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INTERNATIONAL STANDARD

ISO/IEC 9593-1

First edition
1990-06-01

AMENDMENT 1
1995-04-15

Information processing systems — Computer graphics — Programmer's Hierarchical Interactive Graphics System (PHIGS) language bindings —

Part 1: FORTRAN

AMENDMENT 1

Systèmes de traitement de l'information — Infographie — Interfaces langage entre un programme d'application et son support graphique

Partie 1: FORTRAN

AMENDEMENT 1

Reference number
ISO/IEC 9593-1:1990/Amd.1:1995(E)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Amendment 1 to International Standard ISO/IEC 9593-1:1990 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

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Introduction

Replace the Introduction of ISO/IEC 9593-1 with the following text:

ISO/IEC 9592-1:1989, provides a set of functions for the display and modification of 2D or 3D graphical data. Part 1 is extended by Part 4 (PHIGS PLUS) to incorporate the effects of lighting, shading and other properties that are important for the display of surfaces and multidimensional data.

ISO/IEC 9592-1 and ISO/IEC 9592-4 are specified in a language independent manner and must be embedded in language dependent layers (language bindings) for use with particular programming languages.

The purpose of this part of ISO/IEC 9593 is to define the FORTRAN language binding for ISO/IEC 9592-1 and ISO/IEC 9592-4.

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Information processing systems — Computer graphics — Programmer's Hierarchical Interactive Graphics System (PHIGS) language bindings —

Part 1: FORTRAN

AMENDMENT 1

1 Scope

Replace clause 1:

The "Programmer's Hierarchical Interactive Graphics System" (PHIGS), ISO/IEC 9592-1:1989, and ISO/IEC 9592-4:1992, specify a language independent nucleus of a graphics system. For integration into a programming language, PHIGS PLUS is embedded in a language dependent layer obeying the particular conventions of that language. This part of ISO/IEC 9593 specifies the FORTRAN language dependent layer.

2 Normative references

Add the following reference to clause 2:

ISO/IEC 9592-4:1992, *Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) Part 4 - Plus Lumière Und Surfaces (PHIGS PLUS).*

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3 Principles

3.1 Specification

Replace subclause 3.1, Specification, of ISO/IEC 9593-1 with the following text:

This part of ISO/IEC 9593 defines the PHIGS and PHIGS PLUS language binding interface for FORTRAN 77, as described in ISO 1539: 1980. With some minor modifications, application programs can be transported between full FORTRAN77 and FORTRAN77 Subset PHIGS and PHIGS PLUS installations.

This binding incorporates the rules of conformance defined in the PHIGS (ISO/IEC 9592-1) and PHIGS PLUS (ISO/IEC 9592-4) Standard for PHIGS and PHIGS PLUS implementations, with those additional requirements specifically defined for FORTRAN language implementations defined in this part of ISO/IEC 9593. The following criteria are established for determining conformance of an implementation to this binding:

In order to conform, an implementation of the FORTRAN binding of PHIGS shall implement those functions specified in ISO/IEC 9592-1. The implementation shall make visible all of the declarations in the FORTRAN binding specified in clause 5 to 10 in this part of ISO/IEC 9593.

In order to conform, an implementation of the FORTRAN binding of PHIGS PLUS shall implement those functions specified in ISO/IEC 9592-1 and also those functions specified in ISO/IEC 9592-4. The implementation shall make visible all of the declarations in the FORTRAN binding specified in clause 11 to 14 and in clause 5 to 10, as modified by clause 11 to 14, in this part of ISO/IEC 9593.

Thus, for example, the syntax of the function names shall be precisely as specified in this part of ISO/IEC 9593 and the parameters shall be of the data types stated in this part of ISO/IEC 9593.

A PHIGS FORTRAN application should run without modification under a PHIGS PLUS FORTRAN binding implementation.

3.2 Mapping of PHIGS function names to FORTRAN subroutine names

Append the following paragraph to subclause 3.2,

However, two abbreviations are changed for PHIGS PLUS; MAPPING becomes M and WORKSTATION becomes W, due to the FORTRAN subroutine naming restrictions.

3.3 Parameters

No change to ISO/IEC 9593-1.

3.4 The FORTRAN subset

No change to ISO/IEC 9593-1.

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3.5 Error handling

No change to ISO/IEC 9593-1.

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4 Generating FORTRAN subroutine names

Add the following, alphabetically, to table 2 of clause 4:

Table 2 - Reduce compound terms for uniqueness

REPRESENTATION PLUS	-> P

Add the following, alphabetically, to table 3 of clause 4:

Table 3 - Deletions

GEOMETRIC	**NON-UNIFORM**	**WITH**

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Add the following, alphabetically, to table 4 to clause 4:

Table 4 - Abbreviations

PHIGS PLUS word abbreviation		remarks
APPROXIMATION	A	
B-SPLINE	BS	
BACK	B	
CHARACTERISTICS	C	
COORDINATE	CD	
CRITERIA	C	
CUE	C	
CULLING	C	
CURVE	C	
DATA	D	
DEPTH	D	SET DEPTH CUE INDEX:DP
DIRECT	D	
DISTINGUISHING	D	
DYNAMICS	DC	
FACET	F	
LIGHT	L	
MAPPING	M	
MESH	M	FOR PHIGS PLUS
METHOD	M	
PARAMETRIC	P	
PLACEMENT	P	
PLUS	P	
PROPERTIES	P	
QUADRILATERAL	Q	
REFLECTANCE	RF	
RENDERING	R	
SHADING	S	
SPLINE	S	
STRIP	ST	
SURFACE	S	
SOURCE	S	
TRIMMING	T	
TRIANGLE	T	
WORKSTATION	W	FOR PHIGS PLUS

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5 Data types

Append the following data type definitions to clause 5:

COLRV colour value
INTEGER containing colour index when CTYPE is INDIRECT
INTEGER NCC when CTYPE is not INDIRECT
REAL$_1$,REAL$_2$,REAL$_3$,...REAL$_n$ containing $C_1,C_2,C_3,...C_n$ ($_n$=NCC) when CTYPE is not INDIRECT

COLRVH homogeneous colour value
REAL$_1$,REAL$_2$,REAL$_3$,...REAL$_n$ and REAL containing $WC_1,WC_2,WC_3,...WC_n$ and W ($_n$=NCC)

GCOLR general colour
a compound data type containing colour type and colour value of **COLRV**

NORM normal vector
REAL,REAL,REAL containing X-,Y- and Z- values

P2H two-dimensional homogeneous point
REAL,REAL,REAL containing WX-,WY- and W- values (or WU-,WV- and W- of a trimming curve control point) W value is ignored in case of non-rational type

P3H three-dimensional homogeneous point
REAL,REAL,REAL,REAL containing WX-,WY-,WZ- and W- values
W value is ignored in case of non-rational type

A(P3) array of coordinates of points
REAL(*),REAL(*),REAL(*) containing X-,Y- and Z- values(*=number of columns by number of rows)

L(L(P3{,COLRV})) list of vertex data lists
REAL PXA(*),PYA(*),PZA(*) *=last value of array of end indices for point lists(NP)
INTEGER VCOLI(*) *=NP, when CTYPE is INDIRECT
REAL VCOLR(*) *=number of components of colour value(NCC) × NP, when CTYPE is not INDIRECT

{COLRV}{,NORM}{,L(R)} facet data
INTEGER FCOLI when CTYPE is INDIRECT
REAL FCOLR(*) *=number of components of colour value(NCC), when CTYPE is not INDIRECT
REAL FNXA,FNYA,FNZA facet normal data
REAL FDLEN length of application-specific data
REAL FDATA(FDLEN) facet application-specific data

L(L(E)) list of edge flags lists
INTEGER EDATA(*) *=last value of array of end indices for point lists

L(L(P2{,COLRV}{,NORM}{,L(R)}))
REAL PXA(*),PYA(*) *=last value of array of end indices for point lists(NP)
INTEGER VCOLI(*) *=NP, when CTYPE is INDIRECT
REAL VCOLR(*) *=number of components of colour value(NCC) × NP, when CTYPE

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is not INDIRECT
REAL VNXA(*),VNYA(*) vertex normal data(*=NP)
INTEGER VDLEN length of application-specific data
REAL VDATA(*) vertex application-specific data(*=VDLEN × NP)

L(L(P3{,COLRV}{,NORM}{,L(R)}))
REAL PXA(*),PYA(*),PZA(*) *=last value of array of end indices for point lists(NP)
INTEGER VCOLI(*) *=NP, when CTYPE is INDIRECT
REAL VCOLR(*) *=number of components of colour value(NCC) × NP, when CTYPE is not INDIRECT
REAL VNXA(*),VNYA(*),VNZA(*) vertex normal data(*=NP)
INTEGER VDLEN length of application-specific data
REAL VDATA(*) vertex application-specific data(*=VDLEN × NP)

L(L(L(I))) list of lists of vertex indices lists
REAL VIND(*) *=last value of array of end vertex indices for each fill area

L(L(L(E))) list of lists of edge flags lists
INTEGER EDATA(*) *=last value of array of end vertex indices for each fill area

L({COLRV}{,NORM}{,L(R)}) list of facet data
INTEGER FCOLI(*) *=number of fill area sets(N) in set of fill area sets 3 with data or set of fill area sets with data, number of triangles(N) at following 4 functions, triangle set 3 with data, triangle set with data, triangle strip 3 with data and triangle strip with data, when CTYPE is INDIRECT
REAL FCOLR(*) *=number of components of colour value(NCC) x NFS, when CTYPE is not INDIRECT
REAL FNXA(*),FNYA(*),FNZA(*) facet normal data(*=N)
INTEGER FDLEN length of application-specific data
REAL FDATA(*) facet application-specific data(*=FDLEN × N)

L(P3{,COLRV}{,NORM}{,L(R)}) list of vertex data
REAL PXA(*),PYA(*),PZA(*) *=number of points(NP)
INTEGER VCOLI(*) *=NP, when CTYPE is INDIRECT
REAL VCOLR(*) *=number of components of colour value(NCC) x NP, when CTYPE is not INDIRECT
REAL VNXA(*),VNYA(*),VNZA(*) vertex normal data(*=NP)
INTEGER VDLEN length of application-specific data
REAL VDATA(*) vertex application-specific data(*=VDLEN x NP)

L(P2{,COLRV}{,NORM}{,L(R)}) list of vertex data
REAL PXA(*),PYA(*) *=number of points(NP)
INTEGER VCOLI(*) *=NP, when CTYPE is INDIRECT
REAL VCOLR(*) *=number of components of colour value(NCC) x NP, when CTYPE is not INDIRECT
REAL VNXA(*),VNYA(*),VNZA(*) vertex normal data(*=NP)
INTEGER VDLEN length of application-specific data
REAL VDATA(*) vertex application-specific data(*=VDLEN x NP)

A(COLRV) colour array
INTEGER COLIA(*) *=number of columns(DIMX) × number of rows(DIMY), when CTYPE is INDIRECT
REAL COLRA(*) *=number of components of colour value(NCC) × DIMX × DIMY, when CTYPE is not INDIRECT

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A({COLRV}{,NORM}{,L(R)}) array of facet data
INTEGER FCOLI(*) *=number of columns minus 1(NC-1) × number of rows minus 1(NR-1), when CTYPE is INDIRECT
REAL FCOLR(*) *=number of components of colour value(NCC) × NC-1 × NR-1, when CTYPE is not INDIRECT
REAL FNXA(*),FNYA(*),FNZA(*) facet normal data(*= NC-1 × NR-1)
INTEGER FDLEN length of application-specific data
REAL FDATA(*) facet application-specific data(*=FDLEN × NC-1 × NR-1)

A(P3{,COLRV}{,NORM}{,L(R)}) array of vertex data
REAL PXA(*),PYA(*),PZA(*) *=number of columns(NC) × number of rows(NR)
INTEGER VCOLI(*) *=NC × NR, when CTYPE is INDIRECT
REAL VCOLR(*) *=number of components of colour value(NCC) × NC × NR, when CTYPE is not INDIRECT
REAL VNXA(*),VNYA(*),VNZA(*) vertex normal data(*= NC × NR)
INTEGER VDLEN length of application-specific data
REAL VDATA(*) vertex application-specific data(*=VDLEN × NC × NR)

A(P2{,COLRV}{,NORM}{,L(R)}) array of vertex data
REAL PXA(*),PYA(*) *=number of columns(NC) × number of rows(NR)
INTEGER VCOLI(*) *=NC × NR, when CTYPE is INDIRECT
REAL VCOLR(*) *=number of components of colour value(NCC) × NC × NR, when CTYPE is not INDIRECT
REAL VNXA(*),VNYA(*),VNZA(*) vertex normal data(*= NC × NR)
INTEGER VDLEN length of application-specific data
REAL VDATA(*) vertex application-specific data(*=VDLEN × NC × NR)

A(2×E) array of edge data
INTEGER EDATA(*) *=2 × number of columns(NC) × number of rows(NR)

L(P3H)|L(P3) list of curve control points
REAL PXA(*),PYA(*),PZA(*),PWA(*) *=number of control points, when CRTYPE is PRAT
REAL PXA(*),PYA(*),PZA(*) *=number of control points, when CRTYPE is PNRAT

L(COLRVH)|L(COLRV) list of colour spline control points
REAL CSCR(*) *={number of components of colour value(NCC)+1} × number of colour spline control points(NCSCP), when CRTYPE is PRAT
REAL CSCR(*) *=number of components of colour value(NCC) × number of colour spline control points(NCSCP), when CRTYPE is PNRAT

A(P3H)|A(P3) array of surface control points
REAL PXA(*),PYA(*),PZA(*),PWA(*) *=u number of control points dimension(UNCP) × v number of control points dimension(VNCP), when CRTYPE is PRAT
REAL PXA(*),PYA(*),PZA(*) *=u number of control points dimension(UNCP) × v number of control points dimension(VNCP), when CRTYPE is PNRAT

L(L(TRIMCURVE)) list of trimming loop definitions lists
INTEGER TACRI(*) *=number of components of list of trimming loop definitions lists(NCLTL)
INTEGER TCVF(*) trimming curve visibility flag(*=NCLTL)
INTEGER TSORD(*) trimming curve spline order(*=NCLTL)
INTEGER TNKA(*) number of spline knots(*=NCLTL)
REAL TKNOTS(*) *=last value of array of number of spline knots in array(TNKA)
REAL TPARL(2,*) trimming curve parameter range limits(*=NCLTL)
INTEGER TRTYPE(*) trimming curve spline rationality(*=NCLTL)

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INTEGER NTCCP(*) number of timming curve spline control points(*=NCLTL)
REAL TPWXA(*),TPWYA(*),TPWWA(*) *=last value of number of trimming curve spline control points, when CRTYPE is PRAT
REAL TPWXA(*),TPWYA(*) *=last value of number of trimming curve spline control points, when CRTYPE is PNRAT

L(P2H)|L(P2) list of trimming curve control points
REAL TPWUA(*),TPWVA(*),TPWWA(*) *=number of control points, when CRTYPE is PRAT
REAL TPWUA(*),TPWVA(*) *=number of control points, when CRTYPE is PNRAT

A(COLRVH)|A(COLRV) array of colour spline control points
REAL CSCP(*) *={number of components of colour value(NCC)+1} ×
u number of colour spline control points dimension(NUCSCP) ×
v number of colour spline control points dimension(NVCSCP), when CRTYPE is PRAT
REAL CSCP(*) *=number of components of colour value(NCC) ×
u number of colour spline control points dimension(NUCSCP) ×
v number of colour spline control points dimension(NVCSCP), when CRTYPE is PNRAT

L(DATASPLINE) list of data spline (for non-uniform B-spline surface with data)
INTEGER DUSORD(*) u data spline order(*=NDS)
INTEGER DVSORD(*) v data spline order(*=NDS)
INTEGER DNUKA(*) number of u spline knots(*=NDS)
INTEGER DNVKA(*) number of v spline knots(*=NDS)
REAL DUKNTS(*) *=last value of number of u spline knots(DNUKA) × NDS
REAL DVKNTS(*) *=last value of number of v spline knots(DNVKA) × NDS
INTEGER DRTYPE(*) data spline rationality(*=NDS)
INTEGER NUDSCP(*) u number of data spline control points dimension(*=NDS)
INTEGER NVDSCP(*) v number of data spline control points dimension(*=NDS)
INTEGER DDIMS(*) data dimension(*=NDS)
REAL DSCP(*) *=

$$\sum_{i=1}^{NDS} (NUDSCP(i) \times NVDSCP(i) \times DDIMS(i))$$

DDIMS(i) = n+1 (n = $d_1,d_2,d_3,...d_n$,w) when DRTYPE(i) is PRAT.
DDIMS(i) = n (n = $d_1,d_2,d_3,...d_n$) when DRTYPE(i) is PNRAT.

A(DATAH)|A(DATA) control points of data spline
REAL DSCP(*) *=

$$\sum_{i=1}^{NDS} (NUDSCP(i) \times NVDSCP(i) \times DDIMS(i))$$

DDIMS(i) = n+1 (n = $d_1,d_2,d_3,...d_n$,w) when DRTYPE(i) is PRAT.
DDIMS(i) = n (n = $d_1,d_2,d_3,...d_n$) when DRTYPE(i) is PNRAT.

NDS=number of data spline
NUDSCP=u number of data spline control points dimension
NVDSCP=v number of data spline control points dimension
DDIMS=data dimension for spline

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6 Enumeration types

No change to ISO/IEC 9593-1.

7 List of the PHIGS function names

No change to ISO/IEC 9593-1.

8 PHIGS errors specific to the FORTRAN binding

No change to ISO/IEC 9593-1.

9. The PHIGS function interface

No change to ISO/IEC 9593-1.

10 Utility functions not defined in PHIGS

No change to ISO/IEC 9593-1.

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Add the following new clauses 11, 12, 13 and 14:

11 PHIGS PLUS Enumeration types

All the enumeration types of PHIGS PLUS are mapped to FORTRAN INTEGERs. The correspondence between PHIGS PLUS scalars and FORTRAN INTEGERs is shown as follows in a list of symbolic FORTRAN constants that may be included in any application program. This clause contains a mapping of PHIGS PLUS enumeration types to FORTRAN variable names.

"Polyline shading method", "interior shading method", "data mapping method", "reflectance property type", "reflectance model", "curve placement", "light source type", "colour mapping method", "curve approximation type", "surface approximation type" and "parametric surface charcteristic type" are defined as INTEGER rather than enumeration types in PHIGS PLUS. Constant definitions for the explicitly defined and required values of these conceptually unbounded ranges are provided as a convenience.

Also, a numbering of all PHIGS PLUS functions is given for use in the error handling procedures.

Mnemonic FORTRAN names and their values for PHIGS PLUS ENUMERATION type values:

aspect identifier

	polyline colour ..				
INTEGER	PPLCOL,	PPMCOL,	PTXCOL,	PINCOL,	PEDCOL,
1	PPSHMD,	PISHMD,	PDMPMD,	PREFPR,	PREFM,
2	PBINSY,	PBINSI,	PBICOL,	PBISHM,	PBDMPM,
3	PBREFP,	PBREFM,	PCAPCR,	PSAPCR,	PPASUC
PARAMETER(	PPLCOL=18,	PPMCOL=19,	PTXCOL=20,	PINCOL=21,	PEDCOL=22,
1	PPSHMD=23,	PISHMD=24,	PDMPMD=25,	PREFPR=26,	PREFM=27,
2	PBINSY=28,	PBINSI=29,	PBICOL=30,	PBISHM=31,	PBDMPM=32,
3	PBREFP=33,	PBREFM=34,	PCAPCR=35,	PSAPCR=36,	PPASUC=37)

colour mapping method

	true	*pseudo*	*pseudo-n*
INTEGER	PTRUE,	PSUD,	PSUDN
PARAMETER(	PTRUE=1,	PSUD=2,	PSUDN=3)

INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

colour type

	indirect
INTEGER	PINDIR
PARAMETER(	PINDIR=0)

The following colour models are also colour types.
RGB,CIELUV,HSV,HLS

culling mode

	none	*backfacing*	*frontfacing*
INTEGER	PNOFC,	PBKFC,	PFTFC
PARAMETER(	PNOFC=0,	PBKFC=1,	PFTFC=2)

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curve approximation criteria type

	workstation dependent chordal deviation in WC relative DC	*constant between knots chordal deviation in NPC*	*chordal size in WC chordal deviation in DC*	*chordal size in NPC relative WC*	*chordal size in DC relative NPC*
INTEGER	PWDCA,	PCBKCA,	PCSWCA,	PCSNCA,	PCSDCA,
1	PCDWCA,	PCDNCA,	PCDDCA,	PRWCA,	PRNCA,
2	PRDCA				
PARAMETER(	PWDCA=1,	PCBKCA=2,	PCSWCA=3,	PCSNCA=4,	PCSDCA=5,
1	PCDWCA=6,	PCDNCA=7,	PCDDCA=8,	PRWCA=9,	PRNCA=10,
2	PRDCA=11)				

INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

curve placement (of ISOPARAMETRIC CURVE)

	over surface	*between knots*
INTEGER	PUOSCP,	PUBKCP
PARAMETER(	PUOSCP=0,	PUBKCP=1)

curve visibility flag

Uses the POFF/PON enumeration defined for edge flag and error handling mode.

data mapping method

	colour	*single uniform*	*single non-uniform*	*BI uniform*	*BI non-uniform*
INTEGER	PCDM,	PSUDM,	PSNUDM,	PBUDM,	PBNUDM
PARAMETER(	PCDM=1,	PSUDM=2,	PSNUDM=3,	PBUDM=4,	PBNUDM=5)

INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

depth cue mode

	suppressed	*allowed*
INTEGER	PSUPPR	PALLOW
PARAMETER(	PSUPPR=0,	PALLOW=1)

distinguishing mode

Uses the POFF/PON enumeration defined for edge flag and error handling mode.

edge data flag

	none	*edge visibility flag*
INTEGER	PENO	PEVF
PARAMETER(	PENO=0,	PEVF=1)

Not defined in PHIGS PLUS but used to indicate presence of optional data for FORTRAN binding.

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element type

	polyline set 3 with data ..				
INTEGER	PEPLS3,	PEFS3D,	PEFSD,	PECA3P,	PESFS3,
1	PESFSD,	PETS3D,	PETSD,	PETST3,	PETSTD,
2	PEQM3D,	PEQMD,	PEBC3,	PEBC3C,	PEBS3,
3	PEBS3D,	PEDMI,	PERFI,	PEBII,	PEBDMI,
4	PEBRFI,	PEPRSI,	PEPLC,	PEPLSM,	PEPMC,
5	PETXC,	PEFDM,	PEFCM,	PEIC,	PEISM,
6	PEDMM,	PERFP,	PERFM,	PEBIS,	PEBISI,
7	PEBIC,	PEBISM,	PEBDMM,	PEBRFP,	PEBRFM,
8	PELSS,	PEEDC,	PECAC,	PESAC,	PEPSC,
9	PERCM,	PEDPCI,	PECMI)		
PARAMETER(	PEPLS3=71,	PEFS3D=72,	PEFSD=73,	PECA3P=74,	PESFS3=75,
1	PESFSD=76,	PETS3D=77,	PETSD=78,	PETST3=79,	PETSTD=80,
2	PEQM3D=81,	PEQMD=82,	PEBC3=83,	PEBC3C=84,	PEBS3=85,
3	PEBS3D=86,	PEDMI=87,	PERFI=88,	PEBII=89,	PEBDMI=90,
4	PEBRFI=91,	PEPRSI=92,	PEPLC=93,	PEPLSM=94,	PEPMC=95,
5	PETXC=96,	PEFDM=97,	PEFCM=98,	PEIC=99,	PEISM=100,
6	PEDMM=101,	PERFP=102,	PERFM=103,	PEBIS=104,	PEBISI=105,
7	PEBIC=106,	PEBISM=107,	PEBDMM=108,	PEBRFP=109,	PEBRFM=110,
8	PELSS=111,	PEEDC=112,	PECAC=113,	PESAC=114,	PEPSC=115,
9	PERCM=116,	PEDPCI=117,	PECMI=118)		

facet data flag

	no facet data colour	*normal*	*data*	*colour/normal*	
	colour/data	*normal/data*	*colour/normal/data*		
INTEGER	PFNO,	PFC,	PFN,	PFD,	PFCN,
1	PFCD,	PFND,	PFCND		
PARAMETER(	PFNO=0,	PFC=1,	PFN=2,	PFD=3,	PFCN=4,
1	PFCD=5,	PFND=6,	PFCND=7)		

Not defined in PHIGS PLUS but used to indicate presence of optional data for FORTRAN binding.

GDP attributes

	reflectance	*parametric surface*
INTEGER	PRFATT,	PPSATT
PARAMETER(	PRFATT=5,	PPSATT=6)

interior shading method

	none	*colour*	*data*	*data/dot*	*data/normal*
INTEGER	PNOIS,	PCIS,	PDIS,	PDDIS,	PDNIS
PARAMETER(	PNOIS=1,	PCIS=2,	PDIS=3,	PDDIS=4,	PDNIS=5)

INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

light source type

	ambient	*directional*	*positional*	*spot*
INTEGER	PAMB,	PDIRE,	PPOSI,	PSPOT
PARAMETER(	PAMB=1,	PDIRE=2,	PPOSI=3,	PSPOT=4)

INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

parametric surface characteristic type

	none	*workstation dependent*	*isoparametric curve*	*level curve in MC*	*level curve in WC*
INTEGER	PNOPC,	PWDPC,	PICPC,	PLCMPC,	PLCWPC
PARAMETER(	PNOPC=1,	PWDPC=2,	PICPC=3,	PLCMPC=4,	PLCWPC=5)

INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

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polyline shading method

	none	*colour*
INTEGER	PNOPS,	PCPS
PARAMETER(	PNOPS=1,	PCPS=2)

INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

rationality

	rational	*non-rational*
INTEGER	PRAT,	PNRAT
PARAMETER(	PRAT=0,	PNRAT=1)

reflectance model

	no reflectance	*ambient*	*ambient/diffuse*	*ambient/diffuse/specular*
INTEGER	PNORM,	PARM,	PADRM,	PADSRM
PARAMETER(	PNORM=1,	PARM=2,	PADRM=3,	PADSRM=4)

INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

reflectance property type

	simple reflectance
INTEGER	PSRPT
PARAMETER(	PSRPT=1)

INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

surface approximation criteria

	workstation dependent planar deviation in WC relative in DC	*constant between knots planar deviation in NPC*	*chordal size in WC planar deviation in DC*	*chordal size in NPC relative in WC*	*chordal size in DC relative in NPC*
INTEGER	PWDSA,	PCBKSA,	PCSWSA,	PCSNSA,	PCSDSA,
1	PPDWSA,	PPDNSA,	PPDDSA,	PRWSA,	PRNSA,
2	PRDSA				
PARAMETER(	PWDSA=1,	PCBKSA=2,	PCSWSA=3,	PCSNSA=4,	PCSDSA=5,
1	PPDWSA=6,	PPDNSA=7,	PPDDSA=8,	PRWSA=9,	PRNSA=10,
2	PRDSA=11)				

INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

source selector

	colour aspect	*vertex colour*	*vertex data*	*facet colour*	*facet data*
INTEGER	PSCASF,	PSVC,	PSVD,	PSFC,	PSFD
PARAMETER(	PSCASF=0,	PSVC=1,	PSVD=2,	PSFC=3,	PSFD=4)

trimming curve visibility flag

Uses the POFF/PON enumeration defined for edge flag and error handling mode.

vertex data flag

	coordinate only colour/data	*colour normal/data*	*normal colour/normal/data*	*data*	*colour/normal*
INTEGER	PCD,	PCDC,	PCDN,	PCDD,	PCDCN,
1	PCDCD,	PCDND,	PCDCND		
PARAMETER(	PCD=0,	PCDC=1,	PCDN=2,	PCDD=3,	PCDCN=4,
1	PCDCD=5,	PCDND=6,	PCDCND=7)		

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PHIGS PLUS functions. These names are used for error handling. The names are the same as the PHIGS PLUS function names except that the sentinel character 'P' is replaced by 'E'. The same function identification used for full FORTRAN 77.

```
INTEGER     EPLS3C,     EFAS3D,     EFASD,     ECA3P,     ESFAS3
PARAMETER(  EPLS3C=183, EFAS3D=184, EFASD=185, ECA3P=186, ESFAS3=187)
INTEGER     ESFASD,     ETS3D,      ETSD,      ETST3D,    ETSTD
PARAMETER(  ESFASD=188, ETS3D=189,  ETSD=190,  ETST3D=191,ETSTD=192)
INTEGER     EQM3D,      EQMD,       EBSC3,     EBSC3C,    EBSS3
PARAMETER(  EQM3D=193,  EQMD=194,   EBSC3=195, EBSC3C=196,EBSS3=197)
INTEGER     EBSS3D,     ESDMI,      ESRFI,     ESBII,     ESBDMI
PARAMETER(  EBSS3D=198, ESDMI=199,  ESRFI=200, ESBII=201, ESBDMI=202)
INTEGER     ESBRFI,     ESPSI,      ESPLC,     ESPLSM,    ESPMC
PARAMETER(  ESBRFI=203, ESPSI=204,  ESPLC=205, ESPLSM=206,ESPMC=207)
INTEGER     ESTXC,      ESFDM,      ESFCM,     ESIC,      ESISM
PARAMETER(  ESTXC=208,  ESFDM=209,  ESFCM=210, ESIC=211,  ESISM=212)
INTEGER     ESDMM,      ESRFP,      ESRFM,     ESBIS,     ESBISI
PARAMETER(  ESDMM=213,  ESRFP=214,  ESRFM=215, ESBIS=216, ESBISI=217)
INTEGER     ESBIC,      ESBISM,     ESBDMM,    ESBRFP,    ESBRFM
PARAMETER(  ESBIC=218,  ESBISM=219, ESBDMM=220,ESBRFP=221,ESBRFM=222)
INTEGER     ESLSS,      ESEDC,      ESCAC,     ESSAC,     ESPSC
PARAMETER(  ESLSS=223,  ESEDC=224,  ESCAC=225, ESSAC=226, ESPSC=227)
INTEGER     ESRCM,      ESDPCI,     ESCMI,     ESPLP,     ESPMP
PARAMETER(  ESRCM=228,  ESDPCI=229, ESCMI=230, ESPLP=231, ESPMP=232)
INTEGER     ESTXRP,     ESIP,       ESEDP,     ESDMR,     ESRFR
PARAMETER(  ESTXRP=233, ESIP=234,   ESEDP=235, ESDMR=236, ESRFR=237)
INTEGER     ESPSR,      ESPAP,      ESLSR,     ESDCR,     ESCMR
PARAMETER(  ESPSR=238,  ESPAP=239,  ESLSR=240, ESDCR=241, ESCMR=242)
```


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12. List of the PHIGS PLUS function names

The complete list of PHIGS PLUS function names follows.

12.1. List of functions ordered alphabetically by bound name

PBSC3	BS-C-3	NON-UNIFORM B-SPLINE CURVE 3
PBSC3C	BS-C-3-C	NON-UNIFORM B-SPLINE CURVE 3 WITH COLOUR
PBSS3	BS-S-3	NON-UNIFORM B-SPLINE SURFACE 3
PBSS3D	BS-S-3-D	NON-UNIFORM B-SPLINE SURFACE 3 WITH DATA
PCA3P	C-A-3-P	CELL ARRAY 3 PLUS
PFAS3D	F-A-S-3-D	FILL AREA SET 3 WITH DATA
PFASD	F-A-S-D	FILL AREA SET WITH DATA
PPCSC	P-C-S-C	PACK COLOUR SPLINE CURVE
PPCSS	P-C-S-S	PACK COLOUR SPLINE SURFACE
PPDSS	P-D-S-S	PACK DATA SPLINE SURFACE
PPLS3C	PL-S-3-C	POLYLINE SET 3 WITH COLOUR
PPTC	P-T-C	PACK TRIMMING CURVE
PQBSSF	Q-BS-S-F	INQUIRE B-SPLINE SURFACE FACILITIES
PQCMF	Q-C-M-F	INQUIRE COLOUR MAPPING FACILITIES
PQCMMF	Q-C-M-M-F	INQUIRE COLOUR MAPPING METHOD FACILITIES
PQCMR	Q-C-M-R	INQUIRE COLOUR MAPPING REPRESENTATION
PQCMS	Q-C-M-S	INQUIRE COLOUR MAPPING STATE
PQCVF	Q-CV-F	INQUIRE CURVE FACILITIES
PQDCF	Q-D-C-F	INQUIRE DEPTH CUE FACILITIES
PQDCMF	Q-D-C-M-F	INQUIRE DIRECT COLOUR MODEL FACILITIES
PQDCR	Q-D-C-R	INQUIRE DEPTH CUE REPRESENTATION
PQDCWP	Q-DC-W-P	INQUIRE DYNAMICS OF WORKSTATION PLUS
PQDMF	Q-D-M-F	INQUIRE DATA MAPPING FACILITIES
PQDMR	Q-D-M-R	INQUIRE DATA MAPPING REPRESENTATION
PQECMI	Q-E-C-M-I	INQUIRE LIST element OF COLOUR MAPPING INDICES
PQEDCI	Q-E-D-C-I	INQUIRE LIST element OF DEPTH CUE INDICES
PQEDMI	Q-E-D-M-I	INQUIRE LIST element OF DATA MAPPING INDICES
PQEDP	Q-ED-P	INQUIRE EDGE REPRESENTATION PLUS
PQELSI	Q-E-L-S-I	INQUIRE LIST element OF LIGHT SOURCE INDICES
PQEPSI	Q-E-P-S-I	INQUIRE LIST element OF PARAMETRIC SURFACE INDICES
PQERFI	Q-E-R-I	INQUIRE LIST element OF REFLECTANCE INDICES
PQIFP	Q-I-F-P	INQUIRE INTERIOR FACILITIES PLUS
PQIP	Q-I-P	INQUIRE INTERIOR REPRESENTATION PLUS
PQLSF	Q-L-S-F	INQUIRE LIGHT SOURCE FACILITIES
PQLSR	Q-L-S-R	INQUIRE LIGHT SOURCE REPRESENTATION
PQM3D	Q-M-3-D	QUADRILATERAL MESH 3 WITH DATA
PQMD	Q-M-D	QUADRILATERAL MESH WITH DATA
PQPAP	Q-PA-P	INQUIRE PATTERN REPRESENTATION PLUS
PQPCMR	Q-P-C-M-R	INQUIRE PREDEFINED COLOUR MAPPING REPRESENTATION
PQPDCR	Q-P-D-C-R	INQUIRE PREDEFINED DEPTH CUE REPRESENTATION
PQPDMR	Q-P-D-M-R	INQUIRE PREDEFINED DATA MAPPING REPRESENTATION
PQPEDP	Q-P-ED-P	INQUIRE PREDEFINED EDGE REPRESENTATION PLUS
PQPIP	Q-P-I-P	INQUIRE PREDEFINED INTERIOR REPRESENTATION PLUS
PQPLFP	Q-PL-F-P	INQUIRE POLYLINE FACILITIES PLUS
PQPLP	Q-PL-P	INQUIRE POLYLINE REPRESENTATION PLUS
PQPLSR	Q-P-L-S-R	INQUIRE PREDEFINED LIGHT SOURCE REPRESENTATION
PQPMP	Q-PM-P	INQUIRE POLYMARKER REPRESENTATION PLUS
PQPPAP	Q-P-PA-P	INQUIRE PREDEFINED PATTERN REPRESENTATION PLUS
PQPPLP	Q-P-PL-P	INQUIRE PREDEFINED POLYLINE REPRESENTATION PLUS
PQPPMP	Q-P-PM-P	INQUIRE PREDEFINED POLYMARKER REPRESENTATION PLUS
PQPPSR	Q-P-P-S-R	INQUIRE PREDEFINED PARAMETRIC SURFACE REPRESENTATION
PQPRFR	Q-P-RF-R	INQUIRE PREDEFINED REFLECTANCE REPRESENTATION
PQPSF	Q-P-S-F	INQUIRE PARAMETRIC SURFACE FACILITIES
PQPSR	Q-P-S-R	INQUIRE PARAMETRIC SURFACE REPRESENTATION
PQPTXP	Q-P-TX-P	INQUIRE PREDEFINED TEXT REPRESENTATION PLUS
PQRCMF	Q-R-C-M-F	INQUIRE RENDERING COLOUR MODEL FACILITIES
PQRFF	Q-RF-F	INQUIRE REFLECTANCE FACILITIES
PQRFR	Q-RF-R	INQUIRE REFLECTANCE REPRESENTATION

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PQTCF	Q-T-C-F	INQUIRE TRIMMING CURVE FACILITIES
PQTXP	Q-TX-P	INQUIRE TEXT REPRESENTATION PLUS
PQWSLP	Q-W-S-L-P	INQUIRE WORKSTATION STATE TABLE LENGTHS PLUS
PSBDMI	S-B-D-M-I	SET BACK DATA MAPPING INDEX
PSBDMM	S-B-D-M-M	SET BACK DATA MAPPING METHOD
PSBIC	S-B-I-C	SET BACK INTERIOR COLOUR
PSBII	S-B-I-I	SET BACK INTERIOR INDEX
PSBIS	S-B-I-S	SET BACK INTERIOR STYLE
PSBISI	S-B-I-S-I	SET BACK INTERIOR STYLE INDEX
PSBISM	S-B-I-S-M	SET BACK INTERIOR SHADING METHOD
PSBRFI	S-B-RF-I	SET BACK REFLECTANCE INDEX
PSBRFM	S-B-RF-M	SET BACK REFLECTANCE MODEL
PSBRFP	S-B-RF-P	SET BACK REFLECTANCE PROPERTIES
PSCAC	S-C-A-C	SET CURVE APPROXIMATION CRITERIA
PSCMI	S-C-M-I	SET COLOUR MAPPING INDEX
PSCMR	S-C-M-R	SET COLOUR MAPPING REPRESENTATION
PSDCI	S-D-C-I	SET DEPTH CUE INDEX
PSDCR	S-D-C-R	SET DEPTH CUE REPRESENTATION
PSDMI	S-D-M-I	SET DATA MAPPING INDEX
PSDMM	S-D-M-M	SET DATA MAPPING METHOD
PSDMR	S-D-M-R	SET DATA MAPPING REPRESENTATION
PSEDC	S-ED-C	SET EDGE COLOUR
PSEDP	S-ED-P	SET EDGE REPRESENTATION PLUS
PSFAS3	S-F-A-S-3	SET OF FILL AREA SETS 3 WITH DATA
PSFASD	S-F-A-S-D	SET OF FILL AREA SETS WITH DATA
PSFCM	S-F-C-M	SET FACET CULLING MODE
PSFDM	S-F-D-M	SET FACET DISTINGUISHING MODE
PSIC	S-I-C	SET INTERIOR COLOUR
PSIP	S-I-P	SET INTERIOR REPRESENTATION PLUS
PSISM	S-I-S-M	SET INTERIOR SHADING METHOD
PSLSR	S-L-S-R	SET LIGHT SOURCE REPRESENTATION
PSLSS	S-L-S-S	SET LIGHT SOURCE STATE
PSPAP	S-PA-P	SET PATTERN REPRESENTATION PLUS
PSPLC	S-PL-C	SET POLYLINE COLOUR
PSPLP	S-PL-P	SET POLYLINE REPRESENTATION PLUS
PSPLSM	S-PL-S-M	SET POLYLINE SHADING METHOD
PSPMC	S-PM-C	SET POLYMARKER COLOUR
PSPMP	S-PM-P	SET POLYMARKER REPRESENTATION PLUS
PSPSC	S-P-S-C	SET PARAMETRIC SURFACE CHARACTERISTICS
PSPSI	S-P-S-I	SET PARAMETRIC SURFACE INDEX
PSPSR	S-P-S-R	SET PARAMETRIC SURFACE REPRESENTATION
PSRCM	S-R-C-M	SET RENDERING COLOUR MODEL
PSRFI	S-RF-I	SET REFLECTANCE INDEX
PSRFM	S-RF-M	SET REFLECTANCE MODEL
PSRFP	S-RF-P	SET REFLECTANCE PROPERTIES
PSRFR	S-RF-R	SET REFLECTANCE REPRESENTATION
PSSAC	S-S-A-C	SET SURFACE APPROXIMATION CRITERIA
PSTXC	S-TX-C	SET TEXT COLOUR
PSTXRP	S-TX-R-P	SET TEXT REPRESENTATION PLUS
PTS3D	T-S-3-D	TRIANGLE SET 3 WITH DATA
PTSD	T-S-D	TRIANGLE SET WITH DATA
PTST3D	T-ST-3-D	TRIANGLE STRIP 3 WITH DATA
PTSTD	T-ST-D	TRIANGLE STRIP WITH DATA
PUCSC	U-C-S-C	UNPACK COLOUR SPLINE CURVE
PUCSS	U-C-S-S	UNPACK COLOUR SPLINE SURFACE
PUDSS	U-D-S-S	UNPACK DATA SPLINE SURFACE
PUTC	U-T-C	UNPACK TRIMMING CURVE

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12.2 List of functions ordered alphabetically by PHIGS PLUS function name

PCA3P	C-A-3-P	CELL ARRAY 3 PLUS
PFAS3D	F-A-S-3-D	FILL AREA SET 3 WITH DATA
PFASD	F-A-S-D	FILL AREA SET WITH DATA
PQBSSF	Q-BS-S-F	INQUIRE B-SPLINE SURFACE FACILITIES
PQCMF	Q-C-M-F	INQUIRE COLOUR MAPPING FACILITIES
PQCMMF	Q-C-M-M-F	INQUIRE COLOUR MAPPING METHOD FACILITIES
PQCMR	Q-C-M-R	INQUIRE COLOUR MAPPING REPRESENTATION
PQCMS	Q-C-M-S	INQUIRE COLOUR MAPPING STATE
PQCVF	Q-CV-F	INQUIRE CURVE FACILITIES
PQDMF	Q-D-M-F	INQUIRE DATA MAPPING FACILITIES
PQDMR	Q-D-M-R	INQUIRE DATA MAPPING REPRESENTATION
PQDCF	Q-D-C-F	INQUIRE DEPTH CUE FACILITIES
PQDCR	Q-D-C-R	INQUIRE DEPTH CUE REPRESENTATION
PQDCMF	Q-D-C-M-F	INQUIRE DIRECT COLOUR MODEL FACILITIES
PQDCWP	Q-DC-W-P	INQUIRE DYNAMICS OF WORKSTATION PLUS
PQEDP	Q-ED-P	INQUIRE EDGE REPRESENTATION PLUS
PQIFP	Q-I-F-P	INQUIRE INTERIOR FACILITIES PLUS
PQIP	Q-I-P	INQUIRE INTERIOR REPRESENTATION PLUS
PQLSF	Q-L-S-F	INQUIRE LIGHT SOURCE FACILITIES
PQLSR	Q-L-S-R	INQUIRE LIGHT SOURCE REPRESENTATION
PQECMI	Q-E-C-M-I	INQUIRE LIST element OF COLOUR MAPPING INDICES
PQEDMI	Q-E-D-M-I	INQUIRE LIST element OF DATA MAPPING INDICES
PQEDCI	Q-E-D-C-I	INQUIRE LIST element OF DEPTH CUE INDICES
PQELSI	Q-E-L-S-I	INQUIRE LIST element OF LIGHT SOURCE INDICES
PQEPSI	Q-E-P-S-I	INQUIRE LIST element OF PARAMETRIC SURFACE INDICES
PQERFI	Q-E-R-I	INQUIRE LIST element OF REFLECTANCE INDICES
PQPSF	Q-P-S-F	INQUIRE PARAMETRIC SURFACE FACILITIES
PQPSR	Q-P-S-R	INQUIRE PARAMETRIC SURFACE REPRESENTATION
PQPAP	Q-PA-P	INQUIRE PATTERN REPRESENTATION PLUS
PQPLFP	Q-PL-F-P	INQUIRE POLYLINE FACILITIES PLUS
PQPLP	Q-PL-P	INQUIRE POLYLINE REPRESENTATION PLUS
PQPMP	Q-PM-P	INQUIRE POLYMARKER REPRESENTATION PLUS
PQPCMR	Q-P-C-M-R	INQUIRE PREDEFINED COLOUR MAPPING REPRESENTATION
PQPDMR	Q-P-D-M-R	INQUIRE PREDEFINED DATA MAPPING REPRESENTATION
PQPDCR	Q-P-D-C-R	INQUIRE PREDEFINED DEPTH CUE REPRESENTATION
PQPEDP	Q-P-ED-P	INQUIRE PREDEFINED EDGE REPRESENTATION PLUS
PQPIR	Q-P-I-P	INQUIRE PREDEFINED INTERIOR REPRESENTATION PLUS
PQPLSR	Q-P-L-S-R	INQUIRE PREDEFINED LIGHT SOURCE REPRESENTATION
PQPPSR	Q-P-P-S-R	INQUIRE PREDEFINED PARAMETRIC SURFACE REPRESENTATION
PQPPAP	Q-P-PA-P	INQUIRE PREDEFINED PATTERN REPRESENTATION PLUS
PQPPLP	Q-P-PL-P	INQUIRE PREDEFINED POLYLINE REPRESENTATION PLUS
PQPPMP	Q-P-PM-P	INQUIRE PREDEFINED POLYMARKER REPRESENTATION PLUS
PQPRFR	Q-P-RF-R	INQUIRE PREDEFINED REFLECTANCE REPRESENTATION
PQPTXP	Q-P-TX-P	INQUIRE PREDEFINED TEXT REPRESENTATION PLUS
PQRFF	Q-RF-F	INQUIRE REFLECTANCE FACILITIES
PQRFR	Q-RF-R	INQUIRE REFLECTANCE REPRESENTATION
PQRCMF	Q-R-C-M-F	INQUIRE RENDERING COLOUR MODEL FACILITIES
PQTXP	Q-TX-P	INQUIRE TEXT REPRESENTATION PLUS
PQTCF	Q-T-C-F	INQUIRE TRIMMING CURVE FACILITIES
PQWSLP	Q-W-S-L-P	INQUIRE WORKSTATION STATE TABLE LENGTHS PLUS
PBSC3	BS-C-3	NON-UNIFORM B-SPLINE CURVE 3
PBSCC3	BS-C-3-C	NON-UNIFORM B-SPLINE CURVE 3 WITH COLOUR
PBSS3	BS-S-3	NON-UNIFORM B-SPLINE SURFACE 3
PBSSD3	BS-S-3-D	NON-UNIFORM B-SPLINE SURFACE 3 WITH DATA
PPCSC	P-C-S-C	PACK COLOUR SPLINE CURVE
PPCSS	P-C-S-S	PACK COLOUR SPLINE SURFACE
PPDSS	P-D-S-S	PACK DATA SPLINE SURFACE
PPTC	P-T-C	PACK TRIMMING CURVE
PPLS3C	PL-S-3-C	POLYLINE SET 3 WITH COLOUR
PQM3D	Q-M-3-D	QUADRILATERAL MESH 3 WITH DATA
PQMD	Q-M-D	QUADRILATERAL MESH WITH DATA
PSBDMI	S-B-D-M-I	SET BACK DATA MAPPING INDEX

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PSBDMM	S-B-D-M-M	SET BACK DATA MAPPING METHOD
PSBIC	S-B-I-C	SET BACK INTERIOR COLOUR
PSBII	S-B-I-I	SET BACK INTERIOR INDEX
PSBISM	S-B-I-S-M	SET BACK INTERIOR SHADING METHOD
PSBIS	S-B-I-S	SET BACK INTERIOR STYLE
PSBISI	S-B-I-S-I	SET BACK INTERIOR STYLE INDEX
PSBRFI	S-B-RF-I	SET BACK REFLECTANCE INDEX
PSBRFM	S-B-RF-M	SET BACK REFLECTANCE MODEL
PSBRFP	S-B-RF-P	SET BACK REFLECTANCE PROPERTIES
PSCMI	S-C-M-I	SET COLOUR MAPPING INDEX
PSCMR	S-C-M-R	SET COLOUR MAPPING REPRESENTATION
PSCAC	S-C-A-C	SET CURVE APPROXIMATION CRITERIA
PSDMI	S-D-M-I	SET DATA MAPPING INDEX
PSDMM	S-D-M-M	SET DATA MAPPING METHOD
PSDMR	S-D-M-R	SET DATA MAPPING REPRESENTATION
PSDCI	S-D-C-I	SET DEPTH CUE INDEX
PSDCR	S-D-C-R	SET DEPTH CUE REPRESENTATION
PSEDC	S-ED-C	SET EDGE COLOUR
PSEDP	S-ED-P	SET EDGE REPRESENTATION PLUS
PSFCM	S-F-C-M	SET FACET CULLING MODE
PSFDM	S-F-D-M	SET FACET DISTINGUISHING MODE
PSIC	S-I-C	SET INTERIOR COLOUR
PSIP	S-I-P	SET INTERIOR REPRESENTATION PLUS
PSISM	S-I-S-M	SET INTERIOR SHADING METHOD
PSLSR	S-L-S-R	SET LIGHT SOURCE REPRESENTATION
PSLSS	S-L-S-S	SET LIGHT SOURCE STATE
PSFAS3	S-F-A-S-3	SET OF FILL AREA SETS 3 WITH DATA
PSFASD	S-F-A-S-D	SET OF FILL AREA SETS WITH DATA
PSPSC	S-P-S-C	SET PARAMETRIC SURFACE CHARACTERISTICS
PSPSI	S-P-S-I	SET PARAMETRIC SURFACE INDEX
PSPSR	S-P-S-R	SET PARAMETRIC SURFACE REPRESENTATION
PSPAP	S-PA-P	SET PATTERN REPRESENTATION PLUS
PSPLC	S-PL-C	SET POLYLINE COLOUR
PSPLP	S-PL-P	SET POLYLINE REPRESENTATION PLUS
PSPLSM	S-PL-S-M	SET POLYLINE SHADING METHOD
PSPMC	S-PM-C	SET POLYMARKER COLOUR
PSPMP	S-PM-P	SET POLYMARKER REPRESENTATION PLUS
PSRFI	S-RF-I	SET REFLECTANCE INDEX
PSRFM	S-RF-M	SET REFLECTANCE MODEL
PSRFP	S-RF-P	SET REFLECTANCE PROPERTIES
PSRFR	S-RF-R	SET REFLECTANCE REPRESENTATION
PSRCM	S-R-C-M	SET RENDERING COLOUR MODEL
PSSAC	S-S-A-C	SET SURFACE APPROXIMATION CRITERIA
PSTXC	S-TX-C	SET TEXT COLOUR
PSTXRP	S-TX-R-P	SET TEXT REPRESENTATION PLUS
PTS3D	T-S-3-D	TRIANGLE SET 3 WITH DATA
PTSD	T-S-D	TRIANGLE SET WITH DATA
PTST3D	T-ST-3-D	TRIANGLE STRIP 3 WITH DATA
PTSTD	T-ST-D	TRIANGLE STRIP WITH DATA
PUCSC	U-C-S-C	UNPACK COLOUR SPLINE CURVE
PUCSS	U-C-S-S	UNPACK COLOUR SPLINE SURFACE
PUDSS	U-D-S-S	UNPACK DATA SPLINE SURFACE
PUTC	U-T-C	UNPACK TRIMMING CURVE

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13 The PHIGS PLUS function interface

13.1 General principles

For each PHIGS PLUS function the corresponding FORTRAN SUBROUTINE declaration is given. The name of the PHIGS PLUS function is listed, followed by its FORTRAN name and the corresponding parameters. After that, the list of parameters is described by type and a brief identifying phrase.

For the mapping of ENUMERATION types see clause 6 and clause 11.

13.2 Output primitive functions

POLYLINE SET 3 WITH COLOUR

SUBROUTINE PPLS3C(VFLAG,CTYPE,NCC,NPL,IXA,PXA,PYA,PZA,VCOLI,VCOLR)

Input Parameters:

INTEGER VFLAG	data per vertex data flag (PCD,PCDC)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER NPL	number of point lists
INTEGER IXA(NPL)	array of end indices for point lists
REAL PXA(IXA(NPL)),PYA(IXA(NPL)),PZA(IXA(NPL))	coordinates of points(MC)
INTEGER VCOLI(IXA(NPL))	vertex colour indices
REAL VCOLR(NCC*IXA(NPL))	vertex colour values

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FILL AREA SET 3 WITH DATA

```
SUBROUTINE PFAS3D(FFLAG,EFLAG,VFLAG,CTYPE,NCC,FCOLI,FCOLR,FNXA,
*FNYA,FNZA,FDLEN,FDATA,NPL,IXA,EDATA,PXA,PYA,PZA,VCOLI,VCOLR,
*VNXA,VNYA,VNZA,VDLEN,VDATA)
```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PENO,PEVF)
INTEGER VFLAG	data per vertex data flag(PCD,PCDC,PCDN, PCDD,PCDCN,PCDCD,PCDND,PCDCND)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER FCOLI	facet colour index
REAL FCOLR(NCC)	facet colour values
REAL FNXA,FNYA,FNZA	facet normal data(MC)
INTEGER FDLEN	length of application-specific data list per facet
REAL FDATA(FDLEN)	facet application-specific data
INTEGER NPL	number of point lists
INTEGER IXA(NPL)	array of end indices for point lists
INTEGER EDATA(IXA(NPL))	edge data(POFF,PON)
REAL PXA(IXA(NPL)),PYA(IXA(NPL)),PZA(IXA(NPL))	coordinates of points(MC)
INTEGER VCOLI(IXA(NPL))	vertex colour indices
REAL VCOLR(NCC*IXA(NPL))	vertex colour values
REAL VNXA(IXA(NPL)),VNYA(IXA(NPL)),VNZA(IXA(NPL))	vertex normal data(MC)
INTEGER VDLEN	length of application-specific data list per vertex
REAL VDATA(VDLEN*IXA(NPL))	vertex application-specific data

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FILL AREA SET WITH DATA

```
SUBROUTINE PFASD(FFLAG,EFLAG,VFLAG,CTYPE,NCC,FCOLI,FCOLR,FNXA,
*FNYA,FNZA,FDLEN,FDATA,NPL,IXA,EDATA,PXA,PYA,VCOLI,VCOLR,VNXA,
*VNYA,VNZA,VDLEN,VDATA)
```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PENO,PEVF)
INTEGER VFLAG	data per vertex data flag(PCD,PCDC,PCDN, PCDD,PCDCN,PCDCD,PCDND,PCDCND)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER FCOLI	facet colour index
REAL FCOLR(NCC)	facet colour values
REAL FNXA,FNYA,FNZA	facet normal data(MC)
INTEGER FDLEN	length of application-specific data list per facet
REAL FDATA(FDLEN)	facet application-specific data
INTEGER NPL	number of points lists
INTEGER IXA(NPL)	array of end indices for point lists
INTEGER EDATA(IXA(NPL))	edge data(POFF,PON)
REAL PXA(IXA(NPL)),PYA(IXA(NPL))	coordinates of points(MC)
INTEGER VCOLI(IXA(NPL))	vertex colour indices
REAL VCOLR(NCC*IXA(NPL))	vertex colour values
REAL VNXA(IXA(NPL)),VNYA(IXA(NPL)),VNZA(IXA(NPL))	vertex normal data(MC)
INTEGER VDLEN	length of application-specific data list per vertex
REAL VDATA(VDLEN*IXA(NPL))	vertex application-specific data

CELL ARRAY 3 PLUS

```
SUBROUTINE PCA3P(CPXA,CPYA,CPZA,DIMX,DIMY,ISC,ISR,DX,DY,CTYPE,
*NCC,COLIA,COLRA)
```

Input Parameters:

REAL CPXA(3),CPYA(3),CPZA(3)	cell parallelogram(P,Q,R)(MC)
INTEGER DIMX,DIMY	the number of columns and number of rows in COLIA or COLRA
INTEGER ISC,ISR	indices of start column, start row
INTEGER DX,DY	number of columns,number of rows
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER COLIA(DIMX,DIMY)	colour index array
REAL COLRA(NCC*DIMX*DIMY)	colour value array

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SET OF FILL AREA SETS 3 WITH DATA

```
 SUBROUTINE PSFAS3(FFLAG,EFLAG,VFLAG,CTYPE,NCC,NFS,FCOLI,FCOLR,
*FNXA,FNYA,FNZA,FDLEN,FDATA,NF,NP,IXA,EDATA,PXA,PYA,PZA,VCOLI,
*VCOLR,VNXA,VNYA,VNZA,VDLEN,VDATA,VIND)
```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PENO,PEVF)
INTEGER VFLAG	data per vertex data flag(PCD,PCDC,PCDN, PCDD,PCDCN,PCDCD,PCDND,PCDCND)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER NFS	number of fill area sets
INTEGER FCOLI(NFS)	facet colour indices
REAL FCOLR(NCC*NFS)	facet colour values
REAL FNXA(NFS),FNYA(NFS),FNZA(NFS)	facet normal data(MC)
INTEGER FDLEN	length of application-specific data list per facet
REAL FDATA(FDLEN*NFS)	facet application-specific data
INTEGER NF(NFS)	array of end vertex indices in IXA for each fill area set
INTEGER NP	number of points
INTEGER IXA(NF(NFS))	array of end vertex indices in VIND for each fill area
INTEGER EDATA(IXA(NF(NFS))	edge data(POFF,PON)
REAL PXA(NP),PYA(NP),PZA(NP)	coordinates of points(MC)
INTEGER VCOLI(NP)	vertex colour indices
REAL VCOLR(NCC*NP)	vertex colour values
REAL VNXA(NP),VNYA(NP),VNZA(NP)	vertex normal data(MC)
INTEGER VDLEN	length of application-specific data list per vertex
REAL VDATA(VDLEN*NP)	vertex application-specific data
INTEGER VIND(IXA(NF(NFS)))	vertex indices for each fill area

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SET OF FILL AREA SETS WITH DATA

```
 SUBROUTINE PSFASD(FFLAG,EFLAG,VFLAG,CTYPE,NCC,NFS,FCOLI,FCOLR,
*FNXA,FNYA,FNZA,FDLEN,FDATA,NF,NP,IXA,EDATA,PXA,PYA,VCOLI,VCOLR,
*VNXA,VNYA,VNZA,VDLEN,VDATA,VIND)
```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PENO,PEVF)
INTEGER VFLAG	data per vertex data flag(PCD,PCDC,PCDN, PCDD,PCDCN,PCDCD,PCDND,PCDCND)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER NFS	number of fill area sets
INTEGER FCOLI(NFS)	facet colour indices
REAL FCOLR(NCC*NFS)	facet colour values
REAL FNXA(NFS),FNYA(NFS),FNZA(NFS)	facet normal data(MC)
INTEGER FDLEN	length of application-specific data list per facet
REAL FDATA(FDLEN*NFS)	facet application-specific data
INTEGER NF(NFS)	array of end indices in IXA for each fill area set
INTEGER NP	number of points
INTEGER IXA(NF(NFS))	array of end vertex indices in VIND for each fill area
INTEGER EDATA(IXA(NF(NFS))	edge data(POFF,PON)
REAL PXA(NP),PYA(NP)	coordinates of points(MC)
INTEGER VCOLI(NP)	vertex colour indices
REAL VCOLR(NCC*NP)	vertex colour values
REAL VNXA(NP),VNYA(NP),VNZA(NP)	vertex normal data(MC)
INTEGER VDLEN	length of application-specific data list per vertex
REAL VDATA(VDLEN*NP)	vertex application-specific data
INTEGER VIND(IXA(NF(NFS)))	vertex indices for each fill area

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TRIANGLE SET 3 WITH DATA

```
 SUBROUTINE PTS3D(FFLAG,EFLAG,VFLAG,CTYPE,NCC,NTRI,FCOLI,FCOLR,
*FNXA,FNYA,FNZA,FDLEN,FDATA,NP,EDATA,PXA,PYA,PZA,VCOLI,VCOLR,
*VNXA,VNYA,VNZA,VDLEN,VDATA,VIND)
```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PENO,PEVF)
INTEGER VFLAG	data per vertex data flag(PCD,PCDC,PCDN, PCDD,PCDCN,PCDCD,PCDND,PCDCND)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER NTRI	number of triangles
INTEGER FCOLI(NTRI)	facet colour indices
REAL FCOLR(NCC*NTRI)	facet colour values
REAL FNXA(NTRI),FNYA(NTRI),FNZA(NTRI)	facet normal data(MC)
INTEGER FDLEN	length of application-specific data list per facet
REAL FDATA(FDLEN*NTRI)	facet application-specific data
INTEGER NP	number of points
INTEGER EDATA(3*NTRI)	edge data(POFF,PON)
REAL PXA(NP),PYA(NP),PZA(NP)	coordinates of points(MC)
INTEGER VCOLI(NP)	vertex colour indices
REAL VCOLR(NCC*NP)	vertex colour values
REAL VNXA(NP),VNYA(NP),VNZA(NP)	vertex normal data(MC)
INTEGER VDLEN	length of application-specific data list per vertex
REAL VDATA(VDLEN*NP)	vertex application-specific data
INTEGER VIND(NTRI*3)	vertex indices

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TRIANGLE SET WITH DATA

```
 SUBROUTINE PTSD(FFLAG,EFLAG,VFLAG,CTYPE,NCC,NTRI,FCOLI,FCOLR,
*FNXA,FNYA,FNZA,FDLEN,FDATA,NP,EDATA,PXA,PYA,VCOLI,VCOLR,VNXA,
*VNYA,VNZA,VDLEN,VDATA,VIND)
```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PENO,PEVF)
INTEGER VFLAG	data per vertex data flag(PCD,PCDC,PCDN, PCDD,PCDCN,PCDCD,PCDND,PCDCND)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER NTRI	number of triangles
INTEGER FCOLI(NTRI)	facet colour indices
REAL FCOLR(NCC*NTRI)	facet colour values
REAL FNXA(NTRI),FNYA(NTRI),FNZA(NTRI)	facet normal data(MC)
INTEGER FDLEN	length of application-specific data list per facet
REAL FDATA(FDLEN*NTRI)	facet application-specific data
INTEGER NP	number of points
INTEGER EDATA(3*NTRI)	edge data(POFF,PON)
REAL PXA(NP),PYA(NP)	coordinates of points(MC)
INTEGER VCOLI(NP)	vertex colour indices
REAL VCOLR(NCC*NP)	vertex colour values
REAL VNXA(NP),VNYA(NP),VNZA(NP)	vertex normal data(MC)
INTEGER VDLEN	length of application-specific data list per vertex
REAL VDATA(VDLEN*NP)	vertex application-specific data
INTEGER VIND(NTRI*3)	vertex indices

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TRIANGLE STRIP 3 WITH DATA

```
 SUBROUTINE PTST3D(FFLAG,EFLAG,VFLAG,CTYPE,NCC,NP,FCOLI,FCOLR,
*FNXA,FNYA,FNZA,FDLEN,FDATA,EDATA,PXA,PYA,PZA,VCOLI,VCOLR,VNXA,
*VNYA,VNZA,VDLEN,VDATA)
```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PENO,PEVF)
INTEGER VFLAG	data per vertex data flag(PCD,PCDC,PCDN, PCDD,PCDCN,PCDCD,PCDND,PCDCND)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER NP	number of points
INTEGER FCOLI(NP-2)	facet colour indices
REAL FCOLR(NCC*(NP-2))	facet colour values
REAL FNXA(NP-2),FNYA(NP-2),FNZA(NP-2)	facet normal data(MC)
INTEGER FDLEN	length of application-specific data list per facet
REAL FDATA(FDLEN*(NP-2))	facet application-specific data
INTEGER EDATA(2*NP-3)	edge data(POFF,PON)
REAL PXA(NP),PYA(NP),PZA(NP)	coordinates of points(MC)
INTEGER VCOLI(NP)	vertex colour indices
REAL VCOLR(NCC*NP)	vertex colour values
REAL VNXA(NP),VNYA(NP),VNZA(NP)	vertex normal data(MC)
INTEGER VDLEN	length of application-specific data list per vertex
REAL VDATA(VDLEN*NP)	vertex application-specific data

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TRIANGLE STRIP WITH DATA

```
 SUBROUTINE PTSTD(FFLAG,EFLAG,VFLAG,CTYPE,NCC,NP,FCOLI,FCOLR,
*FNXA,FNYA,FNZA,FDLEN,FDATA,EDATA,PXA,PYA,VCOLI,VCOLR,VNXA,VNYA,
*VNZA,VDLEN,VDATA)
```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PENO,PEVF)
INTEGER VFLAG	data per vertex data flag(PCD,PCDC,PCDN, PCDD,PCDCN,PCDCD,PCDND,PCDCND)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER NP	number of points
INTEGER FCOLI(NP-2)	facet colour indices
REAL FCOLR(NCC*(NP-2))	facet colour values
REAL FNXA(NP-2),FNYA(NP-2),FNZA(NP-2)	facet normal data(MC)
INTEGER FDLEN	length of application-specific data list per facet
REAL FDATA(FDLEN*(NP-2))	facet application-specific data
INTEGER EDATA(2*NP-3)	edge data(POFF,PON)
REAL PXA(NP),PYA(NP)	coordinates of points(MC)
INTEGER VCOLI(NP)	vertex colour indices
REAL VCOLR(NCC*NP)	vertex colour values
REAL VNXA(NP),VNYA(NP),VNZA(NP)	vertex normal data(MC)
INTEGER VDLEN	length of application-specific data list per vertex
REAL VDATA(VDLEN*NP)	vertex application-specific data

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QUADRILATERAL MESH 3 WITH DATA

```
SUBROUTINE PQM3D(FFLAG,EFLAG,VFLAG,CTYPE,NCC,NC,NR,FCOLI,FCOLR,
*FNXA,FNYA,FNZA,FDLEN,FDATA,EDATA,PXA,PYA,PZA,VCOLI,VCOLR,VNXA,
*VNYA,VNZA,VDLEN,VDATA)
```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PENO,PEVF)
INTEGER VFLAG	data per vertex data flag(PCD,PCDC,PCDN, PCDD,PCDCN,PCDCD,PCDND,PCDCND)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER NC,NR	number of columns,number of rows
INTEGER FCOLI((NC-1)*(NR-1))	facet colour indices
REAL FCOLR(NCC*(NC-1)*(NR-1))	facet colour values
REAL FNXA((NC-1)*(NR-1)),FNYA((NC-1)*(NR-1)),FNZA((NC-1)*(NR-1))	facet normal data(MC)
INTEGER FDLEN	length of application-specific data list per facet
REAL FDATA(FDLEN*(NC-1)*(NR-1))	facet application-specific data
INTEGER EDATA(2*NC*NR)	edge data(POFF,PON)
REAL PXA(NC*NR),PYA(NC*NR),PZA(NC*NR)	coordinates of points(MC)
INTEGER VCOLI(NC*NR)	vertex colour indices
REAL VCOLR(NCC*NC*NR)	vertex colour values
REAL VNXA(NC*NR),VNYA(NC*NR),VNZA(NC*NR)	vertex normal data(MC)
INTEGER VDLEN	length of application-specific data list per vertex
REAL VDATA(VDLEN*NC*NR)	vertex application-specific data

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QUADRILATERAL MESH WITH DATA

```
 SUBROUTINE PQMD(FFLAG,EFLAG,VFLAG,CTYPE,NCC,NC,NR,FCOLI,FCOLR,
*FNXA,FNYA,FNZA,FDLEN,FDATA,EDATA,PXA,PYA,VCOLI,VCOLR,VNXA,
*VNYA,VNZA,VDLEN,VDATA)
```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PENO,PEVF)
INTEGER VFLAG	data per vertex data flag(PCD,PCDC,PCDN, PCDD,PCDCN,PCDCD,PCDND,PCDCND)
INTEGER CTYPE	colour type
INTEGER NCC	number of components of colour value
INTEGER NC,NR	number of columns,number of rows
INTEGER FCOLI((NC-1)*(NR-1))	facet colour indices
REAL FCOLR(NCC*(NC-1)*(NR-1))	facet colour values
REAL FNXA((NC-1)*(NR-1)),FNYA((NC-1)*(NR-1)),FNZA((NC-1)*(NR-1))	facet normal data(MC)
INTEGER FDLEN	length of application-specific data list per facet
REAL FDATA(FDLEN*(NC-1)*(NR-1))	facet application-specific data
INTEGER EDATA(2*NC*NR)	edge data(POFF,PON)
REAL PXA(NC*NR),PYA(NC*NR)	coordinates of points(MC)
INTEGER VCOLI(NC*NR)	vertex colour indices
REAL VCOLR(NCC*NC*NR)	vertex colour values
REAL VNXA(NC*NR),VNYA(NC*NR),VNZA(NC*NR)	vertex normal data(MC)
INTEGER VDLEN	length of application-specific data list per vertex
REAL VDATA(VDLEN*NC*NR)	vertex application-specific data

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NON-UNIFORM B-SPLINE CURVE 3

SUBROUTINE PBSC3(SORD,NKA,KNOTS,PARL,RTYPE,NCP,PXA,PYA,PZA,PWA)

Input Parameters:

INTEGER SORD	spline order
INTEGER NKA	number of knots
REAL KNOTS(NKA)	knots
REAL PARL(2)	parameter range limits
INTEGER RTYPE	rationality (PRAT,PNRAT)
INTEGER NCP	number of control points
REAL PXA(NCP),PYA(NCP),PZA(NCP),PWA(NCP)	control points(MC)

NON-UNIFORM B-SPLINE CURVE 3 WITH COLOUR

SUBROUTINE PBSC3C(SORD,NKA,KNOTS,PARL,RTYPE,NCP,PXA,PYA,PZA,PWA
*CSCLDR,CSCREC)

Input Parameters:

INTEGER SORD	spline order
INTEGER NKA	number of knots
REAL KNOTS(NKA)	knots
REAL PARL(2)	parameter range limits
INTEGER RTYPE	rationality (PRAT,PNRAT)
INTEGER NCP	number of control points
REAL PXA(NCP),PYA(NCP),PZA(NCP),PWA(NCP)	control points(MC)
INTEGER CSCLDR	number of array elements used in CSCREC
CHARACTER*80 CSCREC(CSCLDR)	colour spline curve data record[1]

NON-UNIFORM B-SPLINE SURFACE 3

SUBROUTINE PBSS3(USORD,VSORD,UNKA,VNKA,UKNOTS,VKNOTS,RTYPE,
*UNCP,VNCP,PXA,PYA,PZA,PWA,TCLDR,TCREC)

Input Parameters:

INTEGER USORD	u spline order
INTEGER VSORD	v spline order
INTEGER UNKA	number of knots for u
INTEGER VNKA	number of knots for v
REAL UKNOTS(UNKA)	u knots
REAL VKNOTS(VNKA)	v knots
INTEGER RTYPE	rationality (PRAT,PNRAT)
INTEGER UNCP	u number of control points dimension
INTEGER VNCP	v number of control points dimension
REAL PXA(UNCP*VNCP),PYA(UNCP*VNCP),PZA(UNCP*VNCP),PWA(UNCP*VNCP)	control points(MC)
INTEGER TCLDR	number of array elements used in TCREC

[1] See PACK COLOUR SPLINE CURVE and UNPACK COLOUR SPLINE CURVE for a description of the colour spline curve data record.

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CHARACTER*80 TCREC(TCLDR) trimming curve data record[2]

NON-UNIFORM B-SPLINE SURFACE 3 WITH DATA

SUBROUTINE PBSS3D(USORD,VSORD,UNKA,VNKA,UKNOTS,VKNOTS,RTYPE,
*UNCP,VNCP,PXA,PYA,PZA,PWA,TCLDR,TCREC,CSSLDR,CSSREC,DSSLDR,
*DSSREC)

Input Parameters:

INTEGER USORD	u spline order
INTEGER VSORD	v spline order
INTEGER UNKA	number of knots for u
INTEGER VNKA	number of knots for v
REAL UKNOTS(UNKA)	u knots
REAL VKNOTS(VNKA)	v knots
INTEGER RTYPE	rationality (PRAT,PNRAT)
INTEGER UNCP	u number of control points dimension
INTEGER VNCP	v number of control points dimension
REAL PXA(UNCP*VNCP),PYA(UNCP*VNCP),PZA(UNCP*VNCP),PWA(UNCP*VNCP)	control points(MC)
INTEGER TCLDR	number of array elements used in TCREC
CHARACTER*80 TCREC(TCLDR)	trimming curve data record[3]
INTEGER CSSLDR	number of array elements used in CSSREC
CHARACTER*80 CSSREC(CSSLDR)	colour spline surface data record[4]
INTEGER DSSLDR	number of array elements used in DSSREC
CHARACTER*80 DSSREC(DSSLDR)	data spline surface data record[5]

[2]See PACK TRIMMING CURVE and UNPACK TRIMMING CURVE for a description of the trimming curve data record.

[3]See PACK TRIMMING CURVE and UNPACK TRIMMING CURVE for a description of the trimming curve data record.

[4]See PACK COLOUR SPLINE SURFACE and UNPACK COLOUR SPLINE SURFACE for a description of the colour spline surface data record.

[5]See PACK DATA SPLINE SURFACE and UNPACK DATA SPLINE SURFACE for a description of the data spline surface data record.

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13.3 Attribute specification functions

13.3.1. Bundled attribute selection

SET DATA MAPPING INDEX

SUBROUTINE PSDMI(DMI)

Input Parameters:

INTEGER DMI	data mapping index

SET REFLECTANCE INDEX

SUBROUTINE PSRFI(RFI)

Input Parameters:

INTEGER RFI	reflectance index

SET BACK INTERIOR INDEX

SUBROUTINE PSBII(BII)

Input Parameters:

INTEGER BII	back interior index

SET BACK DATA MAPPING INDEX

SUBROUTINE PSBDMI(BDMI)

Input Parameters:

INTEGER BDMI	back data mapping index

SET BACK REFLECTANCE INDEX

SUBROUTINE PSBRFI(BRFI)

Input Parameters:

INTEGER BRFI	back reflectance index

SET PARAMETRIC SURFACE INDEX

SUBROUTINE PSPSI(PSI)

Input Parameters:

INTEGER PSI	parametric surface index

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13.3.2 Individual attribute selection

SET POLYLINE COLOUR

SUBROUTINE PSPLC(CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER CTYPE	polyline colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values

SET POLYLINE SHADING METHOD

SUBROUTINE PSPLSM(PLSM)

Input Parameters:

INTEGER PLSM	polyline shading method

SET POLYMARKER COLOUR

SUBROUTINE PSPMC(CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER CTYPE	polymarker colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values

SET TEXT COLOUR

SUBROUTINE PSTXC(CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER CTYPE	text colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values

SET FACET DISTINGUISHING MODE

SUBROUTINE PSFDM(DMODE)

Input Parameters:

INTEGER DMODE	distinguishing mode (POFF,PON)

SET FACET CULLING MODE

SUBROUTINE PSFCM(CMODE)

Input Parameters:

INTEGER CMODE	culling mode (PNOFC,PBKFC,PFTFC)

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SET INTERIOR COLOUR

SUBROUTINE PSIC(CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER CTYPE	interior colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values

SET INTERIOR SHADING METHOD

SUBROUTINE PSISM(ISM)

Input Parameters:

INTEGER ISM	interior shading method

SET DATA MAPPING METHOD

SUBROUTINE PSDMM(DMM,LDR,DATREC)

Input Parameters:

INTEGER DMM	data mapping method
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record

DATREC parameters to build DATA MAPPING METHOD DATA RECORD for DMM = PCDM:
The IA array contains:
- The number of source selectors
- The actual list of source selectors

The other arrays are empty.

Common element:
IL= 1+*
IA(1)= number of source selectors = NSS
IA= element 2 through NSS+1 contain source selectors
RL= 0
RA=( )
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build DATA MAPPING METHOD DATA RECORD for DMM = PSUDM:
The IA array contains:
- The number source selectors
- The actual list of source selectors
- The index of the data value
- The colour type(CT)
- The number of colour values(NCV)
- The list of colour indices.There are NCV colour indices, if CT is indirect.
- The number of components of colour value(NCC), if CT is not indirect.

The RA array contains:

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- The lower range limit
- The upper range limit
- The list of colour values. There are NCV colour values, each having as many components as required by CT.

Common element:
IL= 5+*
IA(1)= number ofsource selectors = NSS
IA= element 2 through NSS+1 contain source selectors
IA(NSS+2)= data value index
IA(NSS+3)= colour type = CT
IA(NSS+4)= number of specified colour = NCV
RL= 2+*
RA(1)= lower range limit
RA(2)= upper range limit
SL= 0
LSTR= ( )
STR= ( )
Individual element:
CASE colour type=PINDDIR:
IA=element NSS+5 through NSS+4+NCV contain the colour indices
CASE colour type=PRGB or PCIE or PHSV or PHLS:
IA(NSS+5)= number of components of colour value = NCC
RA=element 3 through NCC*NCV+2 contain the colour values
example r1,g1,b1,r2,g2,b2,...

DATREC parameters to build DATA MAPPING METHOD DATA RECORD for
DMM = PSNUDM:
The IA array contains:
- The number of source selectors
- The actual list of source selectors
- The index of the data value
- The colour type(CT)
- The number of range boundaries(NRB)
- The list of colour indices.There are NRB+1 colour indices, if CT is indirect.
- The number of components of colour value(NCC), if CT is not indirect.

The RA array contains:
- The actual data of range boundaries
- The list of colour values. There are NRB+1 colour values, each having as many components as required by CT.

Common element:
IL= 5+NSS+*
IA(1)= number of source selectors = NSS
IA= element 2 through NSS+1 contain source selectors
IA(NSS+2)= data value index
IA(NSS+3)= colour type = CT
IA(NSS+4)= number of range boundaries = number of specified colour -1 = NRB
RL= NRB+*
RA=element 1 through NRB contain the range boundary
SL= 0
LSTR= ( )
STR= ( )
Individual element:

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CASE colour type=PINDIR:
IA=element NSS+5 through NSS+4+NRB+1 contain the colour indices
CASE colour type=PRGB or PCIE or PHSV or PHLS:
IA(NSS+5)= number of components of colour value = NCC
RA=element NRB+1 through NCC*(NRB+1)+NRB contain the colour values
example r1,g1,b1,r2,g2,b2,...

DATREC parameters to build DATA MAPPING METHOD DATA RECORD for DMM = PBUDM:
The IA array contains:
- The number of source selectors
- The actual list of source selectors
- The two indices of the data value
- The colour type(CT)
- The number of colour lists(NCL)
- The array of end indices of colour lists
- The list of colour indices.There are a lot of colour indices, if CT is indirect.
- The number of components of colour value(NCC), if CT is not indirect.

The RA array contains:
- The actual data of lower and upper limit of Ra range boundary
- The actual data of lower and upper limit of Rb range boundary
- The list of colour values. There are a lot of colour values, each having as many components as required by CT.

Common element:
IL= 6+NSS+NCL
IA(1)= number of source selectors = NSS
IA= element 2 through NSS+1 contain source selectors
IA(NSS+2)= data value index 1
IA(NSS+3)= data value index 2
IA(NSS+4)= colour type = CT
IA(NSS+5)= number of colour lists = NCL
IA= element NSS+6 through NSS+5+NCL contain array of end indices of colour lists
RL= 4+*
RA(1)= lower limit of Ra range
RA(2)= upper limit of Ra range
RA(3)= lower limit of Rb range
RA(4)= upper limit of Rb range
SL= 0
LSTR= ( )
STR= ( )
Individual element:
CASE colour type=PINDIR:
IA=element NSS+5+NCL+1 through NSS+5+NCL+IA(NSS+5+NCL) contain the colour indices
CASE colour type=PRGB or PCIE or PHSV or PHLS:
IA(NSS+5+NCL+1)= number of components of colour value = NCC
RA=element 5 through NCC*IA(NSS+5+NCL)+4 contain the colour values
example r1,g1,b1,r2,g2,b2,...

DATREC parameters to build DATA MAPPING METHOD DATA RECORD for DMM = PBNUDM:
The IA array contains:
- The number of source selectors
- The actual list of source selectors

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- The two indices of the data value
- The colour type(CT)
- The number of Ra range boundaries(NRAB)
- The array of end indices of Rb range boundaries data
- The list of colour indices.There is a lot of colour indices (number of Rb range boundaries data + number of Ra range boundaries), if CT is indirect.
- The number of components of colour value(NCC), if CT is not indirect.

The RA array contains:
- The actual data of Ra range boundaries
- The actual data of Rb range boundaries
- The list of colour values. There is a lot of colour values (number of Rb range boundaries data + number of Ra range boundaries), each having as many components as required by CT.

Common element:
IL= 6+*
IA(1)= number of source selectors = NSS
IA= element 2 through NSS+1 contain source selectors
IA(NSS+2)= data value index 1
IA(NSS+3)= data value index 2
IA(NSS+4)= colour type = CT
IA(NSS+5)= number of Ra range boundaries = NRAB
IA=element NSS+6 through NSS+5+NRAB array of end indices of Rb range boundaries
RL= NRAB+IA(NSS+5+NRAB)+*
RA=element 1 through NRAB contain Ra range boundary
RA=element NRAB+1 through NRAB+IA(NSS+5+NRAB) contain Rb range boundary
SL= 0
LSTR= ( )
STR= ( )
Individual element:
CASE colour type=PINDIR:
IA=element NSS+5+NRAB+1 through NSS+4+NRAB+1+IA(NSS+5+NRAB) contain colour indices
CASE colour type=PRGB or PCIE or PHSV or PHLS:
IA(NSS+5+NRAB+1)= number of components of colour value = NCC
RA=element NRAB+IA(NSS+5+NRAB)+1 through NRAB+IA(NSS+5+NRAB)+NCC*(IA(NSS+5+NRAB)) contain the colour values
example r1,g1,b1,r2,g2,b2,...

SET REFLECTANCE PROPERTIES

SUBROUTINE PSRFP(RPTYPE,LDR,DATREC)

Input Parameters:

INTEGER RPTYPE	reflectance properties type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record

DATREC parameters to build REFLECTANCE PROPERTIES DATA RECORD for RPTYPE = PSRPT:
The IA array contains:
- The colour type(CT)
- The number of components of colour value(NCC)

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- The colour index of the specular colour if CT is indirect.

The RA array contains:
- The actual data of ambient reflection coefficient
- The actual data of diffuse reflection coefficient
- The actual data of specular reflection coefficient
- The actual data of specular exponent
- The actual data of colour values as required by CT.

Common element:
IL= 2+*
IA(1)= colour type = CT
IA(2)= number of components of colour value = NCC
RL= 4+*
RA(1)= ambient reflection coefficient
RA(2)= diffuse reflection coefficient
RA(3)= specular reflection coefficient
RA(4)= specular exponent
SL= 0
LSTR= ( )
STR= ( )

Individual element:
CASE colour type=PINDIR:
IA(3)= specular colour index
CASE colour type=PRGB or PCIE or PHSV or PHLS:
RA=element 5 through 4+NCC contain the colour values

SET REFLECTANCE MODEL

SUBROUTINE PSRFM(RFM)

Input Parameters:

INTEGER RFM	reflectance model

SET BACK INTERIOR STYLE

SUBROUTINE PSBIS(INTS)

Input Parameters:

INTEGER INTS	interior style (PHOLLO,PSOLID,PPATTR,PPATCH,PISEMP)

SET BACK INTERIOR STYLE INDEX

SUBROUTINE PSBISI(ISTYLI)

Input Parameters:

INTEGER ISTYLI	interior style index

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SET BACK INTERIOR COLOUR

SUBROUTINE PSBIC(CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER CTYPE	back interior colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values

SET BACK INTERIOR SHADING METHOD

SUBROUTINE PSBISM(ISM)

Input Parameters:

INTEGER ISM	interior shading method

SET BACK DATA MAPPING METHOD

SUBROUTINE PSBDMM(DMM,LDR,DATREC)

Input Parameters:

INTEGER DMM	data mapping method
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record[6]

SET BACK REFLECTANCE PROPERTIES

SUBROUTINE PSBRFP(RPTYPE,LDR,DATREC)

Input Parameters:

INTEGER RPTYPE	reflectance properties type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record[7]

SET BACK REFLECTANCE MODEL

SUBROUTINE PSBRFM(RFM)

Input Parameters:

INTEGER RFM	reflectance model

[6]See SET DATA MAPPING METHOD for a description of the data mapping method data records.

[7]See SET REFLECTANCE PROPERTIES for a description of the reflectance properties data records.

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SET LIGHT SOURCE STATE

SUBROUTINE PSLSS(NACTI,ACTLST,NDEAI,DEALST)

Input Parameters:

INTEGER NACTI	number of activation indices
INTEGER ACTLST(NACTI)	activation list
INTEGER NDEAI	number of deactivation indices
INTEGER DEALST(NDEAI)	deactivation list

SET EDGE COLOUR

SUBROUTINE PSEDC(CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER CTYPE	edge colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values

SET CURVE APPROXIMATION CRITERIA

SUBROUTINE PSCAC(ACRI,LDR,DATREC)

Input Parameters:

INTEGER ACRI	curve approximation criteria type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record

DATREC parameters to build CURVE APPROXIMATION CRITERIA DATA RECORD for ACRI=PWDCA: No data record

DATREC parameters to build CURVE APPROXIMATION CRITERIA DATA RECORD for ACRI =PCBKCA:
The IA array contains:
- The actual data of count
The other arrays are empty.

IL= 1
IA(1)= count
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build CURVE APPROXIMATION CRITERIA DATA RECORD for ACRI =PCSWCA or PCSNCA or PCSDCA or PCDWCA or PCDNCA or PCDDCA or PRWCA or PRNCA or PRDCA:
The RA array contains:
- The actual data of approximation value
The other arrays are empty.

IL= 0

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IA= ( )
RL= 1
RA(1)= approximation value
SL= 0
LSTR= ( )
STR= ( )

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SET SURFACE APPROXIMATION CRITERIA

SUBROUTINE PSSAC(ACRI,LDR,DATREC)

Input Parameters:

INTEGER ACRI	surface approximation criteria type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record

DATREC parameters to build SURFACE APPROXIMATION CRITERIA DATA RECORD for ACRI=PWDCA: No data record

DATREC parameters to build SURFACE APPROXIMATION CRITERIA DATA RECORD for ACRI=PCBKSA:
The IA array contains:
- The actual data of u count
- The actual data of v count

The other arrays are empty.
IL= 2
IA(1)= u count
IA(2)= v count
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build SURFACE APPROXIMATION CRITERIA DATA RECORD for ACRI = PCSWSA or PCSNSA or PCSDSA:
The RA array contains:
- The actual data of u approximation value
- The actual data of v approximation value

The other arrays are empty.
IL= 0
IA= ( )
RL= 2
RA(1)= u approximation value
RA(2)= v approximation value
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build SURFACE APPROXIMATION CRITERIA DATA RECORD for ACRI = PPDWSA or PPDNSA or PPDDSA or PRWSA or PRNSA or PRDSA:
The RA array contains:
- The actual data of approximation value

The other arrays are empty.
IL= 0
IA= ( )
RL= 1
RA(1)= approximation value
SL= 0
LSTR= ( )
STR= ( )

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SET PARAMETRIC SURFACE CHARACTERISTICS

SUBROUTINE PSPSC(PSCTY,LDR,DATREC)

Input Parameters:

INTEGER PSCTY	parametric surface characteristics type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record

DATREC parameters to build PARAMETRIC SURFACE CHARACTERISTICS DATA RECORD for PSCTY = PNOPC or PWDPC: No data record

DATREC parameters to build PARAMETRIC SURFACE CHARACTERISTICS DATA RECORD for PSCTY = PICPC:
The IA array contains:
- The actual data of curve placement
- The actual data of curve count in u direction
- The actual data of curve count in v direction

The other arrays are empty.

IL= 3
IA(1)= curve placement(PUOSCP,PUBKCP)
IA(2)= curve count in u direction
IA(3)= curve count in v direction
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build PARAMETRIC SURFACE CHARACTERISTICS DATA RECORD for PSCTY = PLCMPC:
The IA array contains:
- The number of parameters(NP)

The RA array contains:
- The actual data of origin point
- The actual data of direction vector
- The actual data of parameters. There are NP parameters.

IL= 1
IA(1)= number of parameters = NP
RL= 6+NP
RA(1)= x-coordinate of origin point(MC)
RA(2)= y-coordinate of origin point(MC)
RA(3)= z-coordinate of origin point(MC)
RA(4)= x-value of direction vector(MC)
RA(5)= y-value of direction vector(MC)
RA(6)= z-value of direction vector(MC)
RA= element 7 through NP+6 contain parameters
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build PARAMETRIC SURFACE CHARACTERISTICS DATA

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RECORD for PSCTY = PLCWPC:
The IA array contains:
- The number of parameters(NP)
The RA array contains:
- The actual data of origin point
- The actual data of direction vector
- The actual data of parameters. There are NP parameters.

IL= 1
IA(1)= number of parameters = NP
RL= 6+NP
RA(1)= x-coordinate of origin point(WC)
RA(2)= y-coordinate of origin point(WC)
RA(3)= z-coordinate of origin point(WC)
RA(4)= x-value of direction vector(WC)
RA(5)= y-value of direction vector(WC)
RA(6)= z-value of direction vector(WC)
RA= element 7 through NP+6 contain parameters
SL= 0
LSTR= ( )
STR= ( )

SET RENDERING COLOUR MODEL

SUBROUTINE PSRCM(RCOLM)

Input Parameters:

INTEGER RCOLM	rendering colour model

SET DEPTH CUE INDEX

SUBROUTINE PSDCI(DCI)

Input Parameters:

INTEGER DCI	depth cue index

SET COLOUR MAPPING INDEX

SUBROUTINE PSCMI(CMI)

Input Parameters:

INTEGER CMI	colour mapping index

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13.3.3 Aspect source flag setting

SET INDIVIDUAL ASF

SUBROUTINE PSIASF(ASPCID,ASFVAL)

Input Parameters:

INTEGER ASPCID	aspect identifier *(PLN,PLWSC,PPLCI,PMK,PMKSC,PPMCI,PTXFN,* *PTXPR,PCHXP,PCHSP,PTXCI,PIS,PISI,PICI,* *PEDFG,PEDTY,PEWSC,PEDCI,*[8] PPLCOL,PPMCOL,PTXCOL,PINCOL,PEDCOL, PPSHMD,PISHMD,PDMPMD,PREFPR,PREFM, PBINSY,PBINSI,PBICOL,PBISHM,PBDMPM, PBREFP,PBREFM,PCAPCR,PSAPCR,PPASUC)
INTEGER ASFVAL	aspect source flag value (PBUNDL,PINDIV)

This function is defined in PHIGS part 1. Additional aspect identifiers are defined in PHIGS part 4. This binding shows those additional aspect identifiers.

[8] already defined in PHIGS

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13.3.4 Workstation attribute table definition

SET POLYLINE REPRESENTATION PLUS

SUBROUTINE PSPLP(WKID,PLI,LTYPE,LWIDTH,CTYPE,COLI,NCC,COLR,PLSM, *ACRI,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PLI	polyline index
INTEGER LTYPE	linetype
REAL LWIDTH	linewidth scale factor
INTEGER CTYPE	polyline colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values
INTEGER PLSM	polyline shading method
INTEGER ACRI	curve approximation criteria type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	curve approximation criteria data record[9]

SET POLYMARKER REPRESENTATION PLUS

SUBROUTINE PSPMP(WKID,PMI,MTYPE,MSZSF,CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PMI	polymarker index
INTEGER MTYPE	marker type
REAL MSZSF	marker size scale factor
INTEGER CTYPE	polymarker colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values

[9] See SET CURVE APPROXIMATION CRITERIA for a description of the curve approximation criteria data records.

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SET TEXT REPRESENTATION PLUS

SUBROUTINE PSTXRP(WKID,TXI,FONT,PREC,CHXP,CHSP,CTYPE,COLI,NCC,
*COLR)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER TXI	text index
INTEGER FONT	text font
INTEGER PREC	text precision (PSTRP,PCHARP,PSTRKP)
REAL CHXP	character expansion factor
REAL CHSP	character spacing
INTEGER CTYPE	text colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values

SET INTERIOR REPRESENTATION PLUS

SUBROUTINE PSIP(WKID,II,INTS,STYLI,CTYPE,COLI,NCC,COLR,ISM)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER II	interior index
INTEGER INTS	interior style (PHOLLO,PSOLID,PPATTR,PPATCH,PISEMP)
INTEGER STYLI	interior style index
INTEGER CTYPE	interior colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values
INTEGER ISM	interior shading method

SET EDGE REPRESENTATION PLUS

SUBROUTINE PSEDP(WKID,EDI,EDFLAG,EDTYPE,EWIDTH,CTYPE,COLI,NCC,
*COLR)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER EDI	edge index
INTEGER EDFLAG	edge flag (POFF,PON)
INTEGER EDTYPE	edge type
REAL EWIDTH	edgewidth scale factor
INTEGER CTYPE	edge colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values

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SET DATA MAPPING REPRESENTATION

SUBROUTINE PSDMR(WKID,DMI,DMM,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER DMI	data mapping index
INTEGER DMM	data mapping method
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record[10]

SET REFLECTANCE REPRESENTATION

SUBROUTINE PSRFR(WKID,RFI,RFM,RPTYPE,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER RFI	reflectance index
INTEGER RFM	reflectance model
INTEGER RPTYPE	reflectance properties type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record[11]

SET PARAMETRIC SURFACE REPRESENTATION

SUBROUTINE PSPSR(WKID,PSI,ACRI,LDRAC,DARECA,PSCTY,LDRPS,DARECP)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PSI	parametric surface index
INTEGER ACRI	surface approximation criteria type
INTEGER LDRAC	length of surface approximation criteria data record array
CHARACTER*80 DARECA(LDRAC)	surface approximation criteria data record[12]
INTEGER PSCTY	parametric surface characteristics type
INTEGER LDRPS	length of parametric surface characteristics data record array
CHARACTER*80 DARECP(LDRPS)	parametric surface characteristics data record[13]

[10] See SET DATA MAPPING METHOD for a description of the data mapping method data records.

[11] See SET REFLECTANCE PROPERTIES for a description of the reflectance properties data records.

[12] See SET SURFACE APPROXIMATION CRITERIA for a description of the surface approximation criteria data records.

[13] See SET PARAMETRIC SURFACE CHARACTERISTICS for a description of the parametric surface characteristics data records.

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SET PATTERN REPRESENTATION PLUS

SUBROUTINE PSPAP(WKID,PAI,DIMX,DIMY,ISC,ISR,DX,DY,CTYPE,COLIA,
*NCC,COLRA)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PAI	pattern index
INTEGER DIMX,DIMY	number of rows, number of columns in COLIA orr COLRA
INTEGER ISC,ISR	indices of start column, start row for pattern
INTEGER DX,DY	number of columns, number of rows in pattern
INTEGER CTYPE	interior colour type
INTEGER COLIA(DIMX,DIMY)	colour index array
INTEGER NCC	number of components of colour value
REAL COLRA(NCC*DIMX*DIMY)	colour value array

SET LIGHT SOURCE REPRESENTATION

SUBROUTINE PSLSR(WKID,LSI,LSTYP,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER LSI	light source index
INTEGER LSTYP	light source type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record

DATREC parameters to build LIGHT SOURCE DATA RECORD for LSTYP = PAMB:
The IA array contains:
- The colour type(CT)
- The actual data of colour index, if CT is indirect
- The number of components of colour value(NCC)

The RA array contains:
- The actual data of colour values as required by CT

Common element:
IL= 2
IA(1)= colour type = CT
RL= *
RA= ( )
SL= 0
LSTR= ( )
STR= ( )
Individual element:
CASE colour type=PINDIR:
IA(2)= colour index
CASE colour type=PRGB or PCIE or PHSV or PHLS:
IA(2)= number of components of colour value = NCC
RA= element 1 through NCC contain the colour values

DATREC parameters to build LIGHT SOURCE DATA RECORD for LSTYP = PDIRE:
The IA array contains:
- The colour type(CT)
- The actual data of colour index, if CT is indirect.

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- The number of components of colour value(NCC)
The RA array contains:
- The actual data of direction vector
- The actual data of colour values as required by CT.
Common element:
IL= 2
IA(1)= colour type = CT
RL= 3+*
RA(1)=x-value of direction vector(WC)
RA(2)=y-value of direction vector(WC)
RA(3)=z-value of direction vector(WC)
SL= 0
LSTR= ( )
STR= ( )
Individual element:
CASE colour type=PINDIR:
IA(2)=colour index
CASE colour type=PRGB or PCIE or PHSV or PHLS:
IA(2)= number of components of colour value = NCC
RA= element 4 through 3+NCC contain the colour values

DATREC parameters to build LIGHT SOURCE DATA RECORD for LSTYP = PPOSI:
The IA array contains:
- The colour type(CT)
- The actual data of colour index, if CT is indirect.
- The number of components of colour value(NCC)
The RA array contains:
- The actual data of direction vector
- The actual data of attenuation coefficients
- The actual data of colour values as required by CT.
Common element:
IL= 2
IA(1)= colour type = CT
RL= 5+*
RA(1)=x-value of direction vector(WC)
RA(2)=y-value of direction vector(WC)
RA(3)=z-value of direction vector(WC)
RA(4)=attenuation coefficient 1
RA(5)=attenuation coefficient 2
SL= 0
LSTR= ( )
STR= ( )
Individual element:
CASE colour type=PINDIR:
IA(2)=colour index
CASE colour type=PRGB or PCIE or PHSV or PHLS:
IA(2)= number of components of colour value = NCC
RA= element 6 through 5+NCC contain the colour values

DATREC parameters to build LIGHT SOURCE DATA RECORD for LSTYP = PSPOT:
The IA array contains:
- The colour type(CT)
- The actual data of colour index, if CT is indirect.
- The number of components of colour value(NCC)

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The RA array contains:
- The actual data of light source position
- The actual data of direction vector of light source
- The actual data of concentration exponent
- The actual data of attenuatioon coefficients
- The actual data of spread angle
- The actual data of colour values as required by CT.

Common element:
IL= 2
IA(1)= colour type = CT
RL= 10+*
RA(1)=x-coordinate of light source position(WC)
RA(2)=y-coordinate of light source position(WC)
RA(3)=z-coordinate of light source position(WC)
RA(4)=x-value of light source direction(WC)
RA(5)=y-value of light source direction(WC)
RA(6)=z-value of light source direction(WC)
RA(7)= concentration exponent
RA(8)=attenuation coefficient 1
RA(9)=attenuation coefficient 2
RA(10)= spread angle
SL= 0
LSTR= ( )
STR= ( )
Individual element:
CASE colour type=PINDIR:
IA(2)=colour index
CASE colour type=PRGB or PCIE or PHSV or PHLS:
IA(2)= number of components of colour value = NCC
RA= element 11 through 10+NCC contain the colour values

SET DEPTH CUE REPRESENTATION

SUBROUTINE PSDCR(WKID,DCI,DCMODE,DQMIN,DQMAX,DCSFMI,DCSFMX,
*CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER DCI	depth cue index
INTEGER DCMODE	depth cue mode (PSUPPR,PALLOW)
REAL DQMIN,DQMAX	depth cue reference planes(NPC)
REAL DCSFMI,DCSFMX	depth cue scale factors
INTEGER CTYPE	depth cue colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(NCC)	colour values

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SET COLOUR MAPPING REPRESENTATION

SUBROUTINE PSCMR(WKID,CMI,CMM,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER CMI	colour mapping index
INTEGER CMM	colour mapping method
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(LDR)	data record

DATREC parameters to build COLOUR MAPPING METHOD DATA RECORD
for CMM = PTRUE: no data record

DATREC parameters to build COLOUR MAPPING METHOD DATA RECORD
for CMM = PSUD:
The IA array contains:
- The colour model(CM)
- The number of components of colour value(NCC), same as the number of weight vector values
- The number of list of colours in the specified colour model(NLC)

The RA array contains:
- The actual data of weight vector
- The list of colour values. There are NLC colour values,
  each having as many components as required by CM.

IL= 3
IA(1)= colour model = CM
IA(2)= number of components of colour value, same as number of weight vector value = NCC
IA(3)= number of list of colours in the specified colour model = NLC
RL= NCC+NCC*NLC
RA= element 1 through NCC contain the weight vector
RA= element NCC+1 through NCC*NLC+NCC contain the colour value
  example r1,g1,b1,r2,g2,b2,...
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build COLOUR MAPPING METHOD DATA RECORD
for CMM = PSUDN:
The IA array contains:
- The colour model(CM)
- The number of components in the colour model(NCC)
- The array of end indices for list of colour coordinates(IXA)

The RA array contains:
- The list of colour coordinates.

IL= 2
IA(1)= colour model = CM
IA(2)= number of components in the colour model = NCC
IA= element 3 through NCC+2 contain the array of end indices for lists of colour coordinates
RL= IA(NCC+2)
RA=element 1 through IA(NCC+2) contain the lists of colour coordinates
  example for colour model=PRGB:
    RA element 1 through IA(3) contain red values;
    RA element IA(3)+1 through IA(4) contain green values
    RA element IA(4)+1 through IA(5) contain blue values

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SL= 0
LSTR= ( )
STR= ( )

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13.4 Inquiry functions

13.4.1 Inquiry functions for workstation state list

INQUIRE POLYLINE REPRESENTATION PLUS

SUBROUTINE PQPLP(WKID,PLI,CCSBSZ,TYPE,MLDR,ERRIND,LTYPE,
*LWIDTH,CTYPE,COLI,NCC,COLR,PLSM,ACRI,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PLI	polyline index
INTEGER CCSBSZ	colour component specification buffer size
INTEGER TYPE	type of return value(PSET,PREALI)
INTEGER MLDR	dimension of curve approximation criteria data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER LTYPE	linetype
REAL LWIDTH	linewidth scale factor
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values
INTEGER PLSM	polyline shading method
INTEGER ACRI	curve approximation criteria type
INTEGER LDRCA	length of curve approximation criteria data record array
CHARACTER*80 DATREC(MLDR)	curve approximation criteria data record[14]

INQUIRE POLYMARKER REPRESENTATION PLUS

SUBROUTINE PQPMP(WKID,PMI,CCSBSZ,TYPE,ERRIND,MTYPE,MSZSF,CTYPE,
*COLI,NCC,COLR)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PMI	polymarker index
INTEGER CCSBSZ	colour component specification buffer size
INTEGER TYPE	type of return value(PSET,PREALI)

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER MTYPE	marker type
REAL MSZSF	marker scale factor
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values

[14] See SET CURVE APPROXIMATION CRITERIA for a description of the curve approximation criteria data records.

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INQUIRE TEXT REPRESENTATION PLUS

```
SUBROUTINE PQTXP(WKID,TXI,CCSBSZ,TYPE,ERRIND,FONT,PREC,CHXP,
*CHSP,CTYPE,COLI,NCC,COLR)
```

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER TXI	text index
INTEGER CCSBSZ	colour component specification buffer size
INTEGER TYPE	type of return value(PSET,PREALI)

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER FONT	text font
INTEGER PREC	text precision(PSTRP,PCHARP,PSTRKP)
REAL CHXP	character expansion factor
REAL CHSP	character spacing
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values

INQUIRE INTERIOR REPRESENTATION PLUS

```
SUBROUTINE PQIP(WKID,II,CCSBSZ,TYPE,ERRIND,INTS,STYLI,CTYPE,COLI,
*NCC,COLR,ISM)
```

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER II	interior index
INTEGER CCSBSZ	colour component specification buffer size
INTEGER TYPE	type of return value(PSET,PREALI)

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER INTS	interior style
INTEGER STYLI	interior style index
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values
INTEGER ISM	interior shading method

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INQUIRE EDGE REPRESENTATION PLUS

SUBROUTINE PQEDP(WKID,EDI,CCSBSZ,TYPE,ERRIND,EDFLAG,EDTYPE, *EWIDTH,CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER EDI	edge index
INTEGER CCSBSZ	colour component specification buffer size
INTEGER TYPE	type of return value(PSET,PREALI)

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER EDFLAG	edge flag (POFF,PON)
INTEGER EDTYPE	edge type
REAL EWIDTH	edge scale factor
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values

INQUIRE LIST element OF DATA MAPPING INDICES

SUBROUTINE PQEDMI(WKID,N,ERRIND,OL,DMI)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER N	list element requested

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER OL	number of data mapping bundle table entries
INTEGER DMI	Nth element of list of defined data mapping indices

INQUIRE DATA MAPPING REPRESENTATION

SUBROUTINE PQDMR(WKID,DMI,TYPE,MLDR,ERRIND,DMM,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER DMI	data mapping index
INTEGER TYPE	type of return value(PSET,PREALI)
INTEGER MLDR	dimension of data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER DMM	data mapping method
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	data mapping data record[15]

[15] See SET DATA MAPPING METHOD for a description of the data mapping method data records.

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INQUIRE LIST element OF REFLECTANCE INDICES

SUBROUTINE PQERFI(WKID,N,ERRIND,OL,RFI)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER N	list element requested

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER OL	number of reflectance bundle table entries
INTEGER RFI	Nth element of list of defined reflectance indices

INQUIRE REFLECTANCE REPRESENTATION

SUBROUTINE PQRFR(WKID,RFI,TYPE,MLDR,ERRIND,RFM,RPTYPE,LDR, *DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER RFI	reflectance index
INTEGER TYPE	type of return value(PSET,PREALI)
INTEGER MLDR	dimension of data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER RFM	reflectance model
INTEGER RPTYPE	reflectance propety type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	reflectance property colour value data record[16]

INQUIRE LIST element OF PARAMETRIC SURFACE INDICES

SUBROUTINE PQEPSI(WKID,N,ERRIND,OL,PSI)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER N	list element requested

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER OL	number of parametric surface table entries
INTEGER PSI	Nth element of list of defined parametric surface indices

[16] See SET REFLECTANCE PROPERTIES for a description of the reflectance properties data records.

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INQUIRE PARAMETRIC SURFACE REPRESENTATION

SUBROUTINE PQPSR(WKID,PSI,TYPE,MLDRSA,MLDRPS,ERRIND,ACRI,LDRSA, *DARECS,PSCH,LDRPS,DARECP)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PSI	parametric surface bundle index
INTEGER TYPE	type of return value(PSET,PREALI)
INTEGER MLDRSA	dimension of surface approximation criteria data record array
INTEGER MLDRPS	dimension of parametric surface characteristics data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER ACRI	surface approximation criteria type
INTEGER LDRSA	length of surface approximation criteria data record
CHARACTER*80 DARECS(MLDRSA)	surface approximation criteria data record[17]
INTEGER PSCH	parametric surface characteristics type
INTEGER LDRPS	length of parametric surface characteristics data record
CHARACTER*80 DARECP(MLDRPS)	parametric surface characteristics data record[18]

INQUIRE PATTERN REPRESENTATION PLUS

SUBROUTINE PQPAP(WKID,PAI,CCSBSZ,TYPE,DIMX,DIMY,ERRIND,DX,DY, *CTYPE,COLIA,NCC,COLRA)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PAI	pattern index
INTEGER CCSBSZ	colour component specification buffer size
INTEGER TYPE	type of return value(PSET,PREALI)
INTEGER DIMX,DIMY	maximum pattern array dimension

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER DX,DY	pattern array dimensions
INTEGER CTYPE	colour type
INTEGER COLIA(DIMX,DIMY)	colour index
INTEGER NCC	number of components of colour value
REAL COLRA(CCSBSZ)	colour values

[17] See SET SURFACE APPROXIMATION CRITERIA for a description of the surface approximation criteria data records.

[18] See SET PARAMETRIC SURFACE CHARACTERISTICS for a description of the parametric surface characteristics data records.

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INQUIRE LIST element OF LIGHT SOURCE INDICES

SUBROUTINE PQELSI(WKID,N,ERRIND,OL,LSI)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER N	list element requested

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER OL	number of light source table entries
INTEGER LSI	Nth element of list of defined light source indices

INQUIRE LIGHT SOURCE REPRESENTATION

SUBROUTINE PQLSR(WKID,LSI,TYPE,MLDR,ERRIND,LSTYP,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER LSI	light source index
INTEGER TYPE	type of return value(PSET,PREALI)
INTEGER MLDR	dimension of data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER LSTYP	light source type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	data record[19]

INQUIRE LIST element OF DEPTH CUE INDICES

SUBROUTINE PQEDCI(WKID,N,ERRIND,NCC,DCI)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER N	list element requested

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER OL	number of depth cue table entries
INTEGER DCI	Nth element of list of defined depth cue indices

[19] See SET LIGHT SOURCE REPRESENTATION for a description of the light source data record.

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INQUIRE DEPTH CUE REPRESENTATION

SUBROUTINE PQDCR(WKID,DCI,CCSBSZ,TYPE,ERRIND,DCMODE,DQMIN,
*DQMAX,DCSFMI,DCSFMX,CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER DCI	depth cue index
INTEGER CCSBSZ	colour component specification buffer size
INTEGER TYPE	type of return value(PSET,PREALI)

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER DCMODE	depth cue mode(PSUPPR,PALLOW)
REAL DQMIN,DQMAX	depth cue reference plane(NPC)
REAL DCSFMI,DCSFMX	depth cue scale factors
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values

INQUIRE COLOUR MAPPING STATE

SUBROUTINE PQCMS(WKID,CMM,MLDR,ERRIND,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER CMM	colour mapping method
INTEGER MLDR	dimension of data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	data record

DATREC parameters to build COLOUR MAPPING DATA RECORD for CMM = PTRUE:
The IA array contains:
- The number of true colours available
The other array are empty.
IL= 1
IA(1)= number of true colours available
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build COLOUR MAPPING DATA RECORD for CMM = PSUD:
The IA array contains:
- The number of pseudo colour entries available
The other array are empty.
IL= 1
IA(1)= number of pseudo colour entries available
RL= 0

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RA= ( )
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build COLOUR MAPPING DATA RECORD for CMM = PSUDN:
No data record

INQUIRE LIST element OF COLOUR MAPPING INDICES

SUBROUTINE PQECMI(WKID,N,ERRIND,OL,CMI)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER N	list element requested

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER OL	number of colour mapping table entries
INTEGER CMI	Nth element of list of defined colour mapping indices

INQUIRE COLOUR MAPPING REPRESENTATION

SUBROUTINE PQCMR(WKID,CMI,TYPE,MLDR,ERRIND,CMM,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER CMI	colour mapping index
INTEGER TYPE	type of return value(PSET,PREALI)
INTEGER MLDR	dimension of data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER CMM	colour mapping method
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	data record[20]

[20] See SET COLOUR MAPPING REPRESENTATION for a description of the colour mapping data record.

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13.4.2 Inquiry functions for workstation description table

INQUIRE DIRECT COLOUR MODEL FACILITIES

SUBROUTINE PQDCMF(WTYPE,N,ERRIND,NDCM,DCM)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of direct colour model

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NDCM	number of available direct colour model
INTEGER DCM	Nth element of list of defined direct colour model

INQUIRE RENDERING COLOUR MODEL FACILITIES

SUBROUTINE PQRCMF(WTYPE,N,ERRIND,NRCM,RCM)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of rendering colour model

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NRCM	number of available rendering colour model
INTEGER RCM	Nth element of list of defined rendering colour model

INQUIRE DYNAMICS OF WORKSTATION PLUS

SUBROUTINE PQDCWP(WTYPE,ERRIND,DMR,RFR,PSR,LSR,DCR,CMR)

Input Parameters:

INTEGER WTYPE	workstation type

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER DMR	data mapping representation(PIRG,PIMM,PCBS)
INTEGER RFR	reflectance representation(PIRG,PIMM,PCBS)
INTEGER PSR	parametric surface representation (PIRG,PIMM,PCBS)
INTEGER LSR	light source representation(PIRG,PIMM,PCBS)
INTEGER DCR	depth cue representation(PIRG,PIMM,PCBS)
INTEGER CMR	colour mapping representation(PIRG,PIMM,PCBS)

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INQUIRE POLYLINE FACILITIES PLUS

```
SUBROUTINE PQPLFP(WTYPE,NRLT,NRSM,ERRIND,NLT,LT,NLW,NOMLW,
*RLWMIN,RLWMAX,NSM,SM,NPPLI)
```

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER NRLT	list of element requested of linetypes
INTEGER NRSM	list of element requested of shading method

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NLT	number of available linetypes
INTEGER LT	element NRLT of list of available linetypes
INTEGER NLW	number of available linewidths
REAL NOMLW	nominal linewidth
REAL RLWMIN,RLWMAX	range of linewidths
INTEGER NSM	number of available shading method
INTEGER SM	element NRSM of list of available shading method
INTEGER NPPLI	number of predefined polyline indices

INQUIRE PREDEFINED POLYLINE REPRESENTATION PLUS

```
SUBROUTINE PQPPLP(WTYPE,PLI,CCSBSZ,MLDR,ERRIND,LTYPE,LWIDTH,
*CTYPE,COLI,NCC,COLR,PLSM,ACRI,LDR,DATREC)
```

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PLI	predefined polyline index
INTEGER CCSBSZ	colour component specification buffer size
INTEGER MLDR	dimension of curve approximation criteria data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER LTYPE	linetype
REAL LWIDTH	linewidth scale factor
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values
INTEGER PLSM	polyline shading method
INTEGER ACRI	curve approximation criteria type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	curve approximation criteria data record[21]

[21] See SET CURVE APPROXIMATION CRITERIA for a description of the curve approximation criteria data records.

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INQUIRE PREDEFINED POLYMARKER REPRESENTATION PLUS

SUBROUTINE PQPPMP(WTYPE,PMI,CCSBSZ,ERRIND,MTYPE,MSZSF,
*CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PMI	predefined polymarker index
INTEGER CCSBSZ	colour component specification buffer size

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER MTYPE	marker type
REAL MSZSF	marker scale factor
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values

INQUIRE PREDEFINED TEXT REPRESENTATION PLUS

SUBROUTINE PQPTXP(WTYPE,PTXI,CCSBSZ,ERRIND,FONT,PREC,CHXP,CHSP,
*CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PTXI	predefined text index
INTEGER CCSBSZ	colour component specification buffer size

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER FONT	text font
INTEGER PREC	text precision(PSTRP,PCHARP,PSTRKP)
REAL CHXP	character expansion factor
REAL CHSP	character spacing
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values

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INQUIRE INTERIOR FACILITIES PLUS

```
SUBROUTINE PQIFP(WTYPE,NI,NH,NRSM,ERRIND,NIS,IS,NHS,HS,NSM,
*SM,NPFAI)
```

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER NI	list element of interior style requested
INTEGER NH	list element of hatch style requested
INTEGER NRSM	list element of shading method requested

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NIS	number of available interior styles
INTEGER IS	element NI of list of available interior styles
INTEGER NHS	number of available hatch style
INTEGER HS	element NH of list of available hatch styles
INTEGER NSM	number of available shading method
INTEGER SM	element NRSM of list of available shading method
INTEGER NPFAI	number of predefined interior indices

INQUIRE PREDEFINED INTERIOR REPRESENTATION PLUS

```
SUBROUTINE PQPIP(WTYPE,PII,CCSBSZ,ERRIND,INTS,STYLI,
*CTYPE,COLI,NCC,COLR,ISM)
```

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PII	predefined interior index
INTEGER CCSBSZ	colour component specification buffer size

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER INTS	interior style
INTEGER STYLI	interior style index
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values
INTEGER ISM	interior shading method

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INQUIRE PREDEFINED EDGE REPRESENTATION PLUS

SUBROUTINE PQPEDP(WTYPE,PEDI,CCSBSZ,ERRIND,EDFLAG,EDTYPE,
*EWIDTH,CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PEDI	predefined edge index
INTEGER CCSBSZ	colour component specification buffer size

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER EDFLAG	edge flag (POFF,PON)
INTEGER EDTYPE	edge type
REAL EWIDTH	edge scale factor
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour values

INQUIRE DATA MAPPING FACILITIES

SUBROUTINE PQDMF(WTYPE,N,ERRIND,NDM,DM,NPDAI)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of data mapping methods

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NDM	number of available data mapping methods
INTEGER DM	Nth element of list of available data mapping methods
INTEGER NPDAI	number of predefined data mapping indices

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INQUIRE PREDEFINED DATA MAPPING REPRESENTATION

SUBROUTINE PQPDMR(WTYPE,PDMI,MLDR,ERRIND,DMM,LDR,DATREC)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PDMI	predefined data mapping index
INTEGER MLDR	dimension of data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER DMM	data mapping method
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	data mapping data record[22]

INQUIRE REFLECTANCE FACILITIES

SUBROUTINE PQRFF(WTYPE,N,NRRFP,ERRIND,NRFM,RFM,NPRFI,NRFP,RFP)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of reflectance models
INTEGER NRRFP	list of element requested of reflectance properties

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NRFM	number of available reflectance model
INTEGER RFM	Nth element of list of available reflectance models
INTEGER NPRFI	number of predefined reflectance indices
INTEGER NRFP	number of available reflectance properties
INTEGER RFP	element NRRFP of list of available reflectance properties

INQUIRE PREDEFINED REFLECTANCE REPRESENTATION

SUBROUTINE PQPRFR(WTYPE,PRFI,MLDR,ERRIND,RFM,RPTYPE,LDR,DATREC)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PRFI	predefined reflectance index
INTEGER MLDR	dimension of data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER RFM	reflectance model
INTEGER RPTYPE	reflectance properties type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	data record[23]

---

[22] See SET DATA MAPPING METHOD for a description of the data mapping data records.

[23] See SET REFLECTANCE PROPERTIES for a description of the reflectance properties data records.

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INQUIRE CURVE AND SURFACE FACILITIES

It has been broken into four related functions: INQUIRE CURVE FACILITIES, INQUIRE PARAMETRIC SURFACE FACILITIES, INQUIRE B-SPLINE SURFACE FACILITIES, and INQUIRE TRIMMING CURVE FACILITIES.

INQUIRE CURVE FACILITIES

SUBROUTINE PQCVF(WTYPE,N,ERRIND,MNUBSC,NCACT,CACT)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of curve approximation criteria types

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER MNUBSC	maximum non-uniform b-spline curve order supported
INTEGER NCACT	number of available curve approximation criteria types
INTEGER CACT	Nth element of list of available curve approximation criteria types

INQUIRE PARAMETRIC SURFACE FACILITIES

SUBROUTINE PQPSF(WTYPE,N,ERRIND,NPSCT,PSCT,NPPSI)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of parametric surface characteristics types

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NPSCT	number of available parametric surface characteristics
INTEGER PSCT	Nth element of list of available parametric surface characteristics types
INTEGER NPPSI	number of predefined parametric surface indices

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INQUIRE B-SPLINE SURFACE FACILITIES

SUBROUTINE PQBSSF(WTYPE,N,ERRIND,MNUBSS,NCAST,CAST)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of surface approximation criteria types

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER MNUBSS	maximum non-uniform b-spline surface order supported
INTEGER NCAST	number of available surface approximation criteria types
INTEGER CAST	Nth element of list of available surface approximation criteria types

INQUIRE TRIMMING CURVE FACIILITIES

SUBROUTINE PQTCF(WTYPE,N,ERRIND,MTRIMC,NTCACT,TCACT)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of trimming curve approximation criteria types

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER MTRIMC	maximum trimming curve order supported
INTEGER NTCACT	number of available trimming curve approximation criteria types
INTEGER TCACT	Nth element of list of available trimming curve approximation criteria types

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INQUIRE PREDEFINED PARAMETRIC SURFACE REPRESENTATION

SUBROUTINE PQPPSR(WTYPE,PPSI,MLDRSA,MLDRPS,ERRIND,ACRI,LDRSA, *DARECS,PSCH,LDRPS,DARECP)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PPSI	predefined parametric surface bundle index
INTEGER MLDRSA	dimension of surface approximation criteria data record array
INTEGER MLDRPS	dimension of parametric surface characteristics data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER ACRI	surface approximation criteria type
INTEGER LDRSA	length of surface approximation criteria data record
CHARACTER*80 DARECS(MLDRSA)	surface approximation criteria data record[24]
INTEGER PSCH	parametric surface characteristics type
INTEGER LDRPS	length of parametric surface characteristics data record
CHARACTER*80 DARECP(MLDRPS)	parametric surface characteristics data record[25]

INQUIRE PREDEFINED PATTERN REPRESENTATION PLUS

SUBROUTINE PQPPAP(WTYPE,PAI,CCSBSZ,DIMX,DIMY,ERRIND, *DX,DY,CTYPE,COLIA,NCC,COLRA)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PAI	predefined pattern index
INTEGER CCSBSZ	colour component specification buffer size
INTEGER DIMX,DIMY	maximum pattern array dimension

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER DX,DY	pattern array dimensions
INTEGER CTYPE	colour type
INTEGER COLIA(DIMX,DIMY)	colour index
INTEGER NCC	number of components of colour value specification
REAL COLRA(CCSBSZ)	colour values

[24] See SET SURFACE APPROXIMATION CRITERIA for a description of the surface approximation criteria data records.

[25] See SET PARAMETRIC SURFACE CHARACTERISTICS for a description of the parametric surface characteristics data records.

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INQUIRE LIGHT SOURCE FACILITIES

SUBROUTINE PQLSF(WTYPE,N,ERRIND,NLSTYP,LSTYP,MSNALS,NPLSI)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of light source indices

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NLSTYP	number of available light source types
INTEGER LSTYP	Nth element of list of available light source types
INTEGER MSNALS	maximum number of simultaneously active non-ambient light source
INTEGER NPLSI	number of predefined light source indices

INQUIRE PREDEFINED LIGHT SOURCE REPRESENTATION

SUBROUTINE PQPLSR(WTYPE,PLSI,MLDR,ERRIND,LSTYP,LDR,DATREC)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PLSI	predefined light source index
INTEGER MLDR	dimension of data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER LSTYP	light source type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	light source data record[26]

INQUIRE DEPTH CUE FACILITIES

SUBROUTINE PQDCF(WTYPE,N,ERRIND,NPDCI,NDCM,DCM)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of depth cue modes

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NPDCI	number of predefined depth cue indices
INTEGER NDCM	number of depth cue modes
INTEGER DCM	Nth element of list of depth cue mode

[26] See SET LIGHT SOURCE REPRESENTATION for a description of the light source data record.

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INQUIRE PREDEFINED DEPTH CUE REPRESENTATION

SUBROUTINE PQPDCR(WTYPE,PDCI,CCSBSZ,ERRIND,DCMODE,DQMIN,DQMAX,
*DCSFMI,DCSFMX,CTYPE,COLI,NCC,COLR)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PDCI	predefined depth cue index
INTEGER CCSBSZ	colour component specification buffer size

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER DCMODE	depth cue mode(PSUPPR,PALLOW)
REAL DQMIN,DQMAX	depth cue reference planes(NPC)
REAL DCSFMI,DCSFMX	depth cue scale factors
INTEGER CTYPE	colour type
INTEGER COLI	colour index
INTEGER NCC	number of components of colour value
REAL COLR(CCSBSZ)	colour cvalues

INQUIRE COLOUR MAPPING FACILITIES

SUBROUTINE PQCMF(WTYPE,N,ERRIND,NCMTYP,CMTYP,NPCMI)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested of colour mapping indices

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NCMTYP	number of available colour mapping methods
INTEGER CMTYP	Nth element of list of available colour mapping methods
INTEGER NPCMI	number of predefined colour mapping indices

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INQUIRE COLOUR MAPPING METHOD FACILITIES

SUBROUTINE PQCMMF(WTYPE,CMM,MLDR,ERRIND,LDR,DATREC)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER CMM	colour mapping method
INTEGER MLDR	dimension of data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	data record

DATREC parameters to build COLOUR MAPPING METHOD DATA RECORD for CMM=PTRUE:
The IA array contains:
- The number of true colours available
The other array are empty.
IL= 1
IA(1)= number of true colours available
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build COLOUR MAPPING METHOD DATA RECORD for CMM=PSUD:
The IA array contains:
- The maximum number of pseudo colour entries
The other array are empty.
IL= 1
IA(1)= maximum number of pseudo colour entries
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

DATREC parameters to build COLOUR MAPPING METHOD DATA RECORD for CMM = PSUDN: No data record

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INQUIRE PREDEFINED COLOUR MAPPING REPRESENTATION

SUBROUTINE PQPCMR(WTYPE,PCMI,MLDR,ERRIND,CMM,LDR,DATREC)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PCMI	predefined colour mapping index
INTEGER MLDR	dimension of data record array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER CMM	colour mapping method
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	data record[27]

INQUIRE WORKSTATION STATE TABLE LENGTHS PLUS

SUBROUTINE PQWSLP(WTYPE,ERRIND,MDMBTE,MRFBTE,MPSBTE,MLSTE, *MDCTE,MCMTE)

Input Parameters:

INTEGER WTYPE	workstation type

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER MDMBTE	maximum number of data mapping bundle table entries
INTEGER MRFBTE	maximum number of reflectance bundle table entries
INTEGER MPSBTE	maximum number of parametric surface bundle table entries
INTEGER MLSTE	maximum number of light source table entries
INTEGER MDCTE	maximum number of depth cue table entries
INTEGER MCMTE	maximum number of colour mapping table entries

INQUIRE GENERALIZED DRAWING PRIMITIVE 3

SUBROUTINE PQGDP3(WTYPE,GDP,ERRIND,NBND,BNDL)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER GDP	3D GDP identifier

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NBND	number of sets of attributes used
INTEGER BNDL(7)	list of sets of attributes used (*PPLATT,PPMATT,PTXATT,PINATT,PEDATT,*[28] PRFATT,PPSATT)

This function is defined in PHIGS part 1. Additional attributes are defined in PHIGS part 4. This binding shows those additional attributes.

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[27] See SET COLOUR MAPPING REPRESENTATION for a description of the colour mapping data record.

[28] already defined in PHIGS

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INQUIRE GENERALIZED DRAWING PRIMITIVE

SUBROUTINE PQGDP(WTYPE,GDP,ERRIND,NBND,BNDL)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER GDP	GDP identifier

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NBND	number of sets of attributes used
INTEGER BNDL(7)	list of sets of attributes used *(PPLATT,PPMATT,PTXATT,PINATT,PEDATT,*[29] PRFATT,PPSATT)

This function is defined in PHIGS part 1. Additional attributes are defined in PHIGS part 4. This binding shows those additional attributes.

[25] already defined in PHIGS

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INQUIRE CURRENT ELEMENT TYPE AND SIZE

SUBROUTINE PQCETS(ERRIND,ELTYPE,IL,RL,SL)

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER ELTYPE	element type *(PENIL,PEPL3,PEPL,PEPM3,PEPM,PETX3,PETX,* *PEATR3,PEATR,PEFA3,PEFA,PEFAS3,PEFAS,* *PECA3,PECA,PEGDP3,PEGDP,PEPLI,PEPMI,* *PETXI,PEII,PEEDI,PELN,PELWSC,PEPLCI,* *PEMK,PEMKSC,PEPMCI,PETXFN,PETXPR,* *PECHXP,PECHSP,PETXCI,PECHH,PECHUP,* *PETXP,PETXAL,PEATCH,PEATCU,PEATP,* *PEATAL,PEANST,PEIS,PEISI,PEICI,PEEDFG,* *PEEDT,PEEWSC,PEEDCI,PEPA,PEPRPV,* *PEPARF,PEADS,PERES,PEIASF,* *PEHRID,PELMT3,PELMT,PEGMT3,PEGMT,* *PEMCV3,PEMCV,PEMCLI,PERMCV,PEVWI,* *PEEXST,PELB,PEAP,PEGSE,PEPKID,*[30] PEPLS3,PEFS3D,PEFSD,PECA3P,PESFS3, PESFSD,PETS3D,PETSD,PETST3,PETSTD, PEQM3D,PEQMD,PEBC3,PEBC3C,PEBS3, PEBS3D,PEDMI,PERFI,PEBII,PEBDMI, PEBRFI,PEPRSI,PEPLC,PEPLSM,PEPMC, PETXC,PEFDM,PEFCM,PEIC,PEISM, PEDMM,PERFP,PERFM,PEBIS,PEBISI, PEBIC,PEBISM,PEBDMM,PEBRFP,PEBRFM, PELSS,PEEDC,PECAC,PESAC,PEPSC, PERCM,PEDPCI,PECMI)
INTEGER IL	dimension of integer array
INTEGER RL	dimension of real array
INTEGER SL	dimension of character array

This function is defined in PHIGS part 1. Additional element types are defined in PHIGS part 4. This binding shows those additional element types.

[30] already defined in PHIGS

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INQUIRE ELEMENT TYPE AND SIZE

SUBROUTINE PQETS(STRID,ELENUM,ERRIND,ELTYPE,IL,RL,SL)

Input Parameters:	
INTEGER STRID	structure identifier
INTEGER ELENUM	element number
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER ELTYPE	element type *(PENIL,PEPL3,PEPL,PEPM3,PEPM,PETX3,PETX,* *PEATR3,PEATR,PEFA3,PEFA,PEFAS3,PEFAS,* *PECA3,PECA,PEGDP3,PEGDP,PEPLI,PEPMI,* *PETXI,PEII,PEEDI,PELN,PELWSC,PEPLCI,* *PEMK,PEMKSC,PEPMCI,PETXFN,PETXPR,* *PECHXP,PECHSP,PETXCI,PECHH,PECHUP,* *PETXP,PETXAL,PEATCH,PEATCU,PEATP,* *PEATAL,PEANST,PEIS,PEISI,PEICI,PEEDFG,* *PEEDT,PEEWSC,PEEDCI,PEPA,PEPRPV,* *PEPARF,PEADS,PERES,PEIASF,* *PEHRID,PELMT3,PELMT,PEGMT3,PEGMT,* *PEMCV3,PEMCV,PEMCLI,PERMCV,PEVWI,* *PEEXST,PELB,PEAP,PEGSE,PEPKID,*[31] PEPLS3,PEFS3D,PEFSD,PECA3P,PESFS3, PESFSD,PETS3D,PETSD,PETST3,PETSTD, PEQM3D,PEQMD,PEBC3,PEBC3C,PEBS3, PEBS3D,PEDMI,PERFI,PEBII,PEBDMI, PEBRFI,PEPRSI,PEPLC,PEPLSM,PEPMC, PETXC,PEFDM,PEFCM,PEIC,PEISM, PEDMM,PERFR,PERFM,PEBIS,PEBISI, PEBIC,PEBISM,PEBDMM,PEBRFP,PEBRFM, PELSS,PEEDC,PECAC,PESAC,PEPSC, PERCM,PEDPCI,PECMI)
INTEGER IL	dimension of integer array
INTEGER RL	dimension of real array
INTEGER SL	dimension of character array

This function is defined in PHIGS part 1. Additional element types are defined in PHIGS part 4. This binding shows those additional element types.

[31] already defined in PHIGS

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INQUIRE ELEMENT CONTENT

SUBROUTINE PQECO(STRID,ELENUM,IIL,IRL,ISL,ERRIND,IL,IA,RL,RA,SL,
*LSTR,STR)

Input Parameters:

INTEGER STRID	structure identifier
INTEGER ELENUM	element position
INTEGER IIL	dimension of integer array
INTEGER IRL	dimension of real array
INTEGER ISL	dimension of character array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER IL	number of integer entries
INTEGER IA(IIL)	array of containing integer entries
INTEGER RL	number of real entries
REAL RA(IRL)	array of containing real entries
INTEGER SL	number of character string entries
INTEGER LSTR(ISL)	length of each character string entry
CHARACTER*80 STR(ISL)	character string entries[32]

This function is defined in PHIGS part 1. Additional attributes are defined in PHIGS part 4. This binding shows those additional element types.

[32] See INQUIRE CURRENT ELEMENT CONTENT for details on interpreting the information returned in the integer, real and character arrays.

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INQUIRE CURRENT ELEMENT CONTENT

SUBROUTINE PQCECO(IIL,IRL,ISL,ERRIND,IL,IA,RL,RA,SL,LSTR,STR)

Input Parameters:

INTEGER IIL	dimension of integer array
INTEGER IRL	dimension of real array
INTEGER ISL	dimension of character array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER IL	number of integer entries
INTEGER IA(IIL)	array of containing integer entries
INTEGER RL	number of real entries
REAL RA(IRL)	array of containing real entries
INTEGER SL	number of character string entries
INTEGER LSTR(ISL)	length of each character string entry
CHARACTER*80 STR(ISL)	character string entries

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEPLS3:
The IA array contain:
- The start element number and the end element number of following data
  vertex colour indices
  vertex colour components
  If the optional data is not present, the value of the "start element number" is set to zero and the value of the "end element number" is set to -1.
- data per vertex flag
- The colour type
- The number of components of colour value
- The number of point list
- The array of end indices for point lists
- The vertex colour indices

The RA array contains:
- The coordinates of points
- The vertex colour components

IL= 8+IA(8)+(IA(2)-IA(1)+1)
IA(1)= start element number in IA of vertex colour indices
IA(2)= end element number in IA of vertex colour indices
IA(3)= start element number in RA of vertex colour components
IA(4)= end element number in RA of vertex colour components
IA(5)= data per vertex flag(PCD,PCDC)
IA(6)= colour type
IA(7)= number of colour components of colour value
IA(8)= number of point lists in polyline set 3 with colour
IA= element 9 through IA(8)+8 contain the array of end indices for point lists in polyline set 3 with data
IA=element IA(1) through IA(2) contain the vertex colour indices
RL= IA(IA(8)+8)*3
RA=element 1 through IA(IA(8)+8)*3 contain the coordinates of points

This function is defined in PHIGS part 1. Additional attributes are defined in PHIGS part 4. This binding shows those additional element types.

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example x1,x2,...y1,y2,...z1,z2...
RA=element IA(3) through IA(4) contain the vertex colour components
example(colour type =PRGB) r1,g1,b1,r2,g2,b2,.....
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEFS3D:
The IA array contains:
- The start element number and the end element number of following data
  edge data
  vertex colour indices
  vertex colour components
  vertex normal data
  vertex application-specific data
  If the optional data is not present, the value of the "start element number" is set to zero and the value of the "end element number" is set to -1.
- The data per facet flag
- The data per edge flag
- The data per vertex flag
- The colour type
- The number of components of colour value(NCC)
- The number of point lists
- The length of application-specific data list per facet
- The length of application-specific data list per vertex
- The array of end indices for point lists
- The facet colour indices
- The edge data
- The vertex colour indices

The RA array contains:
- The coordinates of points
- The facet colour components
- The facet normal data
- The facet application-specific data
- The vertex colour components
- The vertex normal data
- The vertex application-specific data

IL=19+IA(16)+(IA(2)-IA(1)+1)+(IA(4)-IA(3)+1)
IA(1)= start element number in IA of edge data
IA(2)= end element number in IA of edge data
IA(3)= start element number in IA of vertex colour indices
IA(4)= end element number in IA of vertex colour indices
IA(5)= start element number in RA of vertex colour components
IA(6)= end element number in RA of vertex colour components
IA(7)= start element number in RA of vertex normal data
IA(8)= end element number in RA of vertex normal data
IA(9)= start element number in RA of vertex application-specific data
IA(10)= end element number in RA of vertex application-specific data
IA(11)= data per facet flag(PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
IA(12)= data per edge flag(PENO,PEVF)
IA(13)= data per vertex flag
(PCD,PCDC,PCDN,PCDD,PCDCN,PCDCD,PCDND,PCDCND)

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IA(14)= colour type
IA(15)= number of components of colour value = NCC
IA(16)= number of point lists in fill area set 3 with data
IA(17)= length of application-specific data list per facet
IA(18)= length of application-specific data list per vertex
IA(19)= facet colour index
IA=element 20 through IA(16)+19 contain the array of end indices for point lists in fill area set 3 with data
IA=element IA(1) through IA(2) contain the edge data
IA=element IA(3) through IA(4) contain the vertex colour indices
RL=IA(IA(16)+19)*3+IA(15)+3+IA(17)+(IA(6)-IA(5)+1)+(IA(8)-IA(7)+1)+
(IA(10)-IA(9)-1)
RA=element 1 through IA(IA(16)+19)*3=NUM1 contain the coordinates of points
example x1,x2,...y1,y2,...z1,z2...
RA=element NUM1+1 through NUM1+NCC=NUM2 contain the facet colour components
example(colour type =PRGB) r1,g1,b1,r2,g2,b2,.....
RA=element NUM2+1 through NUM2+3=NUM3 contain the facet normal data
RA=element NUM3+1 through NUM3+IA(17) contain the facet application-specific data
RA=element IA(5) through IA(6) contain the vertex colour components
RA=element IA(7) through IA(8) contain the vertex normal data
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(9) through IA(10) contain the vertex application-specific data
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEFSD:
The IA array contains:
- The start element number and the end element number of following data
  - edge data
  - vertex colour indices
  - vertex colour components
  - vertex normal data
  - vertex application-specific data

  If the optional data is not present, the value of the "start element number" is set to zero and the value of the "end element number" is set to -1.
- The data per facet flag
- The data per edge flag
- The data per vertex flag
- The colour type
- The number of components of colour value(NCC)
- The number of point lists
- The length of application-specific data list per facet
- The length of application-specific data list per vertex
- The array of end indices for point lists
- The facet colour indices
- The edge data
- The vertex colour indices

The RA array contains:
- The coordinates of points
- The facet colour components
- The facet normal data
- The facet application-specific data

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- The vertex colour components
- The vertex normal data
- The vertex application-specific data

IL=19+IA(16)+(IA(2)-IA(1)+1)+(IA(4)-IA(3)+1)
IA(1)= start element number in IA of edge data
IA(2)= end element number in IA of edge data
IA(3)= start element number in IA of vertex colour indices
IA(4)= end element number in IA of vertex colour indices
IA(5)= start element number in RA of vertex colour components
IA(6)= end element number in RA of vertex colour components
IA(7)= start element number in RA of vertex normal data
IA(8)= end element number in RA of vertex normal data
IA(9)= start element number in RA of vertex application-specific data
IA(10)= end element number in RA of vertex application-specific data
IA(11)= data per facet flag(PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
IA(12)= data per edge flag(PENO,PEVF)
IA(13)= data per vertex flag
(PCD,PCDC,PCDN,PCDD,PCDCN,PCDCD,PCDND,PCDCND)
IA(14)= colour type
IA(15)= number of components of colour value = NCC
IA(16)= number of point lists in fill area set with data
IA(17)= length of application-specific data list per facet
IA(18)= length of application-specific data list per vertex
IA(19)= facet colour indices
IA=element 20 through IA(16)+19 contain the array of end indices for point lists in fill area set with data
IA=element IA(1) through IA(2) contain the edge data
IA=element IA(3) through IA(4) contain the vertex colour indices
RL=IA(IA(16)+19)*2+IA(15)+IA(17)+(IA(6)-IA(5)+1)+(IA(8)-IA(7)+1)+
(IA(10)-IA(9)-1)
RA=element 1 through IA(IA(16)+19)*2=NUM1 contain the coordinates of points
example x1,x2,...y1,y2...
RA=element NUM1+1 through NUM1+NCC=NUM2 contain the facet colour components
example(colour type = PRGB) r1,g1,b1,r2,g2,b2,.....
RA=element NUM2+1 through NUM2+3=NUM3 contain the facet normal data
RA=element NUM3+1 through NUM3+IA(17) contain the facet application-specific data
RA=element IA(5) through IA(6) contain the vertex colour components
RA=element IA(7) through IA(8) contain the vertex normal data
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(9) through IA(10) contain the vertex application-specific data
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PECA3P:
The IA array contains:
- The number of columns(NC)
- The number of rows(NR)
- The colour type(CT)
- The number of components of colour value
- The list of colour indices. There are NC*NR colour indices, if CT is indirect.

The RA array contains:

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- The cell parallelogram(P)
- The cell parallelogram(Q)
- The cell parallelogram(R)
- The list of colour values. There are NCC*NC*NR colour values, that having as many components as required by CT.

Common element:
IL= 3+*
IA(1)= number of columns = NC
IA(2)= number of rows = NR
IA(3)= colour type = CT
IA(4)= number of components of colour value = NCC
RL= 9+*
RA=element 1 through 3 contain the cell parallelogram(P)
RA=element 4 through 6 contain the cell parallelogram(Q)
RA=element 7 through 9 contain the cell parallelogram(R)
SL= 0
LSTR= ( )
STR= ( )
Individual element:
CASE colour type=PINDIR:
IA=element 4 through NC*NR+3 contain colour indices
CASE colour type=PRGB or PCIE or PHSV or PHLS:
RA=element 10 through NCC*NC*NR+9 contain the colour components

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PESFS3:
The IA array contains:
- The start element number and the end element number of following data
  facet colour indices
  edge data
  vertex colour indices
  facet colour components
  facet normal data
  facet application-specific data
  vertex colour components
  vertex normal data
  vertex application-specific data

  If the optional data is not present, the value of the "start element number" is set to zero and the value of the "end element number" is set to -1.
- The data per facet flag
- The data per edge flag
- The data per vertex flag
- The colour type
- The number of components of colour value
- The number of fill area sets
- The number of points
- The length of application-specific data list per facet
- The length of application-specific data list per vertex
- The array of end indices of fill area indices for each fill area set
- The array of end indices of vertex indices for each fill area
- The vertex indices
- The facet colour indices
- The edge data

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- The vertex colour indices

The RA array contains:

- The coordinates of points
- The facet colour components
- The facet normal data
- The facet application-specific data
- The vertex colour components
- The vertex normal data
- The vertex application-specific data

IL= 27+(IA(2)-IA(1)+1)+(IA(4)-IA(3)+1)+(IA(6)-IA(5)+1)+IA(24)+IA(IA(24)+27)
+IA(IA(24)+27)+IA(27+IA(24)+IA(27+IA(24)))

IA(1)= start element number in IA of facet colour indices

IA(2)= end element number in IA of facet colour indices

IA(3)= start element number in IA of edge data

IA(4)= end element number in IA of edge data

IA(5)= start element number in IA of vertex colour indices

IA(6)= end element number in IA of vertex colour indices

IA(7)= start element number in RA of facet colour components

IA(8)= end element number in RA of facet colour components

IA(9)= start element number in RA of facet normal data

IA(10)= end element number in RA of facet normal data

IA(11)= start element number in RA of facet application-specific data

IA(12)= end element number in RA of facet application-specific data

IA(13)= start element number in RA of vertex colour components

IA(14)= end element number in RA of vertex colour components

IA(15)= start element number in RA of vertex normal data

IA(16)= end element number in RA of vertex normal data

IA(17)= start element number in RA of vertex application-specific data

IA(18)= end element number in RA of vertex application-specific data

IA(19)= data per facet flag(PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)

IA(20)= data per edge flag(PENO,PEVF)

IA(21)= data per vertex flag
(PCD,PCDC,PCDN,PCDD,PCDCN,PCDCD,PCDND,PCDCND)

IA(22)= colour type

IA(23)= number of components of colour value

IA(24)= number of fill area sets in set of fill area sets 3 with data

IA(25)= number of points in set of fill area sets 3 with data

IA(26)= length of application-specific data list per facet

IA(27)= length of application-specific data list per vertex

IA=element 28 through IA(24)+27 contain the array of end indices of vertex indices for each fill area set in set of fill area sets 3 with data

IA=element IA(24)+28 through IA(24)+27+IA(IA(24)+27)=NUM1 contain the array of end indices for vertex indices in for each fill area in set of fill area sets 3 with data

IA=element NUM1+1 through IA(NUM1)+NUM1 contain the vertex indices

IA=element IA(1) through IA(2) contain the facet colour indices

IA=element IA(3) through IA(4) contain the edge data

IA=element IA(5) through IA(6) contain the vertex colour indices

RL= IA(25)*3+(IA(8)-IA(7)+1)+(IA(10)-IA(9)+1)+(IA(12)-IA(11)+1)+
(IA(14)-IA(13)+1)+(IA(16)-IA(15)+1)+(IA(18)-IA(17)+1)

RA=element 1 through IA(25)*3 contain the coordinates of points
example x1,x2,...y1,y2,...z1,z2...

RA=element IA(7) through IA(8) contain the facet colour components
example(colour type =PRGB) r1,g1,b1,r2,g2,b2,.....

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RA=element IA(9) through IA(10) contain the facet normal data
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(11) through IA(12) contain the facet application-specific data
RA=element IA(13) through IA(14) contain the vertex colour components
RA=element IA(15) through IA(16) contain the vertex normal data
RA=element IA(17) through IA(18) contain the vertex application-specific data
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PESFSD:
The IA array contains:
- The start element number and the end element number of following data
  facet colour indices
  edge data
  vertex colour indices
  facet colour components
  facet normal data
  facet application-specific data
  vertex colour components
  vertex normal data
  vertex application-specific data
  If the optional data is not present, the value of the "start element number" is set to zero and the value of the "end element number" is set to -1.
- The data per facet flag
- The data per edge flag
- The data per vertex flag
- The colour type
- The number of components of colour value
- The number of fill area sets
- The number of points
- The length of application-specific data list per facet
- The length of application-specific data list per vertex
- The array of end indices of vertex indices for each fill area set
- The array of end indices of vertex indices for each fill area
- The vertex indices
- The facet colour indices
- The edge data
- The vertex colour indices

The RA array contains:
- The coordinates of points
- The facet colour components
- The facet normal data
- The facet application-specific data
- The vertex colour components
- The vertex normal data
- The vertex application-specific data

IL= 27+(IA(2)-IA(1)+1)+(IA(4)-IA(3)+11)+(IA(6)-IA(5)+1)+IA(24)+IA(IA(24)+27)
+IA(27+IA(24)+IA(27+IA(24))
IA(1)= start element number in IA of facet colour indices
IA(2)= end element number in IA of facet colour indices
IA(3)= start element number in IA of edge data

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IA(4)= end element number in IA of edge data
IA(5)= start element number in IA of vertex colour indices
IA(6)= end element number in IA of vertex colour indices
IA(7)= start element number in RA of facet colour components
IA(8)= end element number in RA of facet colour components
IA(9)= start element number in RA of facet normal data
IA(10)= end element number in RA of facet normal data
IA(11)= start element number in RA of facet application-specific data
IA(12)= end element number in RA of facet application-specific data
IA(13)= start element number in RA of vertex colour components
IA(14)= end element number in RA of vertex colour components
IA(15)= start element number in RA of vertex normal data
IA(16)= end element number in RA of vertex normal data
IA(17)= start element number in RA of vertex application-specific data
IA(18)= end element number in RA of vertex application-specific data
IA(19)= data per facet flag(PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
IA(20)= data per edge flag(PENO,PEVF)
IA(21)= data per vertex flag
(PCD,PCDC,PCDN,PCDD,PCDCN,PCDCD,PCDND,PCDCND)
IA(22)= colour type
IA(23)= number of components of colour value
IA(24)= number of fill area sets in set of fill area sets with data
IA(25)= number of points in set of fill area sets with data
IA(26)= length of application-specific data list per facet
IA(27)= length of application-specific data list per vertex
IA=element 28 through IA(24)+27 contain the array of end indices of vertex indices for each fill area set in set of fill area sets with data
IA=element IA(24)+28 through IA(24)+27+IA(IA(24)+27)=NUM1 contain the array of end indices for vertex indices in set of fill area sets with data
IA=element NUM1+1 through IA(NUM1)+NUM1 contain the vertex indices
IA=element IA(1) through IA(2) contain the facet colour indices
IA=element IA(3) through IA(4) contain the edge data
IA=element IA(5) through IA(6) contain the vertex colour indices
RL= IA(25)*2+(IA(8)-IA(7)+1)+(IA(10)-IA(9)+1)+(IA(12)-IA(11)+1)+(IA(14)-IA(13)+1)+(IA(16)-IA(15)+1)+(IA(18)-IA(17)+1)
RA=element 1 through IA(25)*2 contain the coordinates of points
example x1,x2,...y1,y2,...
RA=element IA(7) through IA(8) contain the facet colour components
example(colour type =PRGB) r1,g1,b1,r2,g2,b2,.....
RA=element IA(9) through IA(10) contain the facet normal data
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(11) through IA(12) contain the facet application-specific data
RA=element IA(13) through IA(14) contain the vertex colour components
RA=element IA(15) through IA(16) contain the vertex normal data
RA=element IA(17) through IA(18) contain the vertex application-specific data
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PETS3D:
The IA array contains:
- The start element number and the end element number of following data
facet colour indices

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edge data
vertex colour indices
facet colour components
facet normal data
facet application-specific data
vertex colour components
vertex normal data
vertex application-specific data

If the optional data is not present, the value of the "start element number" is set to zero and the value of the "end element number" is set to -1.

- The data per facet flag
- The data per edge flag
- The data per vertex flag
- The colour type
- The number of components of colour value
- The number of triangles
- The number of points
- The length of application-specific data list per facet
- The length of application-specific data list per vertex
- The vertex indices
- The facet colour indices
- The edge data
- The vertex colour indices

The RA array contains:

- The coordinates of points
- The facet colour components
- The facet normal data
- The facet application-specific data
- The vertex colour components
- The vertex normal data
- The vertex application-specific data

IL=27+3*IA(24)+(IA(2)-IA(1)+1)+(IA(4)-IA(3)-1)+(IA(6)-IA(5)+1)
IA(1)= start element number in IA of facet colour indices
IA(2)= end element number in IA of facet colour indices
IA(3)= start element number in IA of edge data
IA(4)= end element number in IA of edge data
IA(5)= start element number in IA of vertex colour indices
IA(6)= end element number in IA of vertex colour indices
IA(7)= start element number in RA of facet colour components
IA(8)= end element number in RA of facet colour components
IA(9)= start element number in RA of facet normal data
IA(10)= end element number in RA of facet normal data
IA(11)= start element number in RA of facet application-specific data
IA(12)= end element number in RA of facet application-specific data
IA(13)= start element number in RA of vertex colour components
IA(14)= end element number in RA of vertex colour components
IA(15)= start element number in RA of vertex normal data
IA(16)= end element number in RA of vertex normal data
IA(17)= start element number in RA of vertex application-specific data
IA(18)= end element number in RA of vertex application-specific data
IA(19)= data per facet flag(PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
IA(20)= data per edge flag(PENO,PEVF)
IA(21)= data per vertex flag

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(PCD,PCDC,PCDN,PCDD,PCDCN,PCDCD,PCDND,PCDCND)
IA(22)= colour type
IA(23)= number of components of colour value
IA(24)= number of triangles
IA(25)= number of points in triangle set 3 with data
IA(26)= length of application-specific data list per facet
IA(27)= length of application-specific data list per vertex
IA=element 28 through 3*IA(24)+27 contain vertex indices
IA=element IA(1) through IA(2) contain the facet colour indices
IA=element IA(3) through IA(4) contain the edge data
IA=element IA(5) through IA(6) contain the vertex colour indices
RL= IA(25)*3+(IA(8)-IA(7)+1)+(IA(10)-IA(9)+1)+(IA(12)-IA(11)+1)+
(IA(14)-IA(13)+1)+(IA(16)-IA(15)+1)+(IA(18)-IA(17)+1)
RA=element 1 through IA(25)*3 contain the coordinates of points
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(7) through IA(8) contain the facet colour components
example(colour type =PRGB) r1,g1,b1,r2,g2,b2,.....
RA=element IA(9) through IA(10) contain the facet normal data
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(11) through IA(12) contain the facet application-specific data
RA=element IA(13) through IA(14) contain the vertex colour components
RA=element IA(15) through IA(16) contain the vertex normal data
RA=element IA(17) through IA(18) contain the vertex application-specific data
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PETSD:
The IA array contains:
- The start element number and the end element number of following data
facet colour indices
edge data
vertex colour indices
facet colour components
facet normal data
facet application-specific data
vertex colour components
vertex normal data
vertex application-specific data
If the optional data is not present, the value of the "start element number"
is set to zero and the value of the "end element number" is set to -1.
- The data per facet flag
- The data per edge flag
- The data per vertex flag
- The colour type
- The number of components of colour value
- The number of triangles
- The number of points
- The length of application-specific data list per facet
- The length of application-specific data list per vertex
- The vertex indices
- The facet colour indices
- The edge data

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- The vertex colour indices
The RA array contains:
- The coordinates of points
- The facet colour components
- The facet normal data
- The facet application-specific data
- The vertex colour components
- The vertex normal data
- The vertex application-specific data

IL=27+3*IA(24)+(IA(2)-IA(1)+1)+(IA(4)-IA(3)+1)+(IA(6)-IA(5)+1)
IA(1)= start element number in IA of facet colour indices
IA(2)= end element number in IA of facet colour indices
IA(3)= start element number in IA of edge data
IA(4)= end element number in IA of edge data
IA(5)= start element number in IA of vertex colour indices
IA(6)= end element number in IA of vertex colour indices
IA(7)= start element number in RA of facet colour components
IA(8)= end element number in RA of facet colour components
IA(9)= start element number in RA of facet normal data
IA(10)= end element number in RA of facet normal data
IA(11)= start element number in RA of facet application-specific data
IA(12)= end element number in RA of facet application-specific data
IA(13)= start element number in RA of vertex colour components
IA(14)= end element number in RA of vertex colour components
IA(15)= start element number in RA of vertex normal data
IA(16)= end element number in RA of vertex normal data
IA(17)= start element number in RA of vertex application-specific data
IA(18)= end element number in RA of vertex application-specific data
IA(19)= data per facet flag(PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
IA(20)= data per edge flag(PENO,PEVF)
IA(21)= data per vertex flag
(PCD,PCDC,PCDN,PCDD,PCDCN,PCDCD,PCDND,PCDCND)
IA(22)= colour type
IA(23)= number of components of colour value
IA(24)= number of triangles
IA(25)= number of points in triangle set 3 with data
IA(26)= length of application-specific data list per facet
IA(27)= length of application-specific data list per vertex
IA=element 28 through 3*IA(24)+27 contain vertex indices
IA=element IA(1) through IA(2) contain the facet colour indices
IA=element IA(3) through IA(4) contain the edge data
IA=element IA(5) through IA(6) contain the vertex colour indices
RL= IA(25)*2+(IA(8)-IA(7)+1)+(IA(10)-IA(9)+1)+(IA(12)-IA(11)+1)+
(IA(14)-IA(13)+1)+(IA(16)-IA(15)+1)+(IA(18)-IA(17)+1)
RA=element 1 through IA(25)*2 contain the coordinates of points
example x1,x2,...y1,y2,...
RA=element IA(7) through IA(8) contain the facet colour components
example(colour type =PRGB) r1,g1,b1,r2,g2,b2,.....
RA=element IA(9) through IA(10) contain the facet normal data
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(11) through IA(12) contain the facet application-specific data
RA=element IA(13) through IA(14) contain the vertex colour components
RA=element IA(15) through IA(16) contain the vertex normal data

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RA=element IA(17) through IA(18) contain the vertex application-specific data
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PETST3:
The IA array contains:
- The start element number and the end element number of following data
  - facet colour indices
  - edge data
  - vertex colour indices
  - facet colour components
  - facet normal data
  - facet application-specific data
  - vertex colour components
  - vertex normal data
  - vertex application-specific data

  If the optional data is not present, the value of the "start element number" is set to zero and the value of the "end element number" is set to -1.
- The data per facet flag
- The data per edge flag
- The data per vertex flag
- The colour type
- The number of components of colour value
- The number of points
- The length of application-specific data list per facet
- The length of application-specific data list per vertex
- The facet colour indices
- The edge data
- The vertex colour indices

The RA array contains:
- The coordinates of points
- The facet colour components
- The facet normal data
- The facet application-specific data
- The vertex colour components
- The vertex normal data
- The vertex application-specific data

IL=26+(IA(2)-IA(1)+1)+(IA(4)-IA(3)+1)+(IA(6)-IA(5)+1)
IA(1)= start element number in IA of facet colour indices
IA(2)= end element number in IA of facet colour indices
IA(3)= start element number in IA of edge data
IA(4)= end element number in IA of edge data
IA(5)= start element number in IA of vertex colour indices
IA(6)= end element number in IA of vertex colour indices
IA(7)= start element number in RA of facet colour components
IA(8)= end element number in RA of facet colour components
IA(9)= start element number in RA of facet normal data
IA(10)= end element number in RA of facet normal data
IA(11)= start element number in RA of facet application-specific data
IA(12)= end element number in RA of facet application-specific data
IA(13)= start element number in RA of vertex colour components

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IA(14)= end element number in RA of vertex colour components
IA(15)= start element number in RA of vertex normal data
IA(16)= end element number in RA of vertex normal data
IA(17)= start element number in RA of vertex application-specific data
IA(18)= end element number in RA of vertex application-specific data
IA(19)= data per facet flag(PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
IA(20)= data per edge flag(PENO,PEVF)
IA(21)= data per vertex flag
(PCD,PCDC,PCDN,PCDD,PCDCN,PCDCD,PCDND,PCDCND)
IA(22)= colour type
IA(23)= number of components of colour value
IA(24)= number of points in triangle strip 3 with data
IA(25)= length of application-specific data list per facet
IA(26)= length of application-specific data list per vertex
IA=element IA(1) through IA(2) contain the facet colour indices
IA=element IA(3) through IA(4) contain the edge data
IA=element IA(5) through IA(6) contain the vertex colour indices
RL= IA(24)*3+(IA(8)-IA(7)+1)+(IA(10)-IA(9)+1)+(IA(12)-IA(11)+1)+
(IA(14)-IA(13)+1)+(IA(16)-IA(15)+1)+(IA(18)-IA(17)+1)
RA=element 1 through IA(24)*3 contain the coordinates of points
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(7) through IA(8) contain the facet colour components
example(colour type =PRGB) r1,g1,b1,r2,g2,b2,.....
RA=element IA(9) through IA(10) contain the facet normal data
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(11) through IA(12) contain the facet application-specific data
RA=element IA(13) through IA(14) contain the vertex colour components
RA=element IA(15) through IA(16) contain the vertex normal data
RA=element IA(17) through IA(18) contain the vertex application-specific data
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PETSTD:
The IA array contains:
- The start element number and the end element number of following data
facet colour indices
edge data
vertex colour indices
facet colour components
facet normal data
facet application-specific data
vertex colour components
vertex normal data
vertex application-specific data
If the optional data is not present, the value of the "start element number"
is set to zero and the value of the "end element number" is set to -1.
- The data per facet flag
- The data per edge flag
- The data per vertex flag
- The colour type
- The number of components of colour value
- The number of points

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- The length of application-specific data list per facet
- The length of application-specific data list per vertex
- The facet colour indices
- The edge data
- The vertex colour indices

The RA array contains:

- The coordinates of points
- The facet colour components
- The facet normal data
- The facet application-specific data
- The vertex colour components
- The vertex normal data
- The vertex application-specific data

IL=26+(IA(2)-IA(1)+1)+(IA(4)-IA(3)+1)+(IA(6)-IA(5)+1)
IA(1)= start element number in IA of facet colour indices
IA(2)= end element number in IA of facet colour indices
IA(3)= start element number in IA of edge data
IA(4)= end element number in IA of edge data
IA(5)= start element number in IA of vertex colour indices
IA(6)= end element number in IA of vertex colour indices
IA(7)= start element number in RA of facet colour components
IA(8)= end element number in RA of facet colour components
IA(9)= start element number in RA of facet normal data
IA(10)= end element number in RA of facet normal data
IA(11)= start element number in RA of facet application-specific data
IA(12)= end element number in RA of facet application-specific data
IA(13)= start element number in RA of vertex colour components
IA(14)= end element number in RA of vertex colour components
IA(15)= start element number in RA of vertex normal data
IA(16)= end element number in RA of vertex normal data
IA(17)= start element number in RA of vertex application-specific data
IA(18)= end element number in RA of vertex application-specific data
IA(19)= data per facet flag(PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
IA(20)= data per edge flag(PENO,PEVF)
IA(21)= data per vertex flag
(PCD,PCDC,PCDN,PCDD,PCDCN,PCDCD,PCDND,PCDCND)
IA(22)= colour type
IA(23)= number of components of colour value
IA(24)= number of points in triangle strip 3 with data
IA(25)= length of application-specific data list per facet
IA(26)= length of application-specific data list per vertex
IA=element IA(1) through IA(2) contain the facet colour indices
IA=element IA(3) through IA(4) contain the edge data
IA=element IA(5) through IA(6) contain the vertex colour indices
RL= IA(24)*2+(IA(8)-IA(7)+1)+(IA(10)-IA(9)+1)+(IA(12)-IA(11)+1)+
(IA(14)-IA(13)+1)+(IA(16)-IA(15)+1)+(IA(18)-IA(17)+1)
RA=element 1 through IA(24)*2 contain the coordinates of points
example x1,x2,...y1,y2,...
RA=element IA(7) through IA(8) contain the facet colour components
example(colour type =PRGB) r1,g1,b1,r2,g2,b2,.....
RA=element IA(9) through IA(10) contain the facet normal data
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(11) through IA(12) contain the facet application-specific data

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RA=element IA(13) through IA(14) contain the vertex colour components
RA=element IA(15) through IA(16) contain the vertex normal data
RA=element IA(17) through IA(18) contain the vertex application-specific data
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEQM3D:
The IA array contains:
- The start element number and the end element number of following data
  - facet colour indices
  - edge data
  - vertex colour indices
  - facet colour components
  - facet normal data
  - facet application-specific data
  - vertex colour components
  - vertex normal data
  - vertex application-specific data

  If the optional data is not present, the value of the "start element number" is set to zero and the value of the "end element number" is set to -1.
- The data per facet flag
- The data per edge flag
- The data per vertex flag
- The colour type
- The number of components of colour value
- The columns number of point dimension
- The rows number of point dimension
- The length of application-specific data list per facet
- The length of application-specific data list per vertex
- The facet colour indices
- The edge data
- The vertex colour indices

The RA array contains:
- The coordinates of points
- The facet colour components
- The facet normal data
- The facet application-specific data
- The vertex colour components
- The vertex normal data
- The vertex application-specific data

IL= 27+(IA(2)-IA(1)+1)+(IA(4)-IA(3)+1)+(IA(6)-IA(5)+1)
IA(1)= start element number in IA of facet colour indices
IA(2)= end element number in IA of facet colour indices
IA(3)= start element number in IA of edge data
IA(4)= end element number in IA of edge data
IA(5)= start element number in IA of vertex colour indices
IA(6)= end element number in IA of vertex colour indices
IA(7)= start element number in RA of facet colour components
IA(8)= end element number in RA of facet colour components
IA(9)= start element number in Ra of facet normal data
IA(10)= end element number in RA of facet normal data

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IA(11)= start element number in RA of facet application-specific data
IA(12)= end element number in RA of facet application-specific data
IA(13)= start element number in RA of vertex colour components
IA(14)= end element number in RA of vertex colour components
IA(15)= start element number in RA of vertex normal data
IA(16)= end element number in RA of vertex normal data
IA(17)= start element number in RA of vertex application-specific data
IA(18)= end element number in RA of vertex application-specific data
IA(19)= data per facet flag(PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
IA(20)= data per edge flag(PENO,PEVF)
IA(21)= data per vertex flag
(PCD,PCDC,PCDN,PCDD,PCDCN,PCDCD,PCDND,PCDCND)
IA(22)= colour type
IA(23)= number of components of colour value
IA(24)= columns number of points dimension
IA(25)= rows number of points dimension
IA(26)= length of application-specific data list per facet
IA(27)= length of application-specific data list per vertex
IA=element IA(1) through IA(2) contain the facet colour indices
IA=element IA(3) through IA(4) contain the edge data
IA=element IA(5) through IA(6) contain the vertex colour indices
RL=IA(24)*IA(25)*3+(IA(8)-IA(7)+1)+(IA(10)-IA(9)+1)+(IA(12)-IA(11)+1)+
(IA(14)-IA(13)+1)+(IA(16)-IA(15)+1)+(IA(18)-IA(17)+1)
RA=element 1 through IA(24)*IA(25)*3 contain the coordinates of points
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(7) through IA(8) contain the facet colour components
example(colour type =PRGB) r1,g1,b1,r2,g2,b2,.....
RA=element IA(9) through IA(10) contain the facet normal data
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(11) through IA(12) contain the facet application-specific data
RA=element IA(13) through IA(14) contain the vertex colour components
RA=element IA(15) through IA(16) contain the vertex normal data
RA=element IA(17) through IA(18) contain the vertex application-specific data
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEQMD:
The IA array contains:
- The start element number and the end element number of following data
facet colour indices
edge data
vertex colour indices
facet colour components
facet normal data
facet application-specific data
vertex colour components
vertex normal data
vertex application-specific data
If the optional data is not present, the value of the "start element number"
is set to zero and the value of the "end element number" is set to -1.
- The data per facet flag
- The data per edge flag

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- The data per vertex flag
- The colour type
- The number of components of colour value
- The columns number of point dimension
- The rows number of point dimension
- The length of application-specific data list per facet
- The length of application-specific data list per vertex
- The facet colour indices
- The edge data
- The vertex colour indices

The RA array contains:

- The coordinates of points
- The facet colour components
- The facet normal data
- The facet application-specific data
- The vertex colour components
- The vertex normal data
- The vertex application-specific data

IL= 27+(IA(2)-IA(1)+1)+(IA(4)-IA(3)+1)+(IA(6)-IA(5)+1)
IA(1)= start element number in IA of facet colour indices
IA(2)= end element number in IA of facet colour indices
IA(3)= start element number in IA of edge data
IA(4)= end element number in IA of edge data
IA(5)= start element number in IA of vertex colour indices
IA(6)= end element number in IA of vertex colour indices
IA(7)= start element number in RA of facet colour components
IA(8)= end element number in RA of facet colour components
IA(9)= start element number in RA of facet normal data
IA(10)= end element number in RA of facet normal data
IA(11)= start element number in RA of facet application-specific data
IA(12)= end element number in RA of facet application-specific data
IA(13)= start element number in RA of vertex colour components
IA(14)= end element number in RA of vertex colour components
IA(15)= start element number in RA of vertex normal data
IA(16)= end element number in RA of vertex normal data
IA(17)= start element number in RA of vertex application-specific data
IA(18)= end element number in RA of vertex application-specific data
IA(19)= data per facet flag(PFNO,PFC,PFN,PFD,PFCN,PFCD,PFND,PFCND)
IA(20)= data per edge flag(PENO,PEVF)
IA(21)= data per vertex flag
(PCD,PCDC,PCDN,PCDD,PCDCN,PCDCD,PCDND,PCDCND)
IA(22)= colour type
IA(23)= number of components of colour value
IA(24)= columns number of points dimension
IA(25)= rows number of points dimension
IA(26)= length of application-specific data list per facet
IA(27)= length of application-specific data list per vertex
IA=element IA(1) through IA(2) contain the facet colour indices
IA=element IA(3) through IA(4) contain the edge data
IA=element IA(5) through IA(6) contain the vertex colour indices
RL=IA(24)*IA(25)*2+(IA(8)-IA(7)+1)+(IA(10)-IA(9)+1)+(IA(12)-IA(11)+1)+
(IA(14)-IA(13)+1)+(IA(16)-IA(15)+1)+(IA(18)-IA(17)+1)
RA=element 1 through IA(23)*IA(24)*2 contain the coordinates of points

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example x1,x2,...y1,y2,...
RA=element IA(7) through IA(8) contain the facet colour components
example(colour type =PRGB) r1,g1,b1,r2,g2,b2,.....
RA=element IA(9) through IA(10) contain the facet normal data
example x1,x2,...y1,y2,...z1,z2...
RA=element IA(11) through IA(12) contain the facet application-specific data
RA=element IA(13) through IA(14) contain the vertex colour components
RA=element IA(15) through IA(16) contain the vertex normal data
RA=element IA(17) through IA(18) contain the vertex application-specific data
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBC3:
The IA array contains:
- The spline order
- The number of knots
- The rationality
- The number of control points
The RA array contains:
- The knots
- The parameter range limits
- The coordinates of points
If "rationality" is PNRAT, coordinates of points are PXA, PYA and PZA.
If "rationality" is PRAT, coordinates of points are PXA, PYA, PZA and PWA.

IL= 4
IA(1)= spline order
IA(2)= number of knots
IA(3)= rationality(PRAT,PNRAT)
IA(4)= number of control points
RL= IA(2)+2+*
RA=element 1 through IA(2) contain the knots
RA=element IA(2)+1 through IA(2)+2 contain the parameter range limits
first minimum parameter, second maximum parameter.
if rationality=PRAT
RA=element IA(2)+4 through IA(2)+2+IA(4)*4 contain the coordinates of points
example x1,x2,...y1,y2,...z1,z2,...w1,w2,...
if rationality=PNRAT
RA=element IA(2)+3 through IA(2)+2+IA(4)*3 contain the coordinates of points
example x1,x2,...y1,y2,...z1,z2,...
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBC3C:
The IA array contains:
- The spline order
- The number of knots
- The rationality
- The number of control points
The RA array contains:

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- The knots
- The parameter range limits
- The coordinates of points
  If "rationality" is PNRAT, coordinates of points are PXA, PYA and PZA.
  If "rationality" is PRAT, coordinates of points are PXA, PYA, PZA and PWA.

The STR array contains:
- The colour spline curve data record.

IL= 4
IA(1)= spline order
IA(2)= number of knots
IA(3)= rationality(PRAT,PNRAT)
IA(4)= number of control points
RL= IA(2)+2+*
RA=element 1 through IA(2) contain the knots
RA=element IA(2)+1 through IA(2)+2 contain the parameter range limits
if rationality=PRAT
  RA=element IA(2)+4 through IA(2)+2+IA(4)*4 contain the coordinates of points
    example x1,x2,...y1,y2,...z1,z2,...w1,w2,...
if rationality=PNRAT
  RA=element IA(2)+3 through IA(2)+2+IA(4)*3 contain the coordinates of points
    example x1,x2,...y1,y2,...z1,z2,...
SL= number of array elements used in data record
For i= 1 to SL
    LSTR(i)= 80
STR= colour spline curve data record

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBS3:
The IA array contains:
- The u spline order
- The v spline order
- The u number of knots
- The v number of knots
- The rationality
- The u number of control points
- The v number of control points

The RA array contains:
- The u knots
- The v knots
- The coordinates of points
  If "rationality" is PNRAT, coordinates of points are PXA, PYA and PZA.
  If "rationality" is PRAT, coordinates of points are PXA, PYA, PZA and PWA.

The STR array contains:
- The trimming curve data record

IL=7
IA(1)= u spline order
IA(2)= v spline order
IA(3)= number of knots in u
IA(4)= number of knots in v
IA(5)= rationality(PRAT,PNRAT)
IA(6)= u number of control points dimension
IA(7)= v number of control points dimension

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RL= IA(3)+IA(4)+*
RA=element 1 through IA(3) contain the u knots
RA=element IA(3)+1 through IA(4)+IA(3) contain the v knots
if rationality=PRAT
  RA=element IA(4)+IA(3)+1 through 4*IA(6)*IA(7)+IA(4)+IA(3) contain
        the coordinates of points
    example x1,x2,...y1,y2,...z1,z2,...w1,w2,...
if rationality=PNRAT
  RA=element IA(4)+IA(3)+1 through 3*IA(6)*IA(7)+IA(4)+IA(3) contain
        the coordinates of points
    example x1,x2,...y1,y2,...z1,z2,...
SL= number of array elements used in trimming curve data record
For i=1 to SL
  LSTR(i)= 80
STR= trimming curve data record

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBS3D:
The IA array contains:
- The u spline order
- The v spline order
- The u number of knots
- The v number of knots
- The rationality
- The u number of control points
- The v number of control points
The RA array contains:
- The u knots
- The v knots
- The coordinates of points
  If "rationality" is PNRAT, coordinates of points are PXA, PYA and PZA.
  If "rationality" is PRAT, coordinates of points are PXA, PYA, PZA and PWA.
The STR array contains:
- The trimming curve data record
- The colour spline surface data record
- The data spline surface data record

IL=7
IA(1)= spline order u
IA(2)= spline order v
IA(3)= number of knots in u
IA(4)= number of knots in v
IA(5)= rationality(PRAT,PNRAT)
IA(6)= u number of control points dimension
IA(7)= v number of control points dimension
RL= IA(3)+IA(4)+*
RA=element 1 through IA(3) contain the u knots
RA=element IA(3)+1 through IA(4)+IA(3) contain the v knots
if rationality=PRAT
  RA=element IA(4)+IA(3)+1 through 4*IA(6)*IA(7)+IA(4)+IA(3) contain
        the coordinates of points
    example x1,x2,...y1,y2,...z1,z2,...w1,w2,...
if rationality=PNRAT
  RA=element IA(4)+IA(3)+1 through 3*IA(6)*IA(7)+IA(4)+IA(3) contain

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the coordinates of points
example x1,x2,...y1,y2,...z1,z2,...
SL= number of array elements used in trimming curve data record +
number of array elements used in colour spline surface data record
number of array elements used in data spline surface data record
For i=1 to SL
LSTR(i)= 80
STR= trimming curve data record, colour spline surface data record and
data spline surface data record

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEDMI:
The IA array contains:
- The data mapping index
The other arrays are empty.

IL= 1
IA(1)= data mapping index
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PERFI:
The IA array contains:
- The reflectance index
The other arrays are empty.

IL= 1
IA(1)= reflectance index
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBII:
The IA array contains:
- The back interior index
The other arrays are empty.

IL= 1
IA(1)= back interior index
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBDMI:

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The IA array contains:
- The back data mapping index
The other arrays are empty.

IL= 1
IA(1)= back data mapping index
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEBRFI:
The IA array contains:
- The back reflectance index
The other arrays are empty.

IL= 1
IA(1)= back reflectance index
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPRSI:
The IA array contains:
- The parametric surface index
The other arrays are empty.

IL= 1
IA(1)= parametric surface index
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPLC:
The IA array contains:
- The colour type(CT)
- The number of components of colour value(NCC)
- The actual data of colour index, if CT is indirect.
The RA array contains:
- The actual data of colour component values as required by CT.

Common element:
IL= 2+*
IA(1)= colour type = CT
IA(2)= number of components of colour value = NCC
RL= *

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SL= 0
LSTR= ( )
STR= ( )
Individual element:
  CASE colour type=PINDIR:
    IA(3)= colour index
  CASE colour type=PRGB or PCIE or PHSV or PHLS:
    RA= element 1 through NCC contain the colour components

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEPLSM:
The IA array contains:
- The polyline shading method
The other arrays are empty.

IL= 1
IA(1)= polyline shading method
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEPMC:
The IA array contains:
- The colour type(CT)
- The number of components of colour value(NCC)
- The actual data of colour index, if CT is indirect.
The RA array contains:
- The actual data of colour component values as required by CT.

Common element:
IL= 2+*
IA(1)= colour type = CT
IA(2)= number of components of colour value
RL= *
SL= 0
LSTR= ( )
STR= ( )
Individual element:
  CASE colour type=PINDIR:
    IA(3)= colour index
  CASE colour type=PRGB or PCIE or PHSV or PHLS:
    RA= element 1 through NCC contain the colour components

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PETXC:
The IA array contains:
- The colour type(CT)
- The number of components of colour value(NCC)
- The actual data of colour index, if CT is indirect.
The RA array contains:
- The actual data of colour component values as required by CT.

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Common element:
IL= 2+*
IA(1)= colour type = CT
IA(2)= number of components of colour value
RL= *
SL= 0
LSTR= ( )
STR= ( )
Individual element:
CASE colour type=PINDIR:
IA(3)= colour index
CASE colour type=PRGB or PCIE or PHSV or PHLS:
RA= element 1 through NCC contain the colour components

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEFDM:
The IA array contains:
- The distinguishing mode
The other arrays are empty.

IL= 1
IA(1)= distinguishing mode(POFF,PON)
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEFCM:
The IA array contains:
- The culling mode
The other arrays are empty.

IL= 1
IA(1)= culling mode(PNOFC,PBKFC,PFTFC)
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEIC:
The IA array contains:
- The colour type(CT)
- The number of components of colour value(NCC)
- The actual data of colour index, if CT is indirect.
The RA array contains:
- The actual data of colour component values as required by CT.

Common element:
IL= 2+*
IA(1)= colour type = CT

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IA(2)= number of components of colour value
RL= *
SL= 0
LSTR= ( )
STR= ( )
Individual element:
  CASE colour type=PINDIR:
    IA(3)= colour index
  CASE colour type=PRGB or PCIE or PHSV or PHLS:
    RA= element 1 through NCC contain the colour components

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEISM:
The IA array contains:
- The interior shading mode
The other arrays are empty.

IL= 1
IA(1)= interior shading method
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEDMM:
The IA array contains:
- The data mapping method
The STR array contains:
- The data mapping data record

IL= 1
IA(1)= data mapping method
RL= 0
RA= ( )
SL= length of data record array
FOR i=1 TO length of data record array
LSTR(i)= 80
STR= data mapping data record[33]

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PERFP:
The IA array contains:
- The properties type
The STR array contains:
- The reflectance propeties data record

Common element:
IL= 1
IA(1)= properties type

[33] See SET DATA MAPPING METHOD for a description of the data mapping method data data record.

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RL= 0
RA( )
SL= length of reflectance properties data record array
For i=1 to SL
LSTR(i)= 80
STR= reflectace propeties data record

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PERFM:
The IA array contains:
- The reflectance model
The other arrays are empty.

IL= 1
IA(1)= reflectance model
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBIS:
The IA array contains:
- The interior style
The other arrays are empty.

IL= 1
IA(1)= interior style(PHOLLO,PSOLID,PPATTR,PPATCH,PISEMP)
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBISI:
The IA array contains:
- The interior style index
The other arrays are empty.

IL= 1
IA(1)= interior style index
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBIC:
The IA array contains:
- The colour type(CT)
- The number of components of colour value(NCC)

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- The actual data of colour index, if CT is indirect.
The RA array contains:
- The actual data of colour component values as required by CT.

Common element:
IL= 2+*
IA(1)= colour type = CT
IA(2)= number of components of colour value
RL= *
SL= 0
LSTR= ( )
STR= ( )
Individual element:
CASE colour type=PINDIR:
IA(3)= colour index
CASE colour type=PRGB or PCIE or PHSV or PHLS:
RA= element 1 through NCC contain the colour components

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBISM:
The IA array contains:
- The interior shading method
The other arrays are empty.

IL= 1
IA(1)= interior shading method
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBDMM:
The IA array contains:
- The data mapping method
The STR array contains:
- The data mapping data record

IL= 1
IA(1)= data mapping method
RL= 0
RA= ( )
SL= length of data record array
FOR i=1 TO length of data record array
LSTR(i)= 80
STR= data mapping data record[34]

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEBRFP:
The IA array contains:

[34] See SET DATA MAPPING METHOD for a description of the data mapping method data data record.

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- The properties type
The STR array contains:
- The reflectance propetries data record

IL= 1
IA(1)= properties type
RL= 0
RA( )
SL= length of reflectance properties data record array
For i=1 to SL
LSTR(i)= 80
STR= reflectace propeties data record

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEBRFM:
The IA array contains:
- The reflectance model
The other arrays are empty.

IL= 1
IA(1)= reflectance model
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PELSS:
The IA array contains:
- The number of activation indices(NAI)
- The list of activation indices
- The number of deactivation indices(NDI)
- The list of deactivation indices
The other arrays are empty.

IL= 1+*
IA(1)= number of activation indices = NAI
IA(2)= number of deactivation indices = NDI
IA= element 3 through NAI+2 contain the activation list
IA= element NAI+3 through NDI+NAI+2 contain the deactivation list
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEEDC:
The IA array contains:
- The colour type(CT)
- The number of components of colour value
- The actual data of colour index, if CT is indirect.
The RA array contains:

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- The actual data of colour component values as required by CT.

Common element:
IL= 2+*
IA(1)= colour type = CT
IA(2)= number of components of colour value
RL= *
SL= 0
LSTR= ( )
STR= ( )
Individual element:
  CASE colour type=PINDIR:
    IA(3)= colour index
  CASE colour type= PRGB or PCIE or PHSV or PHLS:
    RA= element 1 through NCC contain the colour components

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PECAC:
The IA array contains:
- The curve approximation criteria type
The STR array contains:
- The curve approximation data record

IL= 1
IA(1)= curve approximation criteria type
RL= 0
RA=( )
SL= length of curve approximation data record array
For i= 1 to SL
  LSTR(i)= 80
STR= curve approximation data record

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PESAC:
The IA array contains:
- The surface approximation criteria type
The STR array contains:
- The surface approximation data record

IL= 1
IA(1)= surface approximation criteria type
RL= 0
RA=( )
SL= length of surface approximation data record array
For i= 1 to SL
  LSTR(i)= 80
STR= surface approximation data record

Output parameters for STRUCTURE CONTENT DATA RECORD for
ELTYPE = PEPSC:
The IA array contains:
- The parametric surface characteristics type
The STR array contains:
- The parametric surface characteristics data record

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IL= 1
IA(1)= parametric surface characteristics type
RL= 0
RA= ( )
SL= length of data record array
FOR i=1 TO length of data record array
LSTR(i)= 80
STR= parametric surface characteristics data record[35]

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PERCM:
The IA array contains:
- The rendering colour model
The other arrays are empty.

IL= 1
IA(1)= rendering colour model
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEDPCI:
The IA array contains:
- The depth cue index
The other arrays are empty.

IL= 1
IA(1)= depth cue index
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PECMI:
The IA array contains:
- The colour mapping index
The other arrays are empty.

IL= 1
IA(1)= colour mapping index
RL= 0
RA= ( )
SL= 0
LSTR= ( )
STR= ( )

[35] See SET PARAMETRIC SURFACE CHARACTERISTICS for a description of the parametric surface characteristics data record.

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ELEMENT SEARCH

SUBROUTINE PELS(STRID,STRTEP,SRCDIR,EISN,EIS,EESN,EES,ERRIND,
*STATUS,FNDEP)

Input Parameters:

INTEGER STRID	structure identifier
INTEGER STRTEP	start element position
INTEGER SRCDIR	search direction(PBWD,PFWD)
INTEGER EISN	number of elements in element inclusion set
INTEGER EIS(EISN)	element inclusion set *(PENIL,PEPL3,PEPL,PEPM3,PEPM,PETX3,PETX,* *PEATR3,PEATR,PEFA3,PEFA,PEFAS3,PEFAS,* *PECA3,PECA,PEGDP3,PEGDP,PEPLI,PEPMI,* *PETXI,PEII,PEEDI,PELN,PELWSC,PEPLCI,* *PEMK,PEMKSC,PEPMCI,PETXFN,PETXPR,* *PECHXP,PECHSP,PETXCI,PECHH,PECHUP,* *PETXP,PETXAL,PEATCH,PEATCU,PEATP,* *PEATAL,PEANST,PEIS,PEISI,PEICI,PEEDFG,* *PEEDT,PEEWSC,PEEDCI,PEPA,PEPRPV,* *PEPARF,PEADS,PERES,PEIASF,* *PEHRID,PELMT3,PELMT,PEGMT3,PEGMT,* *PEMCV3,PEMCV,PEMCLI,PERMCV,PEVWI,* *PEEXST,PELB,PEAP,PEGSE,PEPKID,*[36] PEPLS3,PEFS3D,PEFSD,PECA3P,PESFS3, PESFSD,PETS3D,PETSD,PETST3,PETSTD, PEQM3D,PEQMD,PEBC3,PEBC3C,PEBS3, PEBS3D,PEDMI,PERFI,PEBII,PEBDMI, PEBRFI,PEPRSI,PEPLC,PEPLSM,PEPMC, PETXC,PEFDM,PEFCM,PEIC,PEISM, PEDMM,PERFP,PERFM,PEBIS,PEBISI, PEBIC,PEBISM,PEBDMM,PEBRFP,PEBRFM, PELSS,PEEDC,PECAC,PESAC,PEPSC, PERCM,PEDPCI,PECMI)
INTEGER EESN	number of elements in element exclusion set
INTEGER EES(EESN)	element exclusion set *(enumerated type the same as that of element inclusion set)*

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER STATUS	status indicator(PFAIL,PSUCC)
INTEGER FNDEP	found element position

This function is defined in PHIGS part 1. Additional enumeration types are defined in PHIGS part 4. This binding shows those additional enumeration types.

[36] already defined in PHIGS

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14 Utility functions not defined in PHIGS and PHIGS PLUS

PACK COLOUR SPLINE CURVE

SUBROUTINE PPCSC (CSORD,CNKA,CKNOTS,CRTYPE,CTYPES,NCC,NCSCP, *CSCP,MLDR,ERRIND,CSCLDR,CSCREC)

Input Parameters:

INTEGER CSORD	colour spline order
INTEGER CNKA	number of colour spline knots
REAL CKNOTS(CNKA)	colour spline knots
INTEGER CRTYPE	colour spline rationality (PRAT,PNRAT)
INTEGER CTYPES	colour type for colour spline
INTEGER NCC	number of colour components (count does not include homogeneous component in rational colour splines)
INTEGER NCSCP	number of colour spline control points
REAL CSCP(*)	colour spline control points
INTEGER MLDR	dimension of colour spline curve data record array

Output Parameters:

INTEGER ERRIND	error indicator (zero if no error)
INTEGER CSCLDR	number of array elements used in CSCREC
CHARACTER*80 CSCREC(MLDR)	colour spline curve data record

UNPACK COLOUR SPLINE CURVE

SUBROUTINE PUCSC (CSCLDR,CSCREC,ICNKA,INCSCP,ERRIND,CSORD,CNKA, *CKNOTS,CRTYPE,CTYPES,NC,NCSCP,CSCP)

Input Parameters:

INTEGER CSCLDR	number of array elements used in CSCREC
CHARACTER*80 CSCREC(CSCLDR)	colour spline curve data record
INTEGER ICNKA	dimension of CKNOTS array
INTEGER INCSCP	dimension of CSCP array

Output Parameters:

INTEGER ERRIND	error indicator (zero if no error)
INTEGER CSORD	colour spline order
INTEGER CNKA	number of colour spline knots in CKNOTS array
REAL CKNOTS(ICNKA)	colour spline knots
INTEGER CRTYPE	colour spline rationality (PRAT,PNRAT)
INTEGER CTYPES	colour type for colour spline
INTEGER NC	number of colour components (count does not include homogeneous component in rational colour splines)
INTEGER NCSCP	number of colour spline control points
REAL CSCP(INCSCP)	colour spline control points

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PACK TRIMMING CURVE

```
SUBROUTINE PPTC (INITFL,LOOPFL,TACRI,LDR,DATREC,TCVF,TSORD,
*TNKA,TKNOTS,TPARL,TRTYPE,NTCCP,TPWUA,TPWVA,TPWWA,MLDR,
*ERRIND,TCLDR,TCREC)
```

Input Parameters:

LOGICAL INITFL	data record initialization flag
LOGICAL LOOPFL	data record new loop flag
INTEGER TACRI	trimming curve approximation criteria type
INTEGER LDR	length of data record array for trimming curve approximation criteria
CHARACTER*80 DATREC(LDR)	data record for trimming curve approximation criteria[37]
INTEGER TCVF	trimming curve visibility flag (POFF,PON)
INTEGER TSORD	trimming curve spline order
INTEGER TNKA	number of spline knots in array
REAL TKNOTS(TNKA)	trimming curve spline knots
REAL TPARL(2)	trimming curve parameter range limits
INTEGER TRTYPE	trimming curve spline rationality (PRAT,PNRAT)
INTEGER NTCCP	number of trimming curve spline control points
REAL TPWUA(NTCCP)	trimming curve U control point components
REAL TPWVA(NTCCP)	trimming curve V control point components
REAL TPWWA(NTCCP)	trimming curve W control point components (unused if trimming curve is non-rational)
INTEGER MLDR	dimension of trimming curve data record

Output Parameters:

INTEGER ERRIND	error indicator (zero if no error)
INTEGER TCLDR	total number of array elements used in TCREC
CHARACTER*80 TCREC(MLDR)	trimming curve data record

[37] See SET CURVE APPROXIMATION CRITERIA for description of the curve approximation criteria data recode.

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UNPACK TRIMMING CURVE

```
 SUBROUTINE PUTC(TCLDR,TCREC,ILOOP,ITCRV,MLDR,ITNKA,INTCCP,
*ERRIND,NLOOP,NCURVE,TACRI,LDR,DATREC,TCVF,TSORD,TNKA,TKNOTS,
*TPARL,TRTYPE,NTCCP,TPWUA,TPWVA,TPWWA)
```

Input Parameters:

INTEGER TCLDR	number of array elements used in TCREC
CHARACTER*80 TCREC(TCLDR)	trimming curve data record
INTEGER ILOOP	which loop
INTEGER ITCRV	which curve in loop
INTEGER MLDR	dimension of data record for trimming curve approximation criteria
INTEGER ITNKA	dimension of TKNOTS array
INTEGER INTCCP	dimension of TPWUA, TPWVA, and TPWWA arrays

Output Parameters:

INTEGER ERRIND	error indicator (zero if no error)
INTEGER NLOOP	Number of trimming loops
INTEGER NCURVE	Number of curves in current loop
INTEGER TACRI	trimming curve approximation criteria type
INTEGER LDR	number of array elements used in DATREC
CHARACTER*80 DATREC(MLDR)	data record for trimming curve approximation criteria[38]
INTEGER TCVF	trimming curve visibility flag (POFF,PON)
INTEGER TSORD	trimming curve spline order
INTEGER TNKA	number of trimming curve spline knots in TKNOTS array
REAL TKNOTS(ITNKA)	trimming curve spline knots
REAL TPARL(2)	trimming curve parameter range limits
INTEGER TRTYPE	trimming curve spline rationality (PRAT,PNRAT)
INTEGER NTCCP	number of trimming curve spline control points
REAL TPWUA(INTCCP)	trimming curve U control point components
REAL TPWVA(INTCCP)	trimming curve V control point components
REAL TPWWA(INTCCP)	trimming curve W control point components (unused if trimming curve is non-rational)

[38] See SET CURVE APPROXIMATION CRITERIA for a description of the curve approximation criteria data recode.

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PACK COLOUR SPLINE SURFACE

```
 SUBROUTINE PPCSS (CUSORD,CVSORD,CUNKA,CVNKA,CUKNTS,CVKNTS,
*CRTYPE,CTYPES,NCC,UNCSCP,VNCSCP,CSCP,MLDR,ERRIND,
*CSSLDR,CSSREC)
```

Input Parameters:

INTEGER CUSORD	u colour spline order
INTEGER CVSORD	v colour spline order
INTEGER CUNKA	number of u spline knots in array
INTEGER CVNKA	number of v spline knots in array
REAL CUKNTS(CUNKA)	u colour spline knots
REAL CVKNTS(CVNKA)	v colour spline knots
INTEGER CRTYPE	colour spline rationality (PRAT,PNRAT)
INTEGER CTYPES	colour type for spline
INTEGER NCC	number of colour components (count does not include homogeneous component in rational colour splines)
INTEGER UNCSCP	u number of colour spline control points dimension
INTEGER VNCSCP	v number of colour spline control points dimension
REAL CSCP(*)	colour spline control points
INTEGER MLDR	dimension of colour spline surface data record array

Output Parameters:

INTEGER ERRIND	error indicator (zero if no error)
INTEGER CSSLDR	number of array elements used in CSSREC
CHARACTER*80 CSSREC(MLDR)	colour spline surface data record

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UNPACK COLOUR SPLINE SURFACE

```
 SUBROUTINE PUCSS (CSSLDR,CSSREC,ICUNKA,ICVNKA,ICNSCP,ERRIND,
*CUSORD,CVSORD,CUNKA,CVNKA,CUKNTS,CVKNTS,CRTYPE,CTYPES,NCC,
*UNCSCP,VNCSCP,CSCP)
```

Input Parameters:

INTEGER CSSLDR	number of array elements used in CSSREC
CHARACTER*80 CSSREC(CSSLDR)	colour spline surface data record
INTEGER ICUNKA	dimension of CUKNTS array
INTEGER ICVNKA	dimension of CVKNTS array
INTEGER INCSCP	dimension of CSCP array

Output Parameters:

INTEGER ERRIND	error indicator (zero if no error)
INTEGER CUSORD	u colour spline order
INTEGER CVSORD	v colour spline order
INTEGER CUNKA	number of u spline knots in CUKNTS array
INTEGER CVNKA	number of v spline knots in CVKNTS array
REAL CUKNTS(ICUNKA)	u colour spline knots
REAL CVKNTS(ICVNKA)	v colour spline knots
INTEGER CRTYPE	colour spline rationality (PRAT,PNRAT)
INTEGER CTYPES	colour type for spline
INTEGER NCC	number of colour components (count does not include homogeneous component in rational colour splines)
INTEGER UNCSCP	u number of colour spline control points dimension
INTEGER VNCSCP	v number of colour spline control points dimension
REAL CSCP(INCSCP)	colour spline control points

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PACK DATA SPLINE SURFACE

```
 SUBROUTINE PPDSS (INITFL,DATAFL,DUSORD,DVSORD,DUNKA,DVNKA,
*DUKNTS,DVKNTS,DRTYPE,UNDSCP,UNDSCP,DDIMS,DSCP,MLDR,ERRIND,
*DSSLDR,DSSREC)
```

Input Parameters:

LOGICAL INITFL	data record initialization flag
LOGICAL DATAFL	data record new data spline flag
INTEGER DUSORD	u data spline order
INTEGER DVSORD	v data spline order
INTEGER DUNKA	number of u spline knots in DUKNTS array
INTEGER DVNKA	number of u spline knots in DVKNTS array
REAL DUKNTS(DUNKA)	u data spline knots
REAL DVKNTS(DVNKA)	v data spline knots
INTEGER DRTYPE	data spline rationality (PRAT,PNRAT)
INTEGER UNDSCP	u number of data spline control points dimension
INTEGER UNDSCP	v number of data spline control points dimension
INTEGER DDIMS	data dimension for spline
REAL DSCP(*)	data spline control points
INTEGER MLDR	dimension of data spline surface data record array

Output Parameters:

INTEGER ERRIND	error indicator (zero if no error)
INTEGER DSSLDR	number of array elements used in DSSREC
CHARACTER*80 DSSREC(MLDR)	data spline surface data record

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UNPACK DATA SPLINE SURFACE

```
 SUBROUTINE PUDSS (DSSLDR,DSSREC,IDS,IDUNKA,IDVNKA,IDNSCP,ERRIND,
*DUSORD,DVSORD,DUNKA,DVNKA,DUKNTS,DVKNTS,DRTYPE,UNDSCP,
*UNDSCP,DDIMS,DSCP)
```

Input Parameters:

INTEGER DSSLDR	number of array elements used in DSSREC
CHARACTER*80 DSSREC(DSSLDR)	data record
INTEGER IDS	which data spline
INTEGER IDUNKA	dimension of DUKNTS array
INTEGER IDVNKA	dimension of DVKNTS array
INTEGER IDNSCP	dimension of DSCP array

Output Parameters:

INTEGER ERRIND	error indicator (zero if no error)
INTEGER DUSORD	u data spline order
INTEGER DVSORD	v data spline order
INTEGER DUNKA	number of u spline knots in array
INTEGER DVNKA	number of v spline knots in array
REAL DUKNTS(IDUNKA)	u data spline knots
REAL DVKNTS(IDVNKA)	v data spline knots
INTEGER DRTYPE	data spline rationality (PRAT,PNRAT)
INTEGER UNDSCP	u number of data spline control points dimension
INTEGER UNDSCP	v number of data spline control points dimension
INTEGER DDIMS	data dimension for spline
REAL DSCP(IDNSCP)	data spline control points

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Annex A
(informative)
FORTRAN Examples

Add the following to AnnexA.
The following sample programs, using the PHIGS and PHIGS PLUS FORTRAN binding,illustrate the use of PHIGS and PHIGS PLUS functions.
Example 1:

```
C     PROGRAM SURF
C
C     DESCRIPTION:
C      This program draws a surface hollowed out by trimming curve.
C      Copyright 1992 O'Reilly and Associates, Inc. Permission to use, copy,
C      and modify this program is hereby granted,as long as this
C      copyright notice appears in each copy of the program source code.
C      Program adapted from C to Fortran for use as language binding example.
C
C     Define PHIGS constants.
C
      INTEGER PNRAT,PHOLLO,PUBKCP
      PARAMETER (PNRAT=0,PHOLLO=0,PUBKCP=1)
      INTEGER PICPC,PCBKSA,PON
      PARAMETER (PICPC=3,PCBKSA=2,PON=1)
      INTEGER PPERFO
      PARAMETER (PPERFO=1)
C
C     Define the surface data.
C
      INTEGER USORD, VSORD
      INTEGER UNKA, VNKA
      INTEGER UNCP, VNCP
      INTEGER RTYPE
      REAL UKNOTS(6)/0.0,0.0,0.0,1.0,1.0,1.0/
      REAL VKNOTS(8)/0.0,0.0,0.0,0.0,1.0,1.0,1.0,1.0/
      REAL PXA(12)/0.0,0.3,0.6,0.9,
     -            0.0,0.3,0.6,0.9,
     -            0.0,0.3,0.6,0.9/
      REAL PYA(12)/0.5,0.5,0.4,0.5,
     -            0.6,1.0,0.5,0.3,
     -            0.5,0.5,0.4,0.2/
      REAL PZA(12)/0.0,0.0,0.0,0.0,
     -            0.5,0.5,0.5,0.5,
     -            1.0,1.0,1.0,1.0/
      REAL PWA(12)/12*1.0/
C
C     Define the trimming curve data.
C
      LOGICAL INITFL,LOOPFL
      INTEGER TACRI,TCVF
      INTEGER TSORD,TNKA,TRTYPE,NTCCP
      REAL TKNOTS(12),TPWUA(9),TPWVA(9)
      DATA TKNOTS(1),TKNOTS(2),TKNOTS(3),TKNOTS(4)/0.0,0.0,0.0,1.0/
```


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```
      DATA TKNOTS(5),TKNOTS(6),TKNOTS(7),TKNOTS(8)/1.0,2.0,2.0,3.0/
      DATA TKNOTS(9),TKNOTS(10),TKNOTS(11),TKNOTS(12)/3.0,4.0,4.0,4.0/
      DATA TPWUA(1),TPWUA(2),TPWUA(3)/0.5,0.68,0.68/
      DATA TPWUA(4),TPWUA(5),TPWUA(6)/0.68,0.5,0.32/
      DATA TPWUA(7),TPWUA(8),TPWUA(9)/0.32,0.32,0.5/
      DATA TPWVA(1),TPWVA(2),TPWVA(3)/0.32,0.32,0.5/
      DATA TPWVA(4),TPWVA(5),TPWVA(6)/0.68,0.68,0.68/
      DATA TPWVA(7),TPWVA(8),TPWVA(9)/0.5,0.32,0.32/
      REAL TPWWA/0.0/
      REAL TPARL(2)
      INTEGER TCLDR
      CHARACTER*80 TCREC(9)
C
      INTEGER PSCTY
      INTEGER ACRI
      INTEGER ERRIND
      INTEGER IA(3),LDR,MLDR
      CHARACTER*80 DATREC
C
C     Open PHIGS and a workstation.
C
      CALL POPPH(99,-1)
      CALL POPWK(1,0,0)
C
C     Open the structure.
C
      CALL POPST(1)
C
C     Select the view index for the surface.
C
      CALL PSVWI(1)
C
C     Hollow the surface.
C
      CALL PSIS(PHOLLO)
C
C     Set the parametric surface characteristics.
C
      IL    = 3
      IA(1) = PUBKCP
      IA(2) = 20
      IA(3) = 20
      MLDR  = 1
      CALL PPREC(IL,IA,0,0,0,0,0,MLDR,ERRIND,LDR,DATREC)
      PSCTY = PICPC
      CALL PSPSC(PSCTY,LDR,DATREC)
C
C     Set the surface approximation criteria.
C
      IL    = 2
      IA(1) = 10
      IA(2) = 10
      MLDR  = 1
      CALL PPREC(IL,IA,0,0,0,0,0,MLDR,ERRIND,LDR,DATREC)
```


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```
      ACRI  = PCBKSA
      CALL PSSAC(ACRI,LDR,DATREC)
C
C     Display the edge of surface.
C
      CALL PSEDFG(PON)
C
C     Set the first trimming  curve
C
      INITFL = .TRUE.
      LOOPFL = .TRUE.
      TACRI  = PCBKCA
      IL     = 1
      IA(1)  = 10
      MLDR   = 1
      CALL PPREC(IL,IA,0,0,0,0,0,MLDR,ERRIND,LDR,DATREC)
      TCVF   = PON
      TSORD  = 3
      TNKA   = 12
      TPARL(1) = 0.0
      TPARL(2) = 4.0
      TRTYPE = PNRAT
      NTCCP  = 9
      MLDR   = 3
      CALL PPTCV(INITFL,LOOPFL,TACRI,LDR,DATREC,TCVF,TSORD,TNKA,
     -           TKNOTS,TPARL,TRTYPE,NTCCP,TPWUA,TPWVA,
     -           TPWWA,MLDR,ERRIND,TCLDR,TCREC)
C
C     Set the second trimming  curve
C
      INITFL = .FALSE.
      LOOPFL = .FALSE.
      TACRI  = PCBKCA
      IL     = 1
      IA(1)  = 10
      MLDR   = 1
      CALL PPREC(IL,IA,0,0,0,0,0,MLDR,ERRIND,LDR,DATREC)
      TCVF   = PON
      TSORD  = 3
      TNKA   = 12
      TKNOTS(1)  = 0.0
      TKNOTS(2)  = 0.0
      TKNOTS(3)  = 0.0
      TKNOTS(4)  = 1.0
      TKNOTS(5)  = 1.0
      TKNOTS(6)  = 2.0
      TKNOTS(7)  = 2.0
      TKNOTS(8)  = 3.0
      TKNOTS(9)  = 3.0
      TKNOTS(10) = 4.0
      TKNOTS(11) = 4.0
      TKNOTS(12) = 4.0
      TPARL(1) = 0.0
      TPARL(2) = 4.0
```


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```
      TRTYPE = PNRAT
      NTCCP  = 9
      TPWUA(1) = 0.5
      TPWUA(2) = 0.75
      TPWUA(3) = 0.75
      TPWUA(4) = 0.75
      TPWUA(5) = 0.5
      TPWUA(6) = 0.25
      TPWUA(7) = 0.25
      TPWUA(8) = 0.25
      TPWUA(9) = 0.5
      TPWVA(1) = 0.25
      TPWVA(2) = 0.25
      TPWVA(3) = 0.5
      TPWVA(4) = 0.75
      TPWVA(5) = 0.75
      TPWVA(6) = 0.75
      TPWVA(7) = 0.5
      TPWVA(8) = 0.25
      TPWVA(9) = 0.25
      MLDR   = TCLDR + 3
      CALL PPTCV(INITFL,LOOPFL,TACRI,LDR,DATREC,TCVF,TSORD,TNKA,
     -           TKNOTS,TPARL,TRTYPE,NTCCP,TPWUA,TPWVA,
     -           TPWWA,MLDR,ERRIND,TCLDR,TCREC)
C
C     Set the third trimming curve
C
      INITFL = .FALSE.
      LOOPFL = .FALSE.
      TACRI  = PCBKCA
      IL     = 1
      IA(1)  = 10
      MLDR   = 1
      CALL PPREC(IL,IA,0,0,0,0,0,MLDR,ERRIND,LDR,DATREC)
      TCVF   = PON
      TSORD  = 2
      TNKA   = 7
      TKNOTS(1)  = 0.0
      TKNOTS(2)  = 0.0
      TKNOTS(3)  = 1.0
      TKNOTS(4)  = 2.0
      TKNOTS(5)  = 3.0
      TKNOTS(6)  = 4.0
      TKNOTS(7)  = 4.0
      TPARL(1) = 0.0
      TPARL(2) = 4.0
      TRTYPE = PNRAT
      NTCCP  = 5
      TPWUA(1) = 0.0
      TPWUA(2) = 1.0
      TPWUA(3) = 1.0
      TPWUA(4) = 0.0
      TPWUA(5) = 0.0
      TPWVA(1) = 0.0
```


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```
      TPWVA(2) = 0.0
      TPWVA(3) = 1.0
      TPWVA(4) = 1.0
      TPWVA(5) = 0.0
      MLDR   = TCLDR + 3
      CALL PPTCV(INITFL,LOOPFL,TACRI,LDR,DATREC,TCVF,TSORD,TNKA,
     -           TKNOTS,TPARL,TRTYPE,NTCCP,TPWUA,TPWVA,
     -           TPWWA,MLDR,ERRIND,TCLDR,TCREC)
C
C Assign the surface parameters
C
      USORD  = 3
      VSORD  = 4
      UNKA   = 6
      VNKA   = 8
      RTYPE  = PNRAT
      UNCP   = 3
      VNCP   = 4
      CALL PBSS3(USORD,VSORD,UNKA,VNKA,UKNOTS,VKNOTS,RTYPE,UNCP,VNCP,
     -           TCLDR,TCREC)
C
C     Close the structure.
C
      CALL PCLST
C
C     Set the view, post the top-level structure and update workstation.
C
      CALL SETVW
      CALL PPOST(1,1,1.0)
      CALL PUWK(1,PPERFO)
C
C     Close the workstation and PHIGS.
C
      CALL PCLWK(1)
      CALL PCLPH
      STOP
      END
C
C
      SUBROUTINE SETVW
C
C     This subroutine stores the view.
C
C     PHIGS constants:
C
      INTEGER PPARL,PCLIP
      PARAMETER (PPARL=0,PCLIP=1)
C
      REAL VWRX, VWRY, VWRZ
      REAL VPNX, VPNY, VPNZ
      REAL VUPX, VUPY, VUPZ
      REAL VWWNLM(4), PJVPLM(6)
      INTEGER PJTYPE
      REAL PJRX, PJRY, PJRZ
```


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```
      REAL VPLD, BPLD, FPLD
      INTEGER XYCLPI, BCLIPI, FCLIPI
      INTEGER ERRIND
      REAL VWORMT(4,4), VWMPMT(4,4)
C
C     Calculate the view orientation matrix.
C
      VWRX = 0.5
      VWRY = 0.5
      VWRZ = 0.5
      VPNX = 0.5643
      VPNY = 0.4775
      VPNZ = 0.6735
      VUPX = 0.0
      VUPY = 1.0
      VUPZ = 0.0
      CALL PEVOM3(VWRX,VWRY,VWRZ,VPNX,VPNY,VPNZ,VUPX,VUPY,VUPZ,
     -            ERRIND,VWORMT)
C
C     Calculate the view mapping matrix.
C
      VWWNLM(1) = -0.78
      VWWNLM(2) = 0.7
      VWWNLM(3) = -0.78
      VWWNLM(4) = 0.7
      PJVPLM(1) = 0.0
      PJVPLM(2) = 1.0
      PJVPLM(3) = 0.0
      PJVPLM(4) = 1.0
      PJVPLM(5) = 0.0
      PJVPLM(6) = 1.0
      PJTYPE    = PPARL
      PJRX      = 0.0
      PJRY      = 0.0
      PJRZ      = 10.0
      VPLD      = 0.0
      BPLD      = -1.0
      FPLD      = 1.0
      CALL PEVMM3(VWWNLM,PJVPLM,PJTYPE,PJRX,PJRY,PJRZ,
     -            VPLD,BPLD,FPLD,ERRIND,VWMPMT)
C
C     Store the view in the view table as view 1.
C
      XYCLPI = PCLIP
      BCLIPI = PCLIP
      FCLIPI = PCLIP
      CALL PSVWR3(1,1,VWORMT,VWMPMT,PJVPLM,XYCLPI,
     -            BCLIPI,FCLIPI)
C
      RETURN
      END
```


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Annex B
(normative)
Function Lists

Add the following to AnnexB.

B.1 List of functions ordered alphabetically by function name

CELL ARRAY 3 PLUS 22
ELEMENT SEARCH 110
FILL AREA SET 3 WITH DATA 21
FILL AREA SET WITH DATA 22
INQUIRE B-SPLINE SURFACE FACILITIES 70
INQUIRE COLOUR MAPPING FACILITIES 73
INQUIRE COLOUR MAPPING METHOD FACILITIES 74
INQUIRE COLOUR MAPPING REPRESENTATION 62
INQUIRE COLOUR MAPPING STATE 61
INQUIRE CURRENT ELEMENT CONTENT 80
INQUIRE CURRENT ELEMENT TYPE AND SIZE 77
INQUIRE CURVE FACILITIES 69
INQUIRE DATA MAPPING FACILITIES 67
INQUIRE DATA MAPPING REPRESENTATION 57
INQUIRE DEPTH CUE FACILITIES 72
INQUIRE DEPTH CUE REPRESENTATION 61
INQUIRE DIRECT COLOUR MODEL FACILITIES 63
INQUIRE DYNAMICS OF WORKSTATION PLUS 63
INQUIRE EDGE REPRESENTATION PLUS 57
INQUIRE ELEMENT CONTENT 79
INQUIRE ELEMENT TYPE AND SIZE 78
INQUIRE GENERALIZED DRAWING PRIMITIVE 76
INQUIRE GENERALIZED DRAWING PRIMITIVE 3 75
INQUIRE INTERIOR FACILITIES PLUS 66
INQUIRE INTERIOR REPRESENTATION PLUS 56
INQUIRE LIGHT SOURCE FACILITIES 72
INQUIRE LIGHT SOURCE REPRESENTATION 60
INQUIRE LIST element OF COLOUR MAPPING INDICES 62
INQUIRE LIST element OF DATA MAPPING INDICES 57
INQUIRE LIST element OF DEPTH CUE INDICES 60
INQUIRE LIST element OF LIGHT SOURCE INDICES 60
INQUIRE LIST element OF PARAMETRIC SURFACE INDICES 58
INQUIRE LIST element OF REFLECTANCE INDICES 58
INQUIRE PARAMETRIC SURFACE FACILITIES 69
INQUIRE PARAMETRIC SURFACE REPRESENTATION 59
INQUIRE PATTERN REPRESENTATION PLUS 59
INQUIRE POLYLINE FACILITIES PLUS 64
INQUIRE POLYLINE REPRESENTATION PLUS 55
INQUIRE POLYMARKER REPRESENTATION PLUS 55
INQUIRE PREDEFINED COLOUR MAPPING REPRESENTATION 75
INQUIRE PREDEFINED DATA MAPPING REPRESENTATION 68
INQUIRE PREDEFINED DEPTH CUE REPRESENTATION 73
INQUIRE PREDEFINED EDGE REPRESENTATION PLUS 67
INQUIRE PREDEFINED INTERIOR REPRESENTATION PLUS 66
INQUIRE PREDEFINED LIGHT SOURCE REPRESENTATION 72
INQUIRE PREDEFINED PARAMETRIC SURFACE REPRESENTATION 71

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INQUIRE PREDEFINED PATTERN REPRESENTATION PLUS 71
INQUIRE PREDEFINED POLYLINE REPRESENTATION PLUS 64
INQUIRE PREDEFINED POLYMARKER REPRESENTATION PLUS 65
INQUIRE PREDEFINED REFLECTANCE REPRESENTATION 68
INQUIRE PREDEFINED TEXT REPRESENTATION PLUS 65
INQUIRE REFLECTANCE FACILITIES 68
INQUIRE REFLECTANCE REPRESENTATION 58
INQUIRE RENDERING COLOUR MODEL FACILITIES 63
INQUIRE TEXT REPRESENTATION PLUS 56
INQUIRE TRIMMING CURVE FACILITIES 70
INQUIRE WORKSTATION STATE TABLE LENGTHS PLUS 75
NON-UNIFORM B-SPLINE CURVE 3 31
NON-UNIFORM B-SPLINE CURVE 3 WITH COLOUR 31
NON-UNIFORM B-SPLINE SURFACE 3 31
NON-UNIFORM B-SPLINE SURFACE 3 WITH DATA 32
PACK COLOUR SPLINE CURVE 111
PACK COLOUR SPLINE SURFACE 114
PACK DATA SPLINE SURFACE 116
PACK TRIMMING CURVE 112
POLYLINE SET 3 WITH COLOUR 20
QUADRILATERAL MESH 3 WITH DATA 29
QUADRILATERAL MESH WITH DATA 30
SET BACK DATA MAPPING INDEX 33
SET BACK DATA MAPPING METHOD 40
SET BACK INTERIOR COLOUR 40
SET BACK INTERIOR INDEX 33
SET BACK INTERIOR SHADING METHOD 40
SET BACK INTERIOR STYLE 39
SET BACK INTERIOR STYLE INDEX 39
SET BACK REFLECTANCE INDEX 33
SET BACK REFLECTANCE MODEL 40
SET BACK REFLECTANCE PROPERTIES 40
SET COLOUR MAPPING INDEX 45
SET COLOUR MAPPING REPRESENTATION 53
SET CURVE APPROXIMATION CRITERIA 41
SET DATA MAPPING INDEX 33
SET DATA MAPPING METHOD 35
SET DATA MAPPING REPRESENTATION 49
SET DEPTH CUE INDEX 45
SET DEPTH CUE REPRESENTATION 52
SET EDGE COLOUR 41
SET EDGE REPRESENTATION PLUS 48
SET FACET CULLING MODE 34
SET FACET DISTINGUISHING MODE 34
SET INDIVIDUAL ASF 46
SET INTERIOR COLOUR 35
SET INTERIOR REPRESENTATION PLUS 48
SET INTERIOR SHADING METHOD 35
SET LIGHT SOURCE REPRESENTATION 50
SET LIGHT SOURCE STATE 41
SET OF FILL AREA SET 3 WITH DATA 23
SET OF FILL AREA SET WITH DATA 24
SET PARAMETRIC SURFACE CHARACTERISTICS 44
SET PARAMETRIC SURFACE INDEX 33

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SET PARAMETRIC SURFACE REPRESENTATION 49
SET PATTERN REPRESENTATION PLUS 50
SET POLYLINE COLOUR 34
SET POLYLINE REPRESENTATION PLUS 47
SET POLYLINE SHADING METHOD 34
SET POLYMARKER COLOUR 34
SET POLYMARKER REPRESENTATION PLUS 47
SET REFLECTANCE INDEX 33
SET REFLECTANCE MODEL 39
SET REFLECTANCE PROPERTIES 38
SET REFLECTANCE REPRESENTATION 49
SET RENDERING COLOUR MODEL 45
SET SURFACE APPROXIMATION CRITERIA 43
SET TEXT COLOUR 34
SET TEXT REPRESENTATION PLUS 48
TRIANGLE SET 3 WITH DATA 25
TRIANGLE SET WITH DATA 26
TRIANGLE STRIP 3 WITH DATA 27
TRIANGLE STRIP WITH DATA 28
UNPACK COLOUR SPLINE CURVE 111
UNPACK COLOUR SPLINE SURFACE 115
UNPACK DATA SPLINE SURFACE 117
UNPACK TRIMMING CURVE 113

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B.2 List of functions ordered alphabetically by bound name

PBSC3 . . . 31
PBSC3C . . . 31
PBSS3 . . . 31
PBSS3D . . . 32
PCA3P . . . 22
PELS . . . 110
PFAS3D . . . 21
PFASD . . . 22
PPCSC . . . 111
PPCSS . . . 114
PPDSS . . . 116
PPLS3C . . . 20
PPTC . . . 112
PQBSSF . . . 70
PQCECO . . . 80
PQCETS . . . 77
PQCMF . . . 73
PQCMMF . . . 74
PQCMR . . . 62
PQCMS . . . 61
PQCVF . . . 69
PQDCF . . . 72
PQDCMF . . . 63
PQDCR . . . 61
PQDCWP . . . 63
PQDMF . . . 67
PQDMR . . . 57
PQECMI . . . 62
PQECO . . . 79
PQEDCI . . . 60
PQEDMI . . . 57
PQEDP . . . 57
PQELSI . . . 60
PQEPSI . . . 58
PQERFI . . . 58
PQETS . . . 78
PQGDP . . . 76
PQGDP3 . . . 75
PQIFP . . . 66
PQIP . . . 56
PQLSF . . . 72
PQLSR . . . 60
PQM3D . . . 29
PQMD . . . 30
PQPAP . . . 59
PQPCMR . . . 75
PQPDCR . . . 73
PQPDMR . . . 68
PQPEDP . . . 67
PQPIP . . . 66

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PQPLFP 64
PQPLP 55
PQPLSR 72
PQPMP 55
PQPPAP 71
PQPPLP 64
PQPPMP 65
PQPPSR 71
PQPRFR 68
PQPSF 69
PQPSR 59
PQPTXP 65
PQRCMF 63
PQRFF 68
PQRFR 58
PQTCF 70
PQTXP 56
PQWSLP 75
PSBDMI 33
PSBDMM 40
PSBIC 40
PSBII 33
PSBIS 39
PSBISI 39
PSBISM 40
PSBRFI 33
PSBRFM 40
PSBRFP 40
PSCAC 41
PSCMI 45
PSCMR 53
PSDCI 45
PSDCR 52
PSDMI 33
PSDMM 35
PSDMR 49
PSEDC 41
PSEDP 48
PSFAS3 23
PSFASD 24
PSFCM 34
PSFDM 34
PSIASF 46
PSIC 35
PSIP 48
PSISM 35
PSLSR 50
PSLSS 41
PSPAP 50
PSPLC 34
PSPLP 47
PSPLSM 34
PSPMC 34
PSPMP 47

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PSPSC 44
PSPSI 33
PSPSR 49
PSRCM 45
PSRFI 33
PSRFM 39
PSRFP 38
PSRFR 49
PSSAC 43
PSTXC 34
PSTXRP 48
PTS3D 25
PTSD 26
PTST3D 27
PTSTD 28
PUCSC 111
PUCSS 115
PUDSS 117
PUTC 113

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Add the following new annex

Annex C

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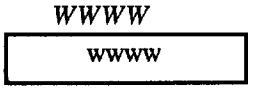
Memory Management

C.1 Introduction

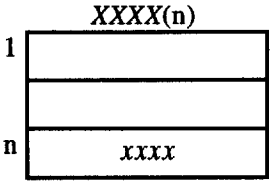
Many of the primitive functions in ISO/IEC 9592-4 use complicated data types for which the binding in FORTRAN could be accomplished in many ways. The FORTRAN data types used to bind the PHIGS data types are defined in Clause 5. This Annex uses diagrams to define how the more complex PHIGS data types are realized in FORTRAN.

C.2 Notations and Conventions

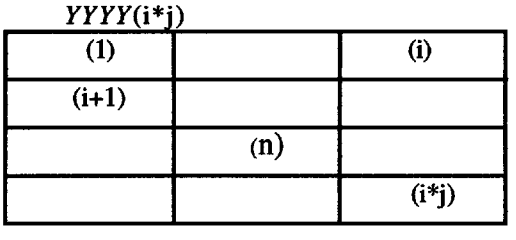
For the subsequent diagrams, the following notations hold:



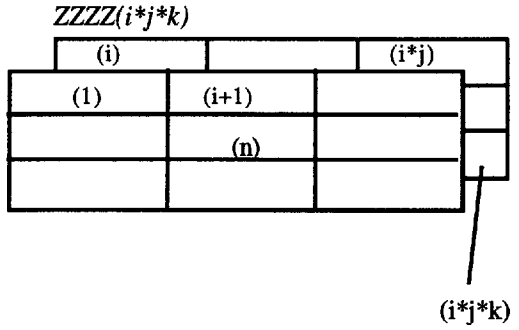
WWWW is a simple variable.
wwww is the value in *WWWW*,



XXXX is an array which has n elements.
xxxx is the value of the nth element in *XXXX*



*YYYY*is a single dimension array which has i*j elements.
(n) means the position of nth element. The 1st element is placed in the upper left box in this array. The next element is placed in the next right box, and so on. Then, the last element is placed in lower right box.



ZZZZ is a single dimension array which has i*j*k elements.
(n) means the position of nth element.
The 1st element is placed upper left and front box in this array.
The next element is placed in the next behind box, and so on.
Then, the last elemet is placed in lower right and back box.

Throughout this annex, the expression array(0) is defined to have the value 0.

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C.3 Polyline set with colour(*PPLS3C*)

The *PPLS3C* function binds the following data type.

a.) L(L(P3{,COLRV})) (a list of lists of points with optional colour values) to input parameters *NPL, IXA, PXA, PYA, PZA, VFLAG, VCOLI, NCC, VCOLR.*

The vertex points are found in input parameters *PXA, PYA, PZA*. The points are organized into lists for each polyline through the use of list end indices found in input parameter *IXA*; the number of polylines(number of lists) is found in input parameter *NPL*.

The presence of the optional vertex colour value is indicated by *VFLAG*. If the colour type is indirect, then the vertex values are found in input parameter *VCOLI*. For other colour types, the vertex values are found in input parameter *VCOLR*, and the number of colour components in a single colour value is specified in input parameter *NCC*.

Figure C.1 illustrates the binding of data type **L(L(P3{,COLRV}))** for *PPLS3C*.

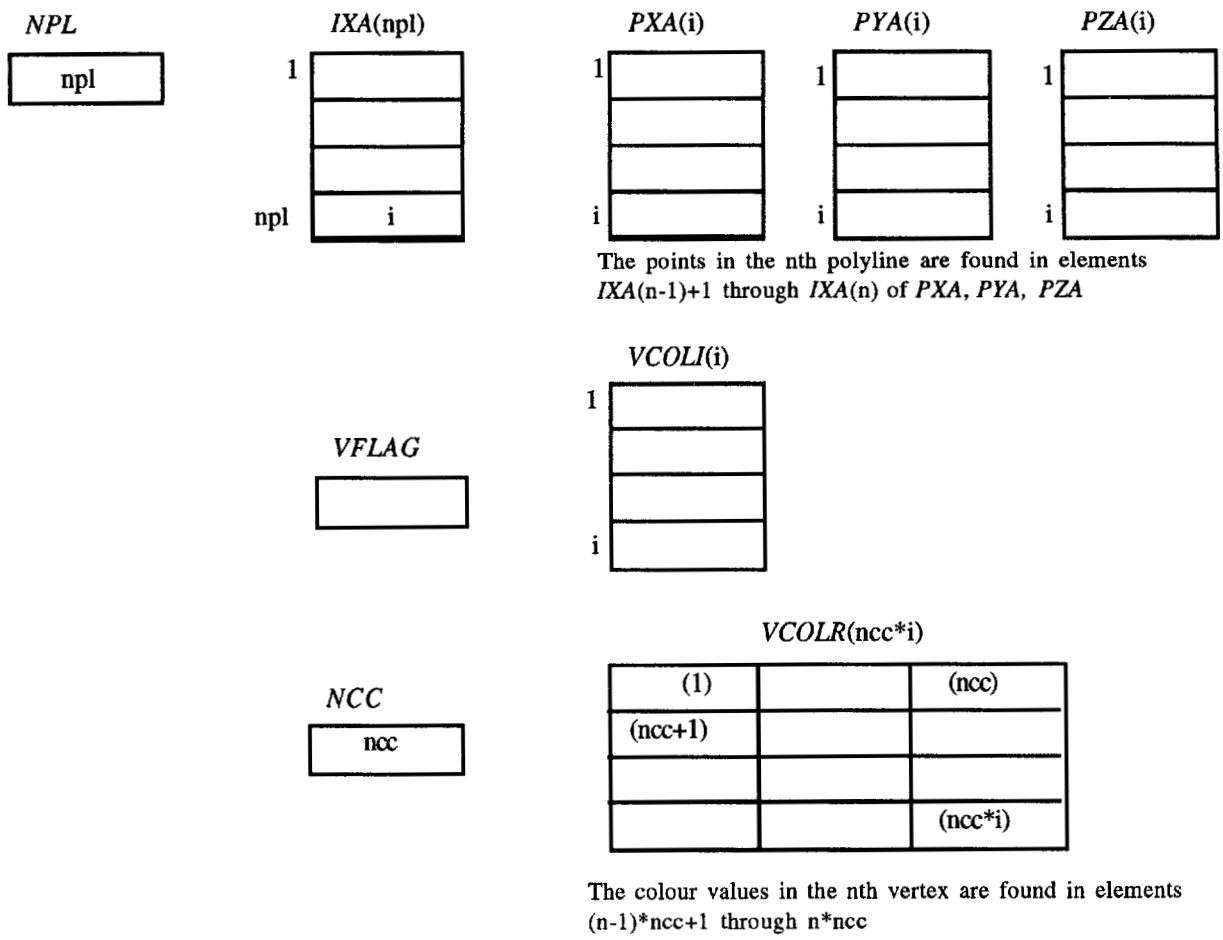

Figure C.1 -The Binding of the data types for PPLS3C

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C.4 Fill Area set(3) with data (PFAS3D / PFASD)

The PFAS3D(PFASD) functions bind the following 3 data types.

a.) {COLRV}{,NORM}{,L(R)}
to input parameters *FFLAG, FCOLI, NCC, FCOLR, FNXA, FNYA, FNZA, FDLEN, FDATA.*

The presence of facet colour, facet normal, and facet application specific data is indicated by input parameter *FFLAG.*

<facet colour>
If the colour type is indirect, then the facet colour is found in input parameter *FCOLI.* For other colour types, the facet colour value is found in input parameter *FCOLR,* and number of colour components in a single colour value is found in input parameter *NCC.*
<facet normal>
The facet normal is found in input parameters *FNXA, FNYA, FNZA.*
<facet application specific data>
The facet application specific data is found in input parameter *FDATA.* The number of application specific data values for the facet is specified in input parameter *FDLEN.*

b.) L(L(E)) (list of edge flags list)
to input parameters *EFLAG, NPL, IXA, EDATA.*

The presence of edge data is indicated by input parameter *EFLAG.* The edge flags are found in input parameter *EDATA.*

c.) L(L(P3{,COLRV}{,NORM}{,L(R)})) (list of lists of vertex data list)
to input parameters *NPL, IXA, PXA, PYA, (PZA), VFLAG, VCOLI, NCC, VCOLR, VNXA, VNYA, VNZA, VDLEN, VDATA.*

The vertex points are found in input parameters *PXA, PYA, (PZA).* The points are organized into lists through list end indices found in input parameter *IXA*; the number of lists is found in input parameter *NPL.*
The presence of the optional vertex colours, vertex normals, vertex application specific data is indicated by input parameter *VFLAG.*
<vertex colour>
If the colour type is indirect, then vertex colours are found in input parameter *VCOLI.* For other colour types, the vertex colour values are found in input parameter *VCOLR,* and the number of colour components in a single colour value is specified in input parameter *NCC.*
<vertex normal>
Vertex normals are found in input parameters *VNXA, VNYA, VNZA.*
<vertex application specific data>
Vertex application specific data are found in input parameter *VDATA,* and the number of data values for each vertex is specified in input parameter *VDLEN.*
Figure C.2 illustrates the binding of these data types for PFAS3D/ PFASD.

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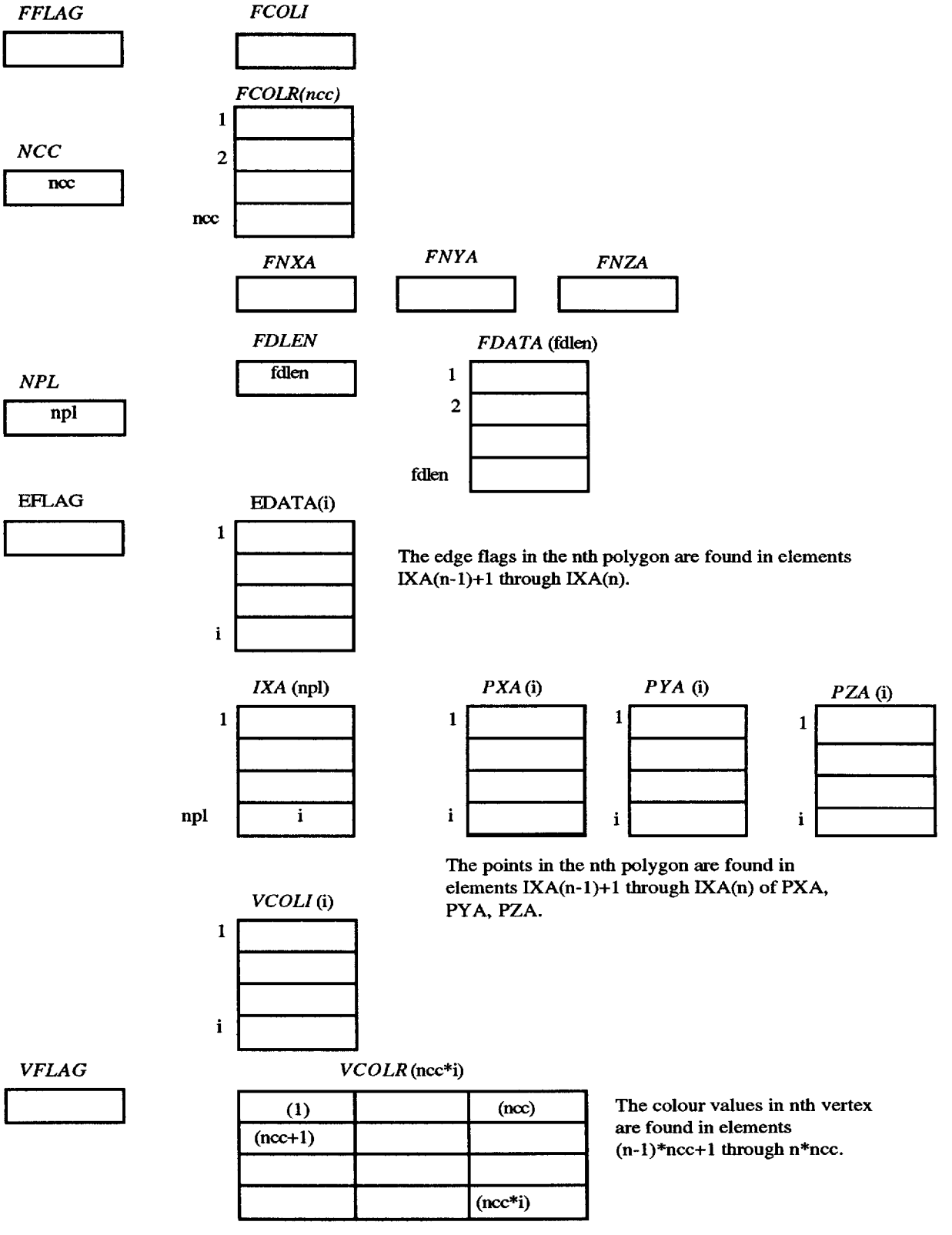

Figure C.2 -The binding data types for PFAS3D (PFASD)

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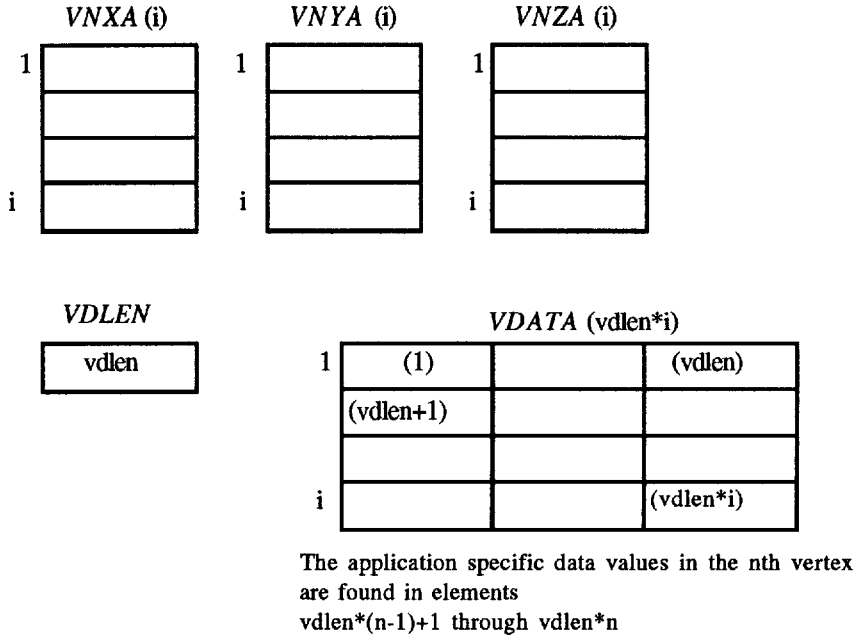

Figure C.2 -The binding data types for PFAS3D(PFASD) (concluded)

C.5 Set of Fill Area Sets (3) with data (PSFAS3 / PSFASD)

The PSFAS3(PSFASD) functions bind the following 4 data types.

a.) L({COLRV}{,NORM}{,L(R)}) (list of facet data)
to input parameters *FFLAG, NFS, FCOLI, NCC, FCOLR, FNXA, FNYA, FNZA, FDLEN, FDATA.*

Number of fill area sets(facets) is specified in input parameter *NFS.*The presence of facet colours, facet normals, and facet application specific data is indicated by input parameter *FFLAG.*

<facet colour>

If the colour type is indirect, then the facet colours are found in input parameter *FCOLI.* For other colour types, the facet colour values are found in input parameter *FCOLR,* and the number of colour components in a single colour value is found in input parameter *NCC.*

<facet normal>

The facet normals are found in input parameters *FNXA, FNYA, FNZA.*

<facet application specific data>

The facet application specific data are found in input parameter *FDATA.* The number of application specific data values for a facet is specified in input parameter *FDLEN.*

b.) L(L(L(E))) (list of list of edge flags list)
to input parameters *EFLAG, NF, NFS, IXA, EDATA.*

The presence of edge data is indicated by input parameter *EFLAG.* The edge flags are found in input parameter *EDATA,* and the number of edge data in a polygon is equal to the number of vertices of each polygon.

c.) L(P3{,COLRV}{,NORM}{,L(R)}) (list of vertex data list)
to input parameters *NP, PXA, PYA,(PZA), VFLAG, VCOLI, NCC, VCOLR, VNXA, VNYA, VNZA, VDLEN, VDATA.*

The vertex points are found in input parameters *PXA, PYA, (PZA).*

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The presence of the optional vertex colours, vertex normals, vertex application specific data is indicated by input parameter *VFLAG*.

<vertex colour>

If the colour type is indirect, then vertex colours are found in input parameter *VCOLI*. For other colour types, the vertex colour values are found in input parameter *VCOLR*, and the number of colour components in a single colour value is specified in input parameter *NCC*.

<vertex normal>

Vertex normals are found in input parameters *VNXA, VNYA, VNZA*.

<vertex application specific data>

Vertex application specific data are found in input parameter *VDATA*, and the number of data values for each vertex is specified in input parameter *VDLEN*.

d.) L(L(L(I))) (list of lists of vertex indices lists)
to input parameters *NFS, NF, IXA, VIND*

The vertex index lists which define each polygon are specified sequentially in input parameter VIND. The end index in VIND of each list(each fill area) is found in input parameter IXA. The polygons are organized into lists(fill area sets) through end indices into IXA which are specified in input parameter NF. NFS specifies the number of fill area sets; NF(NFS) contains the number of polygons.

Figure C.3 illustrates the binding of these data types for PSFAS3/ PSFASD.

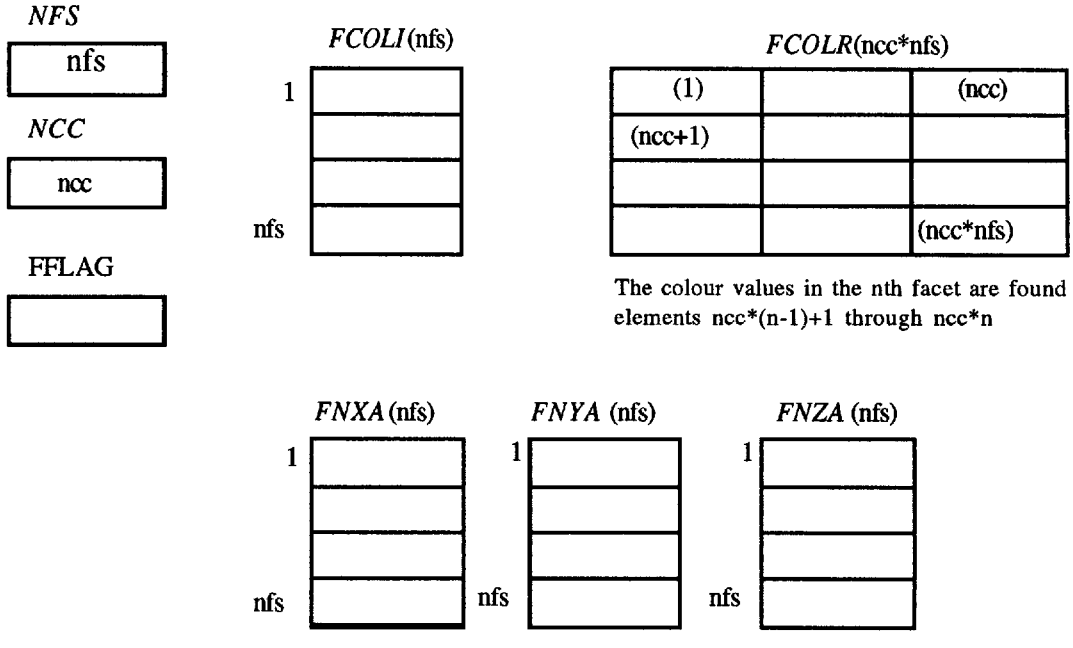

Figure C.3 - The binding data types for PSFAS3 / PSFASD

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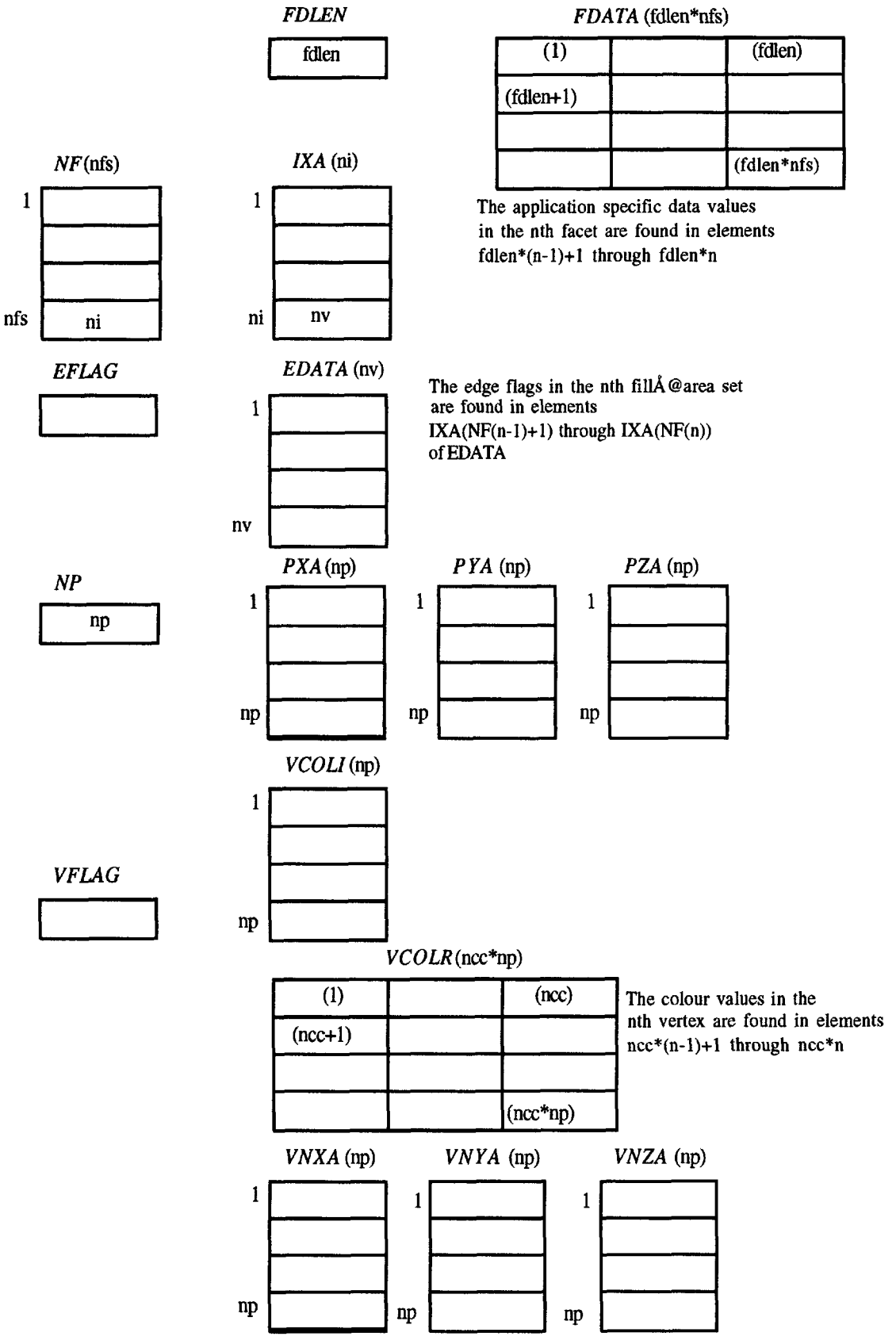

Figure C.3 - The binding data types for PSFAS3 / PSFASD (continued)

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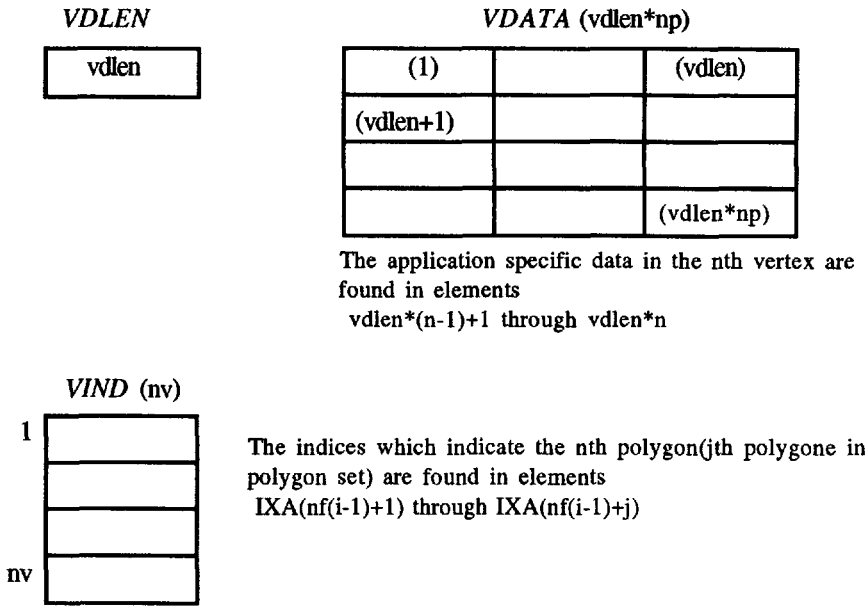

Figure C.3 - The binding data types for PSFAS3 / PSFASD (concluded)

C.6 CELL ARRAY 3 PLUS & SET PATTERN REPRESENTATION PLUS

The PCA3P function binds the following data type.

a.) A(COLRV)

to input parameters *DIMX, DIMY, NCC, COLIA, COLRA.*

<cell array colour>

If the colour type is indirect, then cell array colours are found in input parameter *COLIA*. For other colour types, the cell array colour values are found in input parameter *COLRA*, and the number of colour components in a single colour value is specified in input parameter *NCC*.

Figure C.4 illustrates the binding of this data type for PCA3P/PSPAP.

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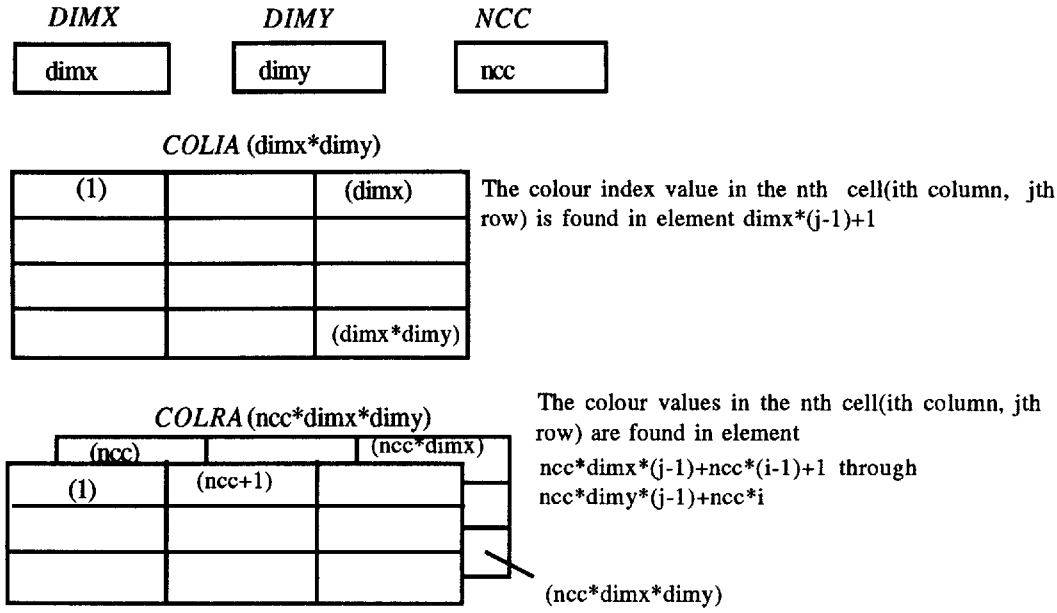

Figure C.4 - The binding data type for PCA3P

C.7 TRIANGLE SET 3 WITH DATA / TRIANGLE SET WITH DATA

The PTS3D(PTSD) functions bind the following 4 data types.

a.) L({COLRV}{,NORM}{,L(R)}) (list of facet data)
to input parameters *FFLAG, NTRI, FCOLI, NCC, FCOLR, FNXA, FNYA, FNZA, FDLEN, FDATA.*

Number of triangles(facets) is specified in input parameter *NTRI.*The presence of facet colours, facet normals, and facet application specific data is indicated by input parameter *FFLAG.*

<facet colour>

If the colour type is indirect, then the facet colours are found in input parameter *FCOLI.* For other colour types, the facet colour values are found in input parameter *FCOLR,* and the number of colour components in a single colour value is found in input parameter *NCC.*

<facet normal>

The facet normals are found in input parameters *FNXA, FNYA, FNZA.*

<facet application specific data>

The facet application specific data are found in input parameter *FDATA.* The number of application specific data values for a facet is specified in input parameter *FDLEN.*

b.) L(3*E) (edge flags list)
to input parameters *EFLAG,NTRI, EDATA.*

The presence of edge data is indicated by input parameter *EFLAG.* The edge flags are found in input parameter *EDATA,* and the number of edge data in a triangle is 3.

c.) L(P3{,COLRV}{,NORM}{,L(R)}) (list of vertex data list)
to input parameters *NP, PXA, PYA,(PZA), VFLAG, VCOLI, NCC, VCOLR, VNXA, VNYA, VNZA, VDLEN, VDATA.*

The vertex points are found in input parameters *PXA, PYA, (PZA).*

The presence of the optional vertex colours, vertex normals, vertex application specific data is indicated by input parameter *VFLAG.*

<vertex colour>

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If the colour type is indirect, then vertex colours are found in input parameter *VCOLI*. For other colour types, the vertex colour values are found in input parameter *VCOLR*, and the number of colour components in a single colour value is specified in input parameter *NCC*.

<vertex normal>

Vertex normals are found in input parameters *VNXA, VNYA, VNZA*.

<vertex application specific data>

Vertex application specific data are found in input parameter *VDATA*, and the number of data values for each vertex is specified in input parameter *VDLEN*.

d.) L(3*I) (list of vertex indices lists)
to input parameters *NTRI, VIND*.

The index lists of vertices which define triangles are specified in input parameter *VIND*. The boundaries of each triangle is each 3 elements sequentially; indices for nth triangle are given in elements 3*(n-1)+1 through 3*n.

Figure C.5 illustrates the binding of these data types for PTS3D/ PTSD.

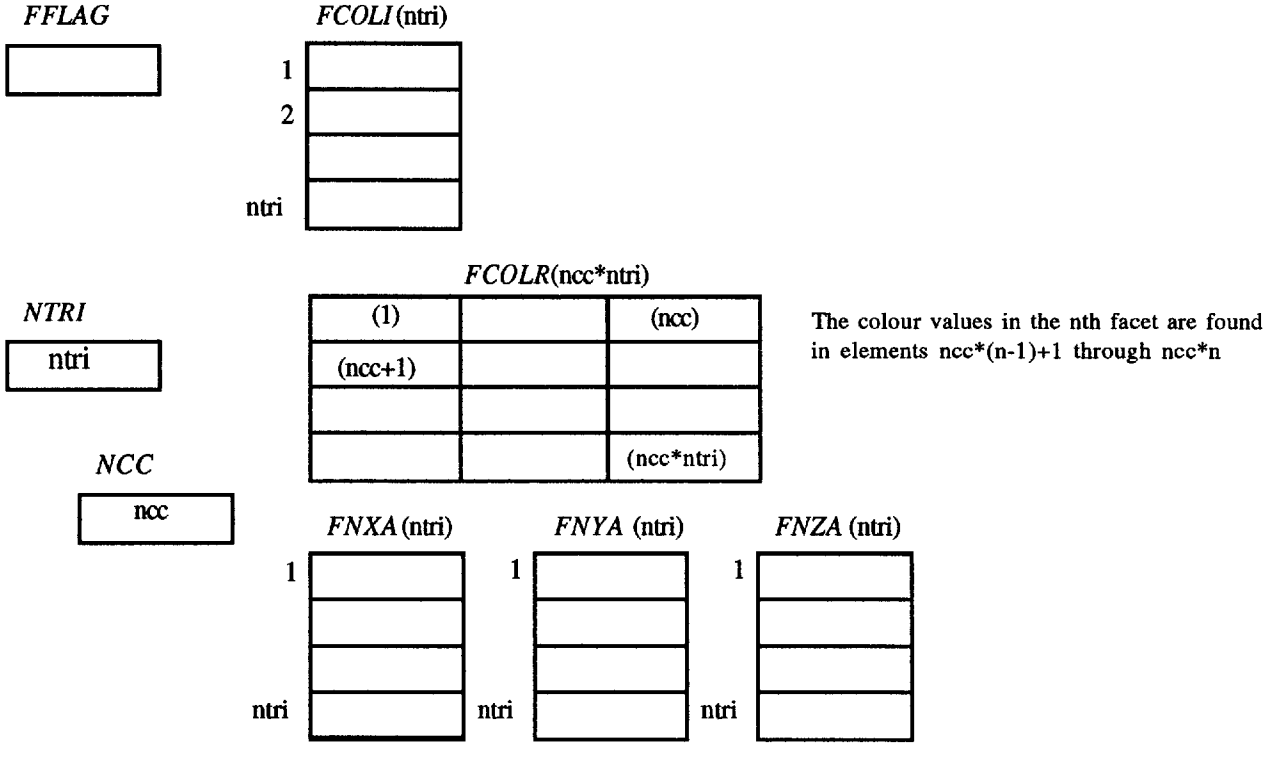

Figure C.5 - The binding data types for PTS3D / PTSD

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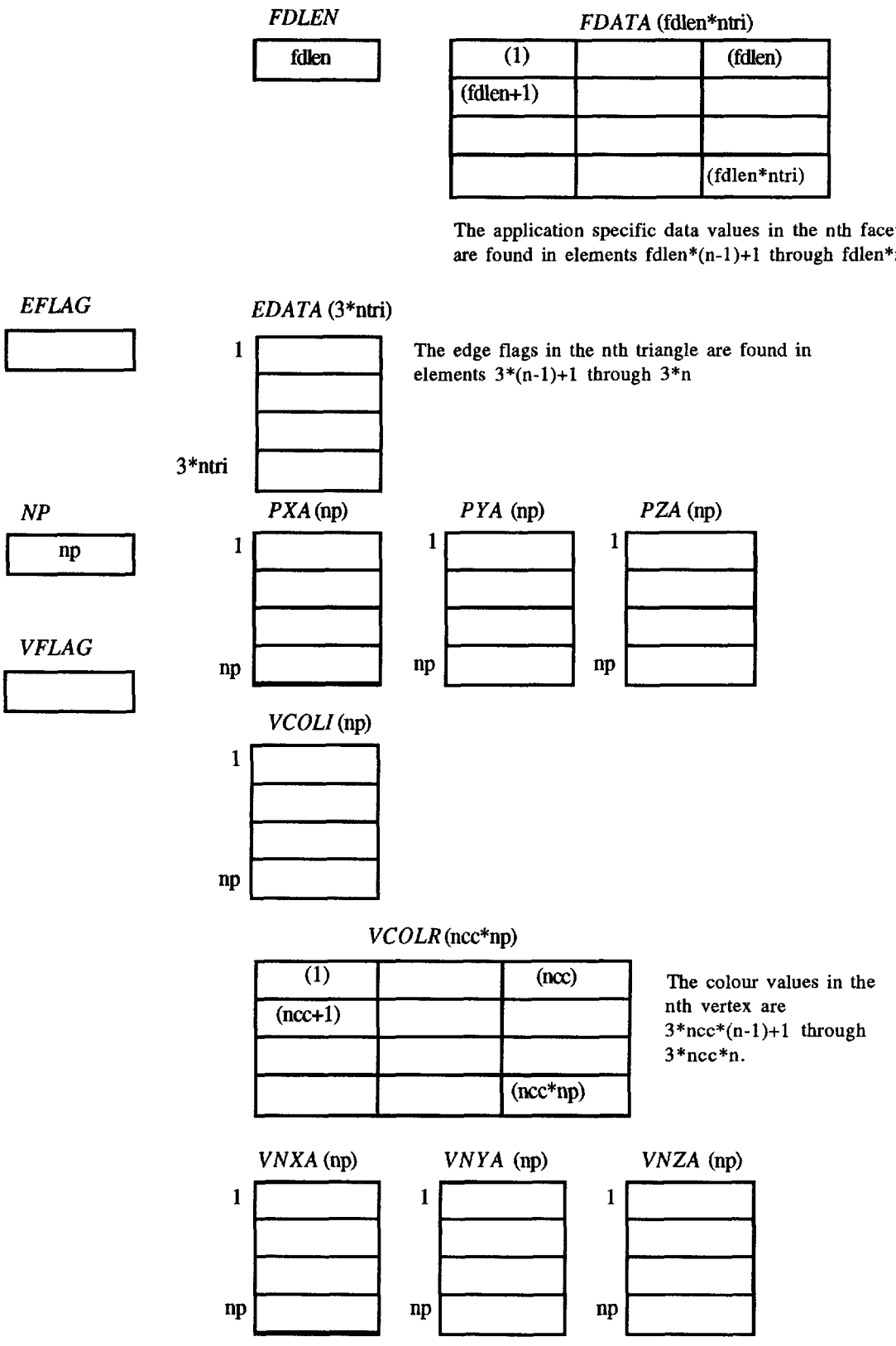

Figure C.5 - The binding data types for PTS3D / PTSD (continued)

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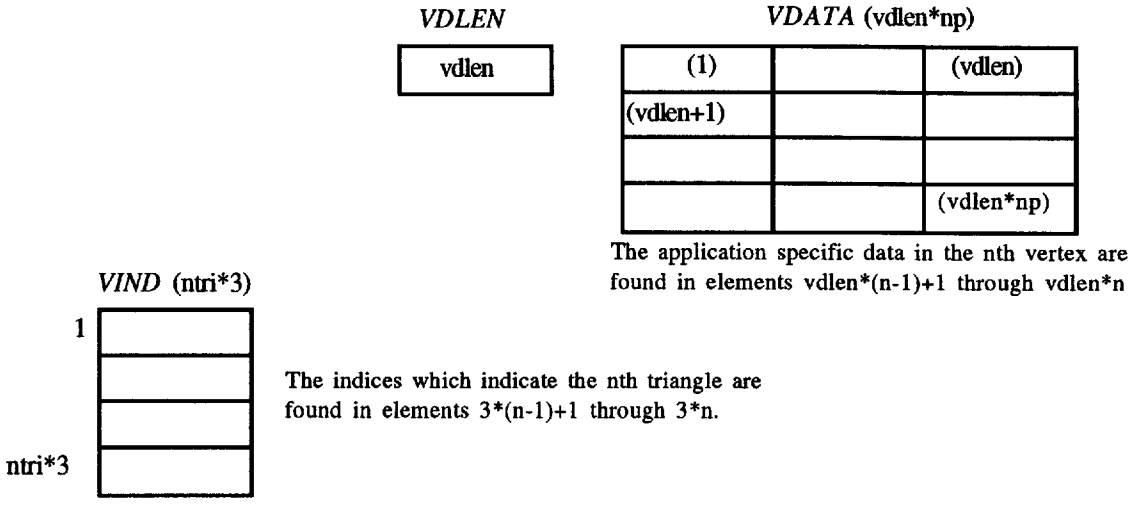

Figure C.5 - The binding data types for PTS3D / PTSD (concluded)

C.8 TRIANGLE STRIP 3 WITH DATA / TRIANGLE STRIP WITH DATA

The PTST3D(PTSTD) functions bind the following 3 data types.

a.) L({COLRV}{,NORM}{,L(R)}) (list of facet data)
to input parameters *FFLAG, NP, FCOLI, NCC, FCOLR, FNXA, FNYA, FNZA, FDLEN, FDATA.*

Number of Triangles strips(facets) is computed from input parameter *NP*;
Number of facets in the triangle (nf) =the value in *NP* -2.
The presence of facet colours, facet normals, and facet application specific data is indicated by input parameter *FFLAG.*
<facet colour>
If the colour type is indirect, then the facet colours are found in input parameter *FCOLI.* For other colour types, the facet colour values are found in input parameter *FCOLR,* and the number of colour components in a single colour value is found in input parameter *NCC.*
<facet normal>
The facet normals are found in input parameters *FNXA, FNYA, FNZA.*
<facet application specific data>
The facet application specific data are found in input parameter *FDATA.* The number of application specific data values for a facet is specified in input parameter *FDLEN.*

b.) L(E) (edge flags list)
to input parameters *EFLAG,NP, EDATA.*

The presence of edge data is indicated by input parameter *EFLAG.* The edge flags are found in input parameter *EDATA.* The number of edge data values are computed from input parameter *NP*; Number of edge data values(ne) = 2*value in *NP -3*

c.) L(P3{,COLRV}{,NORM}{,L(R)}) (list of vertex data list)
to input parameters *NP, PXA, PYA,(PZA), VFLAG, VCOLI, NCC, VCOLR, VNXA, VNYA, VNZA, VDLEN, VDATA.*
The vertex points are found in input parameters *PXA, PYA, (PZA).*
The presence of the optional vertex colours, vertex normals, vertex application specific data is indicated by input parameter *VFLAG.*

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<u>≤vertex colour≥</u>

If the colour type is indirect, then vertex colours are found in input parameter *VCOLI*. For other colour types, the vertex colour values are found in input parameter *VCOLR*, and the number of colour components in a single colour value is specified in input parameter *NCC*.

<u>≤vertex normal≥</u>

Vertex normals are found in input parameters *VNXA, VNYA, VNZA*.

<u>≤vertex application specific data≥</u>

Vertex application specific data are found in input parameter *VDATA*, and the number of data values for each vertex is specified in input parameter *VDLEN*.

Figure C.6 illustrates the binding of these data types for PTST3D/ PTSTD.

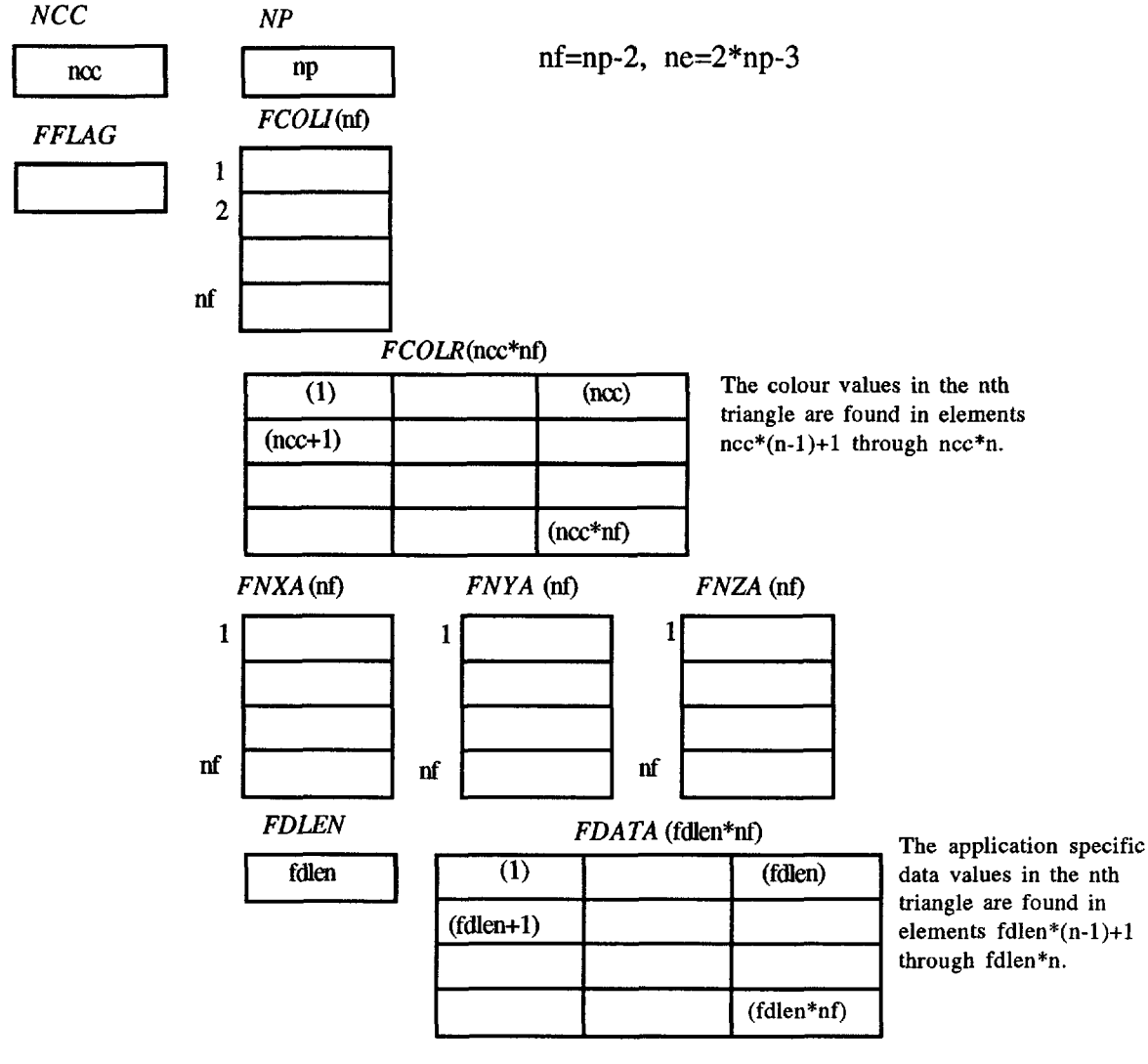

Figure C.6 - The binding data types for PTST3D / PTSTD

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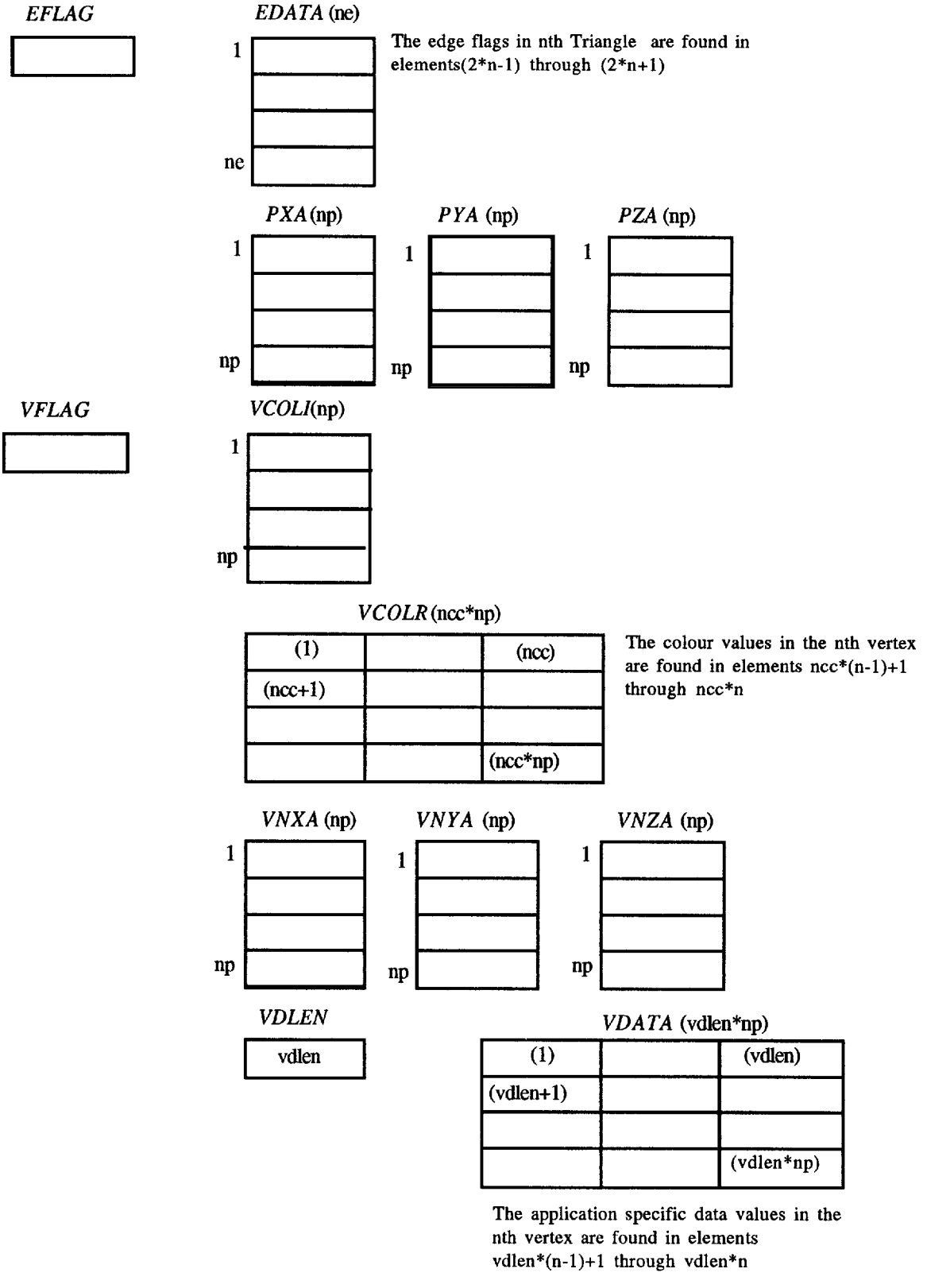

Figure C.6 - The binding data types for PTST3D / PTSTD (concluded)

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C.9 QUADRILATERAL MESH 3 WITH DATA/ QUADRILATERAL MESH WITH DATA

The PQM3D(PQMD) functions bind the following 3 data types.

a.) A({COLRV}{,NORM}{,L(R)}) (array of facet data)
to input parameters *FFLAG, NC, NR, FCOLI, NCC, FCOLR, FNXA, FNYA, FNZA, FDLEN, FDATA.*

Number of facets is computed from input parameter *NC, NR*;
Number of facets (nf) =(value in *NC* - 1) * (value in *NR* - 1).
The presence of facet colours, facet normals, and facet application specific data is indicated by input parameter *FFLAG.*

<facet colour>
If the colour type is indirect, then the facet colours are found in input parameter *FCOLI.* For other colour types, the facet colour values are found in input parameter *FCOLR,* and the number of colour components in a single colour value is found in input parameter *NCC.*

<facet normal>
The facet normals are found in input parameters *FNXA, FNYA, FNZA.*

<facet application specific data>
The facet application specific data are found in input parameter *FDATA.* The number of application specific data values for a facet is specified in input parameter *FDLEN.*

b.) A(2*E) (array of edge flags)
to input parameters *EFLAG,NC, NR, EDATA.*

The presence of edge data is indicated by input parameter *EFLAG.* The edge flags are found in input parameter *EDATA.* The number of edge data values is computed from input parameter *NC, NR*; Number of edge data values (ne) = 2*value in *NC * value in NR*

c.) A(P3{,COLRV}{,NORM}{,L(R)}) (array of vertex data list)
to input parameters *NC, NR, PXA, PYA,(PZA), VFLAG, VCOLI, NCC, VCOLR, VNXA, VNYA, VNZA, VDLEN, VDATA.*

The vertex points are found in input parameters *PXA, PYA, (PZA).*
The presence of the optional vertex colours, vertex normals, vertex application specific data is indicated by input parameter *VFLAG.*

<vertex colour>
If the colour type is indirect, then vertex colours are found in input parameter *VCOLI.* For other colour types, the vertex colour values are found in input parameter *VCOLR,* and the number of colour components in a single colour value is specified in input parameter *NCC.*

<vertex normal>
Vertex normals are found in input parameters *VNXA, VNYA, VNZA.*

<vertex application specific data>
Vertex application specific data are found in input parameter *VDATA,* and the number of data values for each vertex is specified in input parameter *VDLEN.*

Figure C.7 illustrates the binding of these data types for PQM3D/ PQMD.

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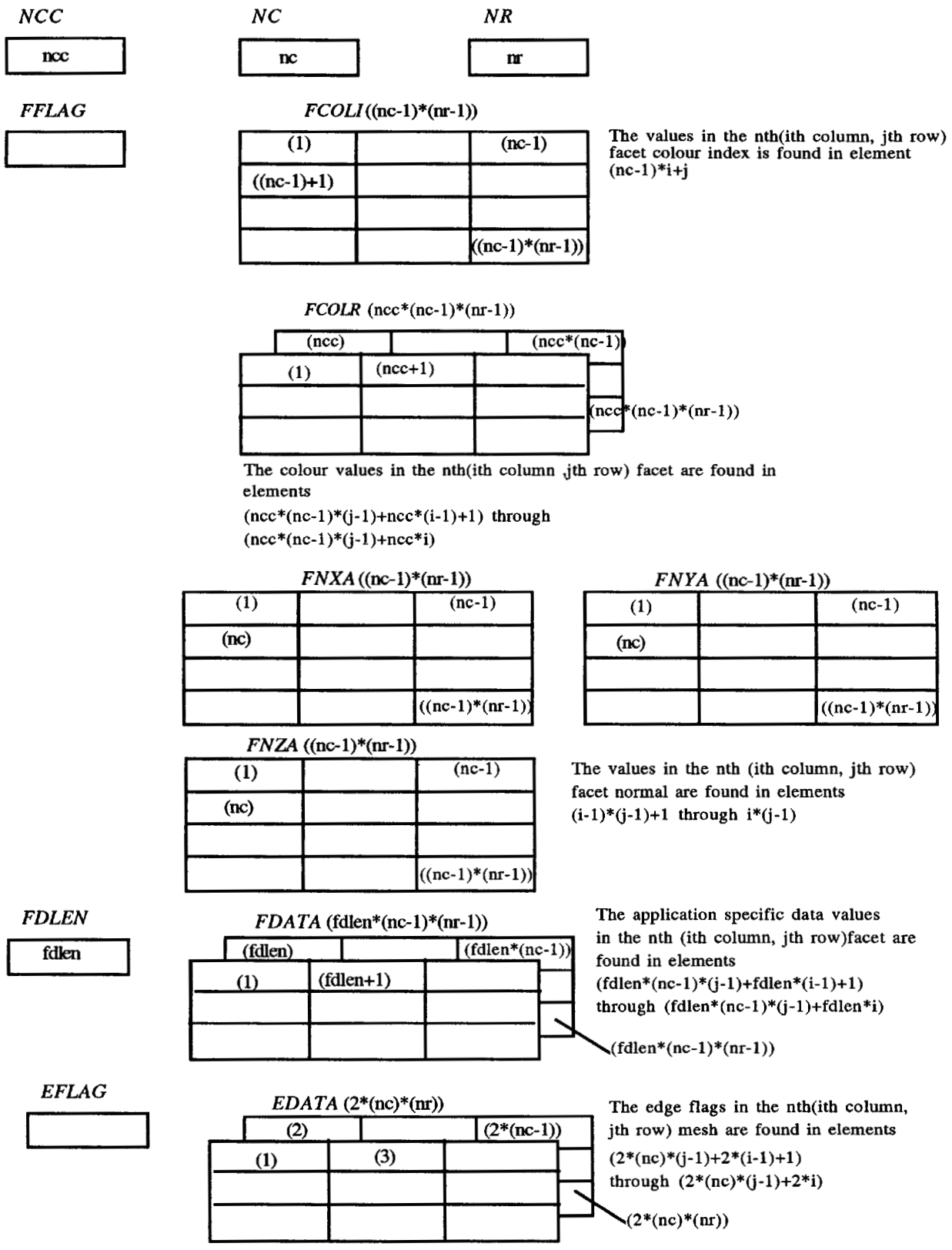

Figure C.7 - The binding data types for PQM3D/ PDQMD

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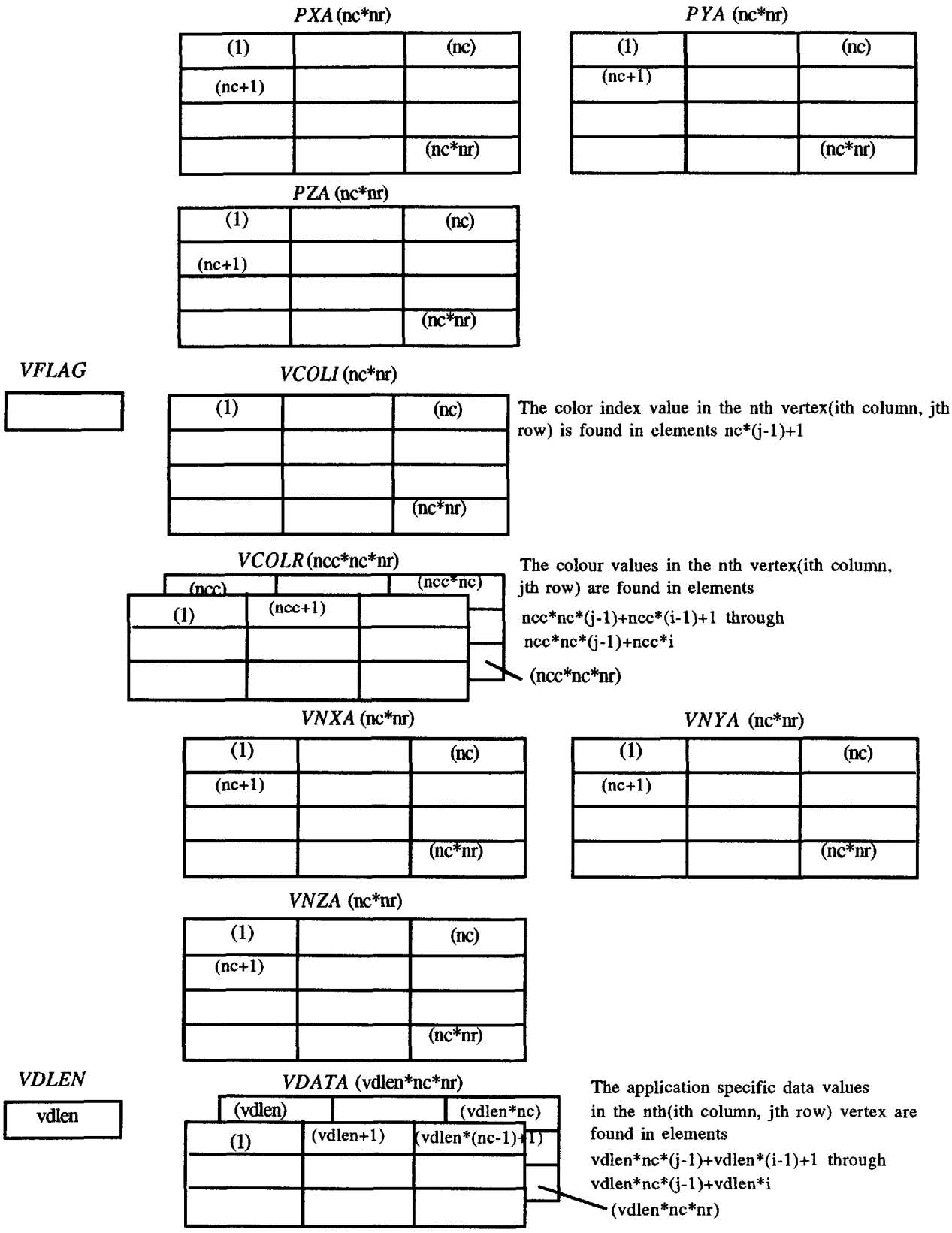

Figure C.7 - The binding data types for PQM3D / PQMD (concluded)

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C.10 NON-UNIFORM B-SPLINE CURVE 3 / NON-UNIFORM B-SPLINE CURVE 3 WITH COLOUR

The PBSC3 / PBSC3C functions bind the following 2 data types.

a.) L(R) (list of knots)
to input parameters *NKA, KNOTS.*

The knots are found in input parameter *KNOTS*, and the number of knots is specified in input parameter *NKA*.

b.) L(P3H)! L(P3) (list of control points)
to input parameters *RTYPE, NCP, PXA, PYA, PZA, PWA.*

The control points are specified in input parameter *PXA, PYA, PZA, PWA*, and the number of control points is specified in input parameter *NCP*.

The type of control points specified (rational or non rational) is indicated by input parameter *RTYPE*. If rational control points are indicated, then homogenerous modeling coordinates are specified in *PXA, PYA, PZA* and *PWA*. If non-rational control points are indicated, then modeling coordinates are specified in *PXA, PYA* and *PZA*.

Figure C.8 illustrates the binding of these data types for PBSC3 / PBSC3C

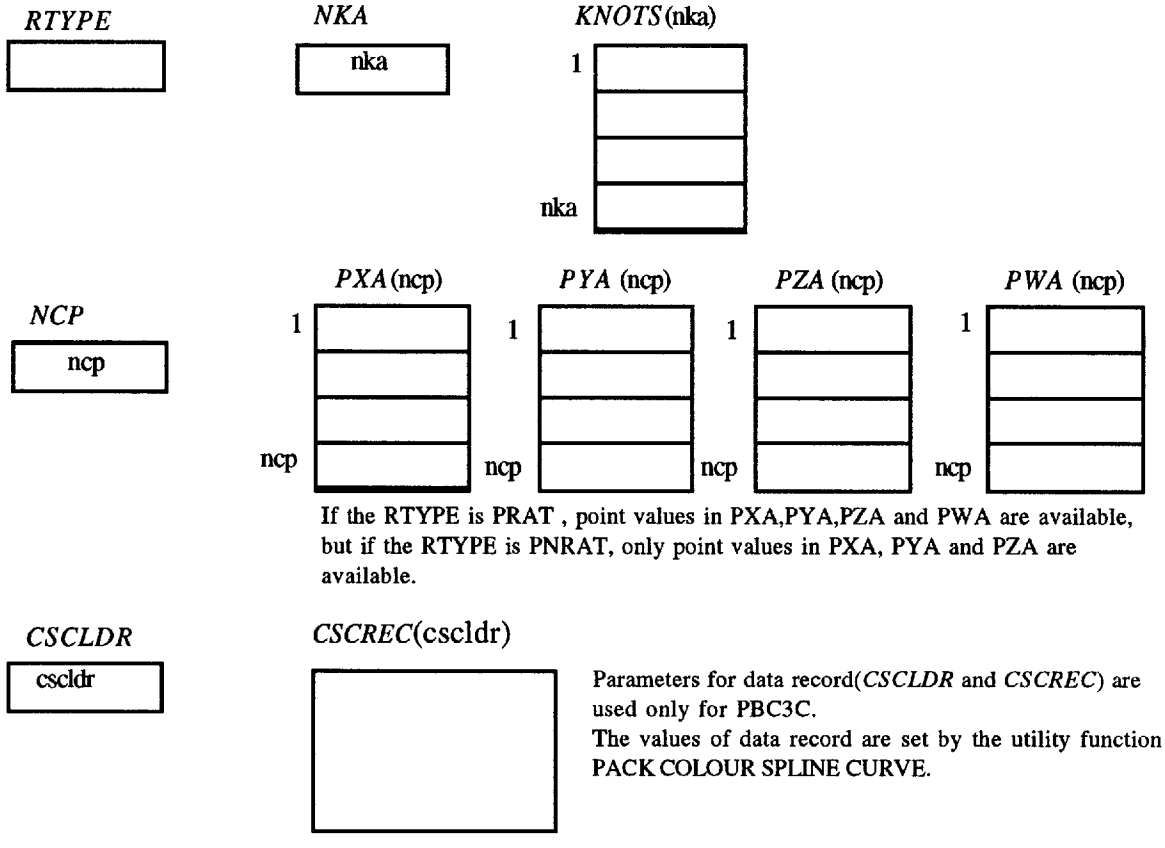

Figure C.8 - The binding data types for PBSC3 / PBSC3C

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C.11 NON-UNIFORM B-SPLINE SURFACE 3 / NON-UNIFORM B-SPLINE SURFACE 3 WITH DATA

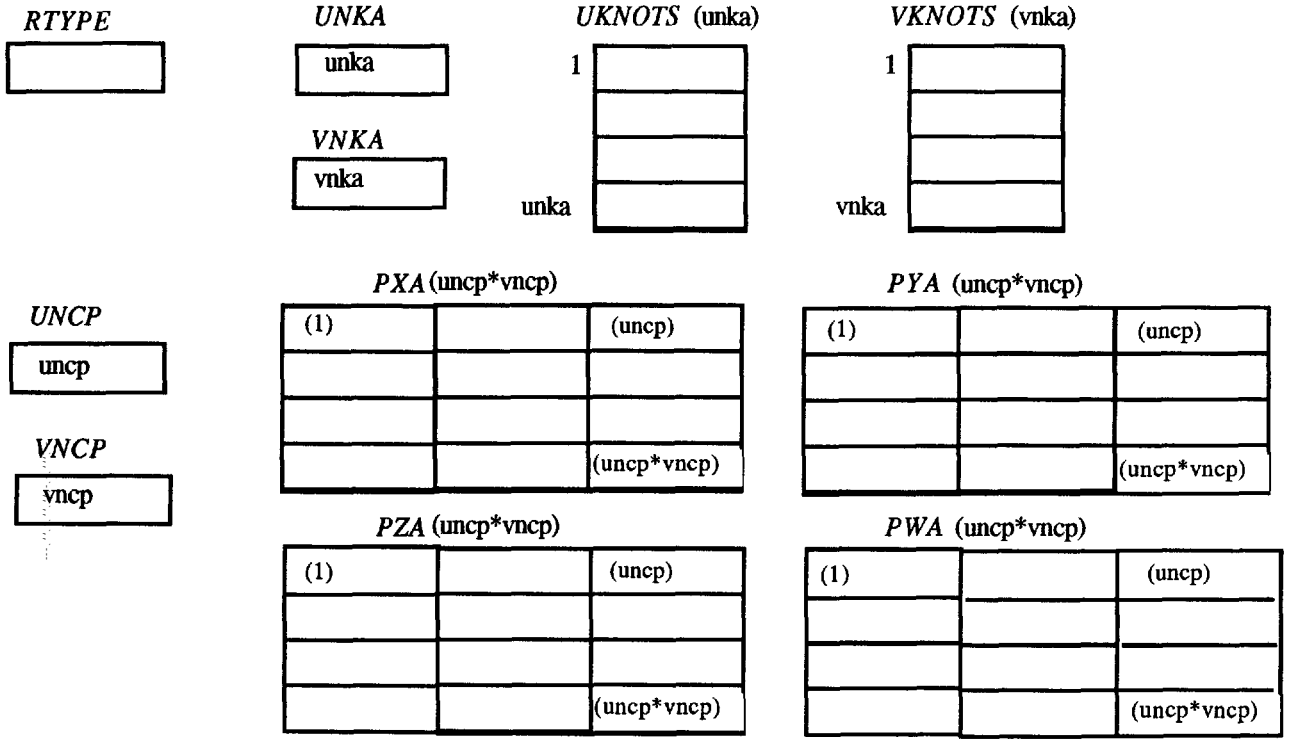
The PBSS3 (PBSS3D)functions bind the following 2 data types.

a.) L(R) (list of knots)
to input parameters *UNKA, VNKA, UKNOTS, VKNOTS.*

The Uknots and Vknots are found in input parameter *UKNOTS* and *VKNOTS* , *a*nd the number of each knots are specified in input parameter *UNKA and VNKA.*

b.) A(P3H) I A(P3) (array of control points)
to input parameters *RTYPE, UNCP, VNCP, PXA, PYA, PZA, PWA.*

The control points are specified in input parameter *PXA, PYA, PZA, PWA,* and the number of control points is specified in input parameter *UNCP* and *VNCP.*
The type of control points specified (rational or non-rational) is indicated by input parameter *RTYPE.* If rational control points are indicated, then homogenerous modeling coordinates are specified in *PXA, PYA, PZA* and *PWA.* If non-rational control points are indicated, then modeling coordinates are specified in *PXA, PYA* and *PZA.*
Figure C.9 illustrates the binding of these data types for PBSS3 / PBSS3D.



If the RTYPE is PRAT , point values in PXA, PYA, PZA and PWA are available, but if the RTYPE is PNRAT, only point values in PXA, PYA and PZA are available. The point values in the nth(ith u dimension, jth v dimension) control points are found in element (uncp*(j-1)+i) of PXA, PYA, PZA, PWA

Figure C.9 - The binding data types for PBSS3 / PBSS3D

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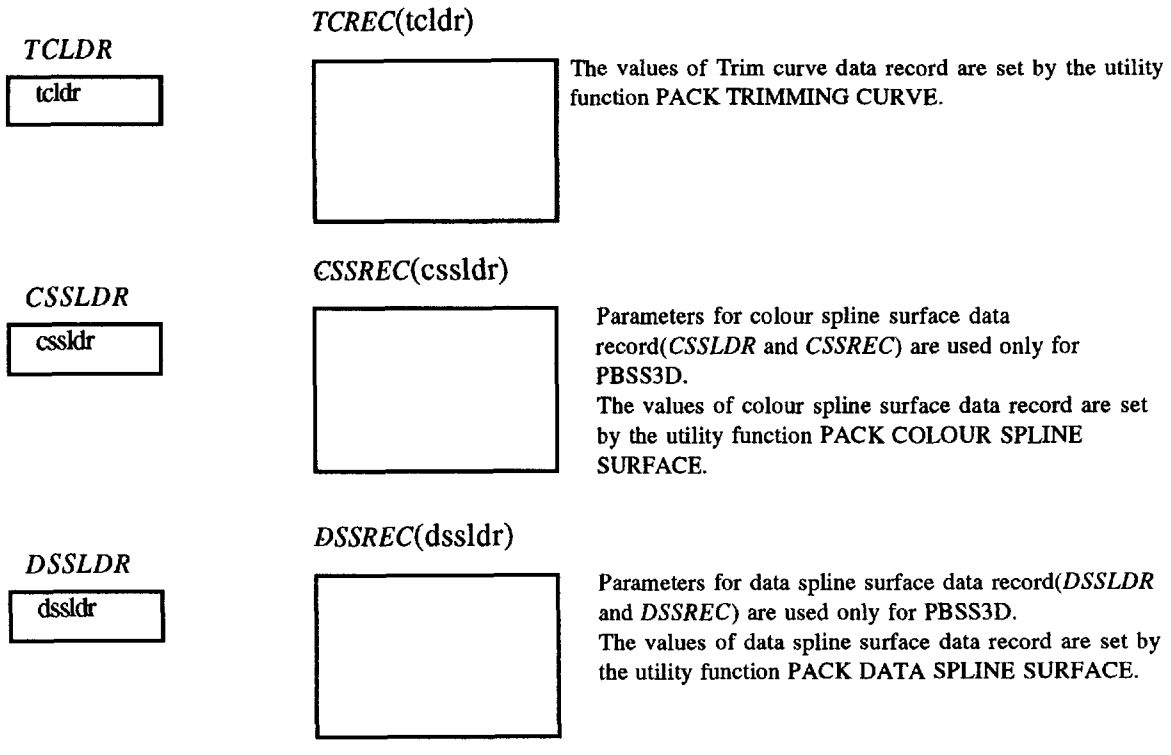

Figure C.9 - The binding data types for PBSS3 / PBSS3D (concluded)

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ICS 35.060.00; 35.140.00

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Price based on 149 pages

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INTERNATIONAL STANDARD ISO/IEC 9593-1:1990
TECHNICAL CORRIGENDUM 2

Published 1994-08-01

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Information processing systems — Computer graphics — Programmer's Hierarchical Interactive Graphics System (PHIGS) language bindings —

Part 1: FORTRAN

TECHNICAL CORRIGENDUM 2

Systèmes de traitement de l'information — Infographie — Interfaces langage entre un programme d'application et son support graphique —

Partie 1: FORTRAN

RECTIFICATIF TECHNIQUE 2

Technical corrigendum 2 to International Standard ISO/IEC 9593-1:1990 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 24, *Computer graphics and image processing.*

Page 8

Clause 5

Change the 4 × 4 × REAL matrix description to be:

$$x' = p[1,1]*x + p[1,2]*y + p[1,3]*z + p[1,4]$$

$$y' = p[2,1]*x + p[2,2]*y + p[2,3]*z + p[2,4]$$

$$z' = p[3,1]*x + p[3,2]*y + p[3,3]*z + p[3,4]$$

$$w' = p[4,1]*x + p[4,2]*y + p[4,3]*z + p[4,4]$$

UDC 681.3.01:681.3.04(084):800.92 **Ref. No. ISO/IEC 9593-1:1990/Cor.2:1994(E)**

Descriptors : data processing, information interchange, graphic data processing, programming (computers), programming languages, FORTRAN.

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Page 21

Clause 6

After the text precision entry, add the following text:

truncation method head (returns head portion of path)
tail (returns tail portion of path)

```
INTEGER          PHEAD       PTAIL
PARAMETER (      PHEAD=0,    PTAIL=1 )
```

Page 72

Subclause 9.9

RETRIEVE PATHS TO ANCESTORS, change the parameter name PTHORD to TRUNCM. Change the description line for PTHORD to

INTEGER TRUNCM truncation method (PHEAD, PTAIL)

RETRIEVE PATHS TO DESCENDANTS, change the parameter name PTHORD to TRUNCM. Change the description line for PTHORD to

INTEGER TRUNCM truncation method (PHEAD, PTAIL)

Page 166

Subclause 9.12.7

INQUIRE PATHS TO ANCESTORS, change the parameter name PTHORD to TRUNCM. Change the description line for PTHORD to

INTEGER TRUNCM truncation method (PHEAD, PTAIL)

INQUIRE PATHS TO DESCENDANTS, change the parameter name PTHORD to TRUNCM. Change the description line for PTHORD to

INTEGER TRUNCM truncation method (PHEAD, PTAIL)

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INTERNATIONAL STANDARD ISO/IEC 9593-1:1990
TECHNICAL CORRIGENDUM 1

Published 1993-07-15

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Information processing systems — Computer graphics — Programmer's Hierarchical Interactive Graphics System (PHIGS) language bindings —

Part 1: FORTRAN

TECHNICAL CORRIGENDUM 1

Systèmes de traitement de l'information — Infographie — Interfaces langage entre un programme d'application et son support graphique —

Partie 1: FORTRAN

RECTIFICATIF TECHNIQUE 1

Technical corrigendum 1 to International Standard ISO/IEC 9593-1:1990 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology.*

Page 9

At the top of the page at the end of the "string" discussion, add the following list item:

3) For output string arguments, the string assignment follows the rules defined by the Fortran language: when a shorter string (the return value) is assigned to a longer string (the actual parameter), the longer string is blank padded on the right. When the actual parameter is not large enough to contain the return value, error 2001 is issued.

Under "list of point lists", delete the paragraph starting "In the actual arguments..." through the end of item g).

Page 35

Delete all of the text for error 2005.

UDC 681.3.01:681.3.04(084):800.92 **Ref. No. ISO/IEC 9593-1:1990/Cor.1:1993(E)**

Descriptors : data processing, information interchange, graphic data processing, programming (computers), computer programs, programming languages, FORTRAN.

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Page 75

For control flag = PFILAS (final text on the page), change the value of IL from 16 to 17.

As part of IA, insert "edge index" before "edge flag".

Page 76

For control flag = PFILAS (final text on the page), change the value of IL from 16 to 17.

Page 77

For control flag = PFILAS (final text on the page), as part of IA, insert "edge index" before "edge flag".

Page 148

For element type PEFAS3, change (IA(IL)) to IA(IL) in 4 places.

Page 149

For element type PEFAS, change (IA(IL)) to IA(IL) in 3 places.

Page 166

Inquire structure status, change (PNOEXS, PEMPTY, PNOEMP) to (PSNOEX, PSEMPT, PSNEMP).

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INTERNATIONAL STANDARD

ISO/IEC 9593-1

First edition
1990-06-01

Information processing systems — Computer graphics — Programmer's Hierarchical Interactive Graphics System (PHIGS) language bindings —

Part 1: FORTRAN

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Partie 1: FORTRAN



Reference number
ISO/IEC 9593-1:1990(E)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 9593-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

ISO/IEC 9593 consists of the following parts, under the general title *Information processing systems — Computer graphics — Programmer's Hierarchical Interactive Graphics System (PHIGS) language bindings* :

— *Part 1: FORTRAN*

— *Part 2: Extended Pascal*

— *Part 3: ADA*

— *Part 4: C*

Annex B forms an integral part of this part of ISO/IEC 9593. Annex A is for information only.

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Introduction

The Programmer's Hierarchical Interactive Graphics System (PHIGS), the functional description of which is given in ISO/IEC 9592-1, is specified in a language independent manner and needs to be embedded in language dependent layers (language bindings) for use with particular programming languages.

The purpose of this part of ISO/IEC 9593 is to define a standard binding for the FORTRAN computer programming language.

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INTERNATIONAL STANDARD ISO/IEC 9593-1:1990(E)

Information processing systems — Computer graphics — Programmer's Hierarchical Interactive Graphics System (PHIGS) language bindings —

Part 1: FORTRAN

1 Scope

ISO/IEC 9592-1 specifies a language independent nucleus of a graphics system. For integration into a programming language, PHIGS is embedded in a language dependent layer obeying the particular conventions of that language. This part of ISO/IEC 9593 specifies such a language dependent layer for the FORTRAN language.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 9593. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 9593 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1539 : 1980, *Information processing systems - Programming Languages - FORTRAN.*

ISO/IEC 9592-1 : 1989, *Information processing systems - Computer graphics - Programmer's Hierarhical Interactive Graphics System (PHIGS) - Part 1 - functional description.*

ISO/IEC TR 9973 : 1988, *Information processing - Procedures for registration of graphical items.*

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3 Principles

3.1 Specification

This part of ISO/IEC 9593 defines the PHIGS language binding interface for FORTRAN 77, as described in ISO 1539 : 1980. With some minor modifications, application programs can be transported between full FORTRAN 77 and FORTRAN 77 Subset PHIGS installations.

3.2 Mapping of PHIGS function names to FORTRAN subroutine names

The function names of PHIGS are all mapped to FORTRAN subroutine names that start with the letter 'P'. The mapping is generally done in a one-to-one correspondence to functions defined in ISO/IEC 9592-1. However, some functions are split into more than one subroutine in this binding, due to the number of parameters required. The remaining letters after the first one are obtained by deriving a unique acronym from the words of the function name; e.g., OPEN becomes OP, WORKSTATION becomes WK. Hence, the FORTRAN subroutine name of PHIGS function OPEN WORKSTATION is POPWK. For a list of all abbreviations, see clause 4. Names used internally that may be known outside PHIGS, e.g., during linking, start with some easily recognized and documented form such as 'PH' (subroutine, function, and common block names). Therefore, no external names starting with this construct should be chosen when using PHIGS, in order to avoid name conflicts.

3.3 Parameters

In general, the order of PHIGS function parameters is preserved. For some subroutines, however, there are additional parameters that have been inserted in the normal parameter sequence (e.g., array length for arrays).

Values of input parameters are unaltered by any PHIGS function as well as PACK DATA RECORD and UNPACK DATA RECORD.

In order that any element of a list (member of a set), such as the set of structure names, can be inquired, in this binding the inquiry functions return only a single element of a list (member of a set). In addition, the total number of elements of the list (members of the set) is always returned. The elements (members) are numbered starting from 1; each invocation of the inquiry function requires the desired element (member) number as an input parameter and returns the corresponding element (member). When the list (set) is empty, a zero is returned as the number of elements (members) and the parameter representing the single element (member) in the list is undefined.

3.4 The FORTRAN subset

The binding for FORTRAN 77 Subset is different from that for full FORTRAN 77 in order to accommodate the FORTRAN 77 Subset restrictions.

Those PHIGS subroutines in the full FORTRAN 77 binding that have arguments of type CHARACTER*(*) have alternative subroutine definitions that include fixed length character strings, CHARACTER*80, for the Subset.

In some cases an additional INTEGER parameter (the number of characters) appears in the parameter list and the Subset version is distinguished by the addition of a final 'S', so that they can coexist in the same implementation. In other cases the INTEGER is already present and the FORTRAN 77 Subset version has the same name as the full FORTRAN 77 version.

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A full FORTRAN 77 implementation shall include both subroutines when the names are distinct and only the full FORTRAN 77 version when the names are the same.

The enumeration values in this binding may be redefined by replacing the PARAMETER statements with corresponding DATA statements.

3.5 Error handling

There are two error routines in every PHIGS system, named PERLOG and PERHND. The user may replace the latter with his/her own subroutine using the same name, PERHND, and calling sequence. Furthermore, this user-defined error routine may call the system-defined error logging procedure PERLOG.

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4 Generating FORTRAN subroutine names

For the binding of the PHIGS functions that inquire lists (sets), the word 'element' ('member') is added to the PHIGS name.

The derivation of the abbreviation for the subroutine names is performed in several steps. First, plurals are reduced to their singular form, and then compound terms are reduced to maintain uniqueness and appropriate name length. Finally, each remaining word is replaced by the null string or by an abbreviation.

Table 1 - Reduction of plurals to singulars

DEVICES	→	DEVICE
ELEMENTS	→	ELEMENT
EVENTS	→	EVENT
FILES	→	FILE
IDENTIFIERS	→	IDENTIFIER
INDICES	→	INDEX
LABELS	→	LABEL
LENGTHS	→	LENGTH
NETWORKS	→	NETWORK
PATHS	→	PATH
PRIMITIVES	→	PRIMITIVE
PRIORITIES	→	PRIORITY
REFERENCES	→	REFERENCE
TRANSFORMATIONS	→	TRANSFORMATION
STRUCTURES	→	STRUCTURE
TYPES	→	TYPE
WORKSTATIONS	→	WORKSTATION

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Generating FORTRAN subroutine names

Table 2 - Reduce compound terms for uniqueness

ANNOTATION TEXT CHARACTER HEIGHT	→	ATCH
ANNOTATION TEXT CHARACTER UP	→	ATCU
INQUIRE ANNOTATION TEXT	→	QAT
SET ANNOTATION TEXT	→	SAT
ANNOTATION TEXT RELATIVE	→	ATR
ARCHIVE ALL	→	ARA
ARCHIVE STRUCTURE IDENTIFIER	→	ASID
IDENTIFIER AND REFERENCE	→	IR
CHANGE STRUCTURE IDENTIFIER	→	CSTID
DELETE ALL STRUCTURE	→	DAS
DYNAMICS OF STRUCTURE	→	DSTR
DYNAMICS OF WORKSTATION ATTRIBUTES	→	DSWA
EDGE FLAG	→	EDFG
ELEMENT POINTER	→	EP
ELEMENT CONTENT	→	ECO
ELEMENT TYPE AND SIZE	→	ETS
ERROR HANDLING MODE	→	ERHM
EVALUATE VIEW MAPPING MATRIX	→	EVMM
EVALUATE VIEW ORIENTATION MATRIX	→	EVOM
GENERALIZED STRUCTURE ELEMENT	→	GSE
INDIVIDUAL ASF	→	IASF
LIST OF	→	E
E AVAILABLE GENERALIZED DRAWING PRIMITIVE 3	→	EGD3
MAXIMUM LENGTH	→	L
MODELLING CLIPPING VOLUME	→	MCV
MODELLING CLIPPING	→	MCL
PATTERN REFERENCE POINT AND VECTORS	→	PRPV
PATTERN REFERENCE POINT	→	PARF
RETRIEVE ALL	→	RA
RETRIEVE STRUCTURE IDENTIFIER	→	RSID
SET OF	→	element
STRUCTURE IDENTIFIER	→	SID
STRUCTURE PATH	→	STPA
STRUCTURE NETWORK	→	SN
STRUCTURE STATE	→	STRS
TEXT FONT	→	TXFN
TRANSFORM POINT	→	TP
UNPOST ALL	→	UPA
VIEW TRANSFORMATION	→	VT
WORKSTATION STATE VALUE	→	WKST
(FORTRAN 77 subset)	→	S

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Table 3 - Deletions

element	ALL	AND	AT	AVAILABLE
BETWEEN	DATA	DEVICE	EVENT	FACTOR
FROM	IN	LIST	METAFILE	MORE
NAMES	NUMBER	OF	SIZE	SUPPORTED
TABLE	TO	TYPE	VALUE	VECTOR
WHICH				

Table 4 - Abbreviations

3	→	3	EMPTY	→	EM
ADD	→	AD	ERROR	→	ER
ALIGNMENT	→	AL	ESCAPE	→	ESC
ANCESTORS	→	AN	EVALUATE	→	EV
ANNOTATION	→	AN	EXECUTE	→	EX
APPLICATION	→	AP	EXPANSION	→	XP
ARCHIVE	→	AR	EXTENT	→	X
AREA	→	A	FACILITIES	→	F
ARRAY	→	A	FILE	→	F
ASF	→	ASF	FILL	→	F
AWAIT	→	WAIT	FILTER	→	FT
BUILD	→	BL	FLAG	→	F
CATEGORY	→	CA	FLUSH	→	FLUSH
CELL	→	C	FONT	→	F
CHANGE	→	C	GENERALIZED	→	G
CHARACTER	→	CH	GET	→	GT
CHOICE	→	CH	GLOBAL	→	GM
CLASSIFICATION	→	CL	HANDLING	→	HND
CLOSE	→	CL	HEIGHT	→	H
COLOUR	→	C	HIGHLIGHTING	→	HL
COMPOSE	→	CO	HLHSR	→	HR
CONFLICT	→	CN	IDENTIFIER	→	ID
CONFLICTING	→	C	INCREMENTAL	→	I
CONNECTION	→	C	INDEX	→	I
CONTENT	→	CT	INDICATOR	→	I
COPY	→	C	INDIVIDUAL	→	I
CURRENT	→	C	INITIALIZE	→	IN
DEFAULT	→	D	INPUT	→	I
DESCENDANTS	→	DE	INQUIRE	→	Q
DELETE	→	D	INTERPRET	→	I
DISPLAY	→	D	INTERIOR	→	I
DRAWING	→	D	INVISIBILITY	→	IV
EDGE	→	ED	ITEM	→	ITM
EDGETYPE	→	EDT	LABEL	→	LB
EDGEWIDTH	→	EW	LENGTH	→	L
EDIT	→	ED	LINETYPE	→	LN
ELEMENT	→	EL	LINEWIDTH	→	LW
EMERGENCY	→	E	LOCAL	→	LM

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Generating FORTRAN subroutine names

Table 4 (continued) - Abbreviations

LOCATOR	→	LC	RESOLUTION	→	RS
LOGGING	→	LOG	RESTORE	→	R
LOGICAL	→	L	RETRIEVE	→	RE
MAPPING	→	MP	ROTATE	→	RO
MARKER	→	MK	SAMPLE	→	SM
MATRIX	→	M	SCALE	→	SC
MESSAGE	→	MSG	SEARCH	→	S
MODE	→	M	SET	→	S
MODEL	→	MD	SIMULTANEOUS	→	SIM
NETWORK	→	N	SPACE	→	SP
OFFSET	→	OS	SPACING	→	SP
OPEN	→	OP	SPATIAL	→	S
ORIENTATION	→	OR	STATE	→	S
OVERFLOW	→	OV	STATUS	→	ST
PACK	→	P	STRING	→	ST
PATH	→	P	STROKE	→	SK
PATTERN	→	PA	STRUCTURE	→	ST
PHIGS	→	PH	STYLE	→	S
PICK	→	PK	SYSTEM	→	SY
POINTER	→	PT	TEXT	→	TX
POLYLINE	→	PL	TRANSFORM	→	T
POLYMARKER	→	PM	TRANSFORMATION	→	T
POST	→	PO	TRANSLATE	→	TR
POSTED	→	PO	UNPACK	→	U
PRECISION	→	PR	UNPOST	→	UPO
PREDEFINED	→	P	UP	→	UP
PRIMITIVE	→	P	UPDATE	→	U
PRIORITY	→	P	VALUATOR	→	VL
QUEUE	→	Q	VIEW	→	VW
RANGE	→	RA	VIEWPORT	→	V
READ	→	RD	VOLUME	→	VOL
RECORD	→	REC	WINDOW	→	W
REDRAW	→	R	WRITE	→	W
REFERENCE	→	RF	WORKSTATION	→	WK
REMOVE	→	RE	X	→	X
REPRESENTATION	→	R	Y	→	Y
REQUEST	→	RQ	Z	→	Z

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5 Data types

In ISO/IEC 9592-1 parameters of several types are used. The following shows the correspondence between the types used in ISO/IEC 9592-1 and their realization in a FORTRAN implementation.

PHIGS Data Type	FORTRAN Data Types
I integer	INTEGER
A(I) array of integers	This is described more at the end of this clause, where the representations of CELL ARRAY and PATTERN are described.
R real	REAL
const × *simple_type* where *simple_type* is realized as I or R	(vector of values, for example 2×R) For input argument where const ≥6 or for output argument where const ≥4, then array of constant length is used, otherwise use separate parameters.
const 1 × const 2 × R (matrix of values, for example 2×3×R)	REAL array (const 1, const 2) For example, in order to store the projection transformation defined by: $x \rightarrow x'/w'$ $y \rightarrow y'/w'$ $z \rightarrow z'/w'$ in a 4 × 4 × REAL matrix, the values shall be stored such that: $x' = p[1,1]*x + p[2,1]*y + p[3,1]*z + p[4,1]$ $y' = p[1,2]*x + p[2,2]*y + p[3,2]*z + p[4,2]$ $z' = p[1,3]*x + p[2,3]*y + p[3,3]*z + p[4,3]$ $w' = p[1,4]*x + p[2,4]*y + p[3,4]*z + p[4,4]$
S string	1) In a full FORTRAN 77 subroutine: a) INTEGER containing the number of characters returned (for output string argument only). b) CHARACTER*(*) containing the string. In addition, if a character string that is an input parameter may reasonably contain no characters, then an INTEGER (≥0) is used to give the number of characters to be passed to the subroutine. 2) In a FORTRAN 77 Subset subroutine: a) INTEGER containing the number of characters passed to the subroutine (for input string only, i.e. only one INTEGER needed for output). b) INTEGER containing the number of characters returned (for output string argument only). If the value is < 0 or > 80, error 2004 is

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Data types

generated.
c) CHARACTER*80 containing the string.

P2 point — REAL, REAL containing the X- and Y-values

const × P2 (only occurs in non-inquiry functions)
Separate REAL parameters, with the X- and Y- coordinates of one point being followed by the X- and Y- coordinates of the next.

P3 point — REAL, REAL, REAL containing the X-, Y-, and Z-values

const × P3 — If const ≥2 REAL arrays xa(const), ya(const), za(const) are used, otherwise separate REAL arrays are used, with the X-, Y-, and Z-coordinates of one point being followed by the X-,Y-, and Z-coordinates of the next.

L(L(P2/3)) list of point lists (for fill area sets)
The following description applies to both 2D and 3D point lists except that the PZA array is not present for 2D point lists. The arguments that specify the list of point lists are as follows:

INTEGER NPL
INTEGER IXA(NPL)
REAL PXA(*), PYA(*), PZA(*)

where
NPL is the number of point lists
IXA is an array of end indices for the point lists
PXA, PYA, PZA are the coordinate arrays

The range of indices in PXA, PYA, and PZA of each point list is as follows:
1 to IXA(1) is the first point list
IXA(i-1)+1 to IXA(i) is the ith point list, for i=2, to NPL when NPL ≥2

Thus, for example:
a) 1 is the start index for the 1st point list,
b) IXA(i-1)+1 is the start index for the ith point list for all i=2 to NPL when NPL≥2, and
c) IXA(i) is the end index for all point lists i=1 to NPL.

In the actual arguments specifying the list of point lists (supplied by the application program), the following conditions shall hold true; otherwise error 2005 is generated, with the allowable exception:
d) NPL≥1,
e) PXA, PYA and PZA are dimensioned by at least IXA(NPL) (however it is allowable for the implementation not to generate error 2005 in this case),
f) IXA(1)≥3 (the first point list is at least 3 points),
g) IXA(i+1)-IXA(i)≥3 for i=1 to NPL-1, when NPL≥2 (the ith point list is at least 3 points).

V2 2D vector — REAL, REAL containing the X- and Y-values specifying an offset from some reference point in the coordinate system of the reference point.

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V3 3D vector

REAL, REAL, REAL containing the X-, Y-, and Z-values specifying an offset from some reference point in the coordinate system of the reference point.

E enumeration

INTEGER
All values are mapped to the range zero to N-1, where N is the number of enumeration alternatives. Except for null values, the order of the enumeration alternatives is the same as in ISO/IEC 9592-1 : null values always appear in the first position. If the integer value given by the application program is not in the range 0 to N-1, there is a language binding error condition (error 2000).

const × E (only occurrence in PHIGS is const = 18)

An array of INTEGER elements of dimension const is used, each element being an enumeration alternative.

NM classification

INTEGER identifying the name of an element of a name set. The domain of the names is the set of INTEGERS from 0 to an implementation defined maximum. The minimum maximum is 63.

FR filter

A compound data type containing two name sets representing inclusion and exclusion sets. Represented as two sets. For input parameter:

INTEGER giving the number of elements in the inclusion set, an array of INTEGERs giving the elements in the inclusion set, INTEGER giving the number of elements in the exclusion set, and an array of INTEGERs giving the elements in the exclusion set.

For output parameter:

INTEGER (input) giving the dimension (ni) of the array that will contain the elements of inclusion set. INTEGER (input) giving the dimension (ne) of the array that will contain the elements of exclusion set. INTEGER (output) giving the number of elements of the inclusion set array actually used. INTEGER (output) giving the number of elements of the exclusion set array actually used. Array of INTEGERs (output) containing the elements in the inclusion set. Array of INTEGERs (output) containing the elements in the exclusion set.

If the size required to contain the inclusion or exclusion elements is greater than the size of the arrays supplied (as determined by the dimensions ni and ne), error 2001 will be generated and the value returned in the corresponding INTEGER (output) parameters will respresent the input array size required.

L(FR) list of filter

This data type is only used in the incremental search functions and applies to both the "normal" and "inverted" lists of filters. The arguments that specify the list of filters are as follows:

```
INTEGER FLN
INTEGER FLISX(FLN)
INTEGER FLIS(*)
INTEGER FLESX(FLN)
INTEGER FLES(*)
```

where

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Data types

FLN is the number filters
FLISX is an array of end indices of each inclusion set in the list filters
FLIS is the array of elements of the inclusion sets
FLESX is an array of end indices of each exclusion set in the list filters
FLES is the array of elements of the exclusion sets

The range of indices in FLIS of each inclusion set is as follows:
1 to FLISX(1) is the first inclusion set,
FLISX(i-1)+1 to FLISX(i) is the ith inclusion set,
for i=2, to FLN when FLN ≥2

Correspondingly the range of indices in FLES of each exclusion set is as follows:
1 to FLESX(1) is the first exclusion set,
FLESX(i-1)+1 to FLESX(i) is the ith exclusion set,
for i=2, to FLN when FLN ≥2

Thus, for example:
a) 1 is the start index for the first inclusion set,
b) FLISX(i-1)+1 is the start index for the i'th inclusion set for all i=2 to FLN when FLN≥2, and
c) FLISX(i) is the end index for all inclusion sets i=1 to FLN.

In the actual arguments specifying the list filters (supplied by the application program), the following conditions shall hold true; otherwise error 2006 is generated, with the allowable exception:
d) FLN≥1,
e) FLIS and FLES are dimensioned by at least FLESX(FLN) (however it is allowable for the implementation not to generate error 2006 in this case),

a set of *simple_type*

(for example, SET(NM) or SET(E)): INTEGER giving the number of elements in the set and an array of *simple_type* giving the elements in the set. The only direct use of the SET constructor involves either a classification, NM, or enumeration, E, as its *simple_type*; both are represented as INTEGERs.

PP pick path item

This data type is never independently accessed through the language binding interface, but is instead realized through the list of pick path items, or *pick path*, L(PP).

L(PP) pick path

INTEGER (input) giving the size of the INTEGER matrix within which the pick path will be returned, an INTEGER (output) returning the actual size of the pick path (only for output parameters) (however, if the size required is greater than the size of the input array size error 2001 will be generated and the value returned represents the input array size required), and a 3×N INTEGER matrix (output) returning the pick path, where the (1,*) components contain the structure identifiers, the (2,*) components contain the pick identifiers, and the (3,*) components contain the element sequence numbers.

ER element reference

This data type is never independently accessed through the language binding interface, but is instead realized through the list of element references, or *element reference path*, L(ER).

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L(ER) element reference path

INTEGER (input) giving the size of the INTEGER matrix within which the element reference path will be returned, an INTEGER (output) returning the actual size of the element reference path (only for output parameters) (however, if the size required is greater than the size of the input array size error 2001 will be generated and the value returned represents the input array size required), and a 2×N INTEGER matrix (output) returning the element reference path, where the (1,*) components contain the structure identifiers, and the (2,*) components contain the the element sequence numbers.

L(L(ER)) list of element reference paths

For inquiry functions, a single call only returns a single element of the list. Each element of the list is a list itself as described under ELEMENT REFERENCE PATH above.

For a complete list of length n,

a) INTEGER (input parameter) containing the *sequence number* (see below) of the required list elements (in the range 0...n).

b) INTEGER (output parameter) containing the number of items in the list, n.

c) parameters of the type described under ELEMENT REFERENCE PATH.

If the sequence number given is 0, the requested element returned is undefined, but an error is not indicated thereby; the number of items in the list n is returned. If the sequence number given is <0 or >n, then error 2002 is indicated, the number of items in the list is returned, but the requested element is undefined; the exception to this occurs when the list size is 0, and in that case an error is not indicated thereby.

HS2 2D half-space

Two (2) REALs giving the X- and Y-components of a point in modelling coordinates and two (2) REALs giving the X- and Y-components of a normal vector in modelling coordinates. This data type is never independently accessed through the language binding interface, but is instead realized through the list of 2D half-spaces, L(HS2).

L(HS2) 2D half-space

2D half-spaces are only used as a component of a list, i.e., L(HS2), and are hence always specified as a component of a two dimensional array.

```
INTEGER NHALFS
REAL HALFSP(4,NHALFS)
```

where

NHALFS is the number of modelling clipping half spaces in the list,
for the ith modelling clipping half-space:
HALFSP(1,i) is the X-component of the point,
HALFSP(2,i) is the Y-component of the point,
HALFSP(3,i) is the DX-component of the normal vector,
HALFSP(4,i) is the DY-component of the normal vector.

HS3 3D half-space

Three (3) REALs giving a point in modelling coordinates and three (3) REALs giving a normal vector in modelling coordinates. This data type is never independently accessed through the language binding interface, but is

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Data types

instead realized through the list of 3D half-spaces, L(HS3).

L(HS3) 3D half-spaces — 3D half-spaces are only used as a component of a list, i.e., L(HS3), and are hence always specified as a component of a two dimensional array.

INTEGER NHALFS
REAL HALFSP(6,NHALFS)

where

NHALFS is the number of modelling clipping half spaces in the list,
for the ith modelling clipping half-space:
HALFSP(1,i) is the X-component of the point,
HALFSP(2,i) is the Y-component of the point,
HALFSP(3,i) is the Z-component of the point,
HALFSP(4,i) is the DX-component of the normal vector,
HALFSP(5,i) is the DY-component of the normal vector,
HALFSP(6,i) is the DZ-component of the normal vector.

FP font/precision pair — This data type is a specific case of the more general ordered pair of different types (described next).

an ordered pair of different types
(for example (I;E) or font/precision pair, FP)
The different types are represented in turn in the FORTRAN parameter list.

SE structure element — This compound data type is realized directly as the constituent parts identified in ISO/IEC 9592-1. The data type of each of the constituent parts is described in this clause.

PS posted structure — This compound data type is realized directly as the constituent parts identified in ISO/IEC 9592-1. The data type of each of the constituent parts is described in this clause.

B bounding range — REAL, REAL specifying a range with the first value less than or equal to the second value.

const × B — (for example 2×B or 3×B) For input argument where const ≥3 or for output argument where const ≥2, use array of constant length, otherwise, use separate parameters. For those cases where const = 2 for input arguments and the parameter list would have more than 9 arguments when applying this rule, use an array of constant length.

CLR colour specification — For input parameter:
INTEGER giving the length (n) of the list of colour components dictated by the colour model. REAL array of at least dimension n. If the length of the list, as described by n, is inappropriate for the colour model in effect, error 118 is indicated.
For output parameter:
INTEGER (input) giving the dimension (n) of the array that will contain the list of colour components. INTEGER (output) giving the number of elements of the array actually used. REAL array of at least dimension n.

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If the size required to contain the list of colour components is greater than the size of the arrays supplied (as determined by the dimension n), error 2001 will be generated and the value returned in the INTEGER (output) parameter will respresent the input array size required.

CC chromaticity coefficient — This only occurs as 3×CC and is realized as a REAL array of nine (9) elements representing the primary colour chromaticity coefficients, (u', v') and luminance value (Y).

C connection identifier — INTEGER where the set of valid values is implementation dependent.

F file — INTEGER where the set of valid values is implementation dependent.

W workstation type — INTEGER where the set of valid values is implementation dependent.

MCV modelling clipping volume
This data type is never used through the language binding interface, but is instead used to describe internal system state in ISO/IEC 9592-1.

G2 2D generalized drawing primitive identifier
INTEGER where the set of legal values is described in ISO/IEC 9592-1.

G3 3D generalized drawing primitive identifier
INTEGER where the set of legal values is described in ISO/IEC 9592-1.

GS generalized structure element identifier
INTEGER where the set of legal values is described in ISO/IEC 9592-1.

AI archive file identifier — INTEGER where an implementation may restrict the range but shall at least provide all non-negative integers that are available at that implementation.

PI pick identifier — INTEGER where an implementation may restrict the range but shall at least provide all non-negative integers that are available at that implementation. The default value for pick identifier is zero.

EI escape identifier — INTEGER where the set of legal values is described in ISO/IEC 9592-1.

FN function name — INTEGER where the range is shown in clause 6.

WI workstation identifier — INTEGER where an implementation may restrict the range but shall at least provide all non-negative integers that are available at that implementation.

D data record — Represented as a set of scalar values and an array of type CHARACTER*80 containing the data. In addition, an INTEGER input parameter is used to dimension the array. Where the data record is an output parameter, an additional output argument 'number of array elements of data record occupied' is needed. There are no scalar values except where the data record contains

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Data types

values that are compulsory in PHIGS.
Special utility functions are defined to pack INTEGER, REAL, and CHARACTER data into the data record and to unpack the data record to the individual data items (PPREC, PUREC). The content of the packed data records is implementation dependent, but PPREC should perform the inverse function of PUREC and vice versa.
For INQUIRE CURRENT ELEMENT CONTENT and INQUIRE ELEMENT CONTENT the data record is returned directly into integer, real and character arrays.

list of n values of one *underlying_type* (for example L(I))

1) For input parameter:
   a) INTEGER (input) containing length n of the list (unless the length is already present as a separate PHIGS parameter, in that case it is not duplicated)
   b) array of dimension n, whose elements are of the appropriate *underlying_type*.

When the length can actually be defined as zero within PHIGS, the binding indicates the array dimension by *. The implementation checks that the given length is ≥ 1.

2) For output parameter in non-inquiry functions:
   a) INTEGER (input) containing the dimension of the array
   b) INTEGER (output) containing the number of elements of the array actually used
   c) an array whose elements are of the appropriate *underlying_type*. The input dimension being too small is a language binding error condition (error 2001).

In both cases (input or output), where the *underlying_type* is a 2D point, there is a REAL array for the X-coordinates and another for the Y-coordinates, and in the case of a 3D point, an additional REAL array for the Z-coordinates.

3) For inquiry functions, a single call only returns a single element of the list. For a complete list of length n,
   a) INTEGER (input) containing the *sequence number* (see below) of required list element (in the range 0...n).
   b) INTEGER (output) containing the number of items in the list, n.
   c) a parameter of the appropriate *underlying_type* containing the requested element.

If the sequence number given is 0, the requested element returned is undefined, but an error is not indicated thereby; the number of items in the list n is returned. If the sequence number given is <0 or $>n$, then error 2002 is indicated, the number of items in the list is returned, but the requested element is undefined; the exception to this occurs when the list size is 0, and in that case an error is not indicated thereby.

4) A complete inquired list is returned from a single call when the maximum

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size of the list is a small constant m:

a) INTEGER (output) containing the number of elements of the array actually used.

b) an array of dimension m, whose elements are of the appropriate *underlying_type*.

The representation of CELL ARRAY and PATTERN allows the user of the routines requiring a cell array parameter to pass any portion of the array as an argument. Two examples should make this clear.

Certainly the user can pass an entire two-dimensional array. In this case the number of columns of the cell array is the same as the dimensions of the FORTRAN array:

```
INTEGER DIMX, DIMY, CELLS (DIMX,DIMY)
CALL PCA (X1,Y1,X2,Y2,DIMX,DIMY,1,1,DIMX,DIMY,CELLS)
```

(1,1)	(2,1)	(3,1)	. . .	(DIMX,1)
(1,2)	(2,2)	(3,2)	. . .	(DIMX,2)
:	:	:		:
(1,DIMY)	(2,DIMY)	(3,DIMY)	. . .	(DIMX,DIMY)

To use an arbitrary portion of an array the user passes the upper left corner of the portion as starting address and the dimensions of the portion of interest of the array. The area inside the small box is the cell array being passed:

```
INTEGER STARTX, STARTY, DX, DY, DIMX, DIMY, CELLS (DIMX,DIMY)
DATA STARTX/3/, STARTY/6/, DX/2/, DY/3/
CALL PCA (X1,Y1,X2,Y2,DIMX,DIMY,STARTX,STARTY,DX,DY,CELLS)
```

(1,1)	(2,1)	(3,1)	(4,1)	. . .	(DIMX,1)
(1,2)	(2,2)	(3,2)	(4,2)	. . .	(DIMX,2)
:	:	:	:		:
:	:				:
(1,6)	(2,6)	(3,6)	(4,6)	. . .	(DIMX,6)
(1,7)	(2,7)	(3,7)	(4,7)	. . .	(DIMX,7)
(1,8)	(2,8)	(3,8)	(4,8)	. . .	(DIMX,8)
:	:				:
:	:	:	:		:
(1,DIMY)	(2,DIMY)	(3,DIMY)	(4,DIMY)	. . .	(DIMX,DIMY)

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6 Enumeration types

All the enumeration types of PHIGS are mapped to FORTRAN INTEGERs. The correspondence between PHIGS scalars and FORTRAN INTEGERs is shown as follows in a list of symbolic FORTRAN constants that may be included in any application program. This clause contains a mapping PHIGS enumeration types to FORTRAN variable names. In a FORTRAN 77 Subset implementation, this mapping could be accomplished by the DATA statement.

"Line type", "marker type" and "colour model" are defined as INTEGER rather than enumeration types in PHIGS. Constant definitions for the explicitly defined and required values of these conceptually unbounded ranges are provided as a convenience.

Also, a numbering of all PHIGS functions is given for use in the error handling procedures.

Mnemonic FORTRAN names and their values for PHIGS ENUMERATION type values:

```
annotation style                    unconnected,  lead line using current polyline attributes
        INTEGER     PUNCON,         PLDLN
        PARAMETER( PUNCON=1,        PLDLN=2 )
INTEGER rather than enumeration type. Explicitly defined and required portion of
conceptually unbounded range defined here.

archive state               ARCL,                   AROP
        INTEGER             PARCL,                  PAROP
        PARAMETER( PARCL=0,                         PAROP=1 )

aspect identifier
        INTEGER     PLN,        PLWSC,      PPLCI,      PMK,        PMKSC,
        1           PPMCI,      PTXFN,      PTXPR,      PCHXP,      PCHSP,
        2           PTXCI,      PIS,        PISI,       PICI,       PEDFG,
        3           PEDT,       PEWSC,      PEDCI
        PARAMETER( PLN=0,       PLWSC=1,    PPLCI=2,    PMK=3,      PMKSC=4,
        1           PPMCI=5,    PTXFN=6,    PTXPR=7,    PCHXP=8,    PCHSP=9,
        2           PTXCI=10,   PIS=11,     PISI=12,    PICI=13,    PEDFG=14,
        3           PEDT=15,    PEWSC=16,   PEDCI=17 )

aspect source               bundled,    individual
        INTEGER             PBUNDL,     PINDIV
        PARAMETER( PBUNDL=0, PINDIV=1 )

clipping indicator          noclip,     clip
        INTEGER             PNCLIP,     PCLIP
        PARAMETER( PNCLIP=0, PCLIP=1 )

colour available            monochrome, colour
        INTEGER             PMONOC,     PCOLOR
        PARAMETER( PMONOC=0, PCOLOR=1 )

colour model                RGB,        CIE,        HSV,        HLS
        INTEGER             PRGB,       PCIE,       PHSV,       PHLS
        PARAMETER( PRGB=1,  PCIE=2,     PHSV=3,     PHLS=4 )
INTEGER rather than enumeration type. Explicitly defined and required portion of
conceptually unbounded range defined here.
```


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Enumeration types

```
composition type        preconcatenate,     postconcatenate,     replace
        INTEGER         PCPRE,              PCPOST,              PCREPL
        PARAMETER(      PCPRE=0,            PCPOST=1,            PCREPL=2 )

conflict resolution     maintain,    abandon,    update
        INTEGER         PCRMNT,      PCRABA,     PCRUPD
        PARAMETER(      PCRMNT=0,    PCRABA=1,   PCRUPD=2 )

control flag conditionally,  always
        INTEGER         PCONDI,      PALWAY
        PARAMETER(      PCONDI=0,    PALWAY=1 )

deferral mode           ASAP,        BNIG,       BNIL,       ASTI,       WAIT
        INTEGER         PASAP,       PBNIG,      PBNIL,      PASTI,      PWAITD
        PARAMETER(      PASAP=0,     PBNIG=1,    PBNIL=2,    PASTI=3,    PWAITD=4 )

device coordinate units metres,      other
        INTEGER         PMETRE,      POTHU
        PARAMETER(      PMETRE=0,    POTHU=1 )

display surface empty   notempty,    empty
        INTEGER         PNEMPT,      PEMPTY
        PARAMETER(      PNEMPT=0,    PEMPTY=1 )

dynamic modification    IRG,         IMM,        CBS
        INTEGER         PIRG,        PIMM,       PCBS
        PARAMETER(      PIRG=0,      PIMM=1,     PCBS=2 )

echo switch             noecho,      echo
        INTEGER         PNECHO,      PECHO
        PARAMETER(      PNECHO=0,    PECHO=1 )

edit mode               insert,      replace
        INTEGER         PINSRT,      PREPLC
        PARAMETER(      PINSRT=0,    PREPLC=1 )
```


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Enumeration types

element type		all,	nil,	polyline 3,	polyline,..		
	INTEGER(	PEALL,	PENIL,	PEPL3,	PEPL,		
	1	PEPM3,	PEPM,	PETX3,	PETX,		
	2	PEATR3,	PEATR,	PEFA3,	PEFA,		
	3	PEFAS3,	PEFAS,	PECA3,	PECA,		
	4	PEGDP3,	PEGDP,	PEPLI,	PEPMI,		
	5	PETXI,	PEII,	PEEDI,	PELN,		
	6	PELWSC,	PEPLCI,	PEMK,	PEMKSC,		
	7	PEPMCI,	PETXFN,	PETXPR,	PECHXP,		
	8	PECHSP,	PETXCI,	PECHH,	PECHUP,		
	9	PETXP,	PETXAL,	PEATCH,	PEATCU,		
	a	PEATP,	PEATAL,	PEANST,	PEIS,		
	b	PEISI,	PEICI,	PEEDFG,	PEEDT,		
	c	PEEWSC,	PEEDCI,	PEPA,	PEPRPV,		
	d	PEPARF,	PEADS,	PERES,	PEIASF,		
	e	PEHRID,	PELMT3,	PELMT,	PEGMT3,		
	f	PEGMT,	PEMCV3,	PEMCV,	PEMCLI,		
	g	PERMCV,	PEVWI,	PEEXST,	PELB,		
	h	PEAP,	PEGSE,	PEPKID			
	PARAMETER(	PEALL=0,	PENIL=1,	PEPL3=2,	PEPL=3,		
	1	PEPM3=4,	PEPM=5,	PETX3=6,	PETX=7,		
	2	PEATR3=8,	PEATR=9,	PEFA3=10,	PEFA=11,		
	3	PEFAS3=12,	PEFAS=13,	PECA3=14,	PECA=15,		
	4	PEGDP3=16,	PEGDP=17,	PEPLI=18,	PEPMI=19,		
	5	PETXI=20,	PEII=21,	PEEDI=22,	PELN=23,		
	6	PELWSC=24,	PEPLCI=25,	PEMK=26,	PEMKSC=27,		
	7	PEPMCI=28,	PETXFN=29,	PETXPR=30,	PECHXP=31,		
	8	PECHSP=32,	PETXCI=33,	PECHH=34,	PECHUP=35,		
	9	PETXP=36,	PETXAL=37,	PEATCH=38,	PEATCU=39,		
	a	PEATP=40,	PEATAL=41,	PEANST=42,	PEIS=43,		
	b	PEISI=44,	PEICI=45,	PEEDFG=46,	PEEDT=47,		
	c	PEEWSC=48,	PEEDCI=49,	PEPA=50,	PEPRPV=51,		
	d	PEPARF=52,	PEADS=53,	PERES=54,	PEIASF=55,		
	e	PEHRID=56,	PELMT3=57,	PELMT=58,	PEGMT3=59,		
	f	PEGMT=60,	PEMCV3=61,	PEMCV=62,	PEMCLI=63,		
	g	PERMCV=64,	PEVWI=65,	PEEXST=66,	PELB=67,		
	h	PEAP=68,	PEGSE=69,	PEPKID=70			
GDP attributes		polyline	polymarker	text	interior	edge	
	INTEGER	PPLATT,	PPMATT,	PTXATT,	PINATT,	PEDATT	
	PARAMETER(	PPLATT=0,	PPMATT=1,	PTXATT=2,	PINATT=3,	PEDATT=4)	
input class		none,	locator,	stroke,	valuator,	choice,	pick,
		string					
	INTEGER	PNCLAS,	PLOCAT,	PSTROK,	PVALUA,	PCHOIC,	PPICK,
	1	PSTRIN					
	PARAMETER(	PNCLAS=0,	PLOCAT=1,	PSTROK=2,	PVALUA=3,	PCHOIC=4,	PPICK=5,
	1	PSTRIN=6)					
input device status		none,	ok,	nopick,	nochoice		
	INTEGER	PNONE,	POK,	PNPICK,	PNCHOI		
	PARAMETER(	PNONE=0,	POK=1,	PNPICK=2,	PNCHOI=2)		
interior style		hollow,	solid,	pattern,	hatch,	empty	
	INTEGER	PHOLLO,	PSOLID,	PPATTR,	PHATCH,	PISEMP	
	PARAMETER(	PHOLLO=0,	PSOLID=1,	PPATTR=2,	PHATCH=3,	PISEMP=4)	

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Enumeration types

linetype solid, dash, dot, dash-dot
INTEGER PLSOLI, PLDASH, PLDOT, PLDASD
PARAMETER(PLSOLI=1, PLDASH=2, PLDOT=3, PLDASD=4)
INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

marker type '.', '+', '*', 'o', 'x'
INTEGER PPOINT, PPLUS, PAST, POMARK, PXMARK
PARAMETER(PPOINT=1, PPLUS=2, PAST=3, POMARK=4, PXMARK=5)
INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

modelling clipping operator replace, intersect
INTEGER PMCREP, PMCINT
PARAMETER(PMCREP=1, PMCINT=2)
INTEGER rather than enumeration type. Explicitly defined and required portion of conceptually unbounded range defined here.

modification mode NIVE, UWOR, UQUM
INTEGER PNIVE, PUWOR, PUQUM
PARAMETER(PNIVE=0, PUWOR=1, PUQUM=2)

more simultaneous events nomore, more
INTEGER PNMORE, PMORE
PARAMETER(PNMORE=0, PMORE=1)

off/on switch for edge flag and error handling mode
off, on
INTEGER POFF, PON
PARAMETER(POFF=0, PON=1)

open-structure status none, open
INTEGER PNONST, POPNST
PARAMETER(PNONST=0, POPNST=1)

operating mode request, sample, event
INTEGER PREQU, PSAMPL, PEVENT
PARAMETER(PREQU=0, PSAMPL=1, PEVENT=2)

path order topfirst, bottomfirst
INTEGER PPOTOP, PPOBOT
PARAMETER(PPOTOP=0, PPOBOT=1)

polyline/fill area control flag polyline, fill area, fill area set
INTEGER PPLINE, PFILLA, PFILAS
PARAMETER(PPLINE=0, PFILLA=1, PFILAS)

presence of invalid values absent, present
INTEGER PABSNT, PPRSNT
PARAMETER(PABSNT=0, PPRSNT=1)

reference handling flag delete, keep
INTEGER PDELE, PKEEP
PARAMETER(PDELE=0, PKEEP=1)

regeneration flag postpone, perform
INTEGER PPOSTP, PPERFO
PARAMETER(PPOSTP=0, PPERFO=1)

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Enumeration types

```
relative input priority     higher,      lower
          INTEGER           PHIGHR,      PLOWER
          PARAMETER(        PHIGHR=0,    PLOWER=1 )

search direction            backward,    forward
          INTEGER           PBWD,        PFWD
          PARAMETER(        PBWD=0,      PFWD=1 )

search success indicator    failure,     success
          INTEGER           PFAIL,       PSUCC
          PARAMETER(        PFAIL=0,     PSUCC=1 )

state of visual representation  correct,  deferred,    simulated
          INTEGER           PVROK,       PVRDFR,      PVRSIM
          PARAMETER(        PVROK=0,     PVRDFR=1,    PVRSIM=2 )

structure network source    CSS,         ARCHIVE
          INTEGER           PCSS,        PARCHV
          PARAMETER(        PCSS=0,      PARCHV=1 )

structure state value       STCL,        STOP
          INTEGER           PSTCL,       PSTOP
          PARAMETER(        PSTCL=0,     PSTOP=1 )

structure status indicator  non-existent, empty,      not empty
          INTEGER           PSNOEX,      PSEMPT,      PSNEMP
          PARAMETER(        PSNOEX=0,    PSEMPT=1,    PSNEMP=2 )

system state value          PHCL,        PHOP
          INTEGER           PPHCL,       PPHOP
          PARAMETER(        PPHCL=0,     PPHOP=1 )

text alignment horizontal   normal,      left,        centre,      right
          INTEGER           PAHNOR,      PALEFT,      PACENT,      PARITE
          PARAMETER(        PAHNOR=0,    PALEFT=1,    PACENT=2,    PARITE=3 )

text alignment vertical     normal,      top,         cap,         half,        base,        bottom
          INTEGER           PAVNOR,      PATOP,       PACAP,       PAHALF,      PABASE,      PABOTT
          PARAMETER(        PAVNOR=0,    PATOP=1,     PACAP=2,     PAHALF=3,    PABASE=4,    PABOTT=5 )

text path                   right,       left,        up,          down
          INTEGER           PRIGHT,      PLEFT,       PUP,         PDOWN
          PARAMETER(        PRIGHT=0,    PLEFT=1,     PUP=2,       PDOWN=3 )

text precision              string,      character,   stroke
          INTEGER           PSTRP,       PCHARP,      PSTRKP
          PARAMETER(        PSTRP=0,     PCHARP=1,    PSTRKP=2 )

type of returned values     set,         realized
          INTEGER           PSET,        PREALI
          PARAMETER(        PSET=0,      PREALI=1 )

update state                notpending,  pending
          INTEGER           PNPEND,      PPEND
          PARAMETER(        PNPEND=0,    PPEND=1 )

vector/raster/other type    vector,      raster,      other
          INTEGER           PVECTR,      PRASTR,      POTHWK
          PARAMETER(        PVECTR=0,    PRASTR=1,    POTHWK=2 )
```


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Enumeration types

```
viewtype                    parallel,       perspective
          INTEGER           PPARL,          PPERS
          PARAMETER(        PPARL=0,        PPERS=1 )

workstation category        OUTPUT,         INPUT,          OUTIN,          MO,             MI
          INTEGER           POUTPT,         PINPUT,         POUTIN,         PMO,            PMI
          PARAMETER(        POUTPT=0,       PINPUT=1,       POUTIN=2,       PMO=3,          PMI=4 )

workstation dependency indicator
                            workstation independent,        workstation dependent
          INTEGER           PWKI,                           PWKD
          PARAMETER(        PWKI=0,                         PWKD=1 )

workstation state value     WSCL,           WSOP
          INTEGER           PWSCL,          PWSOP
          PARAMETER(        PWSCL=0,        PWSOP=1 )
```

additional in the FORTRAN binding, to be used with PHIGS inquiry functions that return both Current and Requested values

```
                            current,        requested
          INTEGER           PCURVL,         PRQSVL
          PARAMETER(        PCURVL=0,       PRQSVL=1 )
```

PHIGS functions. These names are used for error handling. The names are the same as the PHIGS function names except that the sentinel character 'P' is replaced by 'E'. The same function identification is used for both full FORTRAN 77 and FORTRAN 77 Subset.

```
INTEGER         EOPPH,      ECLPH,      EOPWK,      ECLWK,      ERST
PARAMETER(      EOPPH=0,    ECLPH=1,    EOPWK=2,    ECLWK=3,    ERST=4 )
INTEGER         EUWK,       ESDUS,      EMSG,       EPL3,       EPL
PARAMETER(      EUWK=5,     ESDUS=6,    EMSG=7,     EPL3=8,     EPL=9 )
INTEGER         EPM3,       EPM,        ETX3,       ETX,        EATR3
PARAMETER(      EPM3=10,    EPM=11,     ETX3=12,    ETX=13,     EATR3=14 )
INTEGER         EATR,       EFA3,       EFA,        EFAS3,      EFAS
PARAMETER(      EATR=15,    EFA3=16,    EFA=17,     EFAS3=18,   EFAS=19 )
INTEGER         ECA3,       ECA,        EGDP3,      EGDP,       ESPLI
PARAMETER(      ECA3=20,    ECA=21,     EGDP3=22,   EGDP=23,    ESPLI=24 )
INTEGER         ESPMI,      ESTXI,      ESII,       ESEDI,      ESLN
PARAMETER(      ESPMI=25,   ESTXI=26,   ESII=27,    ESEDI=28,   ESLN=29 )
INTEGER         ESLWSC,     ESPLCI,     ESMK,       ESMKSC,     ESPMCI
PARAMETER(      ESLWSC=30,  ESPLCI=31,  ESMK=32,    ESMKSC=33,  ESPMCI=34 )
INTEGER         ESTXFN,     ESTXPR,     ESCHXP,     ESCHSP,     ESTXCI
PARAMETER(      ESTXFN=35,  ESTXPR=36,  ESCHXP=37,  ESCHSP=38,  ESTXCI=39 )
INTEGER         ESCHH,      ESCHUP,     ESTXP,      ESTXAL,     ESATCH
PARAMETER(      ESCHH=40,   ESCHUP=41,  ESTXP=42,   ESTXAL=43,  ESATCH=44 )
INTEGER         ESATCU,     ESATP,      ESATAL,     ESANS,      ESIS
PARAMETER(      ESATCU=45,  ESATP=46,   ESATAL=47,  ESANS=48,   ESIS=49 )
INTEGER         ESISI,      ESICI,      ESEDFG,     ESEDT,      ESEWSC
PARAMETER(      ESISI=50,   ESICI=51,   ESEDFG=52,  ESEDT=53,   ESEWSC=54 )
INTEGER         ESEDCI,     ESPA,       ESPRPV,     ESPARF,     EADS
PARAMETER(      ESEDCI=55,  ESPA=56,    ESPRPV=57,  ESPARF=58,  EADS=59 )
INTEGER         ERES,       ESIASF,     ESPLR,      ESPMR,      ESTXR
PARAMETER(      ERES=60,    ESIASF=61,  ESPLR=62,   ESPMR=63,   ESTXR=64 )
INTEGER         ESIR,       ESEDR,      ESPAR,      ESCR,       ESHLFT
PARAMETER(      ESIR=65,    ESEDR=66,   ESPAR=67,   ESCR=68,    ESHLFT=69 )
INTEGER         ESIVFT,     ESCMD,      ESHRID,     ESHRM,      ESLMT3
PARAMETER(      ESIVFT=70,  ESCMD=71,   ESHRID=72,  ESHRM=73,   ESLMT3=74 )
INTEGER         ESLMT,      ESGMT3,     ESGMT,      ESMCV3,     ESMCV
PARAMETER(      ESLMT=75,   ESGMT3=76,  ESGMT=77,   ESMCV3=78,  ESMCV=79 )
INTEGER         ESMCLI,     ERMCV,      ESVWI,      ESVWR3,     ESVWR
PARAMETER(      ESMCLI=80,  ERMCV=81,   ESVWI=82,   ESVWR3=83,  ESVWR=84 )
INTEGER         ESVTIP,     ESWKW3,     ESWKW,      ESWKV3,     ESWKV
PARAMETER(      ESVTIP=85,  ESWKW3=86,  ESWKW=87,   ESWKV3=88,  ESWKV=89 )
INTEGER         EOPST,      ECLST,      EEXST,      ELB,        EAP
PARAMETER(      EOPST=90,   ECLST=91,   EEXST=92,   ELB=93,     EAP=94 )
INTEGER         EGSE,       ESEDM,      ECELST,     ESEP,       EOSEP
PARAMETER(      EGSE=95,    ESEDM=96,   ECELST=97,  ESEP=98,    EOSEP=99 )
INTEGER         ESEPLB,     EDEL,       EDELRA,     EDELLB,     EEMST
PARAMETER(      ESEPLB=100, EDEL=101,   EDELRA=102, EDELLB=103, EEMST=104 )
INTEGER         EDST,       EDSN,       EDAS,       ECSTID,     ECSTRF
PARAMETER(      EDST=105,   EDSN=106,   EDAS=107,   ECSTID=108, ECSTRF=109 )
```


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Enumeration types

```
INTEGER      ECSTIR,     EPOST,      EUPOST,     EUPAST,     EOPARF
 PARAMETER(  ECSTIR=110, EPOST=111,  EUPOST=112, EUPAST=113, EOPARF=114 )
 INTEGER     ECLARF,     EARST,      EARSN,      EARAST,     ESCNRS
 PARAMETER(  ECLARF=115, EARST=116,  EARSN=117,  EARAST=118, ESCNRS=119 )
 INTEGER     ERSID,      EREST,      ERESN,      ERAST,      EREPAN
 PARAMETER(  ERSID=120,  EREST=121,  ERESN=122,  ERAST=123,  EREPAN=124 )
 INTEGER     EREPDE,     EDSTAR,     EDSNAR,     EDASAR,     ESPKID
 PARAMETER(  EREPDE=125, EDSTAR=126, EDSNAR=127, EDASAR=128, ESPKID=129 )
 INTEGER     ESPKFT,     EINLC3,     EINLC,      EINSK3,     EINSK
 PARAMETER(  ESPKFT=130, EINLC3=131, EINLC=132,  EINSK3=133, EINSK=134 )
 INTEGER     EINVL3,     EINVL,      EINCH3,     EINCH,      EINPK3
 PARAMETER(  EINVL3=135, EINVL=136,  EINCH3=137, EINCH=138,  EINPK3=139 )
 INTEGER     EINPK,      EINST3,     EINST,      ESLCM,      ESSKM
 PARAMETER(  EINPK=140,  EINST3=141, EINST=142,  ESLCM=143,  ESSKM=144 )
 INTEGER     ESVLM,      ESCHM,      ESPKM,      ESSTM,      ERQLC3
 PARAMETER(  ESVLM=145,  ESCHM=146,  ESPKM=147,  ESSTM=148,  ERQLC3=149 )
 INTEGER     ERQLC,      ERQSK3,     ERQSK,      ERQVL,      ERQCH
 PARAMETER(  ERQLC=150,  ERQSK3=151, ERQSK=152,  ERQVL=153,  ERQCH=154 )
 INTEGER     ERQPK,      ERQST,      ESMLC3,     ESMLC,      ESMSK3
 PARAMETER(  ERQPK=155,  ERQST=156,  ESMLC3=157, ESMLC=158,  ESMSK3=159 )
 INTEGER     ESMSK,      ESMVL,      ESMCH,      ESMPK,      ESMST
 PARAMETER(  ESMSK=160,  ESMVL=161,  ESMCH=162,  ESMPK=163,  ESMST=164 )
 INTEGER     EWAIT,      EFLUSH,     EGTLC3,     EGTLC,      EGTSK3
 PARAMETER(  EWAIT=165,  EFLUSH=166, EGTLC3=167, EGTLC=168,  EGTSK3=169 )
 INTEGER     EGTSK,      EGTVL,      EGTCH,      EGTPK,      EGTST
 PARAMETER(  EGTSK=170,  EGTVL=171,  EGTCH=172,  EGTPK=173,  EGTST=174 )
 INTEGER     EWITM,      EGTITM,     ERDITM,     EIITM,      ESERHM
 PARAMETER(  EWITM=175,  EGTITM=176, ERDITM=177, EIITM=178,  ESERHM=179 )
 INTEGER     EESC,       EPREC,      EUREC
 PARAMETER(  EESC=180,   EPREC=181,  EUREC=182 )
```


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7 List of the PHIGS function names

The complete list of PHIGS function names follows. PACK DATA RECORD and UNPACK DATA RECORD do not appear in ISO/IEC 9592-1, but have been created for this binding

7.1 List of functions ordered alphabetically by bound name

PADS	AD-S	ADD NAMES TO SET
PAP	AP	APPLICATION DATA
PARAST	ARA-ST	ARCHIVE ALL STRUCTURES
PARSN	AR-SN	ARCHIVE STRUCTURE NETWORKS
PARST	AR-ST	ARCHIVE STRUCTURES
PATR	ATR	ANNOTATION TEXT RELATIVE
PATR3	ATR-3	ANNOTATION TEXT RELATIVE 3
PATR3S	ATR-3-S	ANNOTATION TEXT RELATIVE 3 (FORTRAN 77 subset)
PATRS	ATR-S	ANNOTATION TEXT RELATIVE (FORTRAN 77 subset)
PBLTM	BL-T-M	BUILD TRANSFORMATION MATRIX
PBLTM3	BL-T-M-3	BUILD TRANSFORMATION MATRIX 3
PCA	C-A	CELL ARRAY
PCA3	C-A-3	CELL ARRAY 3
PCELST	C-EL-ST	COPY ALL ELEMENTS FROM STRUCTURE
PCLARF	CL-AR-F	CLOSE ARCHIVE FILE
PCLPH	CL-PH	CLOSE PHIGS
PCLST	CL-ST	CLOSE STRUCTURE
PCLWK	CL-WK	CLOSE WORKSTATION
PCOM	CO-M	COMPOSE MATRIX
PCOM3	CO-M-3	COMPOSE MATRIX 3
PCOTM	CO-T-M	COMPOSE TRANSFORMATION MATRIX
PCOTM3	CO-T-M-3	COMPOSE TRANSFORMATION MATRIX 3
PCSTID	CSTID	CHANGE STRUCTURE IDENTIFIER
PCSTIR	C-ST-IR	CHANGE STRUCTURE IDENTIFIER AND REFERENCES
PCSTRF	C-ST-RF	CHANGE STRUCTURE REFERENCES
PDAS	DAS	DELETE ALL STRUCTURES
PDASAR	DAS-AR	DELETE ALL STRUCTURES FROM ARCHIVE
PDEL	D-EL	DELETE ELEMENT
PDELLB	D-EL-LB	DELETE ELEMENTS BETWEEN LABELS
PDELRA	D-EL-RA	DELETE ELEMENT RANGE
PDSN	D-SN	DELETE STRUCTURE NETWORK
PDSNAR	D-SN-AR	DELETE STRUCTURE NETWORKS FROM ARCHIVE
PDST	D-ST	DELETE STRUCTURE
PDSTAR	D-ST-AR	DELETE STRUCTURES FROM ARCHIVE
PECLPH	E-CL-PH	EMERGENCY CLOSE PHIGS
PELS	EL-S	ELEMENT SEARCH
PEMST	EM-ST	EMPTY STRUCTURE
PERHND	ER-HND	ERROR HANDLING
PERLOG	ER-LOG	ERROR LOGGING
PESC	ESC	ESCAPE
PEVMM	EVMM	EVALUATE VIEW MAPPING MATRIX
PEVMM3	EVMM-3	EVALUATE VIEW MAPPING MATRIX 3
PEVOM	EVOM	EVALUATE VIEW ORIENTATION MATRIX
PEVOM3	EVOM-3	EVALUATE VIEW ORIENTATION MATRIX 3
PEXST	EX-ST	EXECUTE STRUCTURE
PFA	F-A	FILL AREA
PFA3	F-A-3	FILL AREA 3
PFAS	F-A-S	FILL AREA SET
PFAS3	F-A-S-3	FILL AREA SET 3
PFLUSH	FLUSH	FLUSH DEVICE EVENTS
PGDP	G-D-P	GENERALIZED DRAWING PRIMITIVE
PGDP3	G-D-P-3	GENERALIZED DRAWING PRIMITIVE 3
PGSE	GSE	GENERALIZED STRUCTURE ELEMENT

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List of the PHIGS function names		List of functions ordered alphabetically by bound name
PGTCH	GT-CH	GET CHOICE
PGTITM	GT-ITM	GET ITEM TYPE FROM METAFILE
PGTLC	GT-LC	GET LOCATOR
PGTLC3	GT-LC-3	GET LOCATOR 3
PGTPK	GT-PK	GET PICK
PGTSK	GT-SK	GET STROKE
PGTSK3	GT-SK-3	GET STROKE 3
PGTST	GT-ST	GET STRING
PGTVL	GT-VL	GET VALUATOR
PIITM	I-ITM	INTERPRET ITEM
PINCH	IN-CH	INITIALIZE CHOICE
PINCH3	IN-CH-3	INITIALIZE CHOICE 3
PINLC	IN-LC	INITIALIZE LOCATOR
PINLC3	IN-LC-3	INITIALIZE LOCATOR 3
PINPK	IN-PK	INITIALIZE PICK
PINPK3	IN-PK-3	INITIALIZE PICK 3
PINSK	IN-SK	INITIALIZE STROKE
PINSK3	IN-SK-3	INITIALIZE STROKE 3
PINST	IN-ST	INITIALIZE STRING
PINST3	IN-ST-3	INITIALIZE STRING 3
PINVL	IN-VL	INITIALIZE VALUATOR
PINVL3	IN-VL-3	INITIALIZE VALUATOR 3
PISS	I-S-S	INCREMENTAL SPATIAL SEARCH
PISS3	I-S-S-3	INCREMENTAL SPATIAL SEARCH 3
PLB	LB	LABEL
PMSG	MSG	MESSAGE
PMSGS	MSG-S	MESSAGE (FORTRAN 77 subset)
POPARF	OP-AR-F	OPEN ARCHIVE FILE
POPPH	OP-PH	OPEN PHIGS
POPST	OP-ST	OPEN STRUCTURE
POPWK	OP-WK	OPEN WORKSTATION
POSEP	OS-EP	OFFSET ELEMENT POINTER
PPL	PL	POLYLINE
PPL3	PL-3	POLYLINE 3
PPM	PM	POLYMARKER
PPM3	PM-3	POLYMARKER 3
PPOST	PO-ST	POST STRUCTURE
PPREC	P-REC	PACK DATA RECORD
PQANF	Q-AN-F	INQUIRE ANNOTATION FACILITIES
PQARF	Q-AR-F	INQUIRE ARCHIVE FILES
PQARS	Q-AR-S	INQUIRE ARCHIVE STATE VALUE
PQCECO	Q-C-ECO	INQUIRE CURRENT ELEMENT CONTENT
PQCETS	Q-C-ETS	INQUIRE CURRENT ELEMENT TYPE AND SIZE
PQCF	Q-C-F	INQUIRE COLOUR FACILITIES
PQCHS	Q-CH-S	INQUIRE CHOICE DEVICE STATE
PQCHS3	Q-CH-S-3	INQUIRE CHOICE DEVICE STATE 3
PQCMD	Q-C-MD	INQUIRE COLOUR MODEL
PQCMDF	Q-C-MD-F	INQUIRE COLOUR MODEL FACILITIES
PQCNRS	Q-CN-RS	INQUIRE CONFLICT RESOLUTION
PQCR	Q-C-R	INQUIRE COLOUR REPRESENTATION
PQCST	Q-C-ST	INQUIRE ALL CONFLICTING STRUCTURES
PQCSTN	Q-C-ST-N	INQUIRE CONFLICTING STRUCTURES IN NETWORK
PQDCH	Q-D-CH	INQUIRE DEFAULT CHOICE DEVICE DATA
PQDCH3	Q-D-CH-3	INQUIRE DEFAULT CHOICE DEVICE DATA 3
PQDDUS	Q-D-D-U-S	INQUIRE DEFAULT DISPLAY UPDATE STATE
PQDLC	Q-D-LC	INQUIRE DEFAULT LOCATOR DEVICE DATA
PQDLC3	Q-D-LC-3	INQUIRE DEFAULT LOCATOR DEVICE DATA 3
PQDP	Q-D-P	INQUIRE NUMBER OF DISPLAY PRIORITIES SUPPORTED
PQDPK	Q-D-PK	INQUIRE DEFAULT PICK DEVICE DATA
PQDPK3	Q-D-PK-3	INQUIRE DEFAULT PICK DEVICE DATA 3
PQDSK	Q-D-SK	INQUIRE DEFAULT STROKE DEVICE DATA
PQDSK3	Q-D-SK-3	INQUIRE DEFAULT STROKE DEVICE DATA 3

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List of functions ordered alphabetically by bound name **List of the PHIGS function names**

PQDSP	Q-D-SP	INQUIRE DISPLAY SPACE SIZE
PQDSP3	Q-D-SP-3	INQUIRE DISPLAY SPACE SIZE 3
PQDST	Q-D-ST	INQUIRE DEFAULT STRING DEVICE DATA
PQDST3	Q-D-ST-3	INQUIRE DEFAULT STRING DEVICE DATA 3
PQDSTR	Q-DSTR	INQUIRE DYNAMICS OF STRUCTURES
PQDSWA	Q-DSWA	INQUIRE DYNAMICS OF WORKSTATION ATTRIBUTES
PQDUS	Q-D-U-S	INQUIRE DISPLAY UPDATE STATE
PQDVL	Q-D-VL	INQUIRE DEFAULT VALUATOR DEVICE DATA
PQDVL3	Q-D-VL-3	INQUIRE DEFAULT VALUATOR DEVICE DATA 3
PQECI	Q-E-C-I	INQUIRE LIST OF COLOUR INDICES
PQECO	Q-ECO	INQUIRE ELEMENT CONTENT
PQEDF	Q-ED-F	INQUIRE EDGE FACILITIES
PQEDM	Q-ED-M	INQUIRE EDIT MODE
PQEDR	Q-ED-R	INQUIRE EDGE REPRESENTATION
PQEEDI	Q-E-ED-I	INQUIRE LIST OF EDGE INDICES
PQEGD3	Q-EGD3	INQUIRE LIST OF AVAILABLE GENERALIZED DRAWING PRIMITIVES 3
PQEGDP	Q-E-G-D-P	INQUIRE LIST OF AVAILABLE GENERALIZED DRAWING PRIMITIVES
PQEGSE	Q-E-GSE	INQUIRE LIST OF AVAILABLE GENERALIZED STRUCTURE ELEMENTS
PQEII	Q-E-I-I	INQUIRE LIST OF INTERIOR INDICES
PQEP	Q-EP	INQUIRE ELEMENT POINTER
PQEPAI	Q-E-PA-I	INQUIRE LIST OF PATTERN INDICES
PQEPLI	Q-E-PL-I	INQUIRE LIST OF POLYLINE INDICES
PQEPMI	Q-E-PM-I	INQUIRE LIST OF POLYMARKER INDICES
PQERHM	Q-ERHM	INQUIRE ERROR HANDLING MODE
PQETS	Q-ETS	INQUIRE ELEMENT TYPE AND SIZE
PQETXI	Q-E-TX-I	INQUIRE LIST OF TEXT INDICES
PQEVWI	Q-E-VW-I	INQUIRE LIST OF VIEW INDICES
PQEWK	Q-E-WK	INQUIRE LIST OF AVAILABLE WORKSTATION TYPES
PQGDP	Q-G-D-P	INQUIRE GENERALIZED DRAWING PRIMITIVE
PQGDP3	Q-G-D-P-3	INQUIRE GENERALIZED DRAWING PRIMITIVE 3
PQGSEF	Q-GSE-F	INQUIRE GENERALIZED STRUCTURE ELEMENT FACILITIES
PQHLFT	Q-HL-FT	INQUIRE HIGHLIGHTING FILTER
PQHRIF	Q-HR-I-F	INQUIRE HLHSR (IDENTIFIER) FACILITIES
PQHRM	Q-HR-M	INQUIRE HLHSR MODE
PQHRMF	Q-HR-M-F	INQUIRE HLHSR (MODE) FACILITIES
PQIF	Q-I-F	INQUIRE INTERIOR FACILITIES
PQIQOV	Q-I-Q-OV	INQUIRE INPUT QUEUE OVERFLOW
PQIR	Q-I-R	INQUIRE INTERIOR REPRESENTATION
PQIVFT	Q-IV-FT	INQUIRE INVISIBILITY FILTER
PQLCS	Q-LC-S	INQUIRE LOCATOR DEVICE STATE
PQLCS3	Q-LC-S-3	INQUIRE LOCATOR DEVICE STATE 3
PQLI	Q-L-I	INQUIRE NUMBER OF AVAILABLE LOGICAL INPUT DEVICES
PQMCLF	Q-MCL-F	INQUIRE MODELLING CLIPPING FACILITIES
PQOPST	Q-OP-ST	INQUIRE OPEN STRUCTURE
PQOPWK	Q-OP-WK	INQUIRE SET OF OPEN WORKSTATIONS
PQPAF	Q-PA-F	INQUIRE PATTERN FACILITIES
PQPAN	Q-P-AN	INQUIRE PATHS TO ANCESTORS
PQPAR	Q-PA-R	INQUIRE PATTERN REPRESENTATION
PQPCR	Q-P-C-R	INQUIRE PREDEFINED COLOUR REPRESENTATION
PQPDE	Q-P-DE	INQUIRE PATHS TO DESCENDANTS
PQPEDR	Q-P-ED-R	INQUIRE PREDEFINED EDGE REPRESENTATION
PQPHF	Q-PH-F	INQUIRE PHIGS FACILITIES
PQPIR	Q-P-I-R	INQUIRE PREDEFINED INTERIOR REPRESENTATION
PQPKS	Q-PK-S	INQUIRE PICK DEVICE STATE
PQPKS3	Q-PK-S-3	INQUIRE PICK DEVICE STATE 3
PQPLF	Q-PL-F	INQUIRE POLYLINE FACILITIES
PQPLR	Q-PL-R	INQUIRE POLYLINE REPRESENTATION
PQPMF	Q-PM-F	INQUIRE POLYMARKER FACILITIES
PQPMR	Q-PM-R	INQUIRE POLYMARKER REPRESENTATION
PQPOST	Q-PO-ST	INQUIRE POSTED STRUCTURES
PQPPAR	Q-P-PA-R	INQUIRE PREDEFINED PATTERN REPRESENTATION
PQPPLR	Q-P-PL-R	INQUIRE PREDEFINED POLYLINE REPRESENTATION

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PQPPMR	Q-P-PM-R	INQUIRE PREDEFINED POLYMARKER REPRESENTATION
PQPTXR	Q-P-TX-R	INQUIRE PREDEFINED TEXT REPRESENTATION
PQPVWR	Q-P-VW-R	INQUIRE PREDEFINED VIEW REPRESENTATION
PQSID	Q-SID	INQUIRE STRUCTURE IDENTIFIERS
PQSIM	Q-SIM	INQUIRE MORE SIMULTANEOUS EVENTS
PQSKS	Q-SK-S	INQUIRE STROKE DEVICE STATE
PQSKS3	Q-SK-S-3	INQUIRE STROKE DEVICE STATE 3
PQSTRS	Q-STRS	INQUIRE STRUCTURE STATE VALUE
PQSTS	Q-ST-S	INQUIRE STRING DEVICE STATE
PQSTS3	Q-ST-S-3	INQUIRE STRING DEVICE STATE 3
PQSTST	Q-ST-ST	INQUIRE STRUCTURE STATUS
PQSYS	Q-SY-S	INQUIRE SYSTEM STATE VALUE
PQTXF	Q-TX-F	INQUIRE TEXT FACILITIES
PQTXR	Q-TX-R	INQUIRE TEXT REPRESENTATION
PQTXX	Q-TX-X	INQUIRE TEXT EXTENT
PQTXXS	Q-TX-X-S	INQUIRE TEXT EXTENT (FORTRAN 77 subset)
PQVLS	Q-VL-S	INQUIRE VALUATOR DEVICE STATE
PQVLS3	Q-VL-S-3	INQUIRE VALUATOR DEVICE STATE 3
PQVWF	Q-VW-F	INQUIRE VIEW FACILITIES
PQVWR	Q-VW-R	INQUIRE VIEW REPRESENTATION
PQWKC	Q-WK-C	INQUIRE WORKSTATION CONNECTION AND TYPE
PQWKCA	Q-WK-CA	INQUIRE WORKSTATION CATEGORY
PQWKCL	Q-WK-CL	INQUIRE WORKSTATION CLASSIFICATION
PQWKPO	Q-WK-PO	INQUIRE SET OF WORKSTATIONS TO WHICH POSTED
PQWKSL	Q-WK-S-L	INQUIRE WORKSTATION STATE TABLE LENGTHS
PQWKST	Q-WKST	INQUIRE WORKSTATION STATE VALUE
PQWKT	Q-WK-T	INQUIRE WORKSTATION TRANSFORMATION
PQWKT3	Q-WK-T-3	INQUIRE WORKSTATION TRANSFORMATION 3
PRAST	RA-ST	RETRIEVE ALL STRUCTURES
PRDITM	RD-ITM	READ ITEM FROM METAFILE
PREPAN	RE-P-AN	RETRIEVE PATHS TO ANCESTORS
PREPDE	RE-P-DE	RETRIEVE PATHS TO DESCENDANTS
PRES	RE-S	REMOVE NAMES FROM SET
PRESN	RE-SN	RETRIEVE STRUCTURE NETWORKS
PREST	RE-ST	RETRIEVE STRUCTURES
PRMCV	R-MCV	RESTORE MODELLING CLIPPING VOLUME
PRO	RO	ROTATE
PROX	RO-X	ROTATE X
PROY	RO-Y	ROTATE Y
PROZ	RO-Z	ROTATE Z
PRQCH	RQ-CH	REQUEST CHOICE
PRQLC	RQ-LC	REQUEST LOCATOR
PRQLC3	RQ-LC-3	REQUEST LOCATOR 3
PRQPK	RQ-PK	REQUEST PICK
PRQSK	RQ-SK	REQUEST STROKE
PRQSK3	RQ-SK-3	REQUEST STROKE 3
PRQST	RQ-ST	REQUEST STRING
PRQVL	RQ-VL	REQUEST VALUATOR
PRSID	RSID	RETRIEVE STRUCTURE IDENTIFIERS
PRST	R-ST	REDRAW ALL STRUCTURES
PSANS	S-AN-S	SET ANNOTATION STYLE
PSATAL	SAT-AL	SET ANNOTATION TEXT ALIGNMENT
PSATCH	S-ATCH	SET ANNOTATION TEXT CHARACTER HEIGHT
PSATCU	S-ATCU	SET ANNOTATION TEXT CHARACTER UP VECTOR
PSATP	SAT-P	SET ANNOTATION TEXT PATH
PSC	SC	SCALE
PSC3	SC-3	SCALE 3
PSCHH	S-CH-H	SET CHARACTER HEIGHT
PSCHM	S-CH-M	SET CHOICE MODE
PSCHSP	S-CH-SP	SET CHARACTER SPACING
PSCHUP	S-CH-UP	SET CHARACTER UP VECTOR
PSCHXP	S-CH-XP	SET CHARACTER EXPANSION FACTOR

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PSCMD	S-C-MD	SET COLOUR MODEL
PSCNRS	S-CN-RS	SET CONFLICT RESOLUTION
PSCR	S-C-R	SET COLOUR REPRESENTATION
PSDUS	S-D-U-S	SET DISPLAY UPDATE STATE
PSEDCI	S-EDCI	SET EDGE COLOUR INDEX
PSEDFG	S-EDFG	SET EDGE FLAG
PSEDI	S-ED-I	SET EDGE INDEX
PSEDM	S-ED-M	SET EDIT MODE
PSEDR	S-ED-R	SET EDGE REPRESENTATION
PSEDT	S-EDT	SET EDGETYPE
PSEP	S-EP	SET ELEMENT POINTER
PSEPLB	S-EP-LB	SET ELEMENT POINTER AT LABEL
PSERHM	S-ERHM	SET ERROR HANDLING MODE
PSEWSC	S-EW-SC	SET EDGEWIDTH SCALE FACTOR
PSGMT	S-GM-T	SET GLOBAL TRANSFORMATION
PSGMT3	S-GM-T-3	SET GLOBAL TRANSFORMATION 3
PSHLFT	S-HL-FT	SET HIGHLIGHTING FILTER
PSHRID	S-HR-ID	SET HLHSR IDENTIFIER
PSHRM	S-HR-M	SET HLHSR MODE
PSIASF	S-IASF	SET INDIVIDUAL ASF
PSICI	S-I-C-I	SET INTERIOR COLOUR INDEX
PSII	S-I-I	SET INTERIOR INDEX
PSIR	S-I-R	SET INTERIOR REPRESENTATION
PSIS	S-I-S	SET INTERIOR STYLE
PSISI	S-I-S-I	SET INTERIOR STYLE INDEX
PSIVFT	S-IV-FT	SET INVISIBILITY FILTER
PSLCM	S-LC-M	SET LOCATOR MODE
PSLMT	S-LM-T	SET LOCAL TRANSFORMATION
PSLMT3	S-LM-T-3	SET LOCAL TRANSFORMATION 3
PSLN	S-LN	SET LINETYPE
PSLWSC	S-LW-SC	SET LINEWIDTH SCALE FACTOR
PSMCH	SM-CH	SAMPLE CHOICE
PSMCLI	S-MCL-I	SET MODELLING CLIPPING INDICATOR
PSMCV	S-MCV	SET MODELLING CLIPPING VOLUME
PSMCV3	S-MCV-3	SET MODELLING CLIPPING VOLUME 3
PSMK	S-MK	SET MARKER TYPE
PSMKSC	S-MK-SC	SET MARKER SIZE SCALE FACTOR
PSMLC	SM-LC	SAMPLE LOCATOR
PSMLC3	SM-LC-3	SAMPLE LOCATOR 3
PSMPK	SM-PK	SAMPLE PICK
PSMSK	SM-SK	SAMPLE STROKE
PSMSK3	SM-SK-3	SAMPLE STROKE 3
PSMST	SM-ST	SAMPLE STRING
PSMVL	SM-VL	SAMPLE VALUATOR
PSPA	S-PA	SET PATTERN SIZE
PSPAR	S-PA-R	SET PATTERN REPRESENTATION
PSPARF	S-PARF	SET PATTERN REFERENCE POINT
PSPKFT	S-PK-FT	SET PICK FILTER
PSPKID	S-PK-ID	SET PICK IDENTIFIER
PSPKM	S-PK-M	SET PICK MODE
PSPLCI	S-PL-C-I	SET POLYLINE COLOUR INDEX
PSPLI	S-PL-I	SET POLYLINE INDEX
PSPLR	S-PL-R	SET POLYLINE REPRESENTATION
PSPMCI	S-PM-C-I	SET POLYMARKER COLOUR INDEX
PSPMI	S-PM-I	SET POLYMARKER INDEX
PSPMR	S-PM-R	SET POLYMARKER REPRESENTATION
PSPRPV	S-PRPV	SET PATTERN REFERENCE POINT AND VECTORS
PSSKM	S-SK-M	SET STROKE MODE
PSSTM	S-ST-M	SET STRING MODE
PSTXAL	S-TX-AL	SET TEXT ALIGNMENT
PSTXCI	S-TX-C-I	SET TEXT COLOUR INDEX
PSTXFN	S-TXFN	SET TEXT FONT

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List of the PHIGS function names		List of functions ordered alphabetically by bound name
PSTXI	S-TX-I	SET TEXT INDEX
PSTXP	S-TX-P	SET TEXT PATH
PSTXPR	S-TX-PR	SET TEXT PRECISION
PSTXR	S-TX-R	SET TEXT REPRESENTATION
PSVLM	S-VL-M	SET VALUATOR MODE
PSVTIP	S-VT-I-P	SET VIEW TRANSFORMATION INPUT PRIORITY
PSVWI	S-VW-I	SET VIEW INDEX
PSVWR	S-VW-R	SET VIEW REPRESENTATION
PSVWR3	S-VW-R-3	SET VIEW REPRESENTATION 3
PSWKV	S-WK-V	SET WORKSTATION VIEWPORT
PSWKV3	S-WK-V-3	SET WORKSTATION VIEWPORT 3
PSWKW	S-WK-W	SET WORKSTATION WINDOW
PSWKW3	S-WK-W-3	SET WORKSTATION WINDOW 3
PTP	TP	TRANSFORM POINT
PTP3	TP-3	TRANSFORM POINT 3
PTR	TR	TRANSLATE
PTR3	TR-3	TRANSLATE 3
PTX	TX	TEXT
PTX3	TX-3	TEXT 3
PTX3S	TX-3-S	TEXT 3 (FORTRAN 77 subset)
PTXS	TX-S	TEXT (FORTRAN 77 subset)
PUPAST	UPA-ST	UNPOST ALL STRUCTURES
PUPOST	UPO-ST	UNPOST STRUCTURE
PUREC	U-REC	UNPACK DATA RECORD
PUWK	U-WK	UPDATE WORKSTATION
PWAIT	WAIT	AWAIT EVENT
PWITM	W-ITM	WRITE ITEM TO METAFILE

7.2 List of functions ordered alphabetically by PHIGS function name

PADS	AD-S	ADD NAMES TO SET
PATR	ATR	ANNOTATION TEXT RELATIVE
PATRS	ATR-S	ANNOTATION TEXT RELATIVE (FORTRAN 77 subset)
PATR3	ATR-3	ANNOTATION TEXT RELATIVE 3
PATR3S	ATR-3-S	ANNOTATION TEXT RELATIVE 3 (FORTRAN 77 subset)
PAP	AP	APPLICATION DATA
PARAST	ARA-ST	ARCHIVE ALL STRUCTURES
PARSN	AR-SN	ARCHIVE STRUCTURE NETWORKS
PARST	AR-ST	ARCHIVE STRUCTURES
PWAIT	WAIT	AWAIT EVENT
PBLTM	BL-T-M	BUILD TRANSFORMATION MATRIX
PBLTM3	BL-T-M-3	BUILD TRANSFORMATION MATRIX 3
PCA	C-A	CELL ARRAY
PCA3	C-A-3	CELL ARRAY 3
PCSTID	CSTID	CHANGE STRUCTURE IDENTIFIER
PCSTIR	C-ST-IR	CHANGE STRUCTURE IDENTIFIER AND REFERENCES
PCSTRF	C-ST-RF	CHANGE STRUCTURE REFERENCES
PCLARF	CL-AR-F	CLOSE ARCHIVE FILE
PCLPH	CL-PH	CLOSE PHIGS
PCLST	CL-ST	CLOSE STRUCTURE
PCLWK	CL-WK	CLOSE WORKSTATION
PCOM	CO-M	COMPOSE MATRIX
PCOM3	CO-M-3	COMPOSE MATRIX 3
PCOTM	CO-T-M	COMPOSE TRANSFORMATION MATRIX
PCOTM3	CO-T-M-3	COMPOSE TRANSFORMATION MATRIX 3
PCELST	C-EL-ST	COPY ALL ELEMENTS FROM STRUCTURE
PDAS	DAS	DELETE ALL STRUCTURES
PDASAR	DAS-AR	DELETE ALL STRUCTURES FROM ARCHIVE
PDEL	D-EL	DELETE ELEMENT
PDELRA	D-EL-RA	DELETE ELEMENT RANGE
PDELLB	D-EL-LB	DELETE ELEMENTS BETWEEN LABELS
PDST	D-ST	DELETE STRUCTURE
PDSN	D-SN	DELETE STRUCTURE NETWORK

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List of functions ordered alphabetically by PHIGS function name **List of the PHIGS function names**

PDSNAR	D-SN-AR	DELETE STRUCTURE NETWORKS FROM ARCHIVE
PDSTAR	D-ST-AR	DELETE STRUCTURES FROM ARCHIVE
PELS	EL-S	ELEMENT SEARCH
PECLPH	E-CL-PH	EMERGENCY CLOSE PHIGS
PEMST	EM-ST	EMPTY STRUCTURE
PERHND	ER-HND	ERROR HANDLING
PERLOG	ER-LOG	ERROR LOGGING
PESC	ESC	ESCAPE
PEVMM	EVMM	EVALUATE VIEW MAPPING MATRIX
PEVMM3	EVMM-3	EVALUATE VIEW MAPPING MATRIX 3
PEVOM	EVOM	EVALUATE VIEW ORIENTATION MATRIX
PEVOM3	EVOM-3	EVALUATE VIEW ORIENTATION MATRIX 3
PEXST	EX-ST	EXECUTE STRUCTURE
PFA	F-A	FILL AREA
PFA3	F-A-3	FILL AREA 3
PFAS	F-A-S	FILL AREA SET
PFAS3	F-A-S-3	FILL AREA SET 3
PFLUSH	FLUSH	FLUSH DEVICE EVENTS
PGDP	G-D-P	GENERALIZED DRAWING PRIMITIVE
PGDP3	G-D-P-3	GENERALIZED DRAWING PRIMITIVE 3
PGSE	GSE	GENERALIZED STRUCTURE ELEMENT
PGTCH	GT-CH	GET CHOICE
PGTITM	GT-ITM	GET ITEM TYPE FROM METAFILE
PGTLC	GT-LC	GET LOCATOR
PGTLC3	GT-LC-3	GET LOCATOR 3
PGTPK	GT-PK	GET PICK
PGTST	GT-ST	GET STRING
PGTSK	GT-SK	GET STROKE
PGTSK3	GT-SK-3	GET STROKE 3
PGTVL	GT-VL	GET VALUATOR
PISS	I-S-S	INCREMENTAL SPATIAL SEARCH
PISS3	I-S-S-3	INCREMENTAL SPATIAL SEARCH 3
PINCH	IN-CH	INITIALIZE CHOICE
PINCH3	IN-CH-3	INITIALIZE CHOICE 3
PINLC	IN-LC	INITIALIZE LOCATOR
PINLC3	IN-LC-3	INITIALIZE LOCATOR 3
PINPK	IN-PK	INITIALIZE PICK
PINPK3	IN-PK-3	INITIALIZE PICK 3
PINST	IN-ST	INITIALIZE STRING
PINST3	IN-ST-3	INITIALIZE STRING 3
PINSK	IN-SK	INITIALIZE STROKE
PINSK3	IN-SK-3	INITIALIZE STROKE 3
PINVL	IN-VL	INITIALIZE VALUATOR
PINVL3	IN-VL-3	INITIALIZE VALUATOR 3
PQCST	Q-C-ST	INQUIRE ALL CONFLICTING STRUCTURES
PQANF	Q-AN-F	INQUIRE ANNOTATION FACILITIES
PQARF	Q-AR-F	INQUIRE ARCHIVE FILES
PQARS	Q-AR-S	INQUIRE ARCHIVE STATE VALUE
PQCHS	Q-CH-S	INQUIRE CHOICE DEVICE STATE
PQCHS3	Q-CH-S-3	INQUIRE CHOICE DEVICE STATE 3
PQCF	Q-C-F	INQUIRE COLOUR FACILITIES
PQCMD	Q-C-MD	INQUIRE COLOUR MODEL
PQCMDF	Q-C-MD-F	INQUIRE COLOUR MODEL FACILITIES
PQCR	Q-C-R	INQUIRE COLOUR REPRESENTATION
PQCNRS	Q-CN-RS	INQUIRE CONFLICT RESOLUTION
PQCSTN	Q-C-ST-N	INQUIRE CONFLICTING STRUCTURES IN NETWORK
PQCECO	Q-C-ECO	INQUIRE CURRENT ELEMENT CONTENT
PQCETS	Q-C-ETS	INQUIRE CURRENT ELEMENT TYPE AND SIZE
PQDCH	Q-D-CH	INQUIRE DEFAULT CHOICE DEVICE DATA
PQDCH3	Q-D-CH-3	INQUIRE DEFAULT CHOICE DEVICE DATA 3
PQDDUS	Q-D-D-U-S	INQUIRE DEFAULT DISPLAY UPDATE STATE
PQDLC	Q-D-LC	INQUIRE DEFAULT LOCATOR DEVICE DATA

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PQDLC3	Q-D-LC-3	INQUIRE DEFAULT LOCATOR DEVICE DATA 3
PQDPK	Q-D-PK	INQUIRE DEFAULT PICK DEVICE DATA
PQDPK3	Q-D-PK-3	INQUIRE DEFAULT PICK DEVICE DATA 3
PQDST	Q-D-ST	INQUIRE DEFAULT STRING DEVICE DATA
PQDST3	Q-D-ST-3	INQUIRE DEFAULT STRING DEVICE DATA 3
PQDSK	Q-D-SK	INQUIRE DEFAULT STROKE DEVICE DATA
PQDSK3	Q-D-SK-3	INQUIRE DEFAULT STROKE DEVICE DATA 3
PQDVL	Q-D-VL	INQUIRE DEFAULT VALUATOR DEVICE DATA
PQDVL3	Q-D-VL-3	INQUIRE DEFAULT VALUATOR DEVICE DATA 3
PQDSP	Q-D-SP	INQUIRE DISPLAY SPACE SIZE
PQDSP3	Q-D-SP-3	INQUIRE DISPLAY SPACE SIZE 3
PQDUS	Q-D-U-S	INQUIRE DISPLAY UPDATE STATE
PQDSTR	Q-DSTR	INQUIRE DYNAMICS OF STRUCTURES
PQDSWA	Q-DSWA	INQUIRE DYNAMICS OF WORKSTATION ATTRIBUTES
PQEDF	Q-ED-F	INQUIRE EDGE FACILITIES
PQEDR	Q-ED-R	INQUIRE EDGE REPRESENTATION
PQEDM	Q-ED-M	INQUIRE EDIT MODE
PQECO	Q-ECO	INQUIRE ELEMENT CONTENT
PQEP	Q-EP	INQUIRE ELEMENT POINTER
PQETS	Q-ETS	INQUIRE ELEMENT TYPE AND SIZE
PQERHM	Q-ERHM	INQUIRE ERROR HANDLING MODE
PQGDP	Q-G-D-P	INQUIRE GENERALIZED DRAWING PRIMITIVE
PQGDP3	Q-G-D-P-3	INQUIRE GENERALIZED DRAWING PRIMITIVE 3
PQGSEF	Q-GSE-F	INQUIRE GENERALIZED STRUCTURE ELEMENT FACILITIES
PQHLFT	Q-HL-FT	INQUIRE HIGHLIGHTING FILTER
PQHRIF	Q-HR-I-F	INQUIRE HLHSR (IDENTIFIER) FACILITIES
PQHRMF	Q-HR-M-F	INQUIRE HLHSR (MODE) FACILITIES
PQHRM	Q-HR-M	INQUIRE HLHSR MODE
PQIQOV	Q-I-Q-OV	INQUIRE INPUT QUEUE OVERFLOW
PQIF	Q-I-F	INQUIRE INTERIOR FACILITIES
PQIR	Q-I-R	INQUIRE INTERIOR REPRESENTATION
PQIVFT	Q-IV-FT	INQUIRE INVISIBILITY FILTER
PQEGDP	Q-E-G-D-P	INQUIRE LIST OF AVAILABLE GENERALIZED DRAWING PRIMITIVES
PQEGD3	Q-EGD3	INQUIRE LIST OF AVAILABLE GENERALIZED DRAWING PRIMITIVES 3
PQEGSE	Q-E-GSE	INQUIRE LIST OF AVAILABLE GENERALIZED STRUCTURE ELEMENTS
PQEWK	Q-E-WK	INQUIRE LIST OF AVAILABLE WORKSTATION TYPES
PQECI	Q-E-C-I	INQUIRE LIST OF COLOUR INDICES
PQEEDI	Q-E-ED-I	INQUIRE LIST OF EDGE INDICES
PQEII	Q-E-I-I	INQUIRE LIST OF INTERIOR INDICES
PQEPAI	Q-E-PA-I	INQUIRE LIST OF PATTERN INDICES
PQEPLI	Q-E-PL-I	INQUIRE LIST OF POLYLINE INDICES
PQEPMI	Q-E-PM-I	INQUIRE LIST OF POLYMARKER INDICES
PQETXI	Q-E-TX-I	INQUIRE LIST OF TEXT INDICES
PQEVWI	Q-E-VW-I	INQUIRE LIST OF VIEW INDICES
PQLCS	Q-LC-S	INQUIRE LOCATOR DEVICE STATE
PQLCS3	Q-LC-S-3	INQUIRE LOCATOR DEVICE STATE 3
PQMCLF	Q-MCL-F	INQUIRE MODELLING CLIPPING FACILITIES
PQSIM	Q-SIM	INQUIRE MORE SIMULTANEOUS EVENTS
PQLI	Q-L-I	INQUIRE NUMBER OF AVAILABLE LOGICAL INPUT DEVICES
PQDP	Q-D-P	INQUIRE NUMBER OF DISPLAY PRIORITIES SUPPORTED
PQOPST	Q-OP-ST	INQUIRE OPEN STRUCTURE
PQPAN	Q-P-AN	INQUIRE PATHS TO ANCESTORS
PQPDE	Q-P-DE	INQUIRE PATHS TO DESCENDANTS
PQPAF	Q-PA-F	INQUIRE PATTERN FACILITIES
PQPAR	Q-PA-R	INQUIRE PATTERN REPRESENTATION
PQPHF	Q-PH-F	INQUIRE PHIGS FACILITIES
PQPKS	Q-PK-S	INQUIRE PICK DEVICE STATE
PQPKS3	Q-PK-S-3	INQUIRE PICK DEVICE STATE 3
PQPLF	Q-PL-F	INQUIRE POLYLINE FACILITIES
PQPLR	Q-PL-R	INQUIRE POLYLINE REPRESENTATION
PQPMF	Q-PM-F	INQUIRE POLYMARKER FACILITIES
PQPMR	Q-PM-R	INQUIRE POLYMARKER REPRESENTATION

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List of functions ordered alphabetically by PHIGS function name **List of the PHIGS function names**

PQPOST	Q-PO-ST	INQUIRE POSTED STRUCTURES
PQPCR	Q-P-C-R	INQUIRE PREDEFINED COLOUR REPRESENTATION
PQPEDR	Q-P-ED-R	INQUIRE PREDEFINED EDGE REPRESENTATION
PQPIR	Q-P-I-R	INQUIRE PREDEFINED INTERIOR REPRESENTATION
PQPPAR	Q-P-PA-R	INQUIRE PREDEFINED PATTERN REPRESENTATION
PQPPLR	Q-P-PL-R	INQUIRE PREDEFINED POLYLINE REPRESENTATION
PQPPMR	Q-P-PM-R	INQUIRE PREDEFINED POLYMARKER REPRESENTATION
PQPTXR	Q-P-TX-R	INQUIRE PREDEFINED TEXT REPRESENTATION
PQPVWR	Q-P-VW-R	INQUIRE PREDEFINED VIEW REPRESENTATION
PQOPWK	Q-OP-WK	INQUIRE SET OF OPEN WORKSTATIONS
PQWKPO	Q-WK-PO	INQUIRE SET OF WORKSTATIONS TO WHICH POSTED
PQSTS	Q-ST-S	INQUIRE STRING DEVICE STATE
PQSTS3	Q-ST-S-3	INQUIRE STRING DEVICE STATE 3
PQSKS	Q-SK-S	INQUIRE STROKE DEVICE STATE
PQSKS3	Q-SK-S-3	INQUIRE STROKE DEVICE STATE 3
PQSID	Q-SID	INQUIRE STRUCTURE IDENTIFIERS
PQSTRS	Q-STRS	INQUIRE STRUCTURE STATE VALUE
PQSTST	Q-ST-ST	INQUIRE STRUCTURE STATUS
PQSYS	Q-SY-S	INQUIRE SYSTEM STATE VALUE
PQTXX	Q-TX-X	INQUIRE TEXT EXTENT
PQTXXS	Q-TX-X-S	INQUIRE TEXT EXTENT (FORTRAN 77 subset)
PQTXF	Q-TX-F	INQUIRE TEXT FACILITIES
PQTXR	Q-TX-R	INQUIRE TEXT REPRESENTATION
PQVLS	Q-VL-S	INQUIRE VALUATOR DEVICE STATE
PQVLS3	Q-VL-S-3	INQUIRE VALUATOR DEVICE STATE 3
PQVWF	Q-VW-F	INQUIRE VIEW FACILITIES
PQVWR	Q-VW-R	INQUIRE VIEW REPRESENTATION
PQWKCA	Q-WK-CA	INQUIRE WORKSTATION CATEGORY
PQWKCL	Q-WK-CL	INQUIRE WORKSTATION CLASSIFICATION
PQWKC	Q-WK-C	INQUIRE WORKSTATION CONNECTION AND TYPE
PQWKSL	Q-WK-S-L	INQUIRE WORKSTATION STATE TABLE LENGTHS
PQWKST	Q-WKST	INQUIRE WORKSTATION STATE VALUE
PQWKT	Q-WK-T	INQUIRE WORKSTATION TRANSFORMATION
PQWKT3	Q-WK-T-3	INQUIRE WORKSTATION TRANSFORMATION 3
PIITM	I-ITM	INTERPRET ITEM
PLB	LB	LABEL
PMSG	MSG	MESSAGE
PMSGS	MSG-S	MESSAGE (FORTRAN 77 subset)
POSEP	OS-EP	OFFSET ELEMENT POINTER
POPARF	OP-AR-F	OPEN ARCHIVE FILE
POPPH	OP-PH	OPEN PHIGS
POPST	OP-ST	OPEN STRUCTURE
POPWK	OP-WK	OPEN WORKSTATION
PPREC	P-REC	PACK DATA RECORD
PPL	PL	POLYLINE
PPL3	PL-3	POLYLINE 3
PPM	PM	POLYMARKER
PPM3	PM-3	POLYMARKER 3
PPOST	PO-ST	POST STRUCTURE
PRDITM	RD-ITM	READ ITEM FROM METAFILE
PRST	R-ST	REDRAW ALL STRUCTURES
PRES	RE-S	REMOVE NAMES FROM SET
PRQCH	RQ-CH	REQUEST CHOICE
PRQLC	RQ-LC	REQUEST LOCATOR
PRQLC3	RQ-LC-3	REQUEST LOCATOR 3
PRQPK	RQ-PK	REQUEST PICK
PRQST	RQ-ST	REQUEST STRING
PRQSK	RQ-SK	REQUEST STROKE
PRQSK3	RQ-SK-3	REQUEST STROKE 3
PRQVL	RQ-VL	REQUEST VALUATOR
PRMCV	R-MCV	RESTORE MODELLING CLIPPING VOLUME
PRAST	RA-ST	RETRIEVE ALL STRUCTURES

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List of the PHIGS function names		List of functions ordered alphabetically by PHIGS function name
PREPAN	RE-P-AN	RETRIEVE PATHS TO ANCESTORS
PREPDE	RE-P-DE	RETRIEVE PATHS TO DESCENDANTS
PRSID	RSID	RETRIEVE STRUCTURE IDENTIFIERS
PRESN	RE-SN	RETRIEVE STRUCTURE NETWORKS
PREST	RE-ST	RETRIEVE STRUCTURES
PRO	RO	ROTATE
PROX	RO-X	ROTATE X
PROY	RO-Y	ROTATE Y
PROZ	RO-Z	ROTATE Z
PSMCH	SM-CH	SAMPLE CHOICE
PSMLC	SM-LC	SAMPLE LOCATOR
PSMLC3	SM-LC-3	SAMPLE LOCATOR 3
PSMPK	SM-PK	SAMPLE PICK
PSMST	SM-ST	SAMPLE STRING
PSMSK	SM-SK	SAMPLE STROKE
PSMSK3	SM-SK-3	SAMPLE STROKE 3
PSMVL	SM-VL	SAMPLE VALUATOR
PSC	SC	SCALE
PSC3	SC-3	SCALE 3
PSANS	S-AN-S	SET ANNOTATION STYLE
PSATAL	SAT-AL	SET ANNOTATION TEXT ALIGNMENT
PSATCH	S-ATCH	SET ANNOTATION TEXT CHARACTER HEIGHT
PSATCU	S-ATCU	SET ANNOTATION TEXT CHARACTER UP VECTOR
PSATP	SAT-P	SET ANNOTATION TEXT PATH
PSCHXP	S-CH-XP	SET CHARACTER EXPANSION FACTOR
PSCHH	S-CH-H	SET CHARACTER HEIGHT
PSCHSP	S-CH-SP	SET CHARACTER SPACING
PSCHUP	S-CH-UP	SET CHARACTER UP VECTOR
PSCHM	S-CH-M	SET CHOICE MODE
PSCMD	S-C-MD	SET COLOUR MODEL
PSCR	S-C-R	SET COLOUR REPRESENTATION
PSCNRS	S-CN-RS	SET CONFLICT RESOLUTION
PSDUS	S-D-U-S	SET DISPLAY UPDATE STATE
PSEDCI	S-EDCI	SET EDGE COLOUR INDEX
PSEDFG	S-EDFG	SET EDGE FLAG
PSEDI	S-ED-I	SET EDGE INDEX
PSEDR	S-ED-R	SET EDGE REPRESENTATION
PSEDT	S-EDT	SET EDGETYPE
PSEWSC	S-EW-SC	SET EDGEWIDTH SCALE FACTOR
PSEDM	S-ED-M	SET EDIT MODE
PSEP	S-EP	SET ELEMENT POINTER
PSEPLB	S-EP-LB	SET ELEMENT POINTER AT LABEL
PSERHM	S-ERHM	SET ERROR HANDLING MODE
PSGMT	S-GM-T	SET GLOBAL TRANSFORMATION
PSGMT3	S-GM-T-3	SET GLOBAL TRANSFORMATION 3
PSHLFT	S-HL-FT	SET HIGHLIGHTING FILTER
PSHRID	S-HR-ID	SET HLHSR IDENTIFIER
PSHRM	S-HR-M	SET HLHSR MODE
PSIASF	S-IASF	SET INDIVIDUAL ASF
PSICI	S-I-C-I	SET INTERIOR COLOUR INDEX
PSII	S-I-I	SET INTERIOR INDEX
PSIR	S-I-R	SET INTERIOR REPRESENTATION
PSIS	S-I-S	SET INTERIOR STYLE
PSISI	S-I-S-I	SET INTERIOR STYLE INDEX
PSIVFT	S-IV-FT	SET INVISIBILITY FILTER
PSLN	S-LN	SET LINETYPE
PSLWSC	S-LW-SC	SET LINEWIDTH SCALE FACTOR
PSLMT	S-LM-T	SET LOCAL TRANSFORMATION
PSLMT3	S-LM-T-3	SET LOCAL TRANSFORMATION 3
PSLCM	S-LC-M	SET LOCATOR MODE
PSMKSC	S-MK-SC	SET MARKER SIZE SCALE FACTOR
PSMK	S-MK	SET MARKER TYPE

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List of functions ordered alphabetically by PHIGS function name **List of the PHIGS function names**

PSMCLI	S-MCL-I	SET MODELLING CLIPPING INDICATOR
PSMCV	S-MCV	SET MODELLING CLIPPING VOLUME
PSMCV3	S-MCV-3	SET MODELLING CLIPPING VOLUME 3
PSPARF	S-PARF	SET PATTERN REFERENCE POINT
PSPRPV	S-PRPV	SET PATTERN REFERENCE POINT AND VECTORS
PSPAR	S-PA-R	SET PATTERN REPRESENTATION
PSPA	S-PA	SET PATTERN SIZE
PSPKFT	S-PK-FT	SET PICK FILTER
PSPKID	S-PK-ID	SET PICK IDENTIFIER
PSPKM	S-PK-M	SET PICK MODE
PSPLCI	S-PL-C-I	SET POLYLINE COLOUR INDEX
PSPLI	S-PL-I	SET POLYLINE INDEX
PSPLR	S-PL-R	SET POLYLINE REPRESENTATION
PSPMCI	S-PM-C-I	SET POLYMARKER COLOUR INDEX
PSPMI	S-PM-I	SET POLYMARKER INDEX
PSPMR	S-PM-R	SET POLYMARKER REPRESENTATION
PSSTM	S-ST-M	SET STRING MODE
PSSKM	S-SK-M	SET STROKE MODE
PSTXAL	S-TX-AL	SET TEXT ALIGNMENT
PSTXCI	S-TX-C-I	SET TEXT COLOUR INDEX
PSTXFN	S-TXFN	SET TEXT FONT
PSTXI	S-TX-I	SET TEXT INDEX
PSTXP	S-TX-P	SET TEXT PATH
PSTXPR	S-TX-PR	SET TEXT PRECISION
PSTXR	S-TX-R	SET TEXT REPRESENTATION
PSVLM	S-VL-M	SET VALUATOR MODE
PSVWI	S-VW-I	SET VIEW INDEX
PSVWR	S-VW-R	SET VIEW REPRESENTATION
PSVWR3	S-VW-R-3	SET VIEW REPRESENTATION 3
PSVTIP	S-VT-I-P	SET VIEW TRANSFORMATION INPUT PRIORITY
PSWKV	S-WK-V	SET WORKSTATION VIEWPORT
PSWKV3	S-WK-V-3	SET WORKSTATION VIEWPORT 3
PSWKW	S-WK-W	SET WORKSTATION WINDOW
PSWKW3	S-WK-W-3	SET WORKSTATION WINDOW 3
PTX	TX	TEXT
PTXS	TX-S	TEXT (FORTRAN 77 subset)
PTX3	TX-3	TEXT 3
PTX3S	TX-3-S	TEXT 3 (FORTRAN 77 subset)
PTP	TP	TRANSFORM POINT
PTP3	TP-3	TRANSFORM POINT 3
PTR	TR	TRANSLATE
PTR3	TR-3	TRANSLATE 3
PUREC	U-REC	UNPACK DATA RECORD
PUPAST	UPA-ST	UNPOST ALL STRUCTURES
PUPOST	UPO-ST	UNPOST STRUCTURE
PUWK	U-WK	UPDATE WORKSTATION
PWITM	W-ITM	WRITE ITEM TO METAFILE

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8 PHIGS errors specific to the FORTRAN binding

Certain features of the FORTRAN language make additional errors (beyond the ones described in ISO/IEC 9592-1) possible. Specifically, these new errors are defined:

2000 Ignoring function, enumeration type out of range -- the INTEGER passed as a PHIGS enumerated type is not within the range of valid values.

2001 Ignoring function, output parameter size insufficient -- a FORTRAN array or string being passed as an output parameter is too small to contain the returned information.

2002 Ignoring function, list or set element not available -- for a non-empty list or set, a value less than zero or greater than the size of a list or set was passed as the requested list or set element in an inquiry routine.

2003 Ignoring function, invalid data record -- the data record passed to a PHIGS routine cannot be decoded, or there was a problem encountered when PHIGS was creating a data record, making the result invalid.

2004 Ignoring function, input parameter size out of range -- the INTEGER passed as an input parameter defining the size of FORTRAN array parameters is negative or greater than an absolute maximum (e.g. for FORTRAN subset functions taking strings as input parameters).

2005 Ignoring function, invalid list of point lists -- one of the conditions defining a valid list of point list has been violated:

a) NPL≥1,

b) PXA, PYA and PZA are dimensioned by at least IXA(NPL) (however that it is allowable for the implementation not to generate this error in this case),

c) IXA(1)≥3 (the first point list is at least 3 points),

d) IXA(i+1)-IXA(i)≥3 for i=1 to NPL-1, when NPL≥2 (the ith point list is at least 3 points).

2006 Ignoring function, invalid list of filters -- one of the conditions defining a valid list of filters has been violated:

e) FLN≥1,

f) FLIS and FLES are dimensioned by at least FLESX(FLN) (however that it is allowable for the implementation not to generate this error in this case).

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9 The PHIGS function interface

9.1 General principles

For each PHIGS function the corresponding FORTRAN SUBROUTINE declaration is given. The name of the PHIGS function is listed, followed by its FORTRAN name and the corresponding parameters. After that, the list of parameters is described by type and a brief identifying phrase.

For the mapping of ENUMERATION types see clause 6.

For GENERALIZED DRAWING PRIMITIVE, GENERALIZED DRAWING PRIMITIVE 3, GENERALIZED STRUCTURE ELEMENT, and ESCAPE, subroutines PGDP, PGDP3, PGSE, and PESC are defined. Each GDP with an identifier less than 10,000 in the ISO International Register of Graphical Items and that is available in the implementation may, in addition, be accessed by a subroutine of the form PD*pqrs* or P3*pqrs*, where *pqrs* is a string of 4 digits representing the GDP identifier with leading zeros if necessary.[1)] The parameters are derived from those of PGDP as follows: N, PXA, PYA (and PZA for 3D) are required; PRIMID is absent; the data record is specified by parameters appropriate to the particular GDP identifier. Similarly, each ESCAPE and GSE with an identifier less than 10,000 in the ISO International Register of Graphical Items and that is available in the implementation may, in addition, be accessed by a subroutine of the form PE*pqrs* (for ESCAPE) and PS*pqrs* (for GSE). The parameters are derived from those of PESC and PGSE as follows: FCTID is absent and the data record is specified by parameters appropriate to the specific ESCAPE and GSE function. The type and order of the parameters representing the data record for the individual subroutines, and the corresponding data sent to PACK DATA RECORD if PGDP, PGDP3, PGSE or PESC is used, are defined in the ISO International Register of Graphical Items. For GDP, GDP3, GSE and ESCAPE, it is possible to define each separate subroutine using PGDP, PGDP3, PGSE and PESC.

Unregistered GDP, GDP3, GSE, and ESCAPE functions may be accessed either by the general subroutines PGDP, PGDP3, PGSE, and PESC with negative identifiers, or by subroutines named PU*lmn*, PU3*lmn*, PUS*lmn*, and PUE*lmn* where *lmn* is the absolute value of the negative identifiers. Parameter lists for these subroutines are implementation dependent.

1) For the purpose of this International Standard and according to the rules for the designation and operation of registration authorities in the ISO Directives, the ISO Council has designated the National Institute of Standards and Technology (Institute of Computer Sciences and Technology), A-266 Technology Building, Gaithersburg, MD 20899, USA to act as registration authority.

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9.2 Control functions

OPEN PHIGS

SUBROUTINE POPPH (ERRFIL,BUFA)

Input Parameters:

INTEGER ERRFIL	error file
INTEGER BUFA	amount of memory units (implementation dependent; if -1, use implementation dependent default)

CLOSE PHIGS

SUBROUTINE PCLPH

OPEN WORKSTATION

SUBROUTINE POPWK (WKID,CONID,WTYPE)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER CONID	connection identifier
INTEGER WTYPE	workstation type

CLOSE WORKSTATION

SUBROUTINE PCLWK (WKID)

Input Parameters:

INTEGER WKID	workstation identifier

REDRAW ALL STRUCTURES

SUBROUTINE PRST (WKID,COFL)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER COFL	control flag (PCONDI, PALWAY)

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UPDATE WORKSTATION

SUBROUTINE PUWK (WKID,REGFL)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER REGFL	regeneration flag (PPOSTP,PPERFO)

SET DISPLAY UPDATE STATE

SUBROUTINE PSDUS (WKID,DEFMOD,MODMOD)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER DEFMOD	deferral mode (PASAP,PBNIG,PBNIL,PASTI,PWAITD)
INTEGER MODMOD	modification mode (PNIVE,PUWOR,PUQUM)

MESSAGE
Full FORTRAN 77 version

SUBROUTINE PMSG (WKID,MESS)

Input Parameters:	
INTEGER WKID	workstation identifier
CHARACTER*(*) MESS	message

MESSAGE
FORTRAN 77 subset version

SUBROUTINE PMSGS (WKID,LSTR,MESS)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER LSTR	length of string (in characters)
CHARACTER*80 MESS	message

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9.3 Output primitive functions

POLYLINE 3

SUBROUTINE PPL3 (N,PXA,PYA,PZA)

Input Parameters:

INTEGER N	number of points
REAL PXA (N), PYA (N), PZA (N)	coordinates of points (MC)

POLYLINE

SUBROUTINE PPL (N,PXA,PYA)

Input Parameters:

INTEGER N	number of points
REAL PXA (N), PYA (N)	coordinates of points (MC)

POLYMARKER 3

SUBROUTINE PPM3 (N,PXA,PYA,PZA)

Input Parameters:

INTEGER N	number of points
REAL PXA (N), PYA (N), PZA(N)	coordinates of points (MC)

POLYMARKER

SUBROUTINE PPM (N,PXA,PYA)

Input Parameters:

INTEGER N	number of points
REAL PXA (N), PYA (N)	coordinates of points (MC)

TEXT 3
Full FORTRAN 77 version

SUBROUTINE PTX3 (PX,PY,PZ,TDX,TDY,TDZ,CHARS)

Input Parameters:

REAL PX, PY, PZ	text position (MC)
REAL TDX(2), TDY(2), TDZ(2)	text direction vectors (MC)
CHARACTER*(*) CHARS	character string

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TEXT 3
FORTRAN 77 subset version

SUBROUTINE PTX3S (PX,PY,PZ,TDX,TDY,TDZ,LSTR,CHARS)

Input Parameters:

REAL PX, PY, PZ	text position (MC)
REAL TDX(2), TDY(2), TDZ(2)	text direction vectors (MC)
INTEGER LSTR	length of string (in characters)
CHARACTER*80 CHARS	character string

TEXT
Full FORTRAN 77 version

SUBROUTINE PTX (PX,PY,CHARS)

Input Parameters:

REAL PX, PY	text position (MC)
CHARACTER*(*) CHARS	character string

TEXT
FORTRAN 77 subset version

SUBROUTINE PTXS (PX,PY,LSTR,CHARS)

Input Parameters:

REAL PX, PY	text position (MC)
INTEGER LSTR	length of string (in characters)
CHARACTER*80 CHARS	character string

ANNOTATION TEXT RELATIVE 3
Full FORTRAN 77 version

SUBROUTINE PATR3 (RPX,RPY,RPZ,APX,APY,APZ,CHARS)

Input Parameters:

REAL RPX, RPY, RPZ	reference point (MC)
REAL APX, APY, APZ	annotation offset (NPC)
CHARACTER*(*) CHARS	character string

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ANNOTATION TEXT RELATIVE 3
FORTRAN 77 subset version

SUBROUTINE PATR3S (RPX,RPY,RPZ,APX,APY,APZ,LSTR,CHARS)

Input Parameters:

REAL RPX, RPY, RPZ	reference point (MC)
REAL APX, APY, APZ	annotation offset (NPC)
INTEGER LSTR	length of string (in characters)
CHARACTER*80 CHARS	character string

ANNOTATION TEXT RELATIVE
Full FORTRAN 77 version

SUBROUTINE PATR (RPX,RPY,APX,APY,CHARS)

Input Parameters:

REAL RPX, RPY	reference point (MC)
REAL APX, APY	annotation offset (NPC)
CHARACTER*(*) CHARS	character string

ANNOTATION TEXT RELATIVE
FORTRAN 77 subset version

SUBROUTINE PATRS (RPX,RPY,APX,APY,LSTR,CHARS)

Input Parameters:

REAL RPX, RPY	reference point (MC)
REAL APX, APY	annotation offset (NPC)
INTEGER LSTR	length of string (in characters)
CHARACTER*80 CHARS	character string

FILL AREA 3

SUBROUTINE PFA3 (N,PXA,PYA,PZA)

Input Parameters:

INTEGER N	number of points
REAL PXA (N), PYA (N), PZA (N)	coordinates of points (MC)

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FILL AREA

SUBROUTINE PFA (N,PXA,PYA)

Input Parameters:

INTEGER N	number of points
REAL PXA (N), PYA (N)	coordinates of points (MC)

FILL AREA SET 3

SUBROUTINE PFAS3 (NPL,IXA,PXA,PYA,PZA)

Input Parameters:

INTEGER NPL	number of point lists
INTEGER IXA(NPL)	array of end indices for the point lists
REAL PXA (*), PYA (*), PZA (*)	coordinates of points (MC) (see clause 5)

FILL AREA SET

SUBROUTINE PFAS (NPL,IXA,PXA,PYA)

Input Parameters:

INTEGER NPL	number of point lists
INTEGER IXA(NPL)	array of end indices for the point lists
REAL PXA (*), PYA (*)	coordinates of points (MC) (see clause 5)

CELL ARRAY 3

SUBROUTINE PCA3 (CPXA,CPYA,CPZA,DIMX,DIMY,ISC,ISR,DX,DY,COLIA)

Input Parameters:

REAL CPXA(3),CPYA(3),CPZA(3)	cell parallelogram (P,Q,R) (MC)
INTEGER DIMX, DIMY	the dimensions of COLIA which contains the cell array
INTEGER ISC, ISR	indices of start column, start row
INTEGER DX, DY	number of columns, number of rows
INTEGER COLIA (DIMX,DIMY)	colour index array

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CELL ARRAY

SUBROUTINE PCA (PX,PY,QX,QY,DIMX,DIMY,ISC,ISR,DX,DY,COLIA)

Input Parameters:

REAL PX, PY, QX, QY	two points (P,Q) (MC)
INTEGER DIMX, DIMY	the dimensions of COLIA which contains the cell array
INTEGER ISC, ISR	indices of start column, start row
INTEGER DX, DY	number of columns, number of rows
INTEGER COLIA (DIMX,DIMY)	colour index array

GENERALIZED DRAWING PRIMITIVE 3

SUBROUTINE PGDP3 (N,PXA,PYA,PZA,PRIMID,LDR,DATREC)

Input Parameters:

INTEGER N	number of points (≥ 0)
REAL PXA (*), PYA (*), PZA (*)	coordinates of points (MC)
INTEGER PRIMID	GDP 3 identifier
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

GENERALIZED DRAWING PRIMITIVE

SUBROUTINE PGDP (N,PXA,PYA,PRIMID,LDR,DATREC)

Input Parameters:

INTEGER N	number of points (≥ 0)
REAL PXA (*), PYA (*)	coordinates of points (MC)
INTEGER PRIMID	GDP identifier
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

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9.4 Attribute specification functions

9.4.1 Bundled attribute selection

SET POLYLINE INDEX

SUBROUTINE PSPLI (PLI)

Input Parameters:
INTEGER PLI polyline index

SET POLYMARKER INDEX

SUBROUTINE PSPMI (PMI)

Input Parameters:
INTEGER PMI polymarker index

SET TEXT INDEX

SUBROUTINE PSTXI (TXI)

Input Parameters:
INTEGER TXI text index

SET INTERIOR INDEX

SUBROUTINE PSII (II)

Input Parameters:
INTEGER II interior index

SET EDGE INDEX

SUBROUTINE PSEDI (EDI)

Input Parameters:
INTEGER EDI edge index

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9.4.2 Individual attribute selection

SET LINETYPE

SUBROUTINE PSLN (LTYPE)

Input Parameters:
INTEGER LTYPE linetype

SET LINEWIDTH SCALE FACTOR

SUBROUTINE PSLWSC (LWIDTH)

Input Parameters:
REAL LWIDTH linewidth scale factor

SET POLYLINE COLOUR INDEX

SUBROUTINE PSPLCI (COLI)

Input Parameters:
INTEGER COLI polyline colour index

SET MARKER TYPE

SUBROUTINE PSMK (MTYPE)

Input Parameters:
INTEGER MTYPE marker type

SET MARKER SIZE SCALE FACTOR

SUBROUTINE PSMKSC (MSZSF)

Input Parameters:
REAL MSZSF marker size scale factor

SET POLYMARKER COLOUR INDEX

SUBROUTINE PSPMCI (COLI)

Input Parameters:
INTEGER COLI polymarker colour index

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SET TEXT FONT

SUBROUTINE PSTXFN (FONT)

Input Parameters:

INTEGER FONT	text font

SET TEXT PRECISION

SUBROUTINE PSTXPR (PREC)

Input Parameters:

INTEGER PREC	text precision (PSTRP,PCHARP,PSTRKP)

SET CHARACTER EXPANSION FACTOR

SUBROUTINE PSCHXP (CHXP)

Input Parameters:

REAL CHXP	character expansion factor

SET CHARACTER SPACING

SUBROUTINE PSCHSP (CHSP)

Input Parameters:

REAL CHSP	character spacing

SET TEXT COLOUR INDEX

SUBROUTINE PSTXCI (COLI)

Input Parameters:

INTEGER COLI	text colour index

SET CHARACTER HEIGHT

SUBROUTINE PSCHH (CHH)

Input Parameters:

REAL CHH	character height

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SET CHARACTER UP VECTOR

SUBROUTINE PSCHUP (CHUX,CHUY)

Input Parameters:

REAL CHUX, CHUY	character up vector

SET TEXT PATH

SUBROUTINE PSTXP (TXP)

Input Parameters:

INTEGER TXP	text path (PRIGHT,PLEFT,PUP,PDOWN)

SET TEXT ALIGNMENT

SUBROUTINE PSTXAL (TXALH,TXALV)

Input Parameters:

INTEGER TXALH	text alignment horizontal (PAHNOR,PALEFT,PACENT,PARITE)
INTEGER TXALV	text alignment vertical (PAVNOR,PATOP,PACAP,PAHALF, PABASE,PABOTT)

SET ANNOTATION TEXT CHARACTER HEIGHT

SUBROUTINE PSATCH (ATCHH)

Input Parameters:

REAL ATCHH	annotation text character height

SET ANNOTATION TEXT CHARACTER UP VECTOR

SUBROUTINE PSATCU (ATCHUX,ATCHUY)

Input Parameters:

REAL ATCHUX, ATCHUY	annotation text character up vector

SET ANNOTATION TEXT PATH

SUBROUTINE PSATP (ATP)

Input Parameters:

INTEGER ATP	annotation text path (PRIGHT,PLEFT,PUP,PDOWN)

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SET ANNOTATION TEXT ALIGNMENT

SUBROUTINE PSATAL (ATALH,ATALV)

Input Parameters:

INTEGER ATALH	annotation text alignment horizontal (PAHNOR,PALEFT,PACENT,PARITE)
INTEGER ATALV	annotation text alignment vertical (PAVNOR,PATOP,PACAP,PAHALF, PABASE,PABOTT)

SET ANNOTATION STYLE

SUBROUTINE PSANS (ASTYLE)

Input Parameters:

INTEGER ASTYLE	annotation style

SET INTERIOR STYLE

SUBROUTINE PSIS (INTS)

Input Parameters:

INTEGER INTS	interior style (PHOLLO,PSOLID,PPATTR,PHATCH,PISEMP)

SET INTERIOR STYLE INDEX

SUBROUTINE PSISI (ISTYLI)

Input Parameters:

INTEGER ISTYLI	interior style index

SET INTERIOR COLOUR INDEX

SUBROUTINE PSICI (COLI)

Input Parameters:

INTEGER COLI	interior colour index

SET EDGE FLAG

SUBROUTINE PSEDFG (EDFLAG)

Input Parameters:

INTEGER EDFLAG	edge flag (POFF,PON)

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SET EDGETYPE

SUBROUTINE PSEDT (EDTYPE)

Input Parameters:
INTEGER EDTYPE edgetype

SET EDGEWIDTH SCALE FACTOR

SUBROUTINE PSEWSC (EWIDTH)

Input Parameters:
REAL EWIDTH edgewidth scale factor

SET EDGE COLOUR INDEX

SUBROUTINE PSEDCI (COLI)

Input Parameters:
INTEGER COLI edge colour index

SET PATTERN SIZE

SUBROUTINE PSPA (SZX,SZY)

Input Parameters:
REAL SZX, SZY pattern size (MC)

SET PATTERN REFERENCE POINT AND VECTORS

SUBROUTINE PSPRPV (RFX,RFY,RFZ,RFVX,RFVY,RFVZ)

Input Parameters:
REAL RFX, RFY, RFZ pattern reference point (MC)
REAL RFVX(2), RFVY(2), RFVZ(2)
pattern reference vectors (MC)

SET PATTERN REFERENCE POINT

SUBROUTINE PSPARF (RFX,RFY)

Input Parameters:
REAL RFX, RFY pattern reference point (MC)

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ADD NAMES TO SET

SUBROUTINE PADS (N,NAMSET)

Input Parameters:

INTEGER N	number of names in the set
INTEGER NAMSET (N)	name set

REMOVE NAMES FROM SET

SUBROUTINE PRES (N,NAMSET)

Input Parameters:

INTEGER N	number of names in the set
INTEGER NAMSET (N)	name set

9.4.3 Aspect source flag setting

SET INDIVIDUAL ASF

SUBROUTINE PSIASF (ASPCID,ASFVAL)

Input Parameters:

INTEGER ASPCID	aspect identifier (PLN, PLWSC, PPLCI, PMK, PMKSC, PPMCI, PTXFN, PTXPR, PCHXP, PCHSP, PTXCI, PIS, PISI, PICI, PEDFG, PEDT, PEWSC, PEDCI)
INTEGER ASFVAL	aspect source flag value (PBUNDL,PINDIV)

9.4.4 Workstation attribute table definition

SET POLYLINE REPRESENTATION

SUBROUTINE PSPLR (WKID,PLI,LTYPE,LWIDTH,COLI)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PLI	polyline index
INTEGER LTYPE	linetype
REAL LWIDTH	linewidth scale factor
INTEGER COLI	polyline colour index

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SET POLYMARKER REPRESENTATION

SUBROUTINE PSPMR (WKID,PMI,MTYPE,MSZSF,COLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER PMI	polymarker index
INTEGER MTYPE	marker type
REAL MSZSF	marker size scale factor
INTEGER COLI	polymarker colour index

SET TEXT REPRESENTATION

SUBROUTINE PSTXR (WKID,TXI,FONT,PREC,CHXP,CHSP,COLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER TXI	text index
INTEGER FONT	text font
INTEGER PREC	text precision (PSTRP,PCHARP,PSTRKP)
REAL CHXP	character expansion factor
REAL CHSP	character spacing
INTEGER COLI	text colour index

SET INTERIOR REPRESENTATION

SUBROUTINE PSIR (WKID,II,INTS,STYLI,COLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER II	interior index
INTEGER INTS	interior style (PHOLLO,PSOLID,PPATTR,PHATCH,PISEMP)
INTEGER STYLI	interior style index
INTEGER COLI	interior colour index

SET EDGE REPRESENTATION

SUBROUTINE PSEDR (WKID,EDI,EDFLAG,EDTYPE,EWIDTH,COLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER EDI	edge index
INTEGER EDFLAG	edge flag (POFF,PON)
INTEGER EDTYPE	edgetype
REAL EWIDTH	edgewidth scale factor
INTEGER COLI	edge colour index

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SET PATTERN REPRESENTATION

SUBROUTINE PSPAR (WKID,PAI,DIMX,DIMY,ISC,ISR,DX,DY,COLIA)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER PAI	pattern index
INTEGER DIMX, DIMY	the dimensions of COLIA which contains the pattern colour index array
INTEGER ISC, ISR	indices to start column, start row
INTEGER DX, DY	number of columns, number of rows used
INTEGER COLIA (DIMX,DIMY)	pattern colour index array

SET COLOUR REPRESENTATION

SUBROUTINE PSCR (WKID,CI,NCCS,CSPEC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER CI	colour index
INTEGER NCCS	number of components of colour specification
REAL CSPEC(*)	colour specification

9.4.5 Workstation filter definition

SET HIGHLIGHTING FILTER

SUBROUTINE PSHLFT (WKID, ISN, IS, ESN, ES)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER ISN	number of names in the inclusion set
INTEGER IS (ISN)	inclusion set
INTEGER ESN	number of names in the exclusion set
INTEGER ES (ESN)	exclusion set

SET INVISIBILITY FILTER

SUBROUTINE PSIVFT (WKID, ISN, IS, ESN, ES)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER ISN	number of names in the inclusion set
INTEGER IS (ISN)	inclusion set
INTEGER ESN	number of names in the exclusion set
INTEGER ES (ESN)	exclusion set

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9.4.6 Colour model control

SET COLOUR MODEL

SUBROUTINE PSCMD (WKID, CMODEL)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER CMODEL	colour model

9.4.7 HLHSR attributes

SET HLHSR IDENTIFIER

SUBROUTINE PSHRID (HRID)

Input Parameters:

INTEGER HRID	HLHSR identifier

SET HLHSR MODE

SUBROUTINE PSHRM (WKID, HRM)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER HRM	HLHSR mode

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9.5 Transformation functions

9.5.1 Modelling transformations

SET LOCAL TRANSFORMATION 3

SUBROUTINE PSLMT3 (XFRMT,CTYPE)

Input Parameters:

REAL XFRMT(4,4)	transformation matrix
INTEGER CTYPE	composition type (PCPRE, PCPOST, PCREPL)

SET LOCAL TRANSFORMATION

SUBROUTINE PSLMT (XFRMT,CTYPE)

Input Parameters:

REAL XFRMT(3,3)	transformation matrix
INTEGER CTYPE	composition type (PCPRE, PCPOST, PCREPL)

SET GLOBAL TRANSFORMATION 3

SUBROUTINE PSGMT3 (XFRMT)

Input Parameters:

REAL XFRMT(4,4)	transformation matrix

SET GLOBAL TRANSFORMATION

SUBROUTINE PSGMT (XFRMT)

Input Parameters:

REAL XFRMT(3,3)	transformation matrix

SET MODELLING CLIPPING VOLUME 3

SUBROUTINE PSMCV3 (OP,NHALFS,HALFSP)

Input Parameters:

INTEGER OP	operator
INTEGER NHALFS	number of half-spaces in list
REAL HALFSP(6,NHALFS)	list of half-spaces

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SET MODELLING CLIPPING VOLUME

SUBROUTINE PSMCV (OP,NHALFS,HALFSP)

Input Parameters:

INTEGER OP	operator
INTEGER NHALFS	number of half-spaces in list
REAL HALFSP(4,NHALFS)	list of half-spaces

SET MODELLING CLIPPING INDICATOR

SUBROUTINE PSMCLI (MCLIPI)

Input Parameters:

INTEGER MCLIPI	modelling clipping indicator (PNCLIP,PCLIP)

RESTORE MODELLING CLIPPING VOLUME

SUBROUTINE PRMCV

9.5.2 View operations

SET VIEW INDEX

SUBROUTINE PSVWI (VIEWI)

Input Parameters:

INTEGER VIEWI	view index

SET VIEW REPRESENTATION 3

SUBROUTINE PSVWR3 (WKID,VIEWI,VWORMT,VWMPMT,VWCPLM,
*XYCLPI,BCLIPI,FCLIPI)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER VIEWI	view index
REAL VWORMT(4,4)	view orientation matrix
REAL VWMPMT(4,4)	view mapping matrix
REAL VWCPLM(6)	view clipping limits (NPC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX
INTEGER XYCLPI	x-y clipping indicator (PNCLIP,PCLIP)
INTEGER BCLIPI	back clipping indicator (PNCLIP,PCLIP)
INTEGER FCLIPI	front clipping indicator (PNCLIP,PCLIP)

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SET VIEW REPRESENTATION

SUBROUTINE PSVWR (WKID,VIEWI,VWORMT,VWMPMT,VWCPLM,XYCLPI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER VIEWI	view index
REAL VWORMT(3,3)	view orientation matrix
REAL VWMPMT(3,3)	view mapping matrix
REAL VWCPLM(4)	view clipping limits (NPC) XMIN,XMAX,YMIN,YMAX
INTEGER XYCLPI	x-y clipping indicator (PNCLIP,PCLIP)

SET VIEW TRANSFORMATION INPUT PRIORITY

SUBROUTINE PSVTIP (WKID, VIEWI, RFVWIX, RELPRI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER VIEWI	view index
INTEGER RFVWIX	reference view index
INTEGER RELPRI	relative priority (PHIGHR,PLOWER)

9.5.3 Workstation transformation

SET WORKSTATION WINDOW 3

SUBROUTINE PSWKW3 (WKID,WKWN)

Input Parameters:	
INTEGER WKID	workstation identifier
REAL WKWN(6)	workstation window limits (NPC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX

SET WORKSTATION WINDOW

SUBROUTINE PSWKW (WKID,XMIN,XMAX,YMIN,YMAX)

Input Parameters:	
INTEGER WKID	workstation identifier
REAL XMIN,XMAX,YMIN,YMAX	workstation window limits (NPC)

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SET WORKSTATION VIEWPORT 3

SUBROUTINE PSWKV3 (WKID,WKVP)

Input Parameters:	
INTEGER WKID	workstation identifier
REAL WKVP(6)	workstation viewport limits (DC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX

SET WORKSTATION VIEWPORT

SUBROUTINE PSWKV (WKID,XMIN,XMAX,YMIN,YMAX)

Input Parameters:	
INTEGER WKID	workstation identifier
REAL XMIN,XMAX,YMIN,YMAX	workstation viewport limits (DC)

9.5.4 Utility functions to support modelling

TRANSLATE 3

SUBROUTINE PTR3 (DX,DY,DZ,ERRIND,XFRMT)

Input Parameters:	
REAL DX,DY,DZ	translation vector
Output Parameters:	
INTEGER ERRIND	error indicator
REAL XFRMT(4,4)	transformation matrix

TRANSLATE

SUBROUTINE PTR (DX,DY,ERRIND,XFRMT)

Input Parameters:	
REAL DX,DY	translation vector
Output Parameters:	
INTEGER ERRIND	error indicator
REAL XFRMT(3,3)	transformation matrix

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SCALE 3

SUBROUTINE PSC3 (FX,FY,FZ,ERRIND,XFRMT)

Input Parameters:
REAL FX,FY,FZ scale factors

Output Parameters:
INTEGER ERRIND error indicator
REAL XFRMT(4,4) transformation matrix

SCALE

SUBROUTINE PSC (FX,FY,ERRIND,XFRMT)

Input Parameters:
REAL FX,FY scale factors

Output Parameters:
INTEGER ERRIND error indicator
REAL XFRMT(3,3) transformation matrix

ROTATE X

SUBROUTINE PROX (ROTANG,ERRIND,XFRMT)

Input Parameters:
REAL ROTANG rotation angle in radians (positive if anticlockwise)

Output Parameters:
INTEGER ERRIND error indicator
REAL XFRMT(4,4) transformation matrix

ROTATE Y

SUBROUTINE PROY (ROTANG,ERRIND,XFRMT)

Input Parameters:
REAL ROTANG rotation angle in radians (positive if anticlockwise)

Output Parameters:
INTEGER ERRIND error indicator
REAL XFRMT(4,4) transformation matrix

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ROTATE Z

SUBROUTINE PROZ (ROTANG,ERRIND,XFRMT)

Input Parameters:	
REAL ROTANG	rotation angle in radians (positive if anticlockwise)
Output Parameters:	
INTEGER ERRIND	error indicator
REAL XFRMT(4,4)	transformation matrix

ROTATE

SUBROUTINE PRO (ROTANG,ERRIND,XFRMT)

Input Parameters:	
REAL ROTANG	rotation angle in radians (positive if anticlockwise)
Output Parameters:	
INTEGER ERRIND	error indicator
REAL XFRMT(3,3)	transformation matrix

COMPOSE MATRIX 3

SUBROUTINE PCOM3 (XFRMTA,XFRMTB,ERRIND,XFRMTO)

Input Parameters:	
REAL XFRMTA (4,4)	transformation matrix A
REAL XFRMTB (4,4)	transformation matrix B
Output Parameters:	
INTEGER ERRIND	error indicator
REAL XFRMTO(4,4)	composed transformation matrix

COMPOSE MATRIX

SUBROUTINE PCOM (XFRMTA,XFRMTB,ERRIND,XFRMTO)

Input Parameters:	
REAL XFRMTA (3,3)	transformation matrix A
REAL XFRMTB (3,3)	transformation matrix B
Output Parameters:	
INTEGER ERRIND	error indicator
REAL XFRMTO(3,3)	composed transformation matrix

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TRANSFORM POINT 3

SUBROUTINE PTP3 (XI,YI,ZI,XFRMT,ERRIND,XO,YO,ZO)

Input Parameters:	
REAL XI, YI, ZI	point
REAL XFRMT (4,4)	transformation matrix
Output Parameters:	
INTEGER ERRIND	error indicator
REAL XO, YO, ZO	transformed point

TRANSFORM POINT

SUBROUTINE PTP (XI,YI,XFRMT,ERRIND,XO,YO)

Input Parameters:	
REAL XI, YI	point
REAL XFRMT (3,3)	transformation matrix
Output Parameters:	
INTEGER ERRIND	error indicator
REAL XO, YO	transformed point

BUILD TRANSFORMATION MATRIX 3

SUBROUTINE PBLTM3 (X0,Y0,Z0,DX,DY,DZ,PHIX,PHIY,PHIZ,FX,FY,FZ,
*ERRIND,XFRMT)

Input Parameters:	
REAL X0, Y0, Z0	fixed point
REAL DX, DY, DZ	shift vector
REAL PHIX, PHIY, PHIZ	rotation angles in radians (positive if anticlockwise)
REAL FX, FY, FZ	scale factors
Output Parameters:	
INTEGER ERRIND	error indicator
REAL XFRMT (4,4)	transformation matrix

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BUILD TRANSFORMATION MATRIX

SUBROUTINE PBLTM (X0,Y0,DX,DY,PHI,FX,FY,ERRIND,XFRMT)

Input Parameters:	
REAL X0, Y0	fixed point
REAL DX, DY	shift vector
REAL PHI	rotation angle in radians (positive if anticlockwise)
REAL FX, FY	scale factors

Output Parameters:	
INTEGER ERRIND	error indicator
REAL XFRMT (3,3)	transformation matrix

COMPOSE TRANSFORMATION MATRIX 3

SUBROUTINE PCOTM3 (XFRMTI,X0,Y0,Z0,DX,DY,DZ,PHIX,PHIY,PHIZ,
*FX,FY,FZ,ERRIND,XFRMTO)

Input Parameters:	
REAL XFRMTI (4,4)	transformation matrix
REAL X0, Y0, Z0	fixed point
REAL DX, DY, DZ	shift vector
REAL PHIX, PHIY, PHIZ	rotation angles in radians (positive if anticlockwise)
REAL FX, FY, FZ	scale factors

Output Parameters:	
INTEGER ERRIND	error indicator
REAL XFRMTO (4,4)	composed transformation matrix

COMPOSE TRANSFORMATION MATRIX

SUBROUTINE PCOTM (XFRMTI,X0,Y0,DX,DY,PHI,FX,FY,ERRIND,XFRMTO)

Input Parameters:	
REAL XFRMTI (3,3)	transformation matrix
REAL X0, Y0	fixed point
REAL DX, DY	shift vector
REAL PHI	rotation angle in radians (positive if anticlockwise)
REAL FX, FY	scale factors

Output Parameters:	
INTEGER ERRIND	error indicator
REAL XFRMTO (3,3)	composed transformation matrix

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9.5.5 Utility functions to support viewing

EVALUATE VIEW ORIENTATION MATRIX 3

SUBROUTINE PEVOM3(VWRX,VWRY,VWRZ,VPNX,VPNY,VPNZ,
*VUPX,VUPY,VUPZ,ERRIND,VWORMT)

Input Parameters:	
REAL VWRX, VWRY, VWRZ	view reference point (WC)
REAL VPNX, VPNY, VPNZ	view plane normal (WC)
REAL VUPX, VUPY, VUPZ	view up vector (WC)
Output Parameters:	
INTEGER ERRIND	error indicator
REAL VWORMT (4,4)	view orientation matrix

EVALUATE VIEW ORIENTATION MATRIX

SUBROUTINE PEVOM(VWRX,VWRY,VUPX,VUPY,ERRIND,VWORMT)

Input Parameters:	
REAL VWRX, VWRY	view reference point (WC)
REAL VUPX, VUPY	view up vector (WC)
Output Parameters:	
INTEGER ERRIND	error indicator
REAL VWORMT (3,3)	view orientation matrix

EVALUATE VIEW MAPPING MATRIX 3

SUBROUTINE PEVMM3(VWWNLM,PJVPLM,PJTYPE,PJRX,PJRY,PJRZ,
*VPLD,BPLD,FPLD,ERRIND,VWMPMT)

Input Parameters:	
REAL VWWNLM(4)	window limits (VRC) UMIN,UMAX,VMIN,VMAX
REAL PJVPLM(6)	projection viewport limits (NPC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX
INTEGER PJTYPE	projection type (PPARL,PPERS)
REAL PJRX,PJRY,PJRZ	projection reference point (VRC)
REAL VPLD	view plane distance (VRC)
REAL BPLD	back plane distance (VRC)
REAL FPLD	front plane distance (VRC)
Output Parameters:	
INTEGER ERRIND	error indicator
REAL VWMPMT (4,4)	view mapping matrix

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EVALUATE VIEW MAPPING MATRIX

SUBROUTINE PEVMM(VWWNLM,PJVPLM,ERRIND,VWMPMT)

Input Parameters:

REAL VWWNLM(4)	window limits (VRC) UMIN,UMAX,VMIN,VMAX
REAL PJVPLM(4)	projection viewport limits (NPC) XMIN,XMAX,YMIN,YMAX

Output Parameters:

INTEGER ERRIND	error indicator
REAL VWMPMT (3,3)	view mapping matrix

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9.6 Structure content functions

OPEN STRUCTURE

SUBROUTINE POPST (STRID)

Input Parameters:

INTEGER STRID	structure identifier

CLOSE STRUCTURE

SUBROUTINE PCLST

EXECUTE STRUCTURE

SUBROUTINE PEXST (STRID)

Input Parameters:

INTEGER STRID	structure identifier

LABEL

SUBROUTINE PLB (LABEL)

Input Parameters:

INTEGER LABEL	label identifier

APPLICATION DATA

SUBROUTINE PAP (LDR, DATREC)

Input Parameters:

INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

GENERALIZED STRUCTURE ELEMENT

SUBROUTINE PGSE (GSEID, LDR, DATREC)

Input Parameters:

INTEGER GSEID	GSE identifier
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

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SET EDIT MODE

SUBROUTINE PSEDM (EDITMO)

Input Parameters:
INTEGER EDITMO edit mode (PINSRT, PREPLC)

COPY ALL ELEMENTS FROM STRUCTURE

SUBROUTINE PCELST (STRID)

Input Parameters:
INTEGER STRID structure identifier

SET ELEMENT POINTER

SUBROUTINE PSEP (EP)

Input Parameters:
INTEGER EP element position

OFFSET ELEMENT POINTER

SUBROUTINE POSEP (EPO)

Input Parameters:
INTEGER EPO element position offset

SET ELEMENT POINTER AT LABEL

SUBROUTINE PSEPLB (LABEL)

Input Parameters:
INTEGER LABEL label identifier

DELETE ELEMENT

SUBROUTINE PDEL

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DELETE ELEMENT RANGE

SUBROUTINE PDELRA (EP1,EP2)

Input Parameters:

INTEGER EP1	element position 1
INTEGER EP2	element position 2

DELETE ELEMENTS BETWEEN LABELS

SUBROUTINE PDELLB (LABEL1,LABEL2)

Input Parameters:

INTEGER LABEL1	label identifier 1
INTEGER LABEL2	label identifier 2

EMPTY STRUCTURE

SUBROUTINE PEMST (STRID)

Input Parameters:

INTEGER STRID	structure identifier

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9.7 Structure manipulation functions

DELETE STRUCTURE

SUBROUTINE PDST (STRID)

Input Parameters:

INTEGER STRID	structure identifier

DELETE STRUCTURE NETWORK

SUBROUTINE PDSN (STRID,REFHNF)

Input Parameters:

INTEGER STRID	structure identifier
INTEGER REFHNF	reference handling flag (PDELE,PKEEP)

DELETE ALL STRUCTURES

SUBROUTINE PDAS

CHANGE STRUCTURE IDENTIFIER

SUBROUTINE PCSTID (OLDSID,NEWSID)

Input Parameters:

INTEGER OLDSID	original structure identifier
INTEGER NEWSID	resulting structure identifier

CHANGE STRUCTURE REFERENCES

SUBROUTINE PCSTRF (OLDSID,NEWSID)

Input Parameters:

INTEGER OLDSID	original structure identifier
INTEGER NEWSID	resulting structure identifier

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CHANGE STRUCTURE IDENTIFIER AND REFERENCES

SUBROUTINE PCSTIR (OLDSID,NEWSID)

Input Parameters:

INTEGER OLDSID	original structure identifier
INTEGER NEWSID	resulting structure identifier

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9.8 Structure display functions

POST STRUCTURE

SUBROUTINE PPOST (WKID,STRID,PRIORT)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER STRID	structure identifier
REAL PRIORT	display priority

UNPOST STRUCTURE

SUBROUTINE PUPOST (WKID,STRID)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER STRID	structure identifier

UNPOST ALL STRUCTURES

SUBROUTINE PUPAST (WKID)

Input Parameters:

INTEGER WKID	workstation identifier

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9.9 Structure archiving functions

OPEN ARCHIVE FILE

SUBROUTINE POPARF (AFID,ARCFIL)

Input Parameters:	
INTEGER AFID	archive file identifier
INTEGER ARCFIL	archive file name

CLOSE ARCHIVE FILE

SUBROUTINE PCLARF (AFID)

Input Parameters:	
INTEGER AFID	archive file identifier

ARCHIVE STRUCTURES

SUBROUTINE PARST (AFID,N,LSTRID)

Input Parameters:	
INTEGER AFID	archive file identifier
INTEGER N	number of structure identifiers in the list
INTEGER LSTRID(N)	list of structure identifiers

ARCHIVE STRUCTURE NETWORKS

SUBROUTINE PARSN (AFID,N,LSTRID)

Input Parameters:	
INTEGER AFID	archive file identifier
INTEGER N	number of structure identifiers in the list
INTEGER LSTRID(N)	list of structure identifiers

ARCHIVE ALL STRUCTURES

SUBROUTINE PARAST (AFID)

Input Parameters:	
INTEGER AFID	archive file identifier

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SET CONFLICT RESOLUTION

SUBROUTINE PSCNRS (ARCCR,RETCR)

Input Parameters:

INTEGER ARCCR	archival confict resolution (PCRMNT,PCRABA,PCRUPD)
INTEGER RETCR	retrieval confict resolution (PCRMNT,PCRABA,PCRUPD)

RETRIEVE STRUCTURE IDENTIFIERS

SUBROUTINE PRSID (AFID,ILSIZE,N,LSTRID)

Input Parameters:

INTEGER AFID	archive file identifier
INTEGER ILSIZE	size of the list (LSTRID)

Output Parameters:

INTEGER N	number of structure identifiers in the list
INTEGER LSTRID(*)	list of structure identifiers

RETRIEVE STRUCTURES

SUBROUTINE PREST (AFID,N,LSTRID)

Input Parameters:

INTEGER AFID	archive file identifier
INTEGER N	number of structure identifiers in the list
INTEGER LSTRID(N)	list of structure identifiers

RETRIEVE STRUCTURE NETWORKS

SUBROUTINE PRESN (AFID,N,LSTRID)

Input Parameters:

INTEGER AFID	archive file identifier
INTEGER N	number of structure identifiers in the list
INTEGER LSTRID(N)	list of structure identifiers

RETRIEVE ALL STRUCTURES

SUBROUTINE PRAST (AFID)

Input Parameters:

INTEGER AFID	archive file identifier

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RETRIEVE PATHS TO ANCESTORS

```
SUBROUTINE PREPAN (AFID,STRID,PTHORD,PTHDEP,IPTHSZ,N,OL,
* APTHSZ,PATHS)
```

Input Parameters:	
INTEGER AFID	archive file identifier
INTEGER STRID	structure identifier
INTEGER PTHORD	path order (PPOTOP,PPOBOT)
INTEGER PTHDEP	path depth
INTEGER IPTHSZ	size of path buffer
INTEGER N	element of list of paths
Output Parameters:	
INTEGER OL	number of paths available
INTEGER APTHSZ	actual size of the Nth structure path
INTEGER PATHS(2,IPTHSZ)	Nth structure path

RETRIEVE PATHS TO DESCENDANTS

```
SUBROUTINE PREPDE (AFID,STRID,PTHORD,PTHDEP,IPTHSZ,N,OL,
* APTHSZ,PATHS)
```

Input Parameