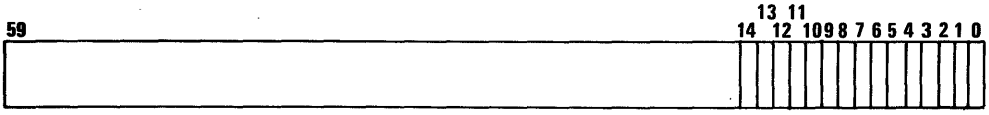
2.39 TAB4 - View Definition Table

This is a paged array containing view definition data. Each view is contained in a 36-word block, seven views per page. Table 2-14 describes the data format for 2.39 TAB4 - View Definition Table.

Table 2-14. Data Format for 2.39 TAB4 - View Definition Table

Word	Description
1	Subscript of next available TAB4 word in this page
i . . . i+8	Transformation matrix from view #1 (model space --> view)
i+9 i+10 i+11	Translation vector from view #1
i+12 i+13	Current XT,YT minimum for display of view
i+14	Current DEPTH scale of view
i+15	Current ZOOM scale of view
i+16	Reserved for future system use

Table 2-14. Data Format for 2.39 TAB4 - View Definition Table (Continued)

Word	Description
i+17	

The integer equivalent of this word is bit-packed as follows:

Bit	Description
0	Z-clip: 0 For no Z-CLIP 1 For Z-CLIP on
1	Boundary: 0 Rectangular boundary 1 Circular boundary
2	Zoomed in: 0 Not zoomed in 1 Currently zoomed in
3	View display: 0 View has been displayed 1 View has never been displayed
4	View name: 0 No name given to view 1 View is named
5	View type: 0 Regular view 1 This if a detail view; only drafting entities may be defined in this view
6	Display outline: 0 Do not display outline 1 Display outline
7	View blanking: 0 Display entities in view 1 Do not display entities in view

Table 2-14. Data Format for 2.39 TAB4 - View Definition Table (Continued)

Word	Description
i+17	Bit — Description
	8 — Display view vectors (= 1)
	9 — Display view name on top of view (= 1)
	10 — Local coordinate system active (= 1)
	11 — Deleted view (= 1)
	12 — System-defined view (= 1)
	13 — Display work name in this view:
	0 Off (default)
	1 On
	14 — Display work axes in this view:
	0 Off (default)
	1 On
i+18	+ZT for Z-CLIP
i+19	-ZT for Z-CLIP
i+20	Saved XT,YT minimum for display on return to original scale
i+21	
i+22	Saved ZOOM scale
i+23	
i+24	Temporary DXT,DYT,DZT to local coordinate system origin
i+25	(currently not used)
i+26	Pointer to associated work space (= 0 if aligned
i+27	Reserved for future system use
i+28	Shrinkage factor of view in current layout
i+29	View number

Table 2-14. Data Format for 2.39 TAB4 - View Definition Table (Continued)

Word	Description
i+30 i+31 i+32 i+33	View name (16 characters)
i+34 i+35	Pointer to viewing display data for border, vectors and title in NDF

NOTE

This format is repeated for each view in the TAB4 page.

254 . . . 256	Reserved for future system use

2.40 TAB5 - Entity Symbolic Name Table

This is a paged integer array containing entity name information.

Word	Description
1	Subscript of next available TAB5 word in this page
2	Subscript of first TAB5 word, i
3	Number of TAB5 words per entity
4	Nonzero when entities have been deleted since last table pack
5	Maximum number of entries allowed in this page
6	Start of symbolic name data (refer to below)
i	Entity symbolic name
i+1	TAB1 pointer corresponding to name
.	.
.	.
.	These 2 words repeated for each name in TAB5.
.	.
.	.
128	

2.41 TEMR - Temporary Application Data Storage (Real)

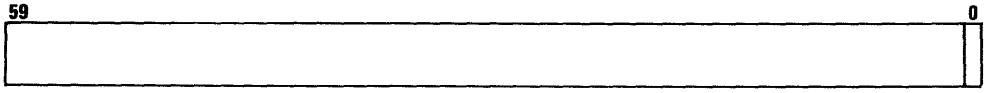
Word	Description
1 . . .	Storage of local real variables during CLINK to graphic coreload

2.42 TMPCOL - Temporary Color Number 1 to 16

This variable is a temporary color number from 1 to 16, and is used when ISMOD(9) is 0.

2.43 VSW - View Control Switch

This integer array controls the return graphics location for view and ZOOM functions.

Word	Description
1	Controls positioning of the plot file in PLOT
2	Location switch for ZOOM, depth, and viewing
3	Local graphics switch for ZOOM and viewing
4	Local graphics switch for ZOOM and viewing
5	Local graphics switch for ZOOM and viewing
6	Local graphics switch for ZOOM and viewing
7	INSW for ZOOM
8	INSW for change view
9	AUX view REDEFN switch
10	

Bit	Description
0	Allow blanked entities to be processed in EG03, ECPRG, and EU19 (= 1)
1	Flag for empty part during Zoom Auto Max/Mins (= 1)
2	Flag for parts with no dimensions during view display (= 1)

11	Controls display of offscreen entities in repaint and ZOOM
12	Reserved for future system use

2.44 ZOOM - Zoom (Window) Parameters

This real array contains current work view display constants.

Word	Description
1	Addressable rasters/display view unit (inch, cm, or other units used)
2	Current scale factor one - raster units/inch
3	Current scale factor two - screen inch/model space inch
4	Addressable rasters/4014 screen unit (inch, cm, or other units used)
5 . . . 8	Display projection constants (U,V) (XT,YT) XT = A(5)*U+A(6) YT = A(7)*V+A(8)
9 . . . 16	Current display projection constants (XT,YT,ZT) (U,V) U = A(9)*X+A(10)*Y+A(11)*Z+A(12) V = A(13)*X+A(14)*Y+A(15)*Z+A(16
17 . . . 24	Display projection constants (XT,YT,ZT) (U,V) U = A(17)*X+A(18)*Y+A(19)*Z+A(20) V = A(21)*X+A(22)*Y+A(23)*Z+A(24)
25	Magnification factor
26	C1, horizontal display factor } Zoom parameters
27	C2, vertical display factor } Zoom parameters
28	D1, horizontal display factor } Projected inch parameters
29	D2, vertical display factor } Projected inch parameters
30	Rotation (degrees) for auxiliary view definition

NOTE

Words 26-30 are defined in VZ03.

31	XMIN	} Projected max-mins of entire display
32	YMIN	} Projected max-mins of entire display
33	XMAX	} Projected max-mins of entire display
34	YMAX	} Projected max-mins of entire display

Entity Types

3

Entity Types 3

This section contains detailed entity dependent information describing each entity type and form. The data contained in the TAB2 array is integer. The data contained in the TAB3 array is real. Additional data may be contained with certain entities that are not dependent on type. (Refer to the TAB2 description in chapter 2 of this manual).

3.0 Entity Types, Curve Parameters, and Surface Parameters

The following tables describe the entity types defined, the flange surface parameters, and the range of curve parameters. Refer to tables 3-1, 3-2, and 3-3.

Table 3-1. Entity Types Defined

Type	Code	Type	Code
0	Entity deleted	37	General note
1	Point	38	Centerline
2	Line	39	Section lining
3	Circle	40	Feature frame
4	Conic	41	Template
5	Spline	42	
6	Composite curve	43	
7	Vector	44	
8	Point set	45	Systems GPG, Inserts, and N/C modals
9	3-dimensional spline		
10	Machining curve	46	Toolpath
11	String	47	Composite toolpath
12	Rectangular array	48	Toolpath GPG and Inserts
13	Circular array	49	Tool
14	Copious data	50	Systems entity
15	Group	51	
16	Variable	52	Hexahedron
17		53	
18	Plane	54	
19	Surface of revolution	55	
20	Tabulated cylinder	56	
21	Ruled/developable surface	57	
22	Curve mesh surface	58	
23	Fillet surface	59	
24		60	Data point set
25		61	Data structure set
26	Reserved for Bezier surface	62	
27		63	
28	Offset surface	64	
29	Composite surface	65	
30	Curve driven surface	66	
31	Bezier curve	67	
32	Linear dimension	68	
33	Radius dimension	69	
34	General label/taper dimension	70	Schematic element
35	Diameter dimension	71	Schematic connect table entity
36	Angular dimension		

Table 3-2. Curve Parameter Range

Curve Type	U Min.	U Max.
Line	0.0	1.0
Arc	Start angle (in radians)	End angle (in radians)
Conic	Start angle (in radians)	End angle (in radians)
Spline	0.0	Sum of chord-lengths of defining points
Composite Curve	0.0	Sum of chord-lengths of n curves
3-Dimensional Spline	0.0	$\sum_{i=1}^{n} \sqrt{C_1^2 + C_2^2}$
Machining Curve	1.0	Number of points in machining curve

Table 3-3. Surface Parameter Range

Surface Type	U Min.	U Max.	V Min.	V Max.
Revolution, Sphere, Cylinder, Torus, Cone	Curve parameters		Start angle	End angle
Tabulated	Curve parameters		First keyed-in parameter	Second keyed-in parameter
Plane Ruled	0.0	1.0	0.0	1.0
Developable	0.0	1.0	0.0	1.0
Curve Mesh	0.0	Number of variable curves - 1	0.0	Number of fixed curves - 1
Fillet†	Center path parameters		0.0	1.0
Offset parameters	Generating surface parameters		Generating surface	
Composite	0.0	1.0	0.0	1.0

†U is lengthwise; V is along end arc.

3.1 Type 1 - Point (Coordinate Values Are in Model Space)

Table 3-4 describes the TAB2 and TAB3 data formats for Type 1 - Point.

Table 3-4. TAB2 and TAB3 Data Formats for Type 1 - Point

Form	Description	TAB2	TAB3
1	Screen position, key in, fan, or incremental	Variable name for X or 0 Variable name for Y or 0 Variable name for Z or 0 (or none)	X,Y,Z
2	Polar coordinates	Pointer to base point Variable name for angle or 0 Variable name for radius or 0	X,Y,Z Angle Radius
3	Delta coordinates	Pointer to base point Variable name for DX or 0 Variable name for DY or 0 Variable name for DZ or 0	X,Y,Z DX DY DZ
4	A vectored distance from a given point	Pointer to base point Pointer to the vector Direction indicator implied for distance Variable name for distance or 0	X,Y,Z Distance
5	The center of a circle	Pointer to the circle	X,Y,Z
6	On a circle at an angle	Pointer to the circle Variable name for angle or 0	X,Y,Z Angle
7	Curve endpoint	Pointer to the curve Position indicator	X,Y,Z
8	Intersection of two curves	Pointer to curve 1 Pointer to curve 2 Position indicator	X,Y,Z
9	Regenerate spline points	Pointer to spline	X,Y,Z
10	On a line at a given abscissa, ordinate, or depth	Pointer to line Coordinate indicator (1 = X, 2 = Y, 3 = Z) Variable name for X or Y or Z or 0	X,Y,Z Value or coordinate value
11	Normal projection of a point to a curve	Pointer to base point Pointer to curve Subselection (when present)	X,Y,Z

Table 3-4. TAB2 and TAB3 Data Formats for Type 1 - Point (Continued)

Form	Description	TAB2	TAB3
12	Bearing/distance	Pointer to base point (1 = North, 2 = South) (1 = East, 2 = West) Degrees Minutes Seconds 4 variable names or 0	X,Y,Z Distance
13	On a curve at a parameter	Pointer to curve Variable name for parameter or 0	X,Y,Z Parameter
14	Surface point	Surface point form 1 Normal 2 Pierce 3 Curve - finite plane 4 Curve - surface 5 U,V parameter Pointer to surface Pointer to first base entity Pointer to base point (or 0) Pointer to curve Unused (= 0) Pointer to second base entity Unused (= 0) Pointer to pierce vector/line (or 0) Unused (= 0)	X,Y,Z NX,NY,NZ T,U,V (1,2) (3,4) (5) (1) (2) (3-5)
15	Spherical	Variable name for radius or 0 Variable name for Z-axis angle or 0 Variable name for X-axis angle or 0	X,Y,Z Radius Z-axis angle X-axis angle
16	Detail magnify	Pointer to original point	X,Y,Z XT,YT,ZT,R of circle detail magnified from XT,YT,ZT,R of circle detail magnified to
30	Axis origin	0	X,Y,Z

NOTE

NX,NY,NZ is the unit surface normal; T is the nonunit curve parameter at the curve-surface intersection; U,V are the unit surface parameters.

All integer data is used for associative regeneration. All real data following the Z coordinate is used for associative regeneration.

3.2 Type 2 - Line (Coordinate Values Are in Model Space)

Table 3-5 describes the TAB2 and TAB3 data formats for Type 2 - Line.

Table 3-5. TAB2 and TAB3 Data Formats for Type 2 - Line

Form	Description	TAB2	TAB3
1	Screen position or key in	Variable name for X1 or 0 Variable name for Y1 or 0 Variable name for Z1 or 0 Variable name for X2 or 0 Variable name for Y2 or 0 Variable name for Z2 or 0 (or none)	Eight words of basic line data
2	Join between two points	Pointer to point 1 Pointer to point 2	Eight words of basic line data
3	Tangent to two curves	Pointer to curve 1 Pointer to curve 2 Position indicator 1 point 1 Position indicator 2 point 2	Eight words of basic line data Position indicator Position indicator
4	Through a point, horizontal or vertical	Pointer to point H/V indicator 1 Horizontal 2 Vertical	Eight words of basic line data
5	Through a point, tangent to a curve	Pointer to point Pointer to curve Position indicator	Eight words of basic line data Indicator point
6	Through a point, at an angle to a line	Pointer to point Pointer to line Variable name for angle or 0 Variable name for distance or 0	Eight words of basic line data Angle Distance
7	Through a point, parallel to a line	Pointer to point Pointer to line	Eight words of basic line data
8	Through a point, perpendicular to a line	Pointer to point Pointer to line	Eight words of basic line data
9	Parallel to a line at a distance	Pointer to line Side indicator Variable name for distance or 0	Eight words of basic line data Distance

Table 3-5. TAB2 and TAB3 Data Formats for Type 2 - Line (Continued)

Form	Description	TAB2	TAB3
10	Parallel to a line, tangent to a curve	Pointer to curve Pointer to line Position indicator	Eight words of basic line data
11	Perpendicular to a line, tangent to a curve	Pointer to curve Pointer to line Position indicator	Eight words of basic line data
12	Line divided into n segments	Pointer to line Number of segments Current segment number Variable name or 0	Eight words of basic line data
13	Join between ends of two curves	Pointer to curve 1 Pointer to curve 2 Position indicator 1 Position indicator 2	Eight words of basic line data XT,YT indicator point 1 XT,YT indicator point 2
15	Axis	Axis indicator 1 Horizontal 2 Vertical	Eight words of basic line data
16	Chamfer	Pointer to line 1 Pointer to line 2 Trim indicator 1 Trim indicator 2 Variable name for distance or 0 Variable name for angle or 0	Eight words of basic line data Chamfer distance Angle WRT to line 1 XT, YT space point XT, YT trim side 1 XT, YT trim side 2
19	Detail magnify	Pointer to original line	Eight words of basic line data XT,YT,ZT,R of circle detail magnified from XT,YT,ZT,R of circle detail magnified to

All integer data is used for associative regeneration.

The eight words of real data are:

0.0 Start line parameter
1.0 End line parameter

X1, Y1, Z1 } Coordinates of first point

X2, Y2, Z2 } Coordinates of second point

3.3 Type 3 - Circle

Table 3-6 describes the TAB2 and TAB3 data formats for Type 3 - Circle.

Table 3-6. TAB2 and TAB3 Data Formats for Type 3 - Circle

Form	Description	TAB2	TAB3
1	Screen position or key in center and radius	Variable name for start angle or 0 Variable name for end angle or 0 Variable name for X or 0 Variable name for Y or 0 Variable name for Z or 0 Variable name for radius or 0 (or none)	Six words of basic arc/circle data
2	Center point and radius	Pointer to point Variable name for start angle or 0 Variable name for end angle or 0 Variable name for X or 0 Variable name for Y or 0 Variable name for Z or 0 Variable name for radius or 0	Six words of basic arc/circle data
3	Center point and tangent line	Pointer to point Pointer to line Variable name for start angle or 0 Variable name for end angle or 0 Variable name for X or 0 Variable name for Y or 0 Variable name for Z or 0 Variable name for radius or 0	Six words of basic arc/circle data
4	Center point and tangent circle	Pointer to point IN/OUT indicator Pointer to circle Variable name for start angle or 0 Variable name for end angle or 0 Variable name for X or 0 Variable name for Y or 0 Variable name for Z or 0 Variable name for radius or 0	Six words of basic arc/circle data
5	Center point and point on circumference	Pointer to point 1 Pointer to point 2 Variable name for start angle or 0 Variable name for end angle or 0 Variable name for X or 0 Variable name for Y or 0 Variable name for Z or 0 Variable name for radius or 0	Six words of basic arc/circle data

Table 3-6. TAB2 and TAB3 Data Formats for Type 3 - Circle (Continued)

Form	Description	TAB2	TAB3
6	Through three points	Pointer to point 1 Pointer to point 2 Pointer to point 3 6 variable names or 0	Six words of basic arc/circle data
7	Arc segment from existing circle	Pointer to circle 6 variable names or 0	Six words of basic arc/circle data
8	Tangent to two curves (fillet)	Pointer to curve 1 Pointer to curve 2 Trim indicator 1 Trim indicator 2 Position indicator 1 Position indicator 2 Variable name for start angle or 0 Variable name for end angle or 0 Variable name for X or 0 Variable name for Y or 0 Variable name for Z or 0 Variable name for radius or 0	Six words of basic arc/circle data X, Y } Center approximation X, Y } First trim end X, Y } Second trim end
9	Inscribed in three lines	Pointer to line 1 Pointer to line 2 Pointer to line 3 6 variable names or 0	Six words of basic arc/circle data
10	Normal to view	Pointer to center point Pointer to edge point 6 variable names or 0	Six words of basic arc/circle data X, Y, Z } Normal Vector Angle from center to edge point
11	Detail magnify	Pointer to original circle	Six words of basic arc/circle data XT,YT,ZT,R of circle detail magnified from XT,YT,ZT,R of circle detail magnified to

All integer data is used for associative regeneration.

The six words of real data are:

1. Start angle (radians)
2. End angle (radians)
3. XT
4. YT } Coordinates of center point
5. ZT
6. Radius

3.4 Type 4 - Conic

Tables 3-7 and 3-8 describe the TAB2 and TAB3 data formats for Type 4 - Conic.

Table 3-7. TAB2 Data Format for Type 4 - Conic

Word	Description
i	Type of conic (refer to types below)
i+1	Number of points to satisfy 0.001 crown height
i+2	Type of conic offset (only if TAB2(i)=1)

Table 3-8. TAB3 Data Format for Type 4 - Conic

Word		Description
j	t1	Initial parameter (0-2 pi for ellipse)
j+1	t2	Final parameter (0-2 pi for ellipse)
j+2	ZT	Z value (transform space)
j+3	XT1	Endpoint coordinates
j+4	YT1	
j+5	XT2	
j+6	YT2	
j+7	XT	Origin point in conic plane
j+8	YT	
j+9	k1	Coefficients of conic equation in a standard parametric form
j+10	k2	
j+11	SINA	Angle of rotation in conic plane
j+12	COSA	
j+13	OD	2-dimensional offset distance (only if TAB2(i)=1)

For offset ellipse:

< 0 Offset to the left
> 0 Offset to the right

For all other conics:

< 0 Offset to the right
> 0 Offset to the left

3.4 Type 4 - Conic

Type = 1 defines an offset conic.

Type = 2 defines an ellipse where:

$$X1 = (k2/SQRT(TAN^2(t)+k2^2/k1^2))*SIGN(COS(t))$$
$$Y1 = TAN(t)*X1$$

Type = 3 defines a parabola where:

$$X1 = t^2/k1$$
$$Y1 = t$$

Type = 4 defines a hyperbola where:

$$X1 = k1/COS(t)$$
$$Y1 = K2*TAN(t)$$

In all cases, output is generated by:

$$X = X1*COSA-Y1*SINA+XT$$
$$Y = X1*SINA+Y1*COSA+YT$$

3.5 Type 5 - Rotated Cubic Spline

The following describes the TAB2 and TAB3 data formats for Type 5 - Rotated Cubic Spline.

Form 1 - 2-D Spline

Form 2 - Offset 2-D Spline

Tables 3-9 and 3-10 describe the TAB2 and TAB3 data formats for forms 1 and 2.

Table 3-9. TAB2 Data Format for Form 1 - 2-D Spline and Form 2 - Offset 2-D Spline

Word	Description
i	Number of points defining original spline (n)
i+1	Number of points to approximate first segment to 0.001 crown height
.	
.	
.	
i+n-1	Number of points to approximate last segment to 0.001 crown height
i+n	Pointer to first point (= 0 if not defined by existing point)
.	
.	
.	
i+2*n-1	Pointer to nth point (= 0 if not defined by existing point)

Table 3-10. TAB3 Data Format for Form 1 - 2-D Spline and Form 2 - Offset 2-D Spline

Word	Description	
j	t1C	Initial parameter for complete curve, = 0 when created
j+1	t2C	Final parameter for complete curve
j+2	t2I	Final parameter for original curve
j+3	XT at t1C	
j+4	YT at t1C	
j+5	XT at t2C	
j+6	YT at t2C	
j+7	ZT	Depth of spline
j+8	DS	Offset distance < 0 Offset to the right > 0 Offset to the left
j+9	t11	Initial parameter for first segment
j+10	XT1	Coordinates of initial point of first segment
j+11	YT1	
j+12	O1	Rotation angle for first segment in radians
j+13	SI1	Slope at beginning of first segment
j+14	SF1	Slope at end of first segment
.		
.		
.		

NOTE

Slope is relative to the segment as rotated.

j+6*(n-1)+3	t1(n-1)	Initial parameter for last segment (n-first)
j+6*(n-1)+4	XT(n-1)	Coordinates of initial point for last segment
j+6*(n-1)+5	YT(n-1)	
j+6*(n-1)+6	O(n-1)	Rotation angle for last segment in radians
j+6*(n-1)+7	SI(n-1)	Slope at beginning of last segment
j+6*(n-1)+8	SF(n-1)	Slope at end of last segment
j+6*(n-1)+9	t2I	

The parameter must be chord length between defining points.

Form 3 - Detail Magnify

Tables 3-11 and 3-12 describe additional TAB2 and TAB3 data formats for Form 3 - Detail Magnify.

Table 3-11. Additional TAB2 Data Format for Form 3 - Detail Magnify

Word	Description
i+2*n	Pointer to the original spline

Table 3-12. Additional TAB3 Data Format for Form 3 - Detail Magnify

Word	Description
j+6*(n-1)+10 j+6*(n-1)+14	XT,YT,ZT,R of circle detail magnified from XT,YT,ZT,R of circle detail magnified to

Form 10 - Non-Regenerative 2-D Spline

The following information applies to data formats for Form 10 - Non-Regenerative 2-D Spline.

TAB2 does not include i+n...i+2*n-1

For each segment, k, and parameter, t: $(tlk \leq t \leq tl[k+1])$

$p = t - tlk$

$DT = tl[k+1] - tlk$
$A = (SIk+SFk)/(DT*DT)$
$B = (-2.0*SIk-SFk)/DT$
$COS = COSINE(Ok)$
$SIN = SIN(Ok)$

$q = A*p^3+B*p^2+SIk*p$

$X' = XTk+p*COS-q*SIN$
$Y' = YTk+p*SIN+q*COS$

$DIR = 3.0*A*p^2+2.0*B*p+SIk$
$DIRX = COS-DIR*SIN$
$DIRY = SIN+DIR*COS$
$DIST = (DIRX*DIRX+DIRY*DIRY)^{1/2}$

$XT = X'-DS*DIRY/DIST$
$YT = Y'+DS*DIRX/DIST$

3.6 Type 6 - Composite Curve

Tables 3-13 and 3-14 describe the TAB2 and TAB3 data formats for Type 6 - Composite Curve.

Table 3-13. TAB2 Data Format for Type 6 - Composite Curve

Word	Description
i	Number of subcurves (n)†
i+1	Pointer to first subcurve (< 0 if subcurve to be evaluated in reverse direction)
.	
.	
.	
i+n	Pointer to nth subcurve (< 0 if subcurve to be evaluated in reverse direction)

Table 3-14. TAB3 Data Format for Type 6 - Composite Curve

Word	Description
j	Start parameter = 0.0
j+1	End parameter = sum of chord lengths of n curves
j+2	Chord length of first curve
j+3	Sum of chord lengths of first two curves
.	
.	
.	
j+n+2	Sum of chord length of n curves

†Subcurves must be contiguous.

3.7 Type 7 - Vector

Table 3-15 describes the TAB2 and TAB3 data formats for Type 7 - Vector.

Table 3-15. TAB2 and TAB3 data formats for Type 7 - Vector

Form	Description	TAB2	TAB3
1	Screen position or absolute coordinates		15 words of basic vector data
2	Between two existing points	Pointer to point Pointer to point	15 words of basic vector data
3	Unit normal to a surface	Pointer to point	15 words of basic vector data
4	Scalar times an existing vector	Pointer to vector	15 words of basic vector data scalar
5	Cross product of two vectors	Pointer to vector Pointer to vector	15 words of basic vector data
6	Normalized vector	Pointer to vector Pointer to point	15 words of basic vector data
7	Length at given angle in given plane	Pointer to point	15 words of basic vector data angle length
8	Intersection of two planes	Pointer to plane Pointer to plane	15 words of basic vector data
9	Addition or subtraction of two vectors	Pointer to vector Pointer to vector Add = 1, Sub = 2	15 words of basic vector data
10	Through a point in ATANGL with line or vector	Pointer to point Pointer to line or vector	15 words of basic vector data angle length
12	Surface normal	Pointer to surface	15 words of basic vector data

The fifteen words of basic TAB3 vector data in model space are outlined in Table 3-16.

Table 3-16. Fifteen Words of Basic TAB3 Vector Data in Model Space

Word	Description	
j	X	Tail
j+1	Y	
j+2	Z	
j+3	X	Head
j+4	Y	
j+5	Z	
j+6	X	Unit vector of barb 1
j+7	Y	
j+8	Z	
j+9	X	Unit vector of barb 2
j+10	Y	
j+11	Z	
j+12	X	Unit vector of barb 3
j+13	Y	
j+14	Z	

3.8 Type 8 - Point Set

Tables 3-17 and 3-18 describe the TAB2 and TAB3 data formats for Type 8 - Point Set.

Table 3-17. TAB2 Data Format for Type 8 - Point Set

Word	Description
i	Number of points = n 4 Triangle 5 Rectangle 7 Hexagon

Table 3-18. TAB3 Data Format for Type 8 - Point Set

Word	Description
j	Start parameter = 1.0
j+1	End parameter = n.0
j+2	Z = Depth for this point set
j+3	X1
j+4	Y1
. . .	List of 2-D points defining this point set
j+2n+1	Xn
j+2n+2	Yn

NOTE

Form 1 defines a closed point set; form 2 defines an open point set.

3.9 Type 9 - 3-D Spline

The following describes the TAB2 and TAB3 data formats for Type 9 - 3-D Spline.

Form 11 - Standard Continuous 2nd Derivative 3-D Spline

Form 12 - Surface Intersection - Continuous 2nd Derivative 3-D Spline

Tables 3-19 and 3-20 describe the TAB2 and TAB3 data formats for forms 11 and 12.

Table 3-19. TAB2 Data Format for Form 11 - Standard Continuous 2nd Derivative 3-D Spline and Form 12 - Surface Intersection Continuous 2nd Derivative 3-D Spline

Word	Description
i	Number of points to approximate to 0.005 crown height
i+1	Unused
i+2	Unused
i+3	Number of points defining original spline
i+4	Pointer to first point (= 0 if not an existing POINT entity)
•	
•	
•	
i+n+3	Pointer to last point (= 0 if not an existing POINT entity)

Table 3-20. TAB3 Data Format for Form 11 - Standard Continuous 2nd Derivative 3-D Spline and Form 12 - Surface Intersection Continuous 2nd Derivative 3-D Spline

Word	Description	
j	Initial parameter of curve	
j+1	Final parameter of curve	
j+2	t_1	Parameter value at first defining point (= 0)
j+3	AX_1	Cubic coefficients defining X in first segment
j+4	BX_1	
j+5	CX_1	
j+6	DX_1	
j+7	AY_1	Cubic coefficients defining Y in first segment
j+8	BY_1	
j+9	CY_1	
j+10	DY_1	
j+11	AZ_1	Cubic coefficients defining Z in first segment
j+12	BZ_1	
j+13	CZ_1	
j+14	DZ_1	
j+15	t_2	Parameter value at second defining point
•		
•		
•		
j+13*(n-1)-11	tn-1	Parameter value at (n-1)th defining point
j+13*(n-1)-10	AXn-1	Cubic coefficients defining X in last segment
j+13*(n-1)-9	BXn-1	
j+13*(n-1)-8	CXn-1	
j+13*(n-1)-7	DXn-1	
j+13*(n-1)-6	AYn-1	Cubic coefficients defining Y in last segment
j+13*(n-1)-5	BXn-1	
j+13*(n-1)-4	CYn-1	
j+13*(n-1)-3	DYn-1	
j+13*(n-1)-2	AZn-1	Cubic coefficients defining Z in last segment
j+13*(n-1)-1	BZn-1	
j+13*(n-1)	CZn-1	
j+13*(n-1)+1	DZn-1	
j+13*n-11	tn	Parameter value at last defining point

Form 20 - Non-Regenerative Continuous Second Derivative Spline

For form 20, TAB2 does not include i+4...i+n+3.

All coefficients are stored in model space.

The parameter (T) is the cumulative chord length between defining points.

For each segment k and parameter T:

$$Tk \leq T \leq Tk+1$$
$$0.0 \leq u \leq 1.0$$
$$DT = (Tk+1 - Tk)$$

$$u = (T-Tk)/DT$$

$$X = AXk*u^3 + BXk*u^2 + CYk*u + DXk$$
$$Y = AYk*u^3 + BYk*u^2 + CYk*u + DYk$$
$$Z = AZk*u^3 + BZk*u^2 + CZk*u + DZk$$

$$X' = (3*AXk*u^2 + 2*BXk*u + CXk)/DT$$
$$Y' = (3*AYk*u^2 + 2*BYk*u + CYk)/DT$$
$$Z' = (3*AZk*u^2 + 2*BZk*u + CZk)/DT$$

DXk, DYk, DZk are the coordinates of the kth point.

The coordinates of the final point are:

$$Xn = AXn-1 + BXn-1 + CXn-1 + DXn-1$$
$$Yn = AYn-1 + BYn-1 + CYn-1 + DYn-1$$
$$Zn = AZn-1 + BZn-1 + CZn-1 + DZn-1$$

3.10 Type 10 - Machining Curve (Coordinate Values Are in Model Space)

Tables 3-21 and 3-22 describe the TAB2 and TAB3 data formats for Type 10 - Machining Curve.

Table 3-21. TAB2 Data Format for Type 10 - Machining Curve

Word	Description
i	Number of copious data pointers (=n)
i+1 . . . i+n	List of copious pointers

Table 3-22. TAB3 Data Format for Type 10 - Machining Curve

Word	Description
j	Start parameter = 1.0
j+1	End parameter = Number of points in machining curve

Form = 1 is a surface edge curve.
Form = 2 is a surface intersection curve.
Form = 3 is a draft curve to a depth.
Form = 4 is a draft curve to a surface or a machining curve.
Form = 5 is a fillet center path.
Form = 6 is a fillet edge path.

For forms 1, 2, 4, and 6, the unit (drive) surface normals are carried after each point.

3.11 Type 11 - String

Tables 3-23 and 3-24 describe the TAB2 and TAB3 data formats for Type 11 - String.

Table 3-23. TAB2 Data Format for Type 11 - String

Word	Description
i	n - number of clusters
i+1	Count of lines or arcs in 1st cluster (count <0 arc)
.	
.	
.	
i+N	Count of lines or arcs in last cluster

Table 3-24. TAB3 Data Format for Type 11 - String

Word		Description	
j	Z	Depth for this string	
	X1	Point 1	for each line cluster n lines long
	Y1		
	.		
	.		
	.		
	Xn+1	Point n+1	
	Yn+1		
	AGO		for each arc
	AEND		
	X		
	Y		
	R		

NOTE

Angles are stored in degrees.

3.12 Type 12 - Rectangular Array

Tables 3-25 and 3-26 describe the TAB2 and TAB3 data formats for Type 12 - Rectangular Array.

Table 3-25. TAB2 Data Format for Type 12 - Rectangular Array

Word	Description
i	Pointer to base entity
i+1	Number of X positions
i+2	Number of Y positions
i+3	Do-Don't list count = n
i+4	Do-Don't flag = 1 Don't; = 0 Do
i+5	Position #1
•	
•	
•	
i+2+n	Position #n-2

Table 3-26. TAB3 Data Format for Type 12 - Rectangular Array

Word	Description
j	X
j+1	Y
j+2	Z
j+3	DX distance
j+4	DY distance
j+5	Angle with horizontal (radians)

3.13 Type 13 - Circular Array

Tables 3-27 and 3-28 describe the TAB2 and TAB3 data formats for Type 13 - Circular Array.

Table 3-27. TAB2 Data Format for Type 13 - Circular Array

Word	Description
i	Pointer to base
i+1	Number of holes
i+2	Do-Don't list count = n
i+3	Do-Don't flag = 1 Don't; = 0 Do
•	
•	
•	
i+1+n	Position #n-2

Table 3-28. TAB3 Data Format for Type 13 - Circular Array

Word	Description
j	X
j+1	Y
j+2	Z
j+3	Radius
j+4	Start angle
j+5	Delta angle

3.14 Type 14 - Copious Data

The following describes the TAB2 and TAB3 data formats for Type 14 - Copious Data.

Form 0 - Standard Copious Data

Form 1 - N/C Toolpath Copious Data

Form 2 - N/C Tool Image Copious Data

Tables 3-29 and 3-30 describe the TAB2 and TAB3 data formats for form 0.

Table 3-29. TAB2 Data Format for Form 0 - Standard Copious Data

Word	Description
i	Display switch: 1 Doubles (XT,YT) 2 Triples (X,Y,Z model) 3 Sextuples Display odd triples (X,Y,Z)(NX,NY,NZ) normal 4 Sextuples Display even triples 5 Sextuples Display odd triples first then even triples with nondisplay of connecting line
i+1	Number of points in TAB3
i+2	Entity display: < 0 Don't display 0 Display as a complete entity (the whole curve is contained in this copious data) 1 Don't initialize display (the final curve segment is contained in this copious data) 2 Don't terminate display (the initial curve segment is contained in this copious data) 3 Don't initialize or terminate display (a middle curve segment is contained in this copious data)

Table 3-30. TAB3 Data Format for Form 0 - Standard Copious Data

Word	Description
j	X of first point (or DEPTH if TAB2(i) = 1)
.	
.	
.	

Form 1 - N/C Toolpath Copious Data

NOTE

Refer to Type 46 for additional information about N/C Toolpath Copious Data.

General rules:

A. Toolpath copious entities use a maximum of 256 TAB2 words and 256 TAB3 words.

B. Toolpath copious entities form a one-way linked list.

C. The sequence number of a toolpath copious entity must be greater than the sequence number of the next toolpath copious entity in the list.

D. All toolpath copious entities are stored with a view of definition of 1 (model space).

E. All integer and real data for a single toolpath statement are stored in one entity. If there is not enough room left in either TAB2 or TAB3 for an entire statement, a new copious must be created.

F. Each statement in a toolpath has a statement type, a line number, and optional character data. The statement types are:

1 - Unknown
2 - GOTO
3 - FROM
4 - GODLTA (not currently stored)
5 - GODLTA/D (not currently stored)
6 - CIRCLE
7 - CIRCLE/CCLW
8 - CIRCLE/CLW
9 - MULTAX/ON
10 - MULTAX/OFF
11 - CALL
12 - #CALL
13 - #STTOOL
14 - #STHOLD
15 - #ARCEND
16 - CALLX
17 - End-of-Macro

Tables 3-31 and 3-32 describe the TAB2 and TAB3 data formats for Form 1 - N/C Toolpath Copious Data.

Table 3-31. TAB2 Data Format for Form 1 - N/C Toolpath Copious Data

Word	Description
i	TAB1 pointer to the next toolpath copious entity or 0 for the last entity
i+1	Integer data for the toolpath statements
.	.
.	.
.	.
i+N-1	Integer data for the toolpath statements (N<=256)

Table 3-32. TAB3 Data Format for Form 1 - N/C Toolpath Copious Data

Word	Description
j	Real data for GOTO, FROM, and CIRCLE statements
.	.
.	.
.	.
j+M-1	Real data for GOTO, FROM, and CIRCLE statements (M<=256)

General rules for unknown, MULTAX, CALL, #CALL, #STTOOL, #STHOLD, #ARCEND, CALLX, and end-of-macro statements:

A. Text for the entire statement is stored in TAB2.

B. End-of-macro statements have no text data (N = 0 always).

C. A CALL or #CALL statement signals the start of a macro. A CALLX statement does not start a macro.

D. An end-of-macro statement signals the end of a macro and must always follow a CALL or #CALL statement.

E. Nested macros are not allowed.

F. Any types of statements except CALL, #CALL, and end-of-macro may appear in a macro.

G. Any number of statements may be in a macro, including none.

H. The line numbers of all macro statements are -1. This includes end-of-macro statements but does not include CALL or #CALL statements.

I. There is no TAB3 data for any of these statements.

Table 3-33 describes the TAB2 data format for Unknown, MULTAX, CALL, #CALL, #STTOOL, #STHOLD, #ARCEND, CALLX, and End-of-Macro statements.

Table 3-33. TAB2 Data Format for Unknown, MULTAX, CALL, #CALL, #STTOOL, #STHOLD, #ARCEND, CALLX, and End-of-Macro Statements

Word	Description
i	Statement type = 1, 9, 10, 11, 12, 13, 14, 15, 16, or 17
i+1	Line number = L; L=-1 for statements in a macro; otherwise, 1<=L<=99999
i+2	Number of characters of statement text = N, N>=0
i+3	Hollerith packed text, left justified
.	.
.	.
.	.
i+M+2	Hollerith packed text, left-justified M = (N+SYCPW-2)/SYCPW where SYCPW = system character per word

General rules for GOTO, FROM, and GODLTA statements:

NOTE

The GODLTA statement is currently not supported and is not stored in a toolpath, if GODLTA is added in the future it will have the following format.

A. All coordinates are transform with respect to the view of definition of the toolpath.

B. Text data stored for these statements is for appended comments only. For example, only ´ $$ START POINT´ would be stored for the statement:

```
GOTO/1,2,3 $$ START POINT
```

Tables 3-34 and 3-35 describe the TAB2 and TAB3 data formats for GOTO,FROM, and GODLTA statements.

Table 3-34. TAB2 Data Format for GOTO, FROM, and GODLTA Statements

Word	Description
i	Statement type = 2, 3, or 4
i+1	Line number = L; L=-1 for statements in a macro; otherwise, 1<=L<=99999
i+2	Number of characters of statement text = N, N>=0
i+3	Hollerith packed text, left justified
.	.
.	.
.	.
i+M+2	Hollerith packed text, left-justified M = (N+SYCPW-2)/SYCPW where SYCPW = system character per word

Table 3-35. TAB3 Data Format for GOTO, FROM, and GODLTA Statements

Word	Description
j	XT
j+1	YT (only XT,YT are stored for 2-D toolpaths)
j+2	ZT (only XT,YT,ZT are stored for 3-D toolpaths)
j+3	IT
j+4	JT
j+5	KT

General rules for GODLTA/D statements:

NOTE

The GODLTA/D statement is currently not supported and is not stored in a toolpath, if GODLTA/D is added in the future it will have the following format.

A. GODLTA/D is valid for 3-D and 6-D toolpaths only.

B. Text data stored for these statements is for appended comments only. For example, only ´ $$ DELTA MOVE´ would be stored for the statement:

```
GODLTA/1,2,3 $$ DELTA MOVE
```

Tables 3-36 and 3-37 describe the TAB2 and TAB3 data formats for GODLTA/D statements.

Table 3-36. TAB2 Data Format for GODLTA/D Statements

Word	Description
i	Statement type = 5
i+1	Line number = L; L=-1 for statements in a macro; otherwise, 1<=L<=99999
i+2	Number of characters of statement text = N, N $\geq$ 0
i+3	Hollerith packed text, left justified
.	.
.	.
.	.
i+M+2	Hollerith packed text, left-justified M = (N+SYCPW-2)/SYCPW where SYCPW = system character per word

Table 3-37. TAB3 Data Format for GODLTA/D Statements

Word	Description
j	D = distance of delta motion made along the previous tool axis

General rules for CIRCLE, CIRCLE/CCLW, and CIRCLE/CLW statements:

A. All coordinates are transform with respect to the view of definition of the toolpath.

B. Text data stored for these statements is for appended comments only. For example, only ´ $$ CIRCLE C1´ would be stored for the statement:

```
CIRCLE/1,2,3,0,0,1,5,CCLW $$ CIRCLE C1
```

C. Clockwise (CLW) and counterclockwise (CCLW) are with respect to a right-hand coordinate system oriented along the circle vector.

D. For 2-D toolpaths a circle vector of (0,0,1) is assumed.

Tables 3-38 through 3-40 describe the various TAB2 and TAB3 data formats for CIRCLE, CIRCLE/CCLW, and CIRCLE/CLW statements.

Table 3-38. TAB2 Data Format for CIRCLE, CIRCLE/CCLW, and CIRCLE/CLW Statements

Word	Description
i	Statement type = 6, 7, or 8
i+1	Line number = L; L=-1 for statements in a macro; otherwise, 1<=L<=99999
i+2	Number of characters of statement text = N, N>=0
i+3	Hollerith packed text, left justified
.	.
.	.
.	.
i+M+2	Hollerith packed text, left-justified M = (N+SYCPW-2)/SYCPW where SYCPW = system character per word

Table 3-39. Two-Dimensional TAB3 Data Format for CIRCLE, CIRCLE/CCLW, and CIRCLE/CLW Statements

Word	Description
j	XT = circle center point
j+1	YT
j+2	R = circle radius
j+3	Unused
j+4	Unused
j+5	Unused
j+6	Unused

Table 3-40. Three-Dimensional and Six-Dimensional TAB3 Data Format for CIRCLE, CIRCLE/CCLW, and CIRCLE/CLW Statements

Word	Description
j	XT = circle center point
j+1	YT
j+2	ZT
j+3	IT = circle vector
j+4	JT
j+5	KT
j+6	R = circle radius

Form 2 - N/C Tool Image Copious Data

NOTE

Refer to Type 49 for additional information about N/C Copious Data.

General rules:

A. Tool image copious entities use a maximum of 255 TAB3 words.

B. Tool image copious entities form a one-way linked list.

C. The sequence number of a tool image copious entity must be greater than the sequence number of the next tool image copious entity in the list.

D. All tool image copious entities are stored with a view of definition of 1 (model space).

Tables 3-41 and 3-42 describe the TAB2 and TAB3 data formats for form 2.

Table 3-41. TAB2 Data Format for Form 2 - N/C Tool Image Copious Data

Word	Description
i	TAB1 pointer to next copious entity (0 = the last entity)

Table 3-42. TAB3 Data Format for Form 2 - N/C Tool Image Copious Data

Word	Description
j	Number of line segments (k) in the point set
j+1	Indicator that the first point in the point set is connected to the last in the previous point set: 0 No 1 Yes
j+2	Zero
j+3	X of first point in point set
j+4	Y of first point in point set
j+5	Z of first point in point set
.	
.	
.	
j+k*3	X of final point in point set
j+k*3+1	Y of final point in point set
j+k*3+2	Z of final point in point set

NOTE

Form 2 entities use a maximum of 255 TAB3 words.

3.15 Type 15 - Group

The following describes the TAB2 data formats for Type 15 - Group.

Form 1 - Standard Group

Form 2 - Balloon

Form 3 - Surface Texture Symbol

Form 4 - Datum Target Symbol

NOTE

Forms 32-63 are reserved for IGES.

Table 3-43 describes the TAB2 data format for all forms.

Table 3-43. TAB2 Data Format for All Forms of Type 15 - Group

Word	Description
i	Count of entities
i+1 . . . i+n	Pointer to entity #n

Form 2 - Balloon

Table 3-44 describes an additional TAB2 data format for Form 2 - Balloon.

Table 3-44. Additional TAB2 Data Format for Form 2 - Balloon

Word	Description
i	Count of entities
i+1	Pointer to arc #1
i+2	Pointer to leader (point set)
i+3	Pointer to cross-line if present (point set)
i+4	Pointer to upper text or only text (general note)
i+5	Pointer to lower text (general note)
i+6	Pointer to arc #2
i+7	Pointer to cross-line #2 if present
i+8	Pointer to upper text or only text
i+9	Pointer to lower text
i+10	Pointer to arc #3

Form 4 - Datum Target Symbol

Table 3-45 describes an additional TAB2 data format for Form 4 - Datum Target Symbol.

Table 3-45. Additional TAB2 Data Format for Form 4 - Datum Target Symbol

Word	Description
i	Count of entities
i+1	Pointer to arc #1
i+2	Pointer to leader (point set)
i+3	Pointer to cross-line (point set)
i+4	Pointer to lower text (general note)
i+5	Pointer to upper text (general note)
i+6	Pointer to point set if point or line delineation, arc if circle delineation
i+7	Point set if point delineation, section lining if circle delineation
i+8	Pointer to arc #2
i+9	Pointer to cross-line
i+10	Pointer to lower text
i+11	Pointer to arc #3

3.16 Type 16 - GRAPL Variables

Tables 3-46 and 3-47 describe the TAB2 and TAB3 data formats for Type 16 - GRAPL Variables.

Table 3-46. TAB2 Data Format for Type 16 - GRAPL Variables

Word	Description	
1	Next available TAB2 index + 1	(initially 3)
2	First variable name	(initially 3)
3	Second variable name	(initially 0)
•		
•		
•		

Table 3-47. TAB3 Data Format for Type 16 - GRAPL Variables

Word	Description	
1	Next available TAB3 index + 1	(initially 3.0)
2	First value (initially 3.0)	
3	Second value	(initially 0.0)
•		
•		
•		

3.17 Type 17 - Reserved for Future System Use

3.18 Type 18 - Plane

Tables 3-48 and 3-49 describe the TAB2 and TAB3 data formats for Type 18 - Plane.

Table 3-48. TAB2 Data Format for Type 18 - Plane

Word	Description
i	TAB1 pointer to one boundary line
i+1	TAB1 pointer to opposite boundary line
i+2	Number of paths in U-direction
i+3	Number of paths in V-direction
i+4	Number of points/U-path
i+5	Number of points/V-path
i+6	Number of copious entities
i+7	Pointer to first copious entity
•	
•	
•	

Table 3-49. TAB3 Data Format for Type 18 - Plane

Word	Description	
j	UMIN	0.0
j+1	VMIN	0.0
j+2	UMAX	1.0
j+3	VMAX	1.0
j+4	Start parameter first curve	0.0
j+5	End parameter first curve	1.0
j+6	Start parameter second curve	0.0
j+7	End parameter second curve	1.0
j+8	A	Coefficient for the form Ax+By+Cz+D=0
j+9	B	
j+10	C	
j+11	D	

NOTE

Center point and corner point do not necessarily lie in the plane.

Form:

1 Coefficients
2 Through three points
3 Through a point parallel to a plane
4 Parallel to a plane at a distance
5 Through a point, perpendicular to a vector
6 Through two points, perpendicular to a plane
7 Through a point, perpendicular to two planes
8 Two lines

3.19 Type 19 - Surfaces of Revolution

The following describes the TAB2 and TAB3 data formats for Type 19 - Surfaces of Revolution.

Form 0 - Standard Surface of Revolution

Tables 3-50 and 3-51 describe the TAB2 and TAB3 data formats for Form 0 - Standard Surface of Revolution.

Table 3-50. TAB2 Data Format for Form 0 - Standard Surface of Revolution

Word	Description
i	TAB1 pointer to generator curve
i+1	Number of paths in U-direction
i+2	Number of paths in V-direction
i+3	Number of points/U-path
i+4	Number of points/V-path
i+5	Number of copious entities
i+6	Pointer to first copious entity
•	
•	
•	

Table 3-51. TAB3 Data Format for Form 0 - Standard Surface of Revolution

Word	Description
j	UMIN Start parameter of generator curve
j+1	VMIN Start angle of revolution in radians
j+2	UMAX End parameter
j+3	VMAX End angle
j+4 j+5 j+6	Unit vector defining axis of revolution
j+7 j+8 j+9	Point on axis of revolution

Form 1 - Sphere Screen Position or Keyed In

Form 2 - Sphere at Existing Point

Tables 3-52 and 3-53 describe the TAB2 and TAB3 data formats for forms 1 and 2.

Table 3-52. TAB2 Data Format for Form 1 - Sphere Screen Position or Keyed In and Form 2 - Sphere at Existing Point

Word	Description
i	TAB1 pointer to arc defining top profile
i+1	Number of paths in U-direction
i+2	Number of paths in V-direction
i+3	Number of points/U-path
i+4	Number of points/V-path
i+5	Number of copious entities
i+6	Pointer to first copious entity
.	
.	
.	

Table 3-53. TAB3 Data Format for Form 1 - Sphere Screen Position or Keyed In and Form 2 - Sphere at Existing Point

Word	Description
j	UMIN Start angle of equator in radians
j+1	VMIN Start angle of circumference in radians
j+2	UMAX End angle, equator
j+3	VMAX End angle, circumference
j+4 j+5 j+6	Unit vector defining main diameter
j+7 j+8 j+9	Center of sphere
j+10	Radius

Form 11 - Cylinder through Existing Line

Form 12 - Cylinder through Screen Positions

Form 13 - Cylinder through Existing Points

Form 14 - Cylinder through Existing Point with Delta Extent

Form 15 - Cylinder by Existing Arc

Tables 3-54 and 3-55 describe the TAB2 and TAB3 data formats for forms 11, 12, 13, 14, and 15.

Table 3-54. TAB2 Data Format for Forms 11-15 of Type 19 - Surfaces of Revolution

Word	Description
i	TAB1 pointer to line parallel to axis a distance R away
i+1	Number of paths in U-direction
i+2	Number of paths in V-direction
i+3	Number of points/U-path
i+4	Number of points/V-path
i+5	Number of copious entities
i+6	Pointer to first copious entity
.	
.	
.	

Table 3-55. TAB3 Data Format for Forms 11-15 of Type 19 - Surfaces of Revolution

Word	Description
j	UMIN 0.0
j+1	VMIN Start angle of revolution in radians
j+2	UMAX Parameter defining extent of outline line
j+3	VMAX End angle of rotation in radians
j+4 j+5 j+6	Unit vector defining axis of revolution
j+7 j+8 j+9	Base center point
j+10	Radius

Form 21 - Torus through Screen Positions

Form 22 - Torus through Existing Points

Tables 3-56 and 3-57 describe the TAB2 and TAB3 data formats for forms 21 and 22.

Table 3-56. TAB2 Data Format for Form 21 - Torus Through Screen Positions and Form 22 - Torus Through Existing Points

Word	Description
i	TAB1 pointer to circle defining cross-section
i+1	Number of paths in U-direction
i+2	Number of paths in V-direction
i+3	Number of points/U-path
i+4	Number of points/V-path
i+5	Number of copious entities
i+6	Pointer to first copious entity
•	
•	
•	

Table 3-57. TAB3 Data Format for Form 21 - Torus Through Screen Positions and Form 22 - Torus Through Existing Points

Word	Description
j	UMIN Start angle of cross-section circle = 0.0
j+1	VMIN Start angle of revolution = 0.0
j+2	UMAX End angle of cross-section circle = 2*pi
j+3	VMAX End angle of revolution = 2*pi
j+4 j+5 j+6	Unit vector defining axis of revolution
j+7 j+8 j+9	Center point
j+10	Inner radius
j+11	Outer radius

Form 31 - Cone through Existing Line

Form 32 - Cone through Screen Positions

Form 33 - Cone through Existing Points

Tables 3-58 and 3-59 describe the TAB2 and TAB3 data formats for forms 31, 32, and 33.

Table 3-58. TAB2 Data Format for Forms 31-33 of Type 19 - Surfaces of Revolution

Word	Description
i	TAB1 pointer to outline generator line
i+1	Number of paths in U-direction
i+2	Number of paths in V-direction
i+3	Number of points/U-path
i+4	Number of points/V-path
i+5	Number of copious entities
i+6	Pointer to first copious entity
•	
•	
•	

Table 3-59. TAB2 Data Format for Forms 31-33 of Type 19 - Surfaces of Revolution

Word	Description
j	UMIN Start parameter of outline line
j+1	VMIN Start angle of revolution in radians
j+2	UMAX End parameter of outline line
j+3	VMAX End angle
j+4 j+5 j+6	Unit vector defining axis of revolution
j+7 j+8 j+9	Vertex point
j+10	Half angle in radians
j+11	Small radius
j+12	Height

3.20 Type 20 - Tabulated Cylinder

Tables 3-60 and 3-61 describe the TAB2 and TAB3 data formats for Type 20 - Tabulated Cylinder.

Table 3-60. TAB2 Data Format for Type 20 - Tabulated Cylinder

Word	Description
i	TAB1 pointer to generator curve
i+1	Number of paths in U-direction
i+2	Number of paths in V-direction
i+3	Number of points/U-path
i+4	Number of points/V-path
i+5	Number of copious entities
i+6	Pointer to first copious entity
•	
•	
•	

Table 3-61. TAB3 Data Format for Type 20 - Tabulated Cylinder

Word	Description
j	UMIN Start parameter of generator curve
j+1	VMIN Start offset
j+2	UMAX End parameter
j+3	VMAX End offset
j+4 j+5 j+6	Directrix unit vector

3.21 Type 21 - Ruled/Developable Surface

The following describes the TAB2 and TAB3 data formats for Type 21 - Ruled/Developable Surface.

Form 1 - Ruled Surface

Form 2 - Developable Surface

Tables 3-62 and 3-63 describe the TAB2 and TAB3 data formats for forms 1 and 2.

Table 3-62. TAB2 Data Format for Form 1 - Ruled Surface and Form 2 - Developable Surface

Word	Description
i	TAB1 pointer to first curve
i+1	TAB1 pointer to second curve
i+2	Number of paths in U-direction
i+3	Number of paths in V-direction
i+4	Number of points/U-path
i+5	Number of points/V-path
i+6	Number of copious entities
i+7	Pointer to first copious entity
•	
•	
•	

Table 3-63. TAB3 Data Format for Form 1 - Ruled Surface and Form 2 - Developable Surface

Word	Description
j	UMIN
j+1	VMIN
j+2	UMAX
j+3	VMAX
j+4	Start parameter first curve
j+5	End parameter first curve
j+6	Start parameter second curve
j+7	End parameter second curve

3.22 Type 22 - Curve Mesh Surface

The following describes the TAB2 and TAB3 data formats for Type 22 - Curve Mesh Surface.

Form 0 - Curve Mesh with Twist Vectors (Pre-Version 1.4)

Form 1 - Curve Mesh with Twist Vectors (Post-Version 1.4)

Form 2 - Curve Mesh Linearly Blended

Tables 3-64 and 3-65 describe the TAB2 and TAB3 data formats for forms 0, 1, and 2.

Table 3-64. TAB2 Data Format for Forms 1-3 of Type 22 - Curve Mesh Surface

Word	Description
i	TAB1 pointer to copious data storage (= 0 if form 2)
i+1	Number of fixed curves, f
i+2	Number of variable curves, v
i+3	TAB1 pointer to first fixed curve
•	
•	
•	
i+2+f	TAB1 pointer to fth fixed curve
i+3+f	TAB1 pointer to first variable curve
•	
•	
•	
i+2+f+v	TAB1 pointer to vth variable curve
i+3+f+v	Number of paths in U-direction
i+4+f+v	Number of paths in V-direction
i+5+f+v	Number of points/U-path
i+6+f+v	Number of points/V-path
i+7+f+v	Number of copious entities
i+8+f+v	Pointer to first copious entity
•	
•	
•	

Table 3-65. TAB3 Data Format for Forms 1-3 of Type 22 - Curve Mesh Surface

Word	Description
j	UMIN = 0.0
j+1	VMIN = 0.0
j+2	UMAX = f-1.0
j+3	VMAX = v-1.0
j+4	U parameter at grid point #1
j+5	V parameter at grid point #1
j+6	U parameter at grid point #2
j+7	V parameter at grid point #2
.	
.	
.	
j+2+2*v*f	U parameter at grid point #v*f
j+3+2*v*f	V parameter at grid point #v*f

The following words are present only in form 0 and form 1:

j+4+2*v*f	Twist vector at grid point #1
.	
.	
.	
j+7+2*v*f	Twist vector at grid point #2
.	
.	
.	
j+1+5*v*f	Twist vector at grid point #v*f

Grid points are numbered consecutively from UMIN, VMIN, to UMAX, VMIN

. . . .
. . . .
. . . .

to UMIN, VMAX, to UMAX, VMAX

U parameter varies along variable curves. V parameter varies along fixed curves.

3.23 Type 23 - Fillet Surface

Tables 3-66 and 3-67 describe the TAB2 and TAB3 data formats for Type 23 - Fillet Surface.

Table 3-66. TAB2 Data Format for Type 23 - Fillet Surface

Word	Description
i	Pointer to center curve
i+1	Pointer to first edge (on drive surface)
i+2	Pointer to second edge (on check surface)
i+3	Number of paths in U-direction
i+4	Number of paths in V-direction
i+5	Number of points/U-path
i+6	Number of points/V-path
i+7	Number of copious entities
i+8	Pointer to first copious entity
•	
•	
•	

Table 3-67. TAB3 Data Format for Type 23 - Fillet Surface

Word	Description
j	UMIN 1.0
j+1	VMIN 0.0
j+2	UMAX Number of points in center curve
j+3	VMAX 1.0
j+4	Start radius
j+5	End radius

3.24 Type 24 - Reserved for Future System Use

3.25 Type 25 - Reserved for Future System Use

3.26 Type 26 - Reserved for Bezier Surface

3.27 Type 27 - Reserved for Future System Use

3.28 Type 28 - Offset Surface

Tables 3-68 and 3-69 describe the TAB2 and TAB3 data formats for Type 28 - Offset Surface.

Table 3-68. TAB2 Data Format for Type 28 - Offset Surface

Word	Description
i	Pointer to base surface
i+1	Number of paths in U-direction
i+2	Number of paths in V-direction
i+3	Number of points/U-path
i+4	Number of points/V-path
i+5	Number of copious data pointers
i+6	Pointer to first copious entity
•	
•	
•	

Table 3-69. TAB3 Data Format for Type 28 - Offset Surface

Word	Description
j	UMIN
j+1	VMIN
j+2	UMAX
j+3	VMAX
j+4	Normal offset distance

3.29 Type 29 - Composite Surface

The following describes the TAB2 and TAB3 data formats for Type 29 - Composite Surface.

Form 1 - Edge Connect

Tables 3-70 and 3-71 describe the TAB2 and TAB3 data formats for Form 1 - Edge Connect.

Table 3-70. TAB2 Data Format for Form 1 - Edge Connect

Word	Description
i	Number of surfaces (= n)
i+1	Pointer to first (leftmost) surface
i+2	UMIN edge number
i+3 • • • i+3*n-2	VMIN edge number Pointer to nth (rightmost) surface
i+3*n-1	UMIN edge number
i+3*n	VMIN edge number
i+3*n+1	Number of paths in U-direction
i+3*n+2	Number of paths in V-direction
i+3*n+3	Number of points/U-path
i+3*n+4	Number of points/V-path
i+3*n+5	Number of copious entities
i+3*n+6 • • •	Pointer to first copious entity

Table 3-71. TAB3 Data Format for Form 1 - Edge Connect

Word	Description
j	UMIN (= 0)
j+1	VMIN (= 0)
j+2	UMAX (= 1)
j+3	VMAX (= 1)

3.30 Type 30 - Curve Driven Surface

The following describes the TAB2 and TAB3 data formats for Type 30 - Curve Driven Surface.

Table 3-72. TAB2 Data Format for Type 30 - Curve Driven Surface

Word	Description
i	Boundary curve = 0 Circle of specified radius (TAB3(j+10)) ≠ 0 Pointer to boundary curve
i+1	Pointer to centerline curve
i+2	Number of paths in U-direction
i+3	Number of paths in V-direction
i+4	Number of points in U-direction
i+5	Number of points in V-direction
i+6	Number of copious display entities
i+7 . . .	Pointer to first copious display entity

Table 3-73. TAB3 Data Format for Type 30 - Curve Driven Surface

Word	Description
j	UMIN t of boundary curve
j+1	VMIN t of centerline curve
j+2	UMAX
j+3	VMAX
j+4 j+5 j+6	Unit vector defining axis vector at origin point of centerline curve in model space
j+7 j+8 j+9	Point at origin of centerline curve in model space
j+10	Radius of boundary curve [only used when TAB2(i) = 0]

NOTE

Form 1 is for circular boundaries of specified radius; Form 2 is for a user-selected boundary curve.

3.31 Type 31 - Bezier Curve

The following describes the TAB2 and TAB3 data formats for Type 31 - Bezier Curve.

Form 1 - Polygon Definition/Non-Regenerative

Form 2 - Interpolation/Approximation

Form 3 - Blending

Form 4 - Conversion

Form 5 - Dupl and Truncate/Extend

Tables 3-74 and 3-75 describe the TAB2 and TAB3 data formats for forms 1, 2, 3, 4, and 5.

Table 3-74. TAB2 Data Format for All Forms of Type 31 - Bezier Curve

Word	Description
i	Dimension (=n+1)
i+1	Description: 0 Curve is a point 1 Curve is linear 2 Curve is planar 3 Curve is spatial
i+2-i+7	Varies by form (see below)

Table 3-75. TAB3 Data Format for All Forms of Type 31 - Bezier Curve

Word	Description
j	Start parameter (=0.0)
j+1	End parameter (=1.0)
j+2	Ratio for display
j+3	AX0
.	. } Polynomial coefficients for x
.	. }
.	. }
j+3+n	AXn
j+4+n	AY0
.	. } Polynomial coefficients for y
.	. }
.	. }
j+4+2n	AYn
j+5+2n	AZ0
.	. } Polynomial coefficients for z
.	. }
.	. }
j+5+3n	AZn

NOTE

Additional information is stored and listed by form (number).

Form 2 - Interpolation/Approximation

Table 3-76 describes an additional TAB2 data format for Form 2 - Interpolation/ Approximation.

Table 3-76. Additional TAB2 Data Format for Form 2 - Interpolation/Approximation

Word	Description
i+2	TAB1 pointer to data point set (type 60) (= 0 if set was deleted or not saved)
i+3	TAB1 pointer to data structure set (type 61) (= 0 if set was deleted or not saved)

Form 3 - Blending

Table 3-77 describes an additional TAB2 data format for Form 3 - Blending.

Table 3-77. Additional TAB2 Data Format for Form 3 - Blending

Word	Description
i+2	TAB1 pointer to first curve
i+3	TAB1 pointer to second curve
i+4	Position indicator first curve
i+5	Connection type first curve: 1 Tangent direction 2 Tangent direction and curvature
i+6	Position indicator second curve
i+7	Connection type second curve (same as above)

Form 4 - Conversion

Tables 3-78 and 3-79 describe additional TAB2 and TAB3 data formats for Form 4 - Conversion.

Table 3-78. Additional TAB2 Data Format for Form 4 - Conversion

Word	Description
i+2	TAB1 pointer to original curve

Table 3-79. Additional TAB3 Data Format for Form 4 - Conversion

Word	Description
j+6+3n	Start parameter (original curve)
j+7+3n	End parameter

Form 5 - Dupl and Truncate/Extend

Tables 3-80 and 3-81 describe additional TAB2 and TAB3 data formats for Form 5 - Dupl and Truncate/Extend.

Table 3-80. Additional TAB2 Data Format for Form 5 - Dupl and Truncate/Extend

Word	Description
i+2	TAB1 pointer to original curve

Table 3-81. Additional TAB3 Data Format for Form 5 - Dupl and Truncate/Extend

Word	Description
j+6+3n	Start parameter (original curve)
j+7+3n	End parameter

All coefficients are stored in model space (EC(5)=IVIEW(8)).

The curve is evaluated as a polynomial:

$0.0 \leq T \leq 1.0$

$$X(T) = \text{Sum}(AXi*T**i) \quad i=0,n$$
$$= AX0+AXI*T+ \ldots +AXn*T**n$$

with similar expressions for the Y and Z coordinates of the point.

The curve tangent is found by differentiating the X(T), Y(T) and Z(T) functions:

$$DX(T) = \text{Sum}(AXI*T**(I-1)) \; I=1,n$$
$$= AX1+AX2*T+ \ldots +AXn*T**(n-1)$$

with similar expressions for the DY and DZ components of the tangent.

The coordinates of the start point are:

SPT = (AX0, AY0, AZ0).

The coordinates of the end point are:

EPT = (AX0 + AX1+ ... + AXn,
AX0 + AY1+ ... + AYn,
AZ0 + AZ1+ ... + AZn)

3.32 Type 32 - Linear Dimension

The following describes the TAB2 and TAB3 data formats for Type 32 - Linear Dimension.

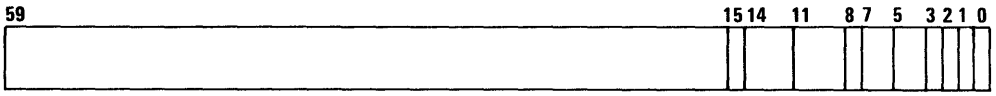
Form 0 - Standard Linear Dimension

Form 2 - Rectangular Coordinate Dimension

Tables 3-82 and 3-83 describe the TAB2 and TAB3 data formats for forms 0 and 2.

Table 3-82. TAB2 Data Format for Form 0 - Standard Linear Dimension and Form 2 - Rectangular Coordinate Dimension

Word	Description
i	Orientation switch: 1 Horizontal 2 Vertical 3 Parallel 4 Parallel/normal 5 Thickness
i+1	Witness line/dimension line suppression:

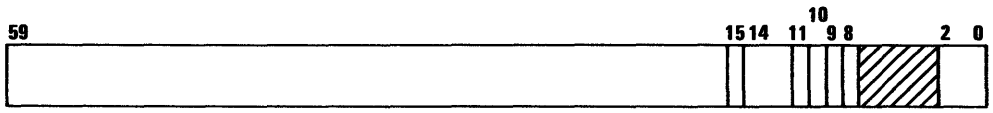


Bit	Description
0	Suppress first extension line (= 1)
1	Suppress second extension line (= 1)
2	Suppress first dimension line (= 1)
3	Suppress second dimension line (= 1)
4-5	First arrowhead: 0 Open triangle 1 Open circle
6-7	Second arrowhead: 0 Open triangle 1 Open circle
8	Text generation: 0 Original text automatic 1 Original text user entered
9-11	Section lining material
12-14	Text origin mode
15	Dimension not to scale: 0 Does not contain dimension not to scale symbol 1 Contains dimension not to scale symbol

Table 3-82. TAB2 Data Format for Form 0 - Standard Linear Dimension and Form 2 - Rectangular Coordinate Dimension (Continued)

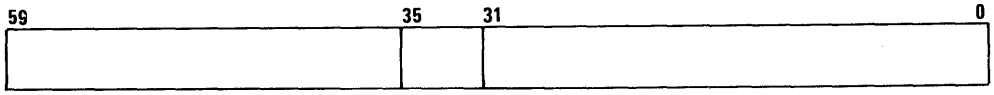
Word	Description

i+2 Text arrow control:

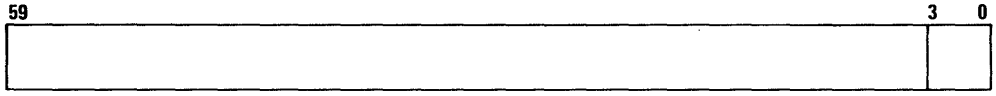


Bit	Description
0-2	Text/arrows: 0 Text in, arrows in 1 Text in, arrows out 2 Text out, arrows out 3 Text out, arrows in
3-7	Unused
8	Tail: 0 Tail on first 1 Tail on second
9	Tail points: 0 Tail points left 1 Tail points right
10	Decimal/fraction mode: 0 Decimal 1 Fraction
11	Arrowhead alignment: 0 No to arrowhead alignment 1 Yes to arrowhead alignment
12-14	Added symbols: 0 Contains no added symbol 1 Contains diameter symbol 2 Contains radius symbol 3 Contains square symbol
15	Repetitive feature text: 0 Contains no repetitive feature text 1 Contains repetitive feature text

Table 3-82. TAB2 Data Format for Form 0 - Standard Linear Dimension and Form 2 - Rectangular Coordinate Dimension (Continued)

Word	Description
i+3	

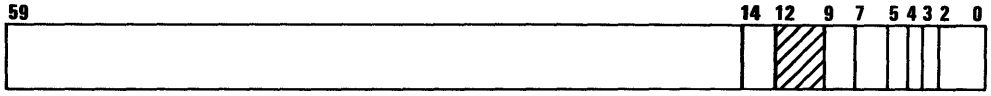
Bit	Description
0-31	Character count
32-35	Character set type
36-59	Character set name

i+4	Character string (n words)
i+4+n	Pointer to first entity
i+4+n+1	Position indicator to first entity†
i+4+n+2	Pointer to second entity
i+4+n+3	Position indicator to second entity†
i+4+n+4	Pointer to point/dimension if text origin is delta
i+4+n+5	Pointer to alignment dimension if alignment was used
i+4+n+6	Drafting decimal places
i+4+n+7	

Bit	Description
0-3	Dual dimension decimal places

†If pointer to the first entity is equal to pointer to the second entity, then the number position indicators are given.

Table 3-82. TAB2 Data Format for Form 0 - Standard Linear Dimension and Form 2 - Rectangular Coordinate Dimension (Continued)

Word	Description
i+4+n+8	

Bit	Description
0-2	Text justification
3	Standard/dual
4	Limits on primary text
5	Limits on secondary text
6-7	Dual dimensioning method: 0 Bracket and position 1 Bracket only 2 Position only
8-9	Text dimension placement: 0 Middle (between dimension line) 1 Above dimension line 2 Below dimension line
10-12	Unused
13-14	Dimension text angle: 0 Horizontal 1 Parallel (linear dimensions only)

Table 3-83. TAB3 Data Format for Form 0 - Standard Linear Dimension and Form 2 - Rectangular Coordinate Dimension

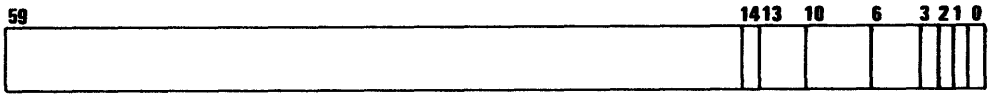
Word	Description
j j+1	Coordinates of text origin
j+2	Character size
j+3 j+4	Coordinate of origin point of first extension line
j+5 j+6	Coordinates of origin point of second extension line
j+7	Length of first extension line to arrowhead
j+8	Length of second extension line to arrowhead
j+9 j+10	Unit vector in direction of extension lines
j+11	Length of first arrow
j+12	Length of second arrow
j+13 j+14	Offset point from text for tail
j+15	Depth
j+16	Primary limit difference #1 (limit #1 - length) or first tolerance
j+17	Primary limit difference #2 (limit #2 - length) or second tolerance
j+18	Draft scale
j+19	Spacing ratio
j+20	Aspect ratio
j+21	Downspace ratio
j+22	Tolerance and fraction ratio
j+23	Arrowhead length
j+24	Distance from text to dimension
j+25	Extension offset distance
j+26	Extension dimension distance
j+27	Delta x if delta form of text origin
j+28	Delta y if delta form of text origin
j+29	Length

3.33 Type 33 - Radius Dimension

Tables 3-84 and 3-85 describe the TAB2 and TAB3 data formats for Type 33 - Radius Dimension.

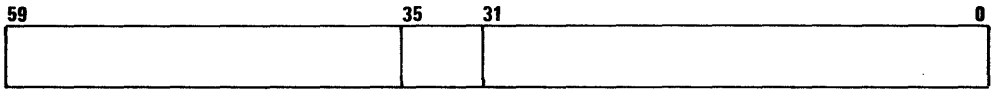
Table 3-84. TAB2 Data Format for Type 33 - Radius Dimension

Word	Description
i	Tail orientation:



Bit	Description
0	From text: 0 From start of text 1 From end of text
1	Line to center: 0 For line to center 1 For no line to center
2	Decimal/fraction mode: 0 Decimal 1 Fraction
3	Text: 0 Automatic text 1 User entered text
4-6	Section lining material
7-10	Text origin mode
11-13	Character set type
14	Dual dimension

i+1



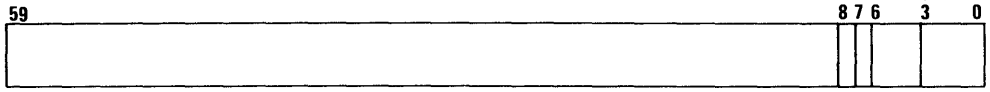
Bit	Description
0-31	Character count
32-35	Character set type
36-59	Character set name

i+2	Character string (n words)
i+2+n	Pointer to circle
i+3+n	Pointer to point/dimension if text origin is delta
i+4+n	Decimal places

Table 3-84. TAB2 Data Format for Type 33 - Radius Dimension (Continued)

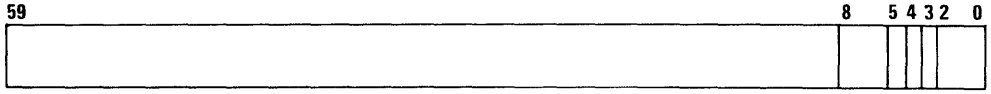
Word	Description

i+5+n



Bit	Description
0-3	Dual dimension decimal places
4-6	Added symbols: 0 Contains no added symbol 5 Contains spherical radius
7	Repetitive feature text: 0 Contains no repetitive feature text 1 Contains repetitive feature text
8	Dimension not to scale: 0 Does not contain dimension not to scale symbol 1 Contains dimension not to scale symbol

i+6+n



Bit	Description
0-2	Text justification
3	Standard/dual
4	Limits on primary text
5	Limits on secondary text
6-8	Dual dimensioning method 0 Bracket and position 1 Bracket only 2 Position only

Table 3-85. TAB3 Data Format for Type 33 - Radius Dimension

Word	Description
j	XT ⎫ Coordinates of text origin
j+1	YT ⎭
j+2	Character size
j+3	XT ⎫ Point on circle that dimension line touches
j+4	YT ⎭
j+5	XT Coordinate of endpoint of tail away from text
j+6	XT ⎫ Endpoint of tail nearest text
j+7	YT ⎭
j+8	XT ⎫ Center of circle or arc
j+9	YT ⎭
j+10	Depth
j+11	Primary limit difference #1 (limit #1 - length) or first tolerance
j+12	Primary limit difference #2 (limit #2 - length) or second tolerance
j+13	Drafting scale
j+14	Spacing ratio
j+15	Aspect ratio
j+16	Downspace ratio
j+17	Tolerance and fraction ratio
j+18	Arrowhead length
j+19	Distance from text to dimension
j+20	Delta x if delta form of text origin
j+21	Delta y if delta form of text origin
j+22	Radius size

3.34 Type 34 - General Label/Taper Dimension/Chamfer Dimension

The following describes the TAB2 and TAB3 data formats for Type 34 - General Label/Taper Dimension/Chamfer Dimension.

Form 1 - Standard Label

Tables 3-86 and 3-87 describe the TAB2 and TAB3 data formats for Form 1 - Standard Label.

Table 3-86. TAB2 Data Format for Form 1 - Standard Label

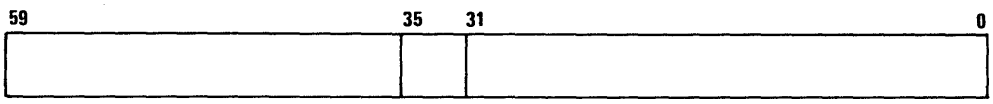
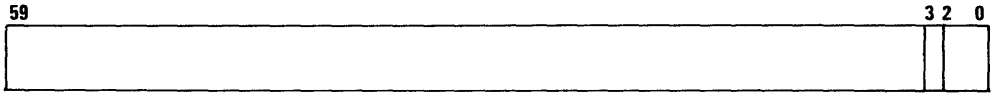
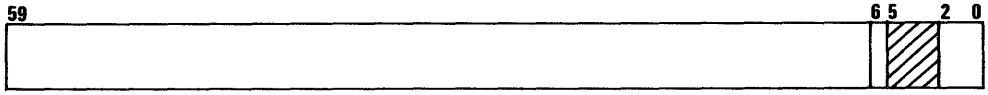
Word	Description
i	Tail orientation: 2 From start of text 3 From end of text
i+1	 Bit — Description 0-31 Character count 32-35 Character set type 36-59 Character set name
i+2	Character string (n words)
i+2+n	Pointer to curve
i+3+n	Pointer to point or dimension if the text origin is delta
i+4+n	 Bit — Description 0-2 Text origin mode 3 Generation method: 0 Through screen position 1 Slope given

Table 3-86. TAB2 Data Format for Form 1 - Standard Label (Continued)

Word	Description
i+5+n	

Bit	Description
0-2	Text justification
3-5	Unused
6	Label leader: 0 Label leader to first 1 Label leader to middle

Table 3-87. TAB3 Data Format for Form 1 - Standard Label

Word	Description
j	XT } Coordinates of text origin
j+1	YT }
j+2	Character size
j+3	XT } Point on entity that dimension line touches
j+4	YT }
j+5 }	Endpoint of tail away from text
j+6 }	
j+7 }	Endpoint of tail nearest text
j+8 }	
j+9	Depth
j+10	Angle of text in radians
j+11	Drafting scale
j+12	Spacing ratio
j+13	Aspect ratio
j+14	Downspace ratio
j+15	Arrowhead length
j+16	Text dimension distance
j+17	Delta x if delta form of text origin
j+18	Delta y if delta form of text origin
j+19	Parameter of the curve at the point

Form 2 - Thickness Dimension

Tables 3-88 and 3-89 describe the TAB2 and TAB3 data formats for Form 2 - Thickness Dimension.

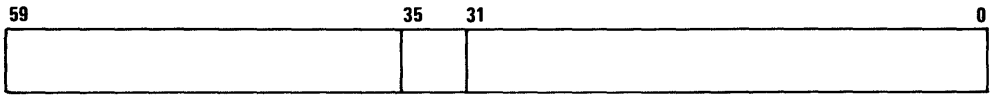
Table 3-88. TAB2 Data Format for Form 2 - Thickness Dimension

Word — **Description**

i — Tail orientation:

- 2 From start of text
- 3 From end of text

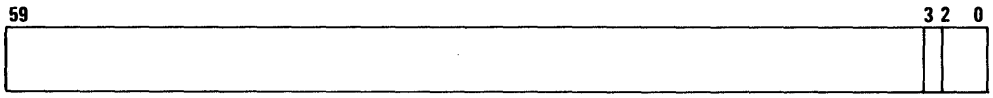
i+1



Bit	Description
0-31	Character count
32-35	Character set type
36-59	Character set name

i+2 — Character string

i+4+n



Bit	Description
0-2	Added symbols: 0 Contains no added symbol 1 Contains diameter symbol 2 Contains radius symbol 3 Contains square symbol
3	Repetitive feature text: 0 Contains no repetitive feature text 1 Contains repetitive feature text

Table 3-89. TAB3 Data Format for Form 2 - Thickness Dimension

Word	Description
j	XT } Coordinates of text origin
j+1	YT }
j+2	Character size
j+3	XT } Point on entity that dimension line touches
j+4	YT }
j+5	} Endpoint of tail away from text
j+6	}
j+7	} Endpoint of tail nearest text
j+8	}
j+9	Depth
j+10	Angle of text in radians
j+11	XT } Point on second curve
j+12	YT }
j+13	Draft scale
j+14	Spacing ratio
j+15	Aspect ratio
j+16	Downspace ratio
j+17	Arrowhead length
j+18	Text-dimension distance

Form 3 - Conical Taper Dimension

Form 4 - Flat Taper Dimension

Tables 3-90 and 3-91 describe the TAB2 and TAB3 data formats for forms 3 and 4.

Table 3-90. TAB2 Data Format for Form 3 - Conical Taper Dimension and Form 4 - Flat Taper Dimension

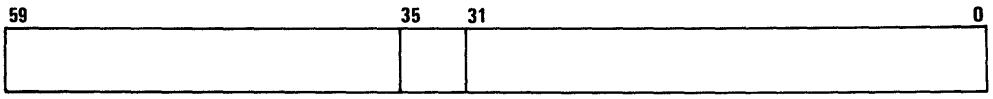
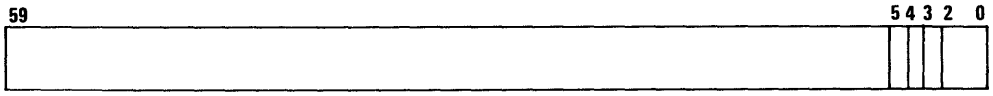
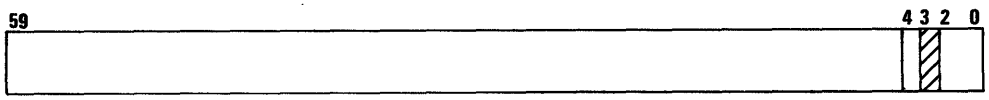
Word	Description
i	Tail orientation: 2 From start of text 3 From end of text
i+1	 Bit — Description 0-31 Character count 32-35 Character set type 36-59 Character set name
i+2	Character string (n words)
i+2+n	Pointer to curve
i+3+n	Pointer to point or dimension if the text origin is delta
i+4+n	 Bit — Description 0-2 Text origin mode 3 Generation method: 0 Through screen position 1 Slope given 4 Repetitive feature text: 0 Contains no repetitive feature text 1 Contains repetitive feature text 5 Dimension not to scale: 0 Does not contain dimension not to scale symbol 1 Contains dimension not to scale symbol

Table 3-90. TAB2 Data Format for Form 3 - Conical Taper Dimension and Form 4 - Flat Taper Dimension (Continued)

Word	Description
i+5+n	

Bit	Description
0-2	Text justification
3	Unused
4	Limits on text

Table 3-91. TAB2 Data Format for Form 3 - Conical Taper Dimension and Form 4 - Flat Taper Dimension

Word	Description
j	XT } Coordinates of text origin
j+1	YT }
j+2	Character size
j+3	XT } Point on entity that dimension line touches
j+4	YT }
j+5 }	Endpoint of tail away from text
j+6 }	
j+7 }	Endpoint of tail nearest text
j+8 }	
j+9	Depth
j+10	Angle of text in radians
j+11	Drafting scale
j+12	Spacing ratio
j+13	Aspect ratio
j+14	Downspace ratio
j+15	Arrowhead length
j+16	Text dimension distance
j+17	Delta x if delta form of text origin
j+18	Delta y if delta form of text origin
j+19	Parameter of the curve at the point
j+20	Tolerance and fraction ratio
j+21	Slope value
j+22	Upper tolerance or limit difference
j+23	Lower tolerance or limit difference

Form 5 - Chamfer Dimension

Tables 3-92 and 3-93 describe the TAB2 and TAB3 data formats for Form 5 - Chamfer Dimension.

Table 3-92. TAB2 Data Format for Form 5 - Chamfer Dimension

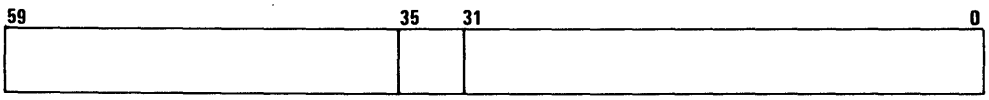
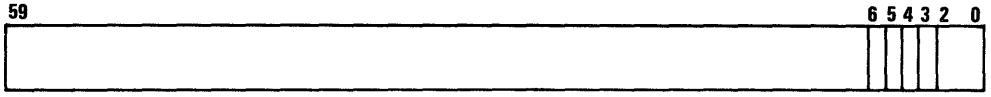
Word	Description
i	Tail orientation: 2 From start of text 3 From end of text
i+1	 Bit — Description 0-31 Character count 32-35 Character set type 36-59 Character set name
i+2	Character string (n words)
i+2+n	Pointer to chamfer line
i+3+n	Pointer to point or dimension if the text origin is delta

Table 3-92. TAB2 Data Format for Form 5 - Chamfer Dimension (Continued)

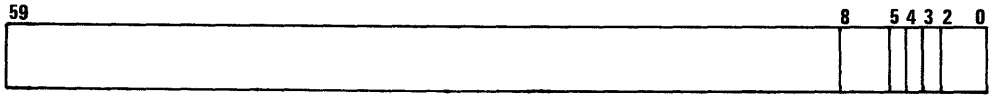
Word	Description

i+4+n



Bit	Description
0-2	Text origin mode
3	Generation method: 0 Through screen position 1 Slope given
4	Repetitive feature text: 0 Contains no repetitive feature text 1 Contains repetitive feature text
5	Dimension not to scale: 0 Does not contain dimension not to scale symbol 1 Contains dimension not to scale symbol
6	Decimal/fraction mode: 0 Decimal 1 Fraction

i+5+n



Bit	Description
0-2	Text justification
3	Standard/dual
4	Limits on primary text
5	Limits on secondary text
6-8	Dual dimensioning method: 0 Bracket and position 1 Bracket only 2 Position only

Table 3-93. TAB3 Data Format for Form 5 - Chamfer Dimension

Word	Description
j	XT } Coordinates of text origin
j+1	YT }
j+2	Character size
j+3	XT } Point on entity that dimension line touches
j+4	YT }
j+5	} Endpoint of tail away from text
j+6	}
j+7	} Endpoint of tail nearest text
j+8	}
j+9	DEPTH
j+10	Angle of text in radians
j+11	Drafting scale
j+12	Spacing ratio
j+13	Aspect ratio
j+14	Downspace ratio
j+15	Arrowhead length
j+16	Text dimension distance
j+17	Delta x if delta form of text origin
j+18	Delta y if delta form of text origin
j+19	Parameter of the curve at the point
j+20	Tolerance and fraction ratio
j+21	Slope value
j+22	Upper tolerance or limit difference
j+23	Lower tolerance or limit difference

3.35 Type 35 - Diameter Dimension

The following describes the TAB2 and TAB3 data formats for Type 35 - Diameter Dimension.

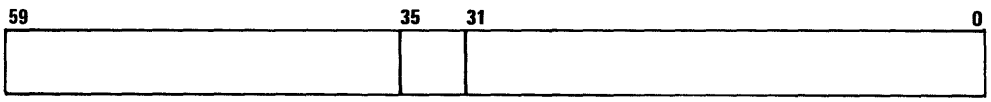
Form 0 - Standard Diameter Dimension

Form 1 - Standard Diameter Dimension

Form 2 - Shouldered Diameter Dimension

Tables 3-94 and 3-95 describe the TAB2 and TAB3 data formats for forms 0, 1, and 2.

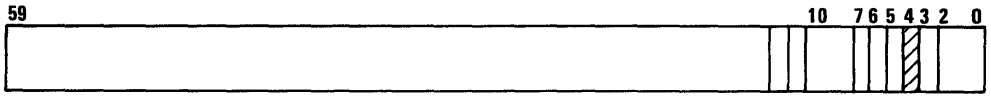
Table 3-94. TAB2 Data Format for Form 0 and 1 - Standard Diameter Dimension and Form 2 - Shouldered Diameter Dimension

Word	Description
i	

Bit	Description
0-31	Character count
32-35	Character set type
36-39	Character set name

Word	Description
i+1	Character string

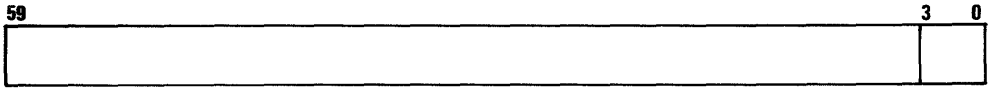
Table 3-94. TAB2 Data Format for Form 0 and 1 - Standard Diameter Dimension and Form 2 - Shouldered Diameter Dimension (Continued)

Word	Description
i+1+n	

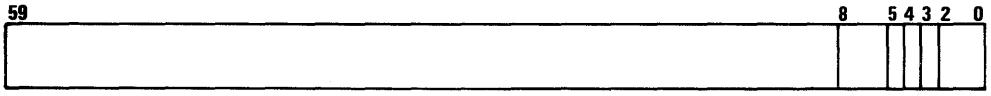
Bit	Description
0-2	Text origin mode
3	Automatic/user-entered text: 0 Automatic text 1 User-entered text
5	Fraction mode
6	Dual dimension
7	Arrow location: 0 Arrows in 1 Arrows out
8-10	Added symbols: 0 Contains no added symbol 4 Contains spherical diameter symbol
11	Repetitive feature text: 0 Contains no repetitive feature text 1 Contains repetitive feature text
12	Dimension not to scale: 0 Does not contain dimension not to scale symbol 1 Contains dimension not to scale symbol

i+2+n	Pointer to circle
i+3+n	Pointer to point/dimension for delta L & D origin
i+4+n	Dimension decimal places

Table 3-94. TAB2 Data Format for Form 0 and 1 - Standard Diameter Dimension and Form 2 - Shouldered Diameter Dimension (Continued)

Word	Description
i+5+n	

Bit	Description
0-3	Dual dimension decimal places

i+6+n 

Bit	Description
0-2	Text justification
3	Standard/dual
4	Limits on primary text
5	Limits on secondary text
6-8	Dual dimensioning method: 0 Bracket and position 1 Bracket only 2 Position only

Table 3-95. TAB3 Data Format for Form 0 and 1 - Standard Diameter Dimension and Form 2 - Shouldered Diameter Dimension

Word	Description
j	XT ⎫ Coordinates of text origin
j+1	YT ⎭
j+2	Character size
j+3	Coordinate of 1 arrowhead tip
j+4	
j+5	Coordinate of other arrowhead tip
j+6	
j+7	Length of first dimension line
j+8	Length of second dimension line; for Form = 2, length of shoulder
j+9	Depth
j+10	Primary limit difference #1 (limit #1 - diameter) or first tolerance
j+11	Primary limit difference #2 (limit #2 - diameter) or second tolerance
j+12	Draft scale
j+13	Spacing ratio
j+14	Aspect ratio
j+15	Downspace ratio
j+16	Tolerance and fraction ratio
j+17	Arrowhead length
j+18	Distance from text to dimension
j+19	Delta x if text origin is delta
j+20	Delta y if text origin is delta
j+21	Diameter

3.36 Type 36 - Angular Dimension

The following describes the TAB2 and TAB3 data formats for Type 36 - Angular Dimension.

Form 0 - Standard Angular Dimension

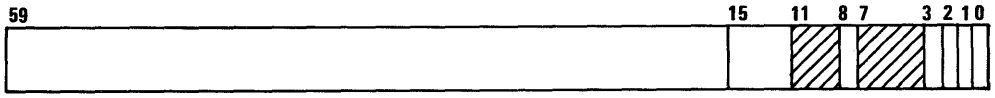
Form 1 - Standard Angular Dimension

Form 2 - Shouldered Angular Dimension

Tables 3-96 and 3-97 describe the TAB2 and TAB3 data formats for forms 0, 1, and 2.

Table 3-96. TAB2 Data Format for Forms 0 and 1 - Standard Angular Dimension and Form 2 - Shouldered Angular Dimension

Word	Description
i	Witness line/dimension line suppression:

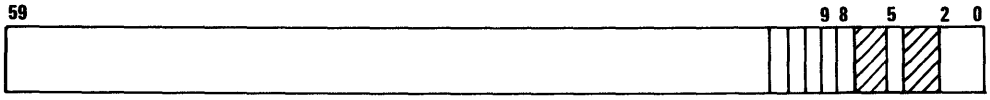


Bit	Description
0	Suppress first extension line (= 1)
1	Suppress second extension line (= 1)
2	Suppress first dimension line (= 1)
3	Suppress second dimension line (= 1)
4-7	Unused
8	Dimension text: 0 Automatic dimension text 1 Key-in dimension text
9-11	Unused
12-15	Text origin method

Table 3-96. TAB2 Data Format for Forms 0 and 1 - Standard Angular Dimension and Form 2 - Shouldered Angular Dimension (Continued)

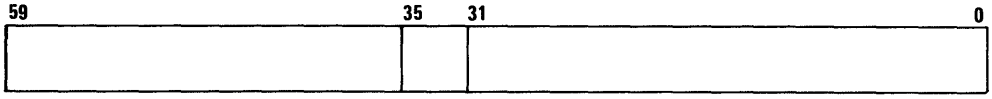
Word	Description

i+1 Text arrow control:



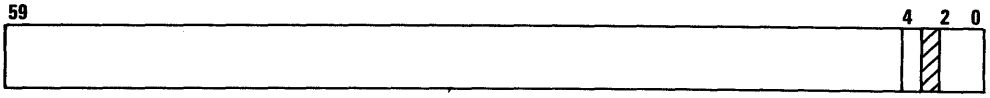
Bit	Description
0-2	Text/arrows: 0 Text in, arrows in 1 Text in, arrows out 2 Text out, arrows out 3 Text out, arrows in
5	Used
8	Tail on: 0 Tail points to first extension line 1 Tail points to second extension line
9	Tail points: 0 Tail points left 1 Tail points right
10	Decimal/fraction mode: 0 Decimal 1 Fraction
11	Repetitive feature text: 0 Contains no repetitive feature text 1 Contains repetitive feature text
12	Dimension not to scale: 0 Does not contain dimension not to scale symbol 1 Contains dimension not to scale symbol

i+2



Bit	Description
0-31	Character count
32-35	Character set type
36-59	Character set name

Table 3-96. TAB2 Data Format for Forms 0 and 1 - Standard Angular Dimension and Form 2 - Shouldered Angular Dimension (Continued)

Word	Description
i+3	Character string (n words)
i+3+n	Pointer to first entity
i+4+n	Position indicator
i+5+n	Pointer to second entity
i+6+n	Position indicator
i+7+n	Dimension decimal places
i+8+n	

Bit	Description
0-2	Text justification
3	Unused
4	Limits on text

Table 3-97. TAB3 Data Format for Forms 0 and 1 - Standard Angular Dimension and Form 2 - Shouldered Angular Dimension

Word	Description
j j+1	Coordinates of text origin
j+2	Character size
j+3 j+4	XT YT of intersection of radial lines
j+5	Distance from line endpoint to extension line endpoint of first line
j+6	Distance from line endpoint to extension line endpoint of second line
j+7 j+8	2-D vector in direction of L1
j+9 j+10	2-D vector in direction of L2
j+11	Radius of dimension arc line
j+12	End angle for first arc
j+13	Start angle of second arc; for Form = 2 position of the end of the tail
j+14 j+15	Endpoint of first radial line
j+16 j+17	Endpoint of second radial line
j+18	Angle of L1
j+19	Angle of L2
j+20	Depth
j+21	Primary limit difference #1 (limit #1 - length) or first tolerance
j+22	Primary limit difference #2 (limit #2 - length) or second tolerance
j+23	Draft scale
j+24	Spacing ratio
j+25	Aspect ratio
j+26	Downspace ratio
j+27	Tolerance and fraction ratio
j+28	Arrowhead length
j+29	Distance from text to dimension
j+30	Extension offset distance
j+31	Extension extension distance
j+32	Delta x if delta form of text origin
j+33	Delta y if delta form of text origin

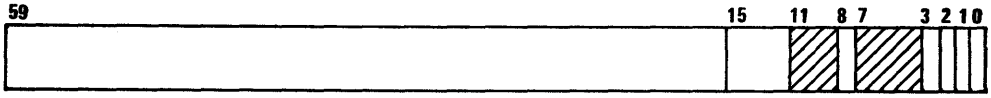
Form 3 - Arc Length Dimension

Form 4 - Shouldered Arc Length Dimension

Tables 3-98 and 3-99 describe the TAB2 and TAB3 data formats for forms 3 and 4.

Table 3-98. TAB2 Data Format for Form 3 - Arc Length Dimension and Form 4 - Shouldered Arc Length Dimension

Word	Description
i	Witness line/dimension line suppression:

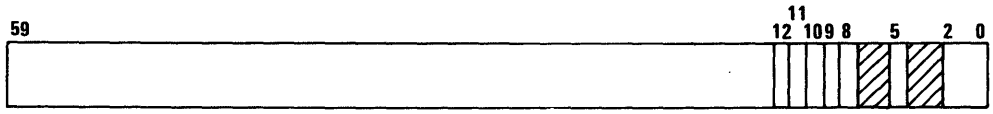


Bit	Description
0	Suppress first extension line (= 1)
1	Suppress second extension line (= 1)
2	Suppress first dimension line (= 1)
3	Suppress second dimension line (= 1)
4-7	Unused
8	Dimension text: 0 Automatic dimension text 1 Key-in dimension text
9-11	Unused
12-15	Text origin method

Table 3-98. TAB2 Data Format for Form 3 - Arc Length Dimension and Form 4 - Shouldered Arc Length Dimension (Continued)

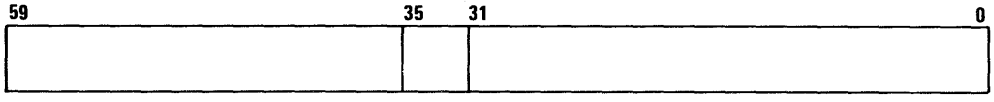
Word	Description

i+1 Text arrow control:



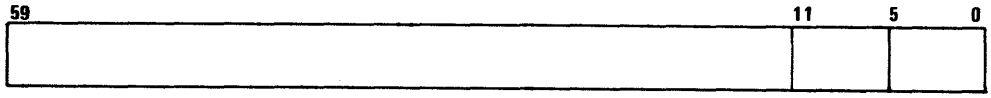
Bit	Description
0-2	Text/arrows: 0 Text in, arrows in 1 Text in, arrows out 2 Text out, arrows out 3 Text out, arrows in
5	Used
8	Tail: 0 Tail points to first extension line 1 Tail points to second extension line
9	Tail points: 0 Tail points left 1 Tail points right
10	Decimal/fraction mode: 0 Decimal 1 Fraction
11	Repetitive feature text: 0 Contains no repetitive feature text 1 Contains repetitive feature text
12	Dimension not to scale: 0 Does not contain dimension not to scale symbol 1 Contains dimension not to scale symbol

i+2

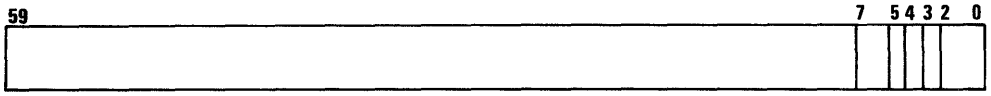


Bit	Description
0-31	Character count
32-35	Character set type
36-59	Character set name

Table 3-98. TAB2 Data Format for Form 3 - Arc Length Dimension and Form 4 - Shouldered Arc Length Dimension (Continued)

Word	Description
i+3	Character string (n words)
i+3+n	Pointer to first entity
i+4+n	Position indicator (= 0)
i+5+n	Pointer to first entity repeated
i+6+n	Position indicator (= 0)
i+7+n	

Bit	Description
0-5	Dimension main decimal places
6-11	Dimension dual decimal places

i+8+n 

Bit	Description
0-2	Text justification
3	Standard/dual
4	Limits on primary text
5	Limits on secondary text
6-7	Dual dimensioning method

Table 3-99. TAB3 Data Format for Form 3 - Arc Length Dimension and Form 4 - Shouldered Arc Length Dimension

Word	Description
j j+1	Coordinates of text origin
j+2	Character size
j+3 j+4	XT YT } of arc center
j+5	Length of first extension line
j+6	Length of second extension line (same as first extension line)
j+7 j+8	2-D vector in direction of first extension line
j+9 j+10	2-D vector in direction of second extension line (same as first extension line)
j+11	Radius of dimension arc
j+12	End angle for first dimension arc
j+13	Start angle of second dimension arc (or position of the end of the tail for form = 4)
j+14 j+15	Endpoint of arc (at start angle)
j+16 j+17	Endpoint of arc (at end angle)
j+18	Angle of a line from the arc center to the intersection of the dimension arc and the first extension line
j+19	Angle of a line from the arc center to the intersection of the dimension arc and the second extension line
j+20	Depth
j+21	Primary limit difference #1 (limit #1 - length) or first tolerance
j+22	Primary limit difference #2 (limit #2 - length) or second tolerance
j+23	Draft scale
j+24	Spacing ratio
j+25	Aspect ratio
j+26	Downspace ratio
j+27	Tolerance and fraction ratio
j+28	Arrowhead length
j+29	Distance from text to dimension
j+30	Extension offset distance
j+31	Extension extension distance
j+32	Delta x if delta form of text origin
j+33	Delta y if delta form of text origin
j+34 j+35	Coordinates of arc length symbol origin

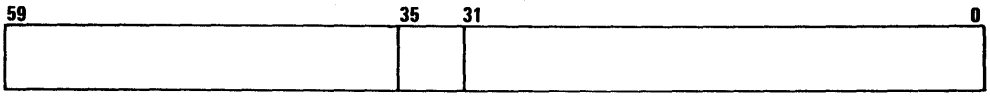
3.37 Type 37 - General Note

The following describes the TAB2 and TAB3 data formats for Type 37 - General Note.

Form 1 - Standard Note

Tables 3-100 and 3-101 describe the TAB2 and TAB3 data formats for Form 1 - Standard Note.

Table 3-100. TAB2 Data Format for Form 1 - Standard Note

Word	Description
i	

Bit	Description
0-31	Character count
32-35	Character type
36-59	Character set name

i+1	Character string (n words)
i+1+n	Text origin mode
i+2+n	Text justification
i+3+n	Pointer to point or dimension if text origin is delta

Table 3-101. TAB3 Data Format for Form 1 - Standard Note

Word	Description
j	XT } Coordinates of text origin
j+1	XT }
j+2	Character size
j+3	Depth
j+4	Angle in radians
j+5	Draft scale
j+6	Spacing ratio
j+7	Aspect ratio
j+8	Downspace ratio
j+9	Delta x if delta form of text origin
j+10	Delta y if delta form of text origin

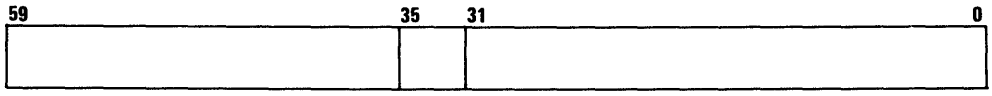
Form 2 - Parallel to Line

Table 3-102 describes the TAB2 data format for Form 2 - Parallel to Line.

NOTE

For the TAB3 data format, refer to Form 1 - Standard Note of Type 37 - General Note.

Table 3-102. TAB2 Data Format for Form 2 - Parallel to Line

Word	Description
i	

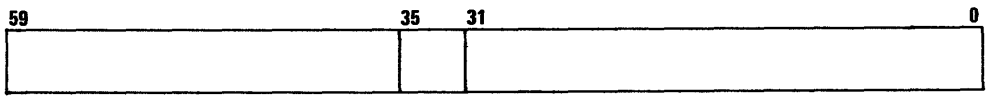
Bit	Description
0-31	Character count
32-35	Character set type
36-59	Character set name

i+1	Character string (n words)
i+1+n	Text origin mode
i+2+n	Text justification
i+3+n	Pointer to point or dimension if text origin is delta
i+4+n	Pointer to line

Form 3 - Parallel to Arc

Tables 3-103 and 3-104 describe the TAB2 and TAB3 data formats for Form 3 - Parallel to Arc.

Table 3-103. TAB2 Data Format for Form 3 - Parallel to Arc

Word	Description
i	

Bit	Description
0-31	Character count
32-35	Character type
36-59	Character set name

i+1	Character string (n words)
i+1+n	Text origin mode
i+2+n	Text justification
i+3+n	Pointer to point or dimension if text origin is delta
i+4+n	Pointer to arc

Table 3-104. TAB3 Data Format for Form 3 - Parallel to Arc

Word	Description
j	XT } Coordinates of text origin
j+1	YT }
j+2	Character size
j+3	Depth
j+4	Angle in radians for start of text
j+5	Radius (negative if counterclockwise)
j+6	Drafting scale
j+7	Spacing ratio
j+8	Aspect ratio
j+9	Downspace ratio
j+10	Delta x if delta form of text origin
j+10	Delta y if delta form of text origin

3.38 Type 38 - Centerline

The following describes the TAB2 and TAB3 data formats for Type 38 - Centerline.

Form 1 - Through Set of Points

Form 2 - Through Set of Circles and Bolt Circle

Table 3-105 describes the TAB2 data format for forms 1 and 2.

Table 3-105. TAB2 Data Format for Form 1 - Through Set of Points, and Form 2 - Through Set of Circles and Bolt Circle

Word	Description
i	Number of points (n)
i+1	Through entity: 0 Points 1 Circles 2 Bolt circle

Points and Circles

Table 3-106 describes the TAB3 data format for points and circles.

Table 3-106. TAB3 Data Format for Points and Circles

Word	Description
j	Depth at time of definition
j+1 . . . j+2*n	List of 2-D points defining centerline

Bolt Circle

Table 3-107 describes the TAB3 data format for bolt circles.

Table 3-107. TAB3 Data Format for Bolt Circles

Word	Description
j	Depth of bolt circle
j+1 j+2	Center of bolt circle
j+3	Radius of bolt circle
j+4	Radius of elements of bolt circle
j+5 • • • j+4+n	Angles of each element of bolt circle
j+5+n	Angle of first element plus 2 pi

Form 3 - Detail Magnified Centerline

Tables 3-108 and 3-109 describe the TAB2 and TAB3 data formats for Form 3 - Detail Magnified Centerline.

Table 3-108. TAB2 Data Format for Form 3 - Detail Magnified Centerline

Word	Description
i+2	Pointer to view of definition

Table 3-109. TAB3 Data Format for Form 3 - Detail Magnified Centerline

Word		Description
j+6+n j+7+n j+8+n j+9+n	XT YT ZT R	of circle detail magnified from
j+10+n j+11+n j+12+n j+13+n	XT YT ZT R	of circle detail magnified to

3.39 Type 39 - Section Lining

The following describes the TAB2 and TAB3 data formats for Type 39 - Section Lining.

Form 0 - Iron Sectioning

Form 1 - Steel Sectioning

Form 2 - Bronze Sectioning

Form 3 - Rubber Sectioning

Form 4 - Refractory Sectioning

Form 5 - Marble Sectioning

Form 6 - Zinc Sectioning

Form 7 - Magnesium Sectioning

Tables 3-110 and 3-111 describe the TAB2 and TAB3 data formats for forms 0, 1, 2, 3, 4, 5, 6, and 7.

Table 3-110. TAB2 Data Format for All Forms of Type 39 - Section Lining

Word	Description
i	Number of copious entities(n)
i+1 . . . l+n	List of copious entity pointers

Table 3-111. TAB3 Data Format for All Forms of Type 39 - Section Lining

Word	Description
j	Depth of sectioning
j+1	Angle
j+2	Distance

3.40 Type 40 - Feature Frame

This section describes the TAB2 and TAB3 data formats for the following forms of Type 40 - Feature Frame.

Form 1 - Geometric Tolerance

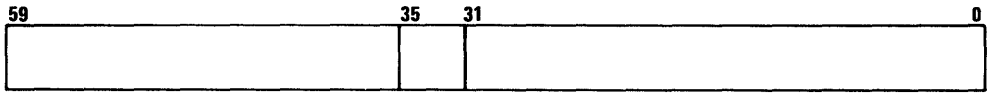
Form 2 - Datum Feature

Form 3 - Composite Geometric Tolerance

Form 1 - Geometric Tolerance

Tables 3-112 and 3-113 describe the TAB2 and TAB3 data formats for Form 1 - Geometric Tolerance.

Table 3-112. TAB2 Data Format for Form 1 - Geometric Tolerance

Word	Description
i	

Bit	Description
0-31	Number of segments
32-35	Character set type
36-59	Character set name

i+1	Geometric characteristic of symbol (-1 = none)
i+2	Number of datums
i+3	Number of characters in first datum

Table 3-112. TAB2 Data Format for Form 1 - Geometric Tolerance (Continued)

Word	Description
i+4	First datum character string:
.	.
.	.
.	.
	Datum modifier if < -1
	Number of characters in second datum
	.
	.
	.
	First special symbol (-1 = none)
	Number of characters in tolerance
	Tolerance string
	Second special symbol (-1 = none)
	Connection switch:
	0 None
	1 Jog
	2 Direct
	3 Direct-modify origin
	4 Jog with profile all around
	NOTE
	The last 4 words are present when the connection is > 0.
	Connect position:
	1 Left
	2 Right
	3 Lower left
	4 Lower right
	5 Upper right
	6 Upper left
	Arrowhead switch:
	1 Yes
	2 No
	Pointer to entity
	Entity end switch:
	1 Start
	2 End

Internal Format of Geometric Characteristic Symbols

1	Straightness
2	Flatness
3	Circularity
4	Cylindricity
5	Profile of a Line
6	Profile of a Surface
7	Angularity
8	Perpendicularity
9	Parallelism
10	Position
11	Concentricity
12	Symmetry (73 ANSI Symbol)
13	Circular Runout
14	Total Runout (73 ANSI Symbol)
20	Total Runout (82 ANSI Symbol)

Internal Format of Modifiers and Special Symbols

15	MMC
16	RFS
17	DIA
18	Projected Tolerance Zone
19	LMC

Table 3-113. TAB3 Data Format for Form 1 - Geometric Tolerance

Word	Description
j	XT ⎫
j+1	YT ⎬ Box origin
j+2	ZT ⎭
j+3	Delta XT
j+4	Delta YT
j+5	Delta XT for first bar
	Delta XT for second bar
.	.
.	.
.	.
j+4+n	Delta XT for nth bar
j+5+n	Draft scale
j+6+n	Spacing scale
j+7+n	Aspect ratio

NOTE

The next 3 words are present when the connection is > 0.

j+8+n	Extension offset distance (arrowhead switch = 2) or arrowhead length (arrowhead switch = 1)	
j+9+n	XT ⎫	Entity connection point
j+10+n	YT ⎭	

NOTE

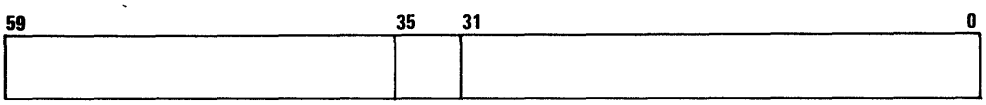
The last 2 words are present when the connection is = 1.

j+11+n	XT ⎫	Jog point
j+12+n	YT ⎭	

Form 2 - Datum Feature

Tables 3-114 and 3-115 describe the TAB2 and TAB3 data formats for Form 2 - Datum Feature.

Table 3-114. TAB2 Data Format for Form 2 - Datum Feature

Word	Description
i	

Bit	Description
0-31	Number of segments (= 0)
32-35	Character set type
36-59	Character set name

i+1	No geometric characteristic symbol (= -1)
i+2	Number of datums (= 1)
i+3	Number of characters in datum feature (= 3 or = 4)
i+4	Datum feature character string
i+5	No special symbol (= -1)
i+6	No characters in tolerance (= 0)
i+7	No special symbol (= -1)
i+8	Connection switch:

0	None
1	Jog
2	Direct
3	Direct-modify origin

NOTE

The last 4 words are present when the connection is > 0.

Table 3-114. TAB2 Data Format for Form 2 - Datum Feature (Continued)

Word	Description
i+9	Connect position: 1 Left 2 Right 3 Lower Left 4 Lower Right 5 Upper Right 6 Upper Left
i+10	Arrowhead switch: 1 Yes 2 No
i+11	Pointer to entity:
i+12	Entity end switch: 1 Start 2 End

Table 3-115. TAB3 Data Format for Form 2 - Datum Feature

Word	Description
j	XT
j+1	YT } Box origin
j+2	ZT
j+3	Delta XT
j+4	Delta YT
j+5	Draft scale
j+6	Spacing scale
j+7	Aspect ratio

NOTE

The next 3 words are present when the connection is > 0.

j+8	Extension offset distance (arrowhead switch = 2) or arrowhead length (arrowhead switch = 1)
j+9	XT } Entity connection point
j+10	YT

NOTE

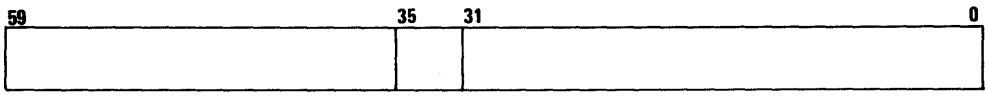
The last 2 words are present when the connection is = 1.

j+11	XT } Jog point
j+12	YT

Form 3 - Composite Geometric Tolerance

Tables 3-116 and 3-117 describe the TAB2 and TAB3 data formats for Form 3 - Composite Geometric Tolerance.

Table 3-116. TAB2 Data Format for Form 3 - Composite Geometric Tolerance

Word	Description
i	

Bit	Description
0-31	Number of segments
32-35	Character set type
36-59	Character set name

i+1	Geometric characteristic symbol (-1 = none)
i+2	Number of datum and tolerance frame sections for top frame
i+3	Number of datum and tolerance frame sections for bottom frame
i+4	Number of characters in first datum or tolerance of top frame
i+5	Character string for first datum or tolerance of top frame
.	.
.	.
.	.
	Datum or tolerance modifier if < -1
.	.
.	.
.	.
	Number of characters in first datum or tolerance of bottom frame
	Character string for first datum or tolerance of bottom frame
.	.
.	.
.	.
	Datum or tolerance modifier if < -1
.	.
.	.
.	.
	Connection switch

0	None
1	Jog
2	Direct
3	Direct-modify origin

NOTE

The last 4 words are present when the connection is > 0.

Table 3-116. TAB2 Data Format for Form 3 - Geometric Tolerance (Continued)

Word	Description
	Connect position: 1 Left 2 Right 3 Lower Left 4 Lower Right 5 Upper Right 6 Upper Left
	Arrowhead switch: 1 Yes 2 No
	Pointer to entity
	Entity end switch: 1 Start 2 End
	Internal Format of Geometric Characteristic Symbols
1	Straightness
2	Flatness
3	Circularity
4	Cylindricity
5	Profile of a line
6	Profile of a surface
7	Angularity
8	Perpendicularity
9	Parallelism
10	Position
11	Concentricity
12	Circular runout
13	Total runout (73 ANSI Symbol)
14	Symmetry (73 ANSI Symbol)
20	Total runout (82 ANSI Symbol)
	Internal Format of Modifiers and Special Symbols
15	MMC
16	RFS
17	DIA
18	Projected tolerance zone
19	LMC

Table 3-117. TAB3 Data Format for Form 3 - Geometric Tolerance

Word	Description
j	XT
j+1	YT } Box origin
j+2	ZT
j+3	Delta XT of top frame sections
j+4	Delta XT of bottom frame sections
j+5	Delta YT
j+6	Delta XT for the first bar of top frame
j+7	Delta XT for the second bar of top frame
.	.
.	.
.	.
	Delta XT for the first bar of bottom frame
	Delta XT for the second bar of bottom frame
.	.
.	.
.	.
	Draft scale
	Spacing scale
	Aspect ratio

NOTE

The next 3 words are present when the connection is > 0.

Extension offset distance (arrowhead switch = 2) or arrowhead length (arrowhead switch = 1)

XT
YT } Entity connection point

NOTE

The last 2 words are present when the connection is = 1.

j+11	XT	Jog point
j+12	YT	

3.41 Type 41 - Template

The following describes the TAB2 and TAB3 data formats for Type 41 - Template.

Form 1 - Template Master

Form 3 - Unlinked Template Master

Tables 3-118 and 3-119 describe the TAB2 and TAB3 data formats for forms 1 and 3.

Table 3-118. TAB2 Data Format for Form 1 - Template Master and Form 3 - Unlinked Template Master

Word	Description
i . . . i+7	Template name
i+8	Number of slaves (instances)
i+9	Number of figures
i+10	Type: 1 Closed 2 Open (contiguous or single)
i+11	Number of display (copious) pointers (= n1)
i+12	Display pointer #1
.	
.	
.	
i+11+n1	Display pointer #n1
i+12+n1	Number of base entities (= n2)
i+13+n1	Pointer to entity #1
.	
.	
.	
i+12+n1+n2	Pointer to entity #n2

NOTE

Repeat i+10...i+12+n1+n2 for each figure.

Table 3-119. TAB3 Data Format for Form 1 - Template Master and Form 3 - Unlinked Template Master

Word	Description
j	INTOL
j+1	OUTOL
j+2	Xmx
j+3	Ymx
j+4	Zmx

Form 2 - Template Instance

Form 4 - Dormant Template Instance

Tables 3-120 and 3-121 describe the TAB2 and TAB3 data formats for forms 2 and 4.

Table 3-120. TAB2 Data Format for Form 2 - Template Instance and Form 4 - Dormant Template Instance

Word	Description
i . . . i+7	Template name
i+8	Pointer to master
i+9	Number of figures
i+10	Type: 1 Closed 2 Open (contiguous or single)
i+11	Number of display (copious) pointers (= n1)
i+12	Display pointer #1
. . .	
i+11+n1	Display pointer #n1
i+12+n1	Number of base entities (= n2)
i+13+n1	Pointer to entity #1
. . .	
i+12+n1+n2	Pointer to entity #n2

NOTE

Repeat i+10...i+12+n1+n2 for each figure.

Table 3-121. TAB3 Data Format for Form 2 - Template Instance and Form 4 - Dormant Template Instance

Word	Description
j . . . j+11	Translation, rotation, and scaling matrix
j+12	Xc
j+13	Yc
j+14	Zc
j+15	Xmn
j+16	Ymn
j+17	Zmn
j+18	Xmx
j+19	Ymx
j+20	Zmx
j+21	Mirror switch (= 1 mirrored)
j+22	X1
j+23	Y1
j+24	X2
j+25	Y2

Mirror axis

3.42 Type 42 - Reserved for Future System Use

3.43 Type 43 - Reserved for Future System Use

3.44 Type 44 - Reserved for Future System Use

3.45 Type 45 - Systems GPG, Inserts, and N/C Modals

This section describes the TAB2 and TAB3 data formats for the following forms of Type 45 - Systems GPG, Inserts, and N/C Modals.

Form 0 - N/C Modals and GPG Pointer Entity
Form 1 - Pre-Generation Insert Statements
Form 2 - N/C File Names
Form 3 - Display and Edit Modals
Form 4 - CLFILE Modals
Form 5 - Point-to-Point GPG
Form 6 - Profile GPG
Form 7 - Pocket GPG
Form 8 - Lathe Roughing GPG (future)
Form 9 - Lathe Contour GPG
Form 10 - Lathe Drilling GPG
Form 11 - Lathe Threading GPG

NOTE

The first TAB2 word of any form of the type 45 entity is reserved for a TAB1 pointer for creation of a linked list to other entities.

Form 0 - N/C Modals and GPG Pointer Entity

Table 3-122 describes the TAB2 data format for Form 0 - N/C Modals and GPG Pointer Entity. There is no TAB3 data format for this form.

NOTE

Only one occurance of the this entity form should exist, IMODE(78) contains the TAB1 pointer to this entity.

Table 3-122. TAB2 Data Format for Form 0 - N/C Modals and GPG Pointer Entity

Word	Description
i	Reserved for linked list pointer (= 0)
i+1	TAB1 pointer to the N/C Files Name entity
i+2	TAB1 pointer to the Display and Edit Modals entity
i+3	TAB1 pointer to the CLFILE Modals entity
i+4	TAB1 pointer to the current Point-to-Point GPG entity
i+5	TAB1 pointer to the current Profile GPG entity
i+6	TAB1 pointer to the current Pocket GPG entity
i+7	TAB1 pointer to the current Lathe Roughing GPG entity (future)
i+8	TAB1 pointer to the current Lathe Contouring GPG entity
i+9	TAB1 pointer to the current Lathe Drilling GPG entity
i+10	TAB1 pointer to the current Lathe Threading GPG entity

Form 1 - Pre-Generation Insert Statements

Table 3-123 describes the TAB2 data format for Form 1 - Pre-generation Insert Statements. There is no TAB3 data format for this form.

Table 3-123. TAB2 Data Format for Form 1 - Pre-generation Insert Statements

Word	Description
i	TAB1 pointer to the next pre-generation insert entity, (= 0 if this is the last entity)
i+1	Number of characters in the statement = N, N>=0
i+2	Statement text, left-justified hollerith
•	•
•	•
•	•
i+M+1	M = (N+SYCPW-1)/SYCPW where SYCPW = characters per word
i+M+2	Number of characters in the statement = N, N>=0
•	
•	
•	

Form 2 - N/C File Names

Table 3-124 describes the TAB2 data format for Form 2 - N/C File Names. There is no TAB3 data format for this form.

Table 3-124. TAB2 Data Format for Form 2 - N/C File Names

Word	Description
i	Reserved for linked list pointer (= 0)
i+1-i+SYWPF	Name of the current GPG file; left justified hollerith (SYWPF = words per file name)

Form 3 - Display and Edit Modals

Tables 3-125 and 3-126 describe the TAB2 and TAB3 data formats for Form 3 - Display and Edit Modals.

Table 3-125. TAB2 Data Format for Form 3 - Display and Edit Modals

Word	Description
i	Reserved for linked list pointer (= 0)
i+1	Editor type: 0 Menu 1 Command
i+2	Text location: 0 Dialogue 1 Graphics
i+3	Factor of GOTO points to display = N, N>=0. Zero means equal spacing and distance is in use; greater than zero is the factor of GOTO points.
i+4	Tool display type: 1 Tool image 2 Trace lines
i+5	Dynamic/static display option: 1 Dynamic 2 Static
i+6	Macro text display option: 1 On 2 Off
i+7-i+6+SYWPF	Name of the macro file (SYWPF = words per file name)

Table 3-126. TAB3 Data Format for Form 3 - Display and Edit Modals

Word	Description
i	Equal spacing distance between tool images

Form 4 - CLFILE Modals

Tables 3-127 and 3-128 describe the TAB2 and TAB3 data formats for Form 4 - CLFILE Modals.

Table 3-127. TAB2 Data Format for Form 4 - CLFILE Modals

Word	Description
i	Reserved for linked list pointer (= 0)
i+1	CL file input format: 1 APTIV 2 APTIII Multiple records 3 APTIII Single records 4 IBM APT 360 5 IBM APT A/C
i+2	CL file output format: 1 APTIV 2 APTIII multiple records 3 APTIII single records 4 IBM APT 360 5 IBM APT A/C 6 APT IV source
i+3	Circle record format: 1 CIRCLE/ and GOTO points 2 ARCSLP/ with no GOTO points 3 = CIRCLE/ with special format if c(0,0,z)
i+4	Number of interpolation points $\geq$ 2
i+5	STOP between toolpaths: 0 No 1 Yes
i+6	PARTNO prompt: 0 Off 1 On
i+7	CL file option: 1 Write to file CLTAPE 2 Write to file and prompt for the name 3 Do not write out
i+8	CL print file option: 1 Write to file CLPRNT 2 Write to file and prompt for the name 3 Do not write out

Table 3-127. TAB2 Data Format for Form 4 - CLFILE Modals (Continued)

Word	Description
i+9	CL input file option: 1 Read from file CLFIN 2 Prompt for the name
i+10	Translate & scale: 0 No 1 Yes and prompt for parameters
i+11	CL data display: 0 Off 1 On
i+12	Blank screen before CL data display: 0 No 1 Yes
i+13	CL data display color number
i+14	Automatic post processing: 0 Off 1 On
i+15	Post processor name prompt: 0 Off 1 On
i+16	Number of characters in the postprocessor name = 6
i+17	Post processor name
.	
.	
.	
i+16 +(5+SYCPW)/SYCPW	
i+17 +(5+SYCPW)/SYCPW	Number of characters in the post processor execution file name = SYFNL
i+18 +(5+SYCPW)/SYCPW	Post processor execution file name
.	
.	
.	
i+18 +(22+2*SYCPW)/SYCPW	

Table 3-128. TAB3 Data Format for Form 4 - CLFILE Modals

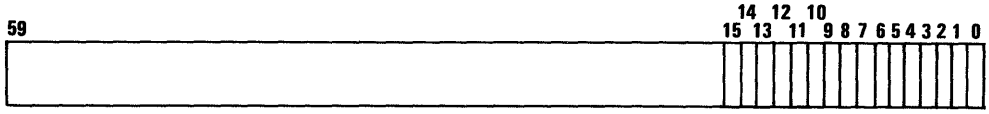
Word	Description	
i	XT	Last Translation Vector
i+1	YT	
i+2	ZT	
i+3	SCALE	Last Scale

Form 5 - Systems Point-to-Point GPG

Tables 3-129 and 3-130 describe the TAB2 and TAB3 data formats for Form 5 - Systems Point-to-Point GPG.

Table 3-129. TAB2 Data Format for Form 5 - Systems Point-to-Point GPG

Word	Description
i	TAB1 pointer to the N/C Pre-Generation Inserts entity, type 45 form 1
i+1	Prompt/no-prompt status for each item of the Point-To-Point generation sequence:

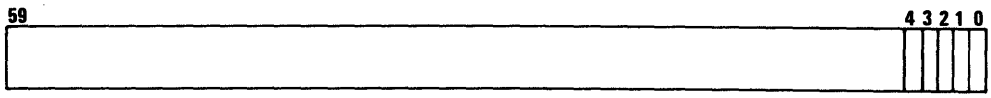


Bit	Description
0	Feed rates: 0 Do not prompt 1 Prompt
1	Spindle parameters
2	Coolant option
3	Tolerances
4	Clearance distance/retract plane
5	Tool axis
6	From position
7	Rapto position
8	Tool name
9	Holder name
10	Tool motion control
11	Starting height
12	Final depth calculation
13	Retraction between points
14	Pre-generation inserts
15	Drill reference

Table 3-129. TAB2 Data Format for Form 5 - Systems Point-to-Point GPG (Continued)

Word	Description

i+2 Statement/no-statement status:



Bit	Description
0	Feed rates: 0 No statement 1 Put statement in toolpath
1	Spindle
2	Coolant
3	Tolerances
4	TOOLNO

i+3 Feed rate rapid mode:

1 Rapid
2 IPM/MMPM

i+4 Spindle direction:

1 CLW
2 CCLW

i+5 Coolant:

1 On
2 Off
3 Flood
4 Mist
5 Tap

i+6 Tool Axis:

1 Off
2 View
3 Enter
4 Variable

i+7 From option:

1 None
2 Coordinates
3 Named point

Table 3-129. TAB2 Data Format for Form 5 - Systems Point-to-Point GPG (Continued)

Word	Description
i+8	Rapto option: 1 None 2 Coordinates 3 Named point
i+9	Holder option: 1 Yes 2 None
i+10	Tool motion control: 1 One cut 2 Chip relief/delta 3 Chip relief/withdrawal 4 Chip relief/dwell 5 Machine cycle 6 User defined cycle
i+11	Number of depth-to-diameter ratios
i+12	Starting height: 1 Constant 2 Use height of each point
i+13	Final depth calculation: 1 Absolute 2 Incremental 3 Countersink to diameter 4 Countersink to depth
i+14	Retraction between points: 1 None 2 Clearance 3 Retract plane
i+15	Pre-generation inserts option: 1 Use statements 2 None
i+16	Drill reference: 1 lip 2 tip

Table 3-129. TAB2 Data Format for Form 5 - Systems Point-to-Point GPG (Continued)

Word	Description
i+17 - i+28	Unused
i+29 - i+28+m	Name of the From point
i+29+m - i+28+2m	Name of the Rapto point
i+29+2m - i+28+3m	Tool name
i+29+3m - i+28+4m	Holder name

NOTE

m = number of words per entity name = (SYENL+SYCPW-1)/SYCPW

Table 3-130. TAB3 Data Format for Form 5 - Systems Point-to-Point GPG

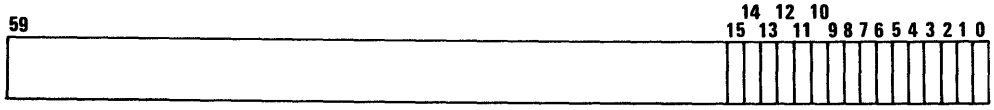
Word	Description
i	Cutting feed rate
i+1	Rapid feed rate
i+2	Pullout feed rate
i+3	Spindle speed
i+4	Intol value
i+5	Outtol value
i+6	Clearance distance
i+7	Retract plane
i+8	Tool axis I value
i+9	Tool axis J value
i+10	Tool axis K value
i+11	From X coordinate
i+12	From Y coordinate
i+13	From Z coordinate
i+14	From I value
i+15	From J value
i+16	From K value
i+17	Rapto X coordinate
i+18	Rapto Y coordinate
i+19	Rapto Z coordinate
i+20	Rapto I value
i+21	Rapto J value
i+22	Rapto K value
i+23	Chip relief delta value
i+24	Chip relief dwell value
i+25	1st depth-to-diameter ratio
i+26	2nd depth-to-diameter ratio
i+27	3rd depth-to-diameter ratio
i+28	4th depth-to-diameter ratio
i+29	5th depth-to-diameter ratio
i+30	6th depth-to-diameter ratio
i+31	7th depth-to-diameter ratio
i+32	8th depth-to-diameter ratio
i+33	9th depth-to-diameter ratio
i+34	10th depth-to-diameter ratio
i+35	Constant starting height
i+36	Absolute final depth
i+37	Incremental final value
i+38	Countersink to diameter value
i+39	Countersink to depth value
i+40	Pilot hole diameter

Form 6 - Systems Profile GPG

Tables 3-131 and 3-132 describe the TAB2 and TAB3 data formats for Form 6 - Systems Profile GPG.

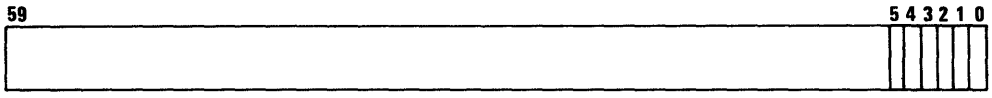
Table 3-131. TAB2 Data Format for Form 6 - Systems Profile GPG

Word	Description
i	TAB1 pointer to the N/C Pre-Generation Inserts entity, type 45 form 1
i+1	Prompt/no-prompt status for each item of the Profile generation sequence:



Bit	Description
0	Feed rates: 0 Do not prompt 1 Prompt
1	Spindle parameters
2	Coolant option
3	Tolerances
4	Clearance distance/retract plane
5	Entry tangential cutting
6	Exit tangential cutting
7	Surface modals
8	Tool axis
9	From position
10	Rapto position
11	Tool name
12	Holder name
13	Stock left on part
14	Base passes
15	Side passes

i+2 Continuation of the prompt/no-prompt status:

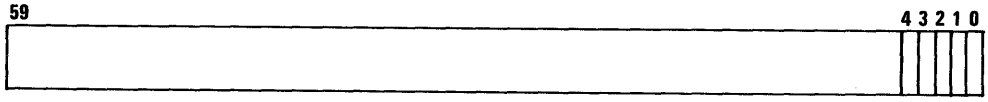


Bit	Description
0	Entry mode
1	Retract mode
2	Tool side selection
3	Close path
4	Part surface
5	Pre-generation inserts

Table 3-131. TAB2 Data Format for Form 6 - Systems Profile GPG (Continued)

Word	Description

i+3 Statement/no-statement status:



Bit	Description
0	Feed rates: 0 No statement 1 Put statement in toolpath
1	Spindle
2	Coolant
3	Tolerances
4	TOOLNO

i+4 Feed rate rapid mode:

1 RAPID
2 IPM/MMPM

i+5 Spindle direction:

1 CLW
2 CCLW

i+6 Coolant:

1 On
2 Off
3 Flood
4 Mist
5 Tap

i+7 From option:

1 None
2 Coordinates
3 Named point

i+8 Rapto option:

1 None
2 Coordinates
3 Named point

i+9 Tool test points

Table 3-131. TAB2 Data Format for Form 6 - Systems Profile GPG (Continued)

Word	Description
i+10	Tool axis: 1 Off 2 View 3 Enter 4 Variable
i+11	Holder option: 1 Yes 2 None
i+12	Number of base passes
i+13	Number of side passes
i+14	Entry method: 1 Plunge 2 Ramp 3 Depth 4 None
i+15	Entry point mode: 1 Coordinates 2 Named point
i+16	Retract method: 1 Plunge 2 Ramp 3 Depth 4 None
i+17	Retract point mode: 1 Coordinates 2 Named point
i+18	Tool side select: 1 Left 2 Right 3 Coordinates 4 Named point
i+19	Closed path: 1 Yes 2 No
i+20	Part surface: 1 Fixed depth 2 Canted plane 3 Surface

Table 3-131. TAB2 Data Format for Form 6 - Systems Profile GPG (Continued)

Word	Description
i+21	Pre-generation inserts option: 1 Use statements 2 None
i+22 - i+28	Unused

NOTE

m = number of words per entity name = (SYENL+SYCPW-1)/SYCPW

i+29 - i+28+m	Name of the From point
i+29+m - i+28+2m	Name of the Rapto point
i+29+2m - i+28+3m	Tool name
i+29+3m - i+28+4m	Holder name
i+29+4m - i+28+5m	Name of entry mode point
i+29+5m - i+28+6m	Name of retract mode point
i+29+6m - i+28+7m	Name of tool side point
i+29+7m - i+28+8m	Name of canted plane or surface

Table 3-132. TAB3 Data Format for Form 6 - Systems Profile GPG

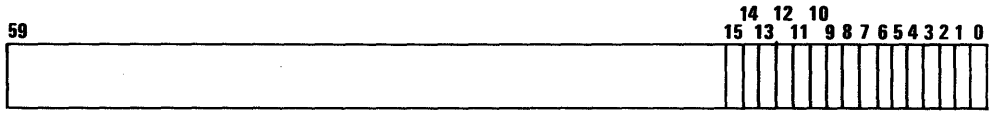
Word	Description
i	Cutting feed rate
i+1	Rapid feed rate
i+2	Spindle speed
i+3	Intol value
i+4	Outtol value
i+5	Surftol value
i+6	Clearance distance
i+7	Retract plane
i+8	Entry line length
i+9	Entry angle
i+10	Entry radius
i+11	Entry extension
i+12	Exit line length
i+13	Exit angle
i+14	Exit radius
i+15	Exit extension
i+16	Surface modal stepsize
i+17	Tool axis I value
i+18	Tool axis J value
i+19	Tool axis K value
i+20	From X coordinate
i+21	From Y coordinate
i+22	From Z coordinate
i+23	From I value
i+24	From J value
i+25	From K value
i+26	Rapto X coordinate
i+27	Rapto Y coordinate
i+28	Rapto Z coordinate
i+29	Rapto I value
i+30	Rapto J value
i+31	Rapto K value
i+32	Base stock left on part
i+33	Side stock left on part
i+34 - i+48	Base pass distances from net
i+49 - i+58	Side pass distances from net
i+59 - i+61	Entry mode X,Y,Z coordinates
i+62 - i+64	Retract mode X,Y,Z coordinates
i+65 - i+67	Tool side X,Y,Z coordinates
i+68	Fixed depth part surface value

Form 7 - Systems Pocket GPG

Tables 3-133 and 3-134 describe the TAB2 and TAB3 data formats for Form 7 - Systems Pocket GPG.

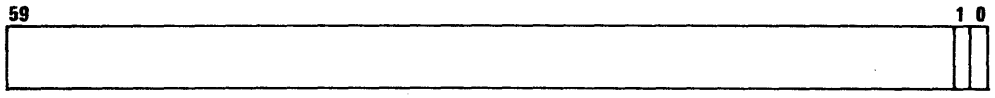
Table 3-133. TAB2 Data Format for Form 7 - Systems Pocket GPG

Word	Description
i	TAB1 pointer to the N/C pre-generation inserts entity, type 45 form 1
i+1	Prompt/no-prompt status for each item of the Pocket generation sequence:



Bit	Description
0	Feed rates: 0 Do not prompt 1 Prompt
1	Spindle parameters
2	Coolant option
3	Tolerances
4	Clearance distance/retract plane
5	Surface modals
6	Tool axis
7	From position
8	Rapto position
9	Tool name
10	Holder name
11	Stock left on part
12	Base passes
13	Entry mode
14	Retract mode
15	Step over

i+2 Continuation of the prompt/no-prompt status:

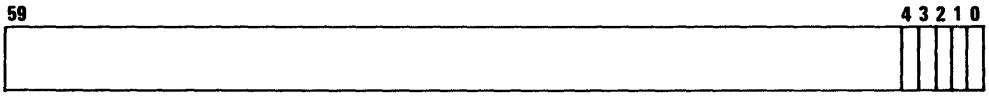


Bit	Description
0	Part surface
1	Pre-generation inserts

Table 3-133. TAB2 Data Format for Form 7 - Systems Pocket GPG (Continued)

Word Description

i+3 Statement/no-statement status:



Bit	Description
0	Feed rates: 0 No statement 1 Put statement in toolpath
1	Spindle
2	Coolant
3	Tolerances
4	TOOLNO

i+4 Feed rate rapid mode:

1 RAPID
2 IPM/MMPM

i+5 Spindle direction:

1 CLW
2 CCLW

i+6 Coolant:

1 On
2 Off
3 Flood
4 Mist
5 Tap

i+7 From option:

1 None
2 Coordinates
3 Named point

i+8 Rapto option:

1 None
2 Coordinates
3 Named point

i+9 Tool test points

Table 3-133. TAB2 Data Format for Form 7 - Systems Pocket GPG (Continued)

Word	Description
i+10	Tool axis: 1 Off 2 View 3 Enter 4 Variable
i+11	Holder option: 1 Yes 2 None
i+12	Number of base passes
i+13	Entry method: 1 Plunge 2 Ramp 3 Depth 4 None
i+14	Entry point mode: 1 Coordinates 2 Named point
i+15	Retract method: 1 Plunge 2 Ramp 3 Depth 4 None
i+16	Retract point mode: 1 Coordinates 2 Named point
i+17	Part surface: 1 Fixed depth 2 Canted plane 3 Surface
i+18	Pre-generation inserts option: 1 Use statements 2 None

Table 3-133. TAB2 Data Format for Form 7 - Systems Pocket GPG (Continued)

Word	Description
i+19 - i+28	Unused

NOTE

m = number of words per entity name = (SYENL+SYCPW-1)/SYCPW

i+29 - i+28+m	Name of the From point
i+29+m - i+28+2m	Name of the Rapto point
i+29+2m - i+28+3m	Tool name
i+29+3m - i+28+4m	Holder name
i+29+4m - i+28+5m	Name of entry mode point
i+29+5m - i+28+6m	Name of retract mode point
i+29+6m - i+28+7m	Name of canted plane or surface

Table 3-134. TAB3 Data Format for Form 7 - Systems Pocket GPG

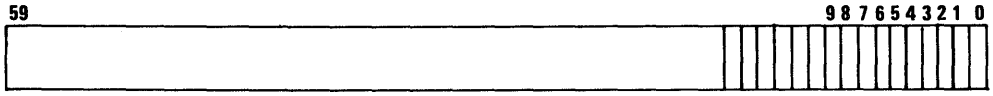
Word	Description
i	Cutting feed rate
i+1	Rapid feed rate
i+2	Spindle speed
i+3	Intol value
i+4	Outtol value
i+5	Surftol value
i+6	Clearance distance
i+7	Retract plane
i+8	Surface modal stepsize
i+9	Tool axis I value
i+10	Tool axis J value
i+11	Tool axis K value
i+12	From X coordinate
i+13	From Y coordinate
i+14	From Z coordinate
i+15	From I value
i+16	From J value
i+17	From K value
i+18	Rapto X coordinate
i+19	Rapto Y coordinate
i+20	Rapto Z coordinate
i+21	Rapto I value
i+22	Rapto J value
i+23	Rapto K value
i+24	Base stock left on part
i+25	Side stock left on part
i+26 - i+35	Base pass distances from net
i+36 - i+38	Entry mode X,Y,Z coordinates
i+39 - i+41	Retract mode X,Y,Z coordinates
i+42	Fixed depth part surface value
i+43	Step over distance

Form 9 - Systems Lathe Contouring GPG

Tables 3-135 and 3-136 describe the TAB2 and TAB3 data formats for Form 9 - Systems Lathe Contouring GPG.

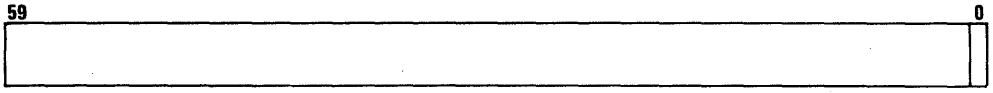
Table 3-135. TAB2 Data Format for Form 9 - Systems Lathe Contouring GPG

Word	Description
i	TAB1 pointer to the N/C pre-generation inserts entity, type 45 form 1
i+1	Prompt/no-prompt status for each item of the Lathe Contour generation sequence:



Bit	Description
0	Feed rates: 0 Do not prompt 1 Prompt
1	Spindle parameters
2	Coolant option
3	Tolerances
4	Lathe type
5	From position
6	Rapto position
7	Tool name
8	Holder name
9	Tool insert compensation
10	Tool side selection
11	Containment
12	Entry motion
13	Exit motion
14	Cut passes
15	Intermediate retract motion

i+2 Continuation of the prompt/no-prompt status:

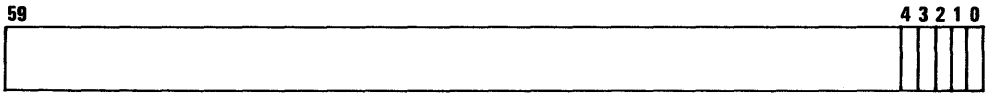


Bit	Description
0	Pre-generation inserts

Table 3-135. TAB2 Data Format for Form 9 - Systems Lathe Contouring GPG (Continued)

Word	Description

i+3 Statement/no-statement status:



Bit	Description
0	Feed rates: 0 No statement 1 Put statement in toolpath
1	Spindle
2	Coolant
3	Tolerances
4	TOOLNO

i+4 Feed rate cut mode:

1 IPR/MMPR
2 IPM/MMPM

i+5 Feed rate rapid mode:

1 RAPID
2 IPM/MMPM

i+6 Spindle mode:

1 SFM/SMM

i+7 Spindle direction:

1 CLW
2 CCLW

i+8 Coolant:

1 On
2 Off
3 Flood
4 Mist
5 Tap

i+9 Lathe type:

1 Horizontal
2 Vertical

Table 3-135. TAB2 Data Format for Form 9 - Systems Lathe Contouring GPG (Continued)

Word	Description
i+10	From option: 1 None 2 Coordinates 3 Named point
i+11	Rapto option: 1 None 2 Coordinates 3 Named point
i+12	Holder option: 1 Yes 2 None
i+13	Tool insert compensation: 1 On 2 Off
i+14	Tool side: 1 Left 2 Right 3 Coordinates 4 Named point
i+15	Number of cut passes
i+16	Intermediate retract option: 1 Single 2 Auto 3 Coordinates 4 Named point
i+17	Number of points or coordinate pairs for intermediate retract option
i+18	Pre-generation inserts option: 1 Use statements 2 None
i+19 - i+18+m	Name of the From point
i+19+m - i+18+2m	Name of the Rapto point
i+19+2m - i+18+3m	Tool name
i+19+3m - i+18+4m	Holder name
i+19+4m - i+18+5m	Name of the tool side point
i+19+5m - i+18+10m	Names of the 5 intermediate retract points

Table 3-136. TAB3 Data Format for Form 9 - Systems Lathe Contouring GPG

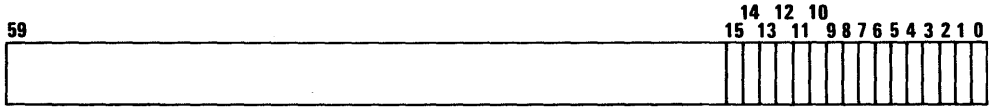
Word	Description
i	Cutting feed rate
i+1	Rapid feed rate
i+2	Spindle speed
i+3	Intol value
i+4	Outtol value
i+5	From X coordinate
i+6	From Y coordinate
i+7	Rapto X coordinate
i+8	Rapto Y coordinate
i+9	Tool insert compensation relief angle
i+10	Entry line length
i+11	Entry angle
i+12	Entry radius
i+13	Entry extension
i+14	Exit line length
i+15	Exit angle
i+16	Exit radius
i+17	Exit extension
i+18	Default delta cut pass step size
i+19	Stock left
i+20 - i+48	User modifiable delta cut pass sizes
i+49 - i+58	X,Y coordinates for the retract motion
i+59 - i+60	X,Y coordinates for the tool side

Form 10 - Systems Lathe Drilling GPG

Tables 3-137 and 3-138 describe the TAB2 and TAB3 data formats for Form 10 - Systems Lathe Drilling GPG.

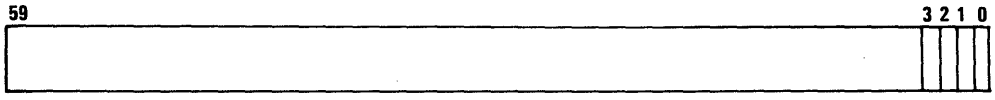
Table 3-137. TAB2 Data Format for Form 10 - Systems Lathe Drilling GPG

Word	Description
i	TAB1 pointer to the N/C pre-generation inserts entity, type 45 form 1
i+1	Prompt/no-prompt status for each item of the Lathe Drilling generation sequence:



Bit	Description
0	Feed rates: 0 Do not prompt 1 Prompt
1	Spindle parameters
2	Coolant option
3	Clearance distance/retract plane
4	Lathe type
5	From position
6	Rapto position
7	Tool name
8	Holder name
9	Headstock origin
10	Drill reference position
11	Start position
12	Final depth mode
13	Pre-generation inserts
14	Cut passes
15	Intermediate retract motion

i+2 Statement/no-statement status:



Bit	Description
0	Feed rates: 0 No statement 1 Put statement in toolpath
1	Spindle
2	Coolant
3	TOOLNO

Table 3-137. TAB2 Data Format for Form 10 - Systems Lathe Drilling GPG (Continued)

Word	Description
i+3	Feed rate cut mode: 1 IPR/MMPR 2 IPM/MMPM
i+4	Feed rate rapid mode: 1 RAPID 2 IPM/MMPM
i+5	Spindle direction: 1 CLW 2 CCLW
i+6	Coolant: 1 On 2 Off 3 Flood 4 Mist 5 Tap
i+7	Lathe type: 1 Horizontal 2 Vertical
i+8	Headstock origin: 1 Coordinates 2 Named point
i+9	From option: 1 None 2 Coordinates 3 Named point
i+10	Rapto option: 1 None 2 Coordinates 3 Named point
i+11	Holder option: 1 Yes 2 None
i+12	Tool reference position: 1 tip 2 lip

Table 3-137. TAB2 Data Format for Form 10 - Systems Lathe Drilling GPG (Continued)

Word	Description
i+13	Start position mode: 1 Screen position 2 Coordinates 3 Existing entity 4 Named point
i+14	Tool motion control: 1 One cut 2 Chip relief/delta 3 Chip relief/withdrawal 4 Chip relief/dwell 5 Machine cycle 6 User cycle
i+15	Final depth mode: 1 Screen position 2 Coordinates 3 Existing entity 4 Delta 5 Countersink to diameter 6 Countersink to depth 7 Named point
i+16	Pre-generation inserts option: 1 Use statements 2 None
i+17	Number of distances/diameter ratios
i+18	TAB1 pointer to the start position entity
i+19	TAB1 pointer to the ending depth entity
i+20 - i+19+m	Name of the From point (m = words per entity name)
i+20+m - i+19+2m	Name of the Rapto point
i+20+2m - i+19+3m	Name of the start point
i+20+3m - i+19+4m	Name of the ending point
i+20+4m - i+19+5m	Name of the headstock point
i+20+5m - i+19+6m	Name of the tool name
i+20+6m - i+19+7m	Name of the holder name

Table 3-138. TAB3 Data Format for Form 10 - Systems Lathe Drilling GPG

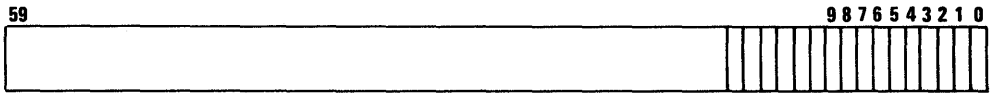
Word	Description
i	Cutting feed rate
i+1	Rapid feed rate
i+2	Spindle speed
i+3	Headstock X coordinate
i+4	Headstock Y coordinate
i+5	From X coordinate
i+6	From Y coordinate
i+7	Rapto X coordinate
i+8	Rapto Y coordinate
i+9	Clearance distance
i+10	Retract plane
i+11	Chip relief/delta value
i+12	Chip relief/dwell time units value
i+13	Dis/dia ratio 1
•	•
•	•
•	•
i+22	Dis/dia ratio 10
i+24	Start coordinate on axis

Form 11 - Systems Lathe Threading GPG

Tables 3-139 and 3-140 describe the TAB2 and TAB3 data formats for Form 11 - Systems Lathe Threading GPG.

Table 3-139. TAB2 Data Format for Form 11 - Systems Lathe Threading GPG

Word	Description
i	TAB1 pointer to the N/C pre-generation inserts entity, type 45 form 1
i+1	Prompt/no-prompt status for each item of the Lathe Threading generation sequence:



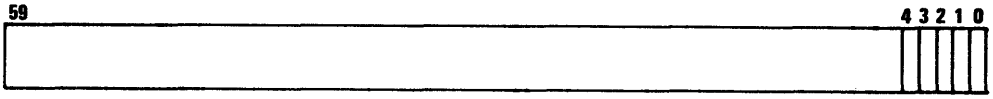
Bit	Description
0	Feed rates: 0 Do not prompt 1 Prompt
1	Spindle parameters
2	Coolant option
3	Lathe type
4	Headstock
5	From position
6	Rapto position
7	Tool name
8	Holder name
9	Thread form
10	Thread size and tool passes
11	Approach, finish, retract angles, and clearance
12	Lead in/out
13	Pre-generation inserts
14	Cut passes
15	Intermediate retract motion

i+2	Continuation of the prompt/no-prompt status (future)

Table 3-139. TAB2 Data Format for Form 11 - Systems Lathe Threading GPG (Continued)

Word	Description

i+3 Statement/no-statement status:



Bit	Description
0	Feed rates: 0 No statement 1 Put statement in toolpath
1	Spindle
2	Coolant
3	TOOLNO
4	Thread size (PITCH)

i+4 Feed rate cut mode:

1 IPR/MMPR
2 IPM/MMPM

i+5 Feed rate rapid mode:

1 RAPID
2 IPM/MMPM

i+6 Spindle mode:

1 SFM/SMM
2 RPM

i+7 Spindle direction:

1 CLW
2 CCLW

i+8 Coolant:

1 On
2 Off
3 Flood
4 Mist
5 Tap

i+9 Lathe type:

1 Horizontal
2 Vertical

Table 3-139. TAB2 Data Format for Form 11 - Systems Lathe Threading GPG (Continued)

Word	Description
i+10	Headstock origin: 1 Coordinates 2 Named point
i+11	From option: 1 None 2 Coordinates 3 Named point
i+12	Rapto option: 1 None 2 Coordinates 3 Named point
i+13	Holder option: 1 Yes 2 None
i+14	Thread form: 1 External 2 Internal
i+15	Number of cut passes
i+16	Number of finish passes
i+17	Number of spring passes
i+18	Thread starts
i+19	Pre-generation inserts option 1 Use statements 2 None
i+20 - i+19+m	Name of the headstock origin point (m = words per entity name)
i+20+m - i+19+2m	Name of the From point
i+20+2m - i+19+3m	Name of the Rapto point
i+20+3m - i+19+4m	Name of the tool name
i+20+4m - i+19+5m	Name of the holder name

Table 3-140. TAB3 Data Format for Form 11 - Systems Lathe Threading GPG

Word	Description
i	Cutting feed rate
i+1	Rapid feed rate
i+2	Spindle speed
i+3	Headstock X coordinate
i+4	Headstock Y coordinate
i+5	From X coordinate
i+6	From Y coordinate
i+7	Rapto X coordinate
i+8	Rapto Y coordinate
i+9	Thread pitch (metric) or threads/inch (English)
i+10	Approach angle
i+11	Finish angle
i+12	Retract angle
i+13	Clearance distance
i+14	Lead in distance
i+15	Lead out distance
i+16	Thread depth
i+17	Maximum delta cut depth
i+18 - i+67	User modifiable delta cut pass sizes
i+68 - i+77	User modifiable delta finish pass sizes

3.46 Type 46 - Toolpath

This section describes the TAB2 and TAB3 data formats for the following forms of Type 46 - Toolpath.

Form 1 - 3-D Coordinates for all 3-Axis Point-To-Point and Milling Toolpaths
Form 2 - 6-D Coordinates for all 5-Axis Point-To-Point and Milling Toolpaths
Form 3 - 2-D Coordinates for Punching and Flame Cutting Toolpaths
Form 4 - 2-D Coordinates for Horizontal Lathe Toolpaths
Form 5 - 2-D Coordinates for Vertical Lathe Toolpaths

General rules:

A. All toolpath coordinates are stored in transform space. The standard entity view of definition pointer defines the coordinate system (see EC(5)).

B. A toolpath has two linked lists of entities. The first is a linked list of toolpath copious data entities (type 14, form 1) that contain the toolpath statements. The second is a linked list of toolpath GPG entities (type 48) that contain the input parameters used to generate the toolpath.

C. There must be at least one entity in the copious list. The GPG list may be empty.

D. The sequence number of the main toolpath entity must be greater than the sequence numbers of all copious and GPG entities.

Tables 3-141 and 3-142 describe the TAB2 and TAB3 data formats for Type 46 - Toolpath.

Table 3-141. TAB2 Data Format for Type 46 - Toolpath

Word	Description
i	TAB1 pointer to the first toolpath copious data entity (type 14, form 1)
i+1	TAB1 pointer to the first toolpath GPG entity (type 48), or 0 if no GPG entities

Table 3-142. TAB3 Data Format for Type 46 - Toolpath

Word	Description
j	XF (coordinate of first toolpath point)
j+1	YF
j+2	ZF (depth of 2-D toolpaths (forms 3, 4, 5))
j+3	XL (coordinate of last toolpath point)
j+4	YL
j+5	ZL

3.47 Type 47 - Composite Tool Path

Table 3-143 describes the TAB2 data format for Type 47 - Composite Tool Path.

Table 3-143. TAB2 Data Format for Type 47 - Composite Tool Path

Word	Description
i	Number of tool paths - n
i+1	Name of first tool path
•	
•	
•	
i+n	Name of nth tool path

NOTE

There is a limit of 100 toolpaths per composite toolpath.

3.48 Type 48 - Toolpath GPG

This section describes the TAB2 and TAB3 data formats for the following forms of Type 46 - Toolpath.

Form 1 - Pre-Generation Insert Statements (see Type 45, form 1)
Form 5 - Point-To-Point GPG (see type 45, form 5)
Form 6 - Profile GPG (see type 45, form 6)
Form 7 - Pocket GPG (see type 45, form 7)
Form 8 - Lathe Roughing GPG (future) (see type 45, form 8)
Form 9 - Lathe Contour GPG (see type 45, form 9)
Form 10 - Lathe Drilling GPG (see type 45, form 10)
Form 11 - Lathe Threading GPG (see type 45, form 11)

General rules:

A. All toolpath GPG entities are stored with a toolpath.

B. The second pointer in the main toolpath entity points to the toolpath GPG.

C. In general the prompt options will be turned off in a toolpath GPG.

3.49 Type 49 - Tool

This section describes the TAB2 and TAB3 data formats for the following forms of Type 49 - Tool.

Form 1 - Mill
Form 2 - Drill
Form 3 - Center Drill
Form 4 - Bore
Form 5 - Ream
Form 6 - Tap
Form 7 - Counter Sink
Form 8 - Lathe Turning
Form 9 - Lathe Threading
Form 10 - Standard Punch
Form 11 - Notching Punch
Form 12 - Nibbling Punch
Form 13 - Holder

General rules:

A. All tool entities are stored with a view of definition of 1 (model space).

B. A tool entity contains a linked list of tool image copious data entities (type 14, form 2).

C. The sequence number of the main tool entity must be greater than the sequence numbers of all copious entities.

Form 1 - Mill

Tables 3-144 and 3-145 describe the TAB3 and TAB3 data formats for Form 1 - Mill.

Table 3-144. TAB2 Data Format for Form 1 - Mill

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-145. TAB3 Data Format for Form 1 - Mill

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Diameter
j+4	Corner radius
j+5	Tool length
j+6	Gage length

Form 2 - Drill

Tables 3-146 and 3-147 describe the TAB2 and TAB3 data formats for Form 2 - Drill.

Table 3-146. TAB2 Data Format for Form 2 - Drill

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-147. TAB3 Data Format for Form 2 - Drill

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Diameter
j+4	Tip angle
j+5	Tool length
j+6	Gage length

Form 3 - Center Drill

Tables 3-148 and 3-149 describe the TAB2 and TAB3 data formats for Form 3 - Center Drill.

Table 3-148. TAB2 Data Format for Form 3 - Center Drill

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-149. TAB3 Data Format for Form 3 - Center Drill

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Drill diameter
j+4	Drill length
j+5	Drill angle
j+6	Body diameter
j+7	Body angle
j+8	Tool length
j+9	Gage length

Form 4 - Bore

Tables 3-150 and 3-151 describe the TAB2 and TAB3 data formats for Form 4 - Bore.

Table 3-150. TAB2 Data Format for Form 4 - Bore

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-151. TAB3 Data Format for Form 4 - Bore

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Diameter
j+4	Tool length
j+5	Gage length

Form 5 - Ream

Tables 3-152 and 3-153 describe the TAB2 and TAB3 data formats for Form 5 - Ream.

Table 3-152. TAB2 Data Format for Form 5 - Ream

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-153. TAB3 Data Format for Form 5 - Ream

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Diameter
j+4	Tool length
j+5	Gage length

Form 6 - Tap

Tables 3-154 and 3-155 describe the TAB2 and TAB3 data formats for Form 6 - Tap.

Table 3-154. TAB2 Data Format for Form 6 - Tap

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-155. TAB3 Data Format for Form 6 - Tap

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Diameter
j+4	Threads/inch or pitch
j+5	Tool length
j+6	Gage length

Form 7 - Counter Sink

Tables 3-156 and 3-157 describe the TAB2 and TAB3 data formats for Form 7 - Counter Sink.

Table 3-156. TAB2 Data Format for Form 7 - Counter Sink

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-157. TAB3 Data Format for Form 7 - Counter Sink

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Diameter
j+4	Tip angle
j+5	Tool length
j+6	Gage length

Form 8 - Lathe Turning

Tables 3-158 and 3-159 describe the TAB2 and TAB3 data formats for Form 8 - Lathe Turning.

Table 3-158. TAB2 Data Format for Form 8 - Lathe Turning

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-159. TAB3 Data Format for Form 8 - Lathe Turning

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Nose radius
j+4	X gage length
j+5	Y gage length

Form 9 - Lathe Threading

Tables 3-160 and 3-161 describe the TAB2 and TAB3 data formats for Form 9 - Lathe Threading.

Table 3-160. TAB2 Data Format for Form 9 - Lathe Threading

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-161. TAB3 Data Format for Form 9 - Lathe Threading

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Tip angle
j+4	X gage length
j+5	Y gage length

Form 10 - Standard Punch

Tables 3-162 and 3-163 describe the TAB2 and TAB3 data formats for Form 10 - Standard Punch.

Table 3-162. TAB2 Data Format for Form 10 - Standard Punch

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-163. TAB3 Data Format for Form 10 - Standard Punch

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value

Form 11 - Notching Punch

Tables 3-164 and 3-165 describe the TAB2 and TAB3 data formats for Form 11 - Notching Punch.

Table 3-164. TAB2 Data Format for Form 11 - Notching Punch

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-165. TAB3 Data Format for Form 11 - Notching Punch

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Width
j+4	Tool length

Form 12 - Nibbling Punch

Tables 3-166 and 3-167 describe the TAB2 and TAB3 data formats for Form 12 - Nibbling Punch.

Table 3-166. TAB2 Data Format for Form 12 - Nibbling Punch

Word	Description
i	Tool image specification indicator: 0 Default 1 User-defined
i+1	Tool image type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Tool number

Table 3-167. TAB3 Data Format for Form 12 - Nibbling Punch

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value
j+3	Diameter
j+4	Tool length

Form 13 - Holder

Tables 3-168 and 3-169 describe the TAB2 and TAB3 data formats for Form 13 - Holder.

Table 3-168. TAB2 Data Format for Form 13 - Holder

Word	Description
i	Holder specification indicator: 0 Default 1 User-defined
i+1	Holder type: 0 Non-rotating 1 Rotating
i+2	Pointer to first copious data entity
i+3	Holder number

Table 3-169. TAB3 Data Format for Form 13 - Holder

Word	Description
j	Translation reference X value
j+1	Translation reference Y value
j+2	Translation reference Z value

3.50 Type 50 - Systems Entity

The following describes the TAB2 and TAB3 data formats for Type 50 - Systems Entity.

Form 2 - View Layout

Tables 3-170 and 3-171 describe the TAB2 and TAB3 data formats for Form 2 - View Layout.

Table 3-170. TAB2 Data Format for Form 2 - View Layout

Word	Description
i	Number of characters in layout name (32)
i+1 • • • i+8	Layout name
i+9	U raster of zoomed display
i+10	V raster of zoomed display
i+11	Status switches
i+12	Number of views in layout (n)
i+13	Work view area number
i+14	TAB4 pointer to first view area
i+15 i+16 i+17 i+18	U,V max/mins for view in the base configuration of the layout (these are not clipped to fit the screen)
• • •	
i+13+5*(K-1)+1 • • i+13+5*(K-1)+5	Kth view 5 words repeated for each view area defined (maximum of 32 views total)
• • •	
i+13+5*n+1 i+13+5*n+n i+13+6*n+1 2 3 4	n words of bit-packed data - refer to TAB4 (i+17) representing the base configuration of the layout unclipped u,v max/mins of first view area in current display These are updated by VM06 with each zoom of the entire layout. IVIEW (18-176) contains these values clipped as need to fit the screen.
• • •	
i+13+6*n+4*(K-1)+1 2 3 4	Unclipped max/mins for Kth view area

Table 3-171. TAB3 Data Format for Form 2 - View Layout

Word	Description
j	Global magnification factor for zoomed display
j+1	XT origin of first view } Unclipped base configuration
j+2	YT origin of first view } Unclipped base configuration
j+3	Zoom scale of view
j+4	Shrinkage factor (percentage of screen)
j+4*(K-1)+1	Second through nth views (maximum of 32 views total)
.	
.	
.	
j+4*(n-1)+4	

Form 3 - Saved Zoom Scale

Tables 3-172 and 3-173 describe the TAB2 and TAB3 data formats for Form 3 - Saved Zoom Scale.

Table 3-172. TAB2 Data Format for Form 3 - Saved Zoom Scale

Word	Description
i	Number of characters in ZOOM scale name
i+1 i+2 . . . i+4	ZOOM scale name
i+5	View number
i+6	Status switches (currently not used and = 0)

Table 3-173. TAB3 Data Format for Form 3 - Saved Zoom Scale

Word	Description
j	XT origin of display
j+1	YT origin of display
j=2	Magnification factor

Form 4 - Analysis Accumulator

Table 3-174 describes the TAB3 data format for Form 4 - Analysis Accumulator.

NOTE

There is no TAB2 data format for Form 4 - Analysis Accumulator.

Table 3-174. TAB3 Data Format for Form 4 - Analysis Accumulator

Word	Description
j	Surface area
j+1	Volume
j+2	Weight
j+3	Weight per unit length
j+4	First moment of mass wrt X-Y plane
j+5	First moment of mass wrt X-Z plane
j+6	First moment of mass wrt Y-Z plane
j+7	X } Center of mass
j+8	Y }
j+9	Z }
j+10	Moment of inertia wrt X axis
j+11	Moment of inertia wrt Y axis
j+12	Moment of inertia wrt Z axis
j+13	Mixed moments wrt X-Y plane
j+14	Mixed moments wrt X-Z plane
j+15	Mixed moments wrt Y-Z plane
j+16	X } Radius of gyration
j+17	Y }
j+18	Z }
j+19	Spherical moment of inertia
j+20	Spherical radius of gyration

Form 6 - Constraint Set Entity

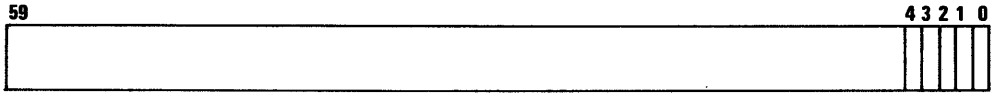
Table 3-175 describes the TAB2 data format for Form 6 - Constraint Set Entity.

NOTE

This form is used for entity selection.

Table 3-175. TAB2 Data Format for Form 6 - Constraint Set Entity

Word	Description
i	Bit packed word indicating which types of constraints are/are not defined: 0 No constraints of this type are defined 1 Constraints of this type are defined



Bit	Description
0	Level constraints
1	Pen constraints
2	Color constraints
3	Type constraints
4	Font constraints

i+1	64 words for level constraints; bit packed for each level; 16 levels per word: 0 Entities on this level cannot be selected 1 Entities on this level can be selected
i+65	1 word for pen constraints; bit packed for each pen: 0 Entities drawn in this pen cannot be selected 1 Entities drawn in this pen can be selected
i+66	1 word for color constraints; bit packed for each color: 0 Entities drawn in this color cannot be selected 1 Entities drawn in this color can be selected

Table 3-175. TAB2 Data Format for Form 6 - Constraint Set Entity (Continued)

Word	Description
i+67	5 words for type constraints; bit packed for each type; 16 bits per word (see GC(3) - GC(8)): 0 Entities of this type cannot be selected 1 Entities of this type can be selected
i+72	1 word for font constraints; bit packed for each font: 0 Entities drawn in this font cannot be selected 1 Entities drawn in this font can be selected

NOTE

There is no TAB3 data for this form.

3.51 Type 51 - Reserved for Future System Use

3.52 Type 52 - Hexahedron

Tables 3-176 and 3-177 describe the TAB2 and TAB3 data formats for Type 52 - Hexahedron.

Table 3-176. TAB2 Data Format for Type 52 - Hexahedron

Word	Description
i	TAB1 pointer to first tabulated cylinder
.	
.	
.	
i+5	TAB1 pointer to sixth tabulated cylinder

Table 3-177. TAB3 Data Format for Type 52 - Hexahedron

Word	Description
j j+1 j+2	Center of hexahedron
j+3 j+4 j+5	First axis vector to face
j+6 j+7 j+8	Second axis vector to face
j+9 j+10 j+11	Third axis vector to face

3.53 Type 53 - Reserved for Future System Use

3.54 Type 54 - Reserved for Future System Use

3.55 Type 55 - Reserved for Future System Use

3.56 Type 56 - Reserved for Future System Use

3.57 Type 57 - Reserved for Future System Use

3.58 Type 58 - Reserved for Future System Use

3.59 Type 59 - Reserved for Future System Use

3.60 Type 60 - Data Point Set

The following describes the TAB2 and TAB3 data formats for Type 60 - Data Point Set.

Form 1 - 1-Dimensional Data Set for Polynomial Curves

Tables 3-178 and 3-179 describe the TAB2 and TAB3 data formats for form 1.

NOTE

Form 2 is reserved for 2-dimensional data set for polynomial surfaces.

Table 3-178. TAB2 Data Format for Form 1 - 1-Dimensional Data Set For Polynomial Curves

Word	Description
i	TAB1 pointer to continuation entity (=0 if all data is contained in this entity)
i+1	Number of points (n)
i+2	Number of curves using this entity

Table 3-179. TAB3 Data Format for Form 1 - 1-Dimensional Data Set For Polynomial Curves

Word		Description
j	X1	Model space coordinates of first point
j+1	Y1	
j+2	Z1	
.		
.		
.		
j+3(n-1)	Xn	Coordinates of nth point
j+3(n-1)+1	Yn	
j+3(n-1)+2	Zn	

3.61 Type 61 - Data Structure Set

The following describes the TAB2 and TAB3 data formats for Type 61 - Data Structure Set.

Form 1 - Polynomial Curve

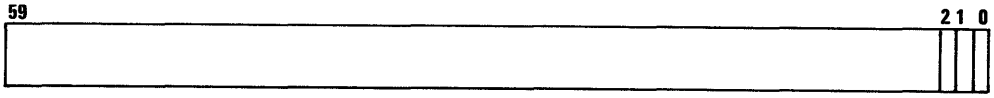
Table 3-180 describes the TAB2 data format for form 1.

NOTE

Form 2 is reserved for polynomial surfaces.

Table 3-180. TAB2 Data Format for Form 1 - Polynomial Curve

Word	Description
i	Approximation type: 1 Chebyshev 2 Least squares fit
i+1	Parameter distribution: 3 Geometric mean 2 Chordal 1 Equidistant > 0 TAB1 pointer to curve
i+2	Closure description:



Bit	Description
0	Curve is closed (= 1)
1	Start/end tangents are equal (= 1)
2	Start/end curvatures are equal (= 1)

Fixed Point Constraints

Table 3-181 describes an additional TAB2 data format for fixed point constraints where p = i+3.

Table 3-181. Additional TAB2 Data Format for Fixed Point Constraints

Word	Description
p	Number of fixed point constraints (np) (= 0 if none applied)
p+1	Number of the first point to be interpolated
.	.
.	.
.	.
p+np	Number of the np(th) point to be interpolated

Tangent Constraints

Table 3-182 describes an additional TAB2 data format for tangent constraints where q = i+4+np.

Table 3-182. Additional TAB2 Data Format for Tangent Constraints

Word	Description
q	Number of tangent constraints (nt) (= 0 if none applied)
q+1	Number of the first point with a tangent constraint
.	.
.	.
.	.
q+nt	Number of the nt(th) point with a tangent constraint

Curvature Constraints

Tables 3-183 and 3-184 describe additional TAB2 and TAB3 data formats for curvature constraints where r=i+5+np+nt.

Table 3-183. Additional TAB2 Data Format for Curvature Constraints

Word	Description
r	Number of curvature constraints (nc) (= 0 if none applied)
r+1	Number of the first point with a curvature constraint
.	
.	
.	
r+nc	Number of the nc(th) point with a curvature constraint

Table 3-184. Additional TAB3 Data Format for Curvature Constraints

Word	Description
j	Smoothing factor

3.62 Type 62 - Reserved for Future System Use

3.63 Type 63 - Reserved for Future System Use

3.64 Type 64 - Reserved for Future System Use

3.65 Type 65 - Reserved for Future System Use

3.66 Type 66 - Reserved for Future System Use

3.67 Type 67 - Reserved for Future System Use

3.68 Type 68 - Reserved for Future System Use

3.69 Type 69 - Reserved for Future System Use

3.70 Type 70 - Schematic Element

The following describes the TAB2 and TAB3 data formats for Type 70 - Schematic Element.

Form (8 Bits of Model Type Code)

Tables 3-185 and 3-186 describe the TAB2 and TAB3 data formats for Form (8 Bits of Model Type Code).

Table 3-185. TAB2 Data Format for Form (8 Bits of Model Type Code)

Word	Description		
i	Bit	Description	
	60	Element model name	
i+1	Bit	Description	
	24	Element model name	
i+2	Byte	Bit	Description
	0	36	Model type codes
	1	12	Pointer to pin name address
	2	12	Section number
i+3	Bit	Description	
	48	Logical name assigned at placement	
i+4	Element table parameters:		
	Byte	Bit	Description
	0	12	TAB2 word count
	1	12	Pin 1 word pointer
	2	12	Number of pin word
	3	12	Attribute data pointer
	4	12	Number of attribute words
i+5	Sequence/level parameters:		
	Byte	Bit	Description
	0	18	Definition sequence number
	1	12	Page (level) number
	2	18	Element sequence number

Table 3-185. TAB2 Data Format for Form (8 Bits of Model Type Code) (Continued)

Word	Description
i+6	Physical attribute word
i+7	n number of pin words, each pin word has the format:

Byte	Bit	Description
0	24	Net link (net entity TAB1 pointer)
1	16	Net number
2	11	Pin number
3	9	Pin function word ordinal in PINDEF array of MODLIB

i+n	na number of attribute data words
i+na	

Table 3-186. TAB3 Data Format for Form (8 Bits of Model Type Code)

Word	Description
i	Element sequence number
i+1	TAB3 word count
i+2	Element origin (x-coordinate)
i+3	Element origin (y-coordinate)
i+4	Number of pins
i+5	Number of parameter words
i+6	Logic name note location (x-coordinate)
i+7	Logic name note location (y-coordinate)
i+8	Physical note location (x-coordinate)
i+9	Physical note location (y-coordinate)
i+10	Pin-1 location (x-coordinate)
i+11	Pin-1 location (y-coordinate)
i+10+n	Pin-n location (x-coordinate)
i+11+n	Pin-n location (y-coordinate)

3.71 Type 71 - Schematic Connection Table Entity

The following describes the TAB2 and TAB3 data formats for Type 71 - Schematic Connection Table Entity.

Form 1 - Schematic Net Table Entity

Table 3-187 describes the TAB2 data format for Form 1 - Schematic Net Table Entity.

Table 3-187. TAB2 Data Format for Form 1 - Schematic Net Table Entity

Word	Description			
i	Net identifier:			
		Byte	Bit	Description
		0	16	Net number
		1	16	Net type code
i+1		Byte	Bit	Description
		0	24	Net group TAB1 PTR
		1	12	Word count of table
		2	24	Page (level) number
i+2		Byte	Bit	Description
		0	12	Number of pins in net
		1	12	Number of pin words available
		2	12	Array number
		3	24	Net link chain pointer
		Word	Bit	Description
i+3		1	60	Signal name text
i+4		2	60	Signal name text
i+5		3	60	Signal name text
i+6	Pin word - 1 data:			
.				
.		Byte	Bit	Description
.				
		0	24	TAB1 pointer of connected element
		1	12	Model type of connected element
		2	12	Pin number on element
		3	12	Element entity pin word ordinal
i+6+n	Pin word - n data (= 0 if unused)			
.				
.				
.				





Program Common 4

Program Common 4

This chapter describes the ICEM DDN common that is used internally within ICEM DDN but is not saved with a part on TAPE3.

4.1 Labeled COMMON/INTCOM/

Temporary integer common.

```
INTEGER TEMI(256)
COMMON /INTCOM/ TEMI
```

4.2 Labeled COMMON/CHRCOM/

Temporary character common.

```
CHARACTER MMPTXT*256,TEMC*256
COMMON /CHRCOM/ MMPTXT,TEMC
```

4.3 Labeled COMMON/FETS/

Integer common for NOS interface tables.

```
INTEGER IFET(8),IIBUF(513),MSBUF(65),MSTR(8),OFET(8),OOBUF(513)
INTEGER PPBUF(513),PRNTER(8)
COMMON /FETS/ PRNTER,IFET,OFET,IIBUF,OOBUF,PPBUF,MSTR,MSBUF
```

4.4 Labeled COMMON/EDLCOM/

Integer common for EDL use.

```
INTEGER ICOPY,IDLIW,IFNDSW
COMMON /EDLCOM/ IFNDSW,ICOPY,IDLIW
```

4.5 Labeled COMMON/IDFCOM/

Integer common for use by internal drafting standard libraries. This common is not saved with the part.

```
INTEGER IDFNRM(12)
COMMON /IDFCOM/ IDFNRM
```

4.6 Labeled COMMON/TABOO/

Integer common for tablet page manipulation and for tablet string processing.

Integer	Description
ACTUCF	Name of command file associated with active upper page
ACTLCF	Name of command file associated with active lower page
ACTUMF	Name of MSTRING currently being processed
ACTLMF	Reserved (currently unused)
CMDFIL	Name of current tablet command file from which pages are activated and from which commands are read
CUP	Name of current upper tablet page in use
CLP	Name of current lower tablet page in use
EDFILE	Name of current tablet edit file for page creation
IMNUST	Number of characters in ITABUF left to process
ICNT	Current character location in ITABUF
ICHRT	Current graphic pick character
ITABUF(19)	Byte packed 8 bit characters, left-justified, 7 characters per word
IRPT	Repeat switch: = 0 Repeat sequence off > 0 Start of repeat sequence
IRPT2	Location of the end of the repeat sequence in ITABUF
IRCNT	Number of repeats completed without user input
ITSET	Tablet selections: Bit 0 Characters: 0 Upper case characters 1 Lower case characters Bit 1 Page in memory: 0 Page in memory OK 1 Page in memory needs reloading
MSWC	MSTRING word count: = 0 No MSTRING program in process > 0 MSTRING location
MFILNM	Name of MSTRING file to be searched for MSTRING names
NEWPAG	Tablet page activation flag (currently unused): 0 Not activating new page 1 New tablet page location required
TFILNM	Name of tablet file to which input or output is currently occuring

4.7 Labeled COMMON/TNI/

Integer common.

Integer	Description
ITNI	Indicates whether or not to output sync codes: 0 Send sync codes 1 Do not send sync codes

4.8 Labeled COMMON/CDC1/

Integer common.

Integer	Description
IBAUD	Current baud rate in characters per second: 30 120 420 900

4.9 Labeled COMMON/COMPM/

Integer common for part merge.

4.10 Labeled COMMON/CDC3/

Integer	Description
IF	Number of input lines: = 0 No input > 0 Number of inputs

4.11 Labeled COMMON/TM/

```
TM
C
        INTEGER TM
        COMMON /TM/ TM
C
C       TM - TRACE MODE.  .NE.0  WHEN TRACE IS ON.
```

Integer	Description
TM	Trace mode: = 0 Trace off ≠ 0 Create IT, OT, CT, MT trace files

4.12 Labeled COMMON/FILEN/

```
FILEN
C
      INTEGER INPUT(8),OUTPUT(8),OT(5),IT(5),CT(5),MT(5),CD2000(5)
C
      COMMON /FILEN/ INPUT,OUTPUT,OT,IT,CT,MT,CD2000
C
```

Integer	Description

INPUT — INPUT file environment table (FET):

Word	Description
1	Bit 0-5: 0"03"; Bit 6-59: File name left-justified zero filled
2-8	No description

OUTPUT — OUTPUT file environment table (FET):

Word	Description
1	Bit 0-5: 0"03"; Bit 6-59: File name left-justified zero filled
2-8	No description

OT — OT file environment table (FET):

Word	Description
1	Bit 0-5: 0"03"; Bit 6-59: File name left-justified zero filled
2-5	No description

IT — IT file environment table (FET):

Word	Description
1	Bit 0-5: 0"03"; Bit 6-59: File name left-justified zero filled
2-5	No description

Integer	Description

CT — CT file environment table (FET):

Word	Description	
1	Bit	Description
	0-5	0"03"
	6-59	File name left-justified zero filled
2-5	No description	

MT — MT file environment table (FET):

Word	Description	
1	Bit	Description
	0-5	0"03"
	6-59	File name left-justified zero filled
2-5	No description	

CD2000 — Overlay replacement file environment table (FET):

Word	Description	
1	Bit	Description
	0-5	0"03"
	6-59	File name left-justified zero filled
2-5	No description	

4.13 Labeled COMMON/COMMDP/

Common for data pooling.

```
INTEGER MDP(39),IDP(4096)
REAL    DPTRN(24),EPS06M,EPS12M,EPS899
COMMON  /COMMDP/ MDP,DPTRN,EPS06M,EPS12M,EPS899,IDP
```

Real	Description
DPTRN	Data Pooling Transformations: 1-12 Transformation matrix from model space to specified DP work space 13-24 Transformation matrix from view of definition of an entity to specified work space (used by DPANN while adding entity type NN to a data pool)
EPS06M/EPS12M/EPS899	Common Convergence Criteria: EPS06M = MATH(1)*1.0E-06 A) Two floating point numbers close; A - B B) Floating point number is zero; ABS(A) EPS12M = MATH(1)*1.0E-12 A) Distance between two positions is zero; (AX-BX)**2 + (AY-BY)**2 + (AZ-BZ)**2 B) Vector length is zero; (AX-AX)**2 + (AY-AY)**2 + (AZ-AZ)**2 EPS899 = COS(89.9 degrees) = SIN(0.1 degrees) A) Unit vectors perpendicular; DOT(A,B) B) Unit vectors parallel; CROSS(A,B), check I,J,K

Integer	Description
IDP	Data Pooling Disc Buffer
MDP	Miscellaneous Data Pooling Values:

1	Current data pool for adding entities (1-5)
2	Absolute disk location for extended IDP array
3	Size of the IDP array in declaration
4	Data pool TAB4 work space pointer
5-9	Start position of pool n in IDP array
10-14	Save switch for pool n: 0 Do not save 1 Save before disk read
15-19	Start position in extended array, pool n
20-24	End position in extended array
25-29	Start position currently loaded in IDP, pool n (pointer into extended array)
30-34	End position currently loaded in IDP, pool n (pointer into extended array)
35-39	Size of pool n in IDP array

4.14 Labeled COMMON/HDWARE/

The labeled COMMON block /HDWARE/ contains the data required to describe the characteristics of the terminal and attached hardware.

```
C HARDWARE COMMON BLOCK

      LOGICAL COLORD,COLTRM,DIVSCR,LDFUSE,REFRSH,SCRDIA,SPLITS,TABCUR
      LOGICAL DGPRES,L3DVEW
      INTEGER ALPHAT,ERASMD,LDFTRM,LOSW,MICROF,MODSEG,NBTPLN,TRMTYP
      INTEGER DGCOOR,DGVIEW,DGTABL,PRVXCO,PRVYCO,PRVZCO,VWNOSF
      INTEGER STMCTR,MAXTRM
C
      COMMON /HDWARE/ ALPHAT,COLORD,COLTRM,DIVSCR,ERASMD,LDFUSE,LDFTRM
      COMMON /HDWARE/ L3DVEW,LOSW,MICROF,MODSEG,NBTPLN,REFRSH,SCRDIA
      COMMON /HDWARE/ SPLITS,TABCUR,TRMTYP
      COMMON /HDWARE/ MAXTRM,PRVXCO,PRVYCO,PRVZCO,STMCTR,VWNOSF
      COMMON /HDWARE/ DGPRES, DGCOOR, DGVIEW, DGTABL(2)
      COMMON /HDWARE/ DGVALO(2), DGVALX, DGVALY, DGORIG(2), DGMATR(2,2)
C
```

Logical	Description
COLTRM	Terminal has color capability; valid for Tektronix 4113, 4115, 4105, 4107, 4109, 4125, 4128, 4129, CDC 790 with TEKEM and CDC 790 native terminals
DIVSCR	Divided screen dialog; valid for CDC 721 terminals
LDFUSE	Use LDF segmenting capability for entities
REFRSH	Segment refresh/storage option on the terminal; set for Tektronix 4114 terminals
SCRDIA	Graphics terminal has a scrolling dialog
SPLITS	Split screen dialog area present
TABCUR	Tablet cursor must be started; valid for Tektronix 4014, 4016, CDC IST III, and CDC 721 terminals
DGPRES	True if large tablet digitizer is present
COLORD	True if color dialogue is in use on Tektronix 4105, 4107, and 4109 terminals
L3DVEW	True: Draw 3-D data in 3-D mode False: Draw 2-D data in 3-D mode

Integer	Description
ALPHAT	Alpha screen extras: 0 No extras involved in dialog 1 Refresh buffer on Tektronix 4014 or 4016 terminal 2 Interactive buffer on Tektronix 4014 or 4016 terminal 3 722/752 4 ADM-3 5 "Special alpha"
ERASMD	Erasing method: 0 Storage terminal (no erasing is possible); valid for Tektronix 4014, 4016, CDC IST III, and Tektronix 4114 when LDF is not in use 1 Erase by deleting the segment; valid for Tektronix 4113, 4114, 4115, 4107, 4109, 4125, 4128, 4129, and CDC 790 with TEKEM with LDF in use 2 Erase by drawing in background color; valid for Tektronix 4113, 4115, 4107, 4109, 4125, 4128, 4129, and CDC 790 with TEKEM when LDF is not in use or while on a 4105 terminal 3 Erase by inverse video drawing; valid for CDC 721 terminals
LDFTRM	Terminal's local display file capabilities: 0 No LDF capability; valid for Tektronix 4014, 4016, 4105, CDC 721, CDC IST III terminals 1 2-D LDF capability; valid for Tektronix 4113, 4114, 4115, 4107, 4109, 4125, and CDC 790 with TEKEM terminals 2 3-D LDF capability; valid for Tektronix 4128, 4129, and CDC 790 terminals in native mode
LOSW	List output switch: 1 Graphics area 2 Scrolling dialog area; set when alpha screen is 722/752, ADM-3, or "special" or when the terminal is a Tektronix 4113, 4114, 4115, 4105, 4107, 4109, 4125, 4128, or 4129 terminal or CDC 790 with TEKEM
PRVXCO PRVYCO PRVYCO	Previous X, Y, and Z for 3-D moves and draws
VWNOSF	View number of the surface in the terminal
STMCTR	Step mode counter for 3-D dynamice rotation
MAXTRM	Presently unused

Integer	Description

MICROF — Local microprocessor switches:

Bit	Description
0	Local character set or grid flag 0 Off 1 On
1	Local microprocessor type 0 GTA-1(SWTI) black box or none 1 Tektronix local characters

MODSEG — Segment modification capability:

0 Segments cannot be modified

1 Segments can be modified; valid for Tektronix 4125, 4128, 4129, or CDC 790 in native mode terminals

NBTPLN — Number of bit planes on current terminal

TRMTYP — Graphics terminal type:

0 4014 Tektronix terminal present
1 4016 Tektronix terminal present
2 CDC IST III (Plato) terminal present
3 4113 Tektronix terminal present
4 4114 Tektronix terminal present
5 4115 Tektronix terminal present
6 CDC 721 terminal present
7 4105 Tektronix terminal present
8 4107 Tektronix terminal present
9 4109 Tektronix terminal present
10 Ramtek 790 (CDC IEW) TEKEM mode present
11 Ramtek 790 (CDC IEW) native mode present
12 4125 Tektronix terminal present
13 4128 Tektronix terminal present
14 4129 Tektronix terminal present

DGCOOR — Status of large tablet digitizer coordinate system:

-1 If system is inactive
0 If system is not yet defined
1 If system is active

DGVIEW — View of digitizer coordinate system

DGTABL(1) — Screen position x of tablet area
DGTABL(2) — Screen position y of tablet area

Real	Description
DGVALO(1)	xt of digitizer origin
DGVALO(2)	yt of digitizer origin
DGVALX	xt of x-axis reference point
DGVALY	yt of y-axis reference point
DGORIG(1)	Screen position x of origin
DGORIG(2)	Screen position y of origin
DGMATR	Transformation matrix of digitizer coordinate system:
	DGMATR(1,1) Matrix element (1,1)
	DGMATR(1,2) Matrix element (1,2)
	DGMATR(2,1) Matrix element (2,1)
	DGMATR(2,2) Matrix element (2,2)

4.15 Labeled COMMON/SWITCH/

The switch COMMON passes control card parameters from the assembly language routine AIO to system intialization.

CAUTION

Avoid using this COMMON throughout DDN since it may be a good candidate for elimination in the future.

```
SWITCH
C
      INTEGER DSSWT,INDPIC(5),DCSWT,UMSWT,FSFLAG
      COMMON /SWITCH/ DSSWT,INDPIC,DCSWT,UMSWT,FSFLAG
C
```

Integer	Description
DSSWT	Drafting standard from control card (stores the parameter characters until interpreted): -1 Parameter not set 1 82 ANSI 2 73 ANSI 3 DIN 4 NF (French) 5 BS (British) 6 SMS (Swedish)
INDPIC(1)	Graphics terminal type from control card (stores the parameter characters until interpreted): -1 Parameter not set 0 4014 Tektronix terminal present 1 4016 Tektronix terminal present 2 CDC IST III (Plato) terminal present 3 4113 Tektronix terminal present 4 4114 Tektronix terminal present 5 4115 Tektronix terminal present 6 CDC 721 terminal present 7 4105 Tektronix terminal present 8 4107 Tektronix terminal present 9 4109 Tektronix terminal present 10 Ramtek 790 (CDC IEW) TEKEM mode present 11 Ramtek 790 (CDC IEW) native mode present 12 4125 Tektronix terminal present 13 4128 Tektronix terminal present 14 4129 Tektronix terminal present
INDPIC(2)	Menu area special from control card (stores the parameter characters until interpreted): -1 Parameter not set

Integer	Description
INDPIC(3)	Local assist on/off from control card
INDPIC(4)	Tablet setting from control card: 0 No tablet 1 Standard or Option 13 tablet 2 Option 4957 Tektronix tablet
INDPIC(5)	LDF on/off from control card
DCSWT	No configuration display (DC parameter)
UMSWT	Units of measure from control card: 0 Metric (mm) 1 English (inch) 2 English (foot/inch)
FSFLAG	FS parameter flag from control card

4.16 Labeled COMMON/IPATCM/

Integer common for pattern use.

```
INTEGER IPAT(20)
COMMON /IPATCM/ IPAT
```

Table 4-1 describes the integer common retrieve modals for pattern use.

Table 4-1. Integer Common Retrieve Modals

Integer	Description
IPAT(1)	Origin method: 0 Screen position 1 Enter coordinates 2 Existing point 3 Delta from curve end 4 Normal to curve
IPAT(2)	Rotation axis: 0 x/xt axis 1 y/yt axis 2 z/zt axis
IPAT(3)	Orientation: 0 Work space 1 Model space
IPAT(4)	Entity grouping: 0 On 1 Off
IPAT(5)	Entity level: 0 Use original levels 1 Offset from original levels 2 Use current level 3 Specify level
IPAT(6)	Entity pen: 0 Use original pen 1 Use current pen 2 Specify pen
IPAT(7)	Entity color: 0 Use original entity color 1 Use current color 2 Specify color

Table 4-1. Integer Common Retrieve Modals (Continued)

Integer	Description
IPAT(8)	Entity names: 0 Drop entity names 1 Retain entity names
IPAT(9)	Set when used: 0 On 1 Off
IPAT(10)	Offset level
IPAT(11)	Specified level
IPAT(12)	Specified pen
IPAT(13)	Specified color

Table 4-2 describes the copy modal for pattern use.

Table 4-2. Integer Common Copy Modal

Integer	Description
IPAT(14)	Copy overwrite modal (used by COPY ALL): 0 Prompt if pattern already exists 1 Overwrite all existing patterns 2 Do not overwrite existing patterns

Table 4-3 describes the integer common file information for pattern use.

Table 4-3. Integer Common File Information

Integer	Description
IPAT(15)	File number of a pattern library on which one of the following operations is being applied to: Create (primary only) Retrieve (primary or secondary) Delete (primary only) List (primary or secondary) Copy To (primary or secondary) Update To (primary or secondary)
IPAT(16)	File number of a pattern library on which the following operation is being applied to: Copy From (primary or secondary)
IPAT(17)	Bit flag (= 1 if pattern library is permanent): Bit — Description 0 — Primary library 1 — Secondary library
IPAT(18)	Bit flag (= 1 if pattern library has write permission): Bit — Description 0 — Primary library 1 — Secondary library
IPAT(19)	Address of a pattern in the pattern library
IPAT(20)	Address of a pattern in the pattern directory

4.17 Labeled COMMON/RPATCM/

Real common for pattern use.

```
INTEGER RPAT(5)
COMMON /RPATCM/ RPAT
```

Real	Description
RPAT(1)	Scale factor
RPAT(2)	Rotation angle
RPAT(3,4,5)	Pattern origin (x,y,z)

4.18 Labeled COMMON/CPATCM/

Character common for pattern use.

```
CHARACTER PRILIB(SYFNL),SECLIB*(SYFNL),PNAME*(SYCPNH)
COMMON /CPATCM/ PRILIB,SECLIB,PNAME
```

Character	Description
PRILIB	Name of the primary library
SECLIB	Name of the secondary library
PNAME	Name of the pattern being processed

4.19 Labeled COMMON/PATUP/

Integer common for pattern update.

```
INTEGER UPDAT,BLANKP
COMMON /PATUP/ UPDAT,BLANKP
```

Integer	Description
UPDAT	Flag set to 1 after the first time the TAPE3 pattern update prompt appears. This is used to tell subroutine INIT not to display the pattern update prompt each time the user gets a new part.
BLANKP	Flag set to 1 to tell subroutine INIT that a blank part is being requested from pattern update.

4.20 Labeled COMMON/CPATUP/

Character common of pattern update.

```
CHARACTER UPNAME*(SYFNL)
COMMON /CPATUP/ UPNAME
```

Integer	Description
UPNAME	Name of the pattern library that the patterns are updated to

4.21 Labeled COMMON/NOS/

```
INTEGER NOS
COMMON /NOS/ NOS
```

Integer	Description
NOS	Flags which system is being run: 0 NOS 1 NOS/BE or SCOPE 2 NOS/VE

4.22 Labeled COMMON/FROMBF/

```
INTEGER FROMBF(513)
COMMON /FROMBF/ FROMBF
```

Integer	Description
FROMBF	Buffer used for the FET of the pattern library being updated. This common is local to overlay CX477.

4.23 Labeled COMMON /COMEGNC/

Temporary integer and real common used by Extended Geometry and N/C.

```
INTEGER IMODE2(128)
REAL    RMODE2(128)
COMMON /COMEGNC/ IMODE2,RMODE2
```

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COMMENT SHEET

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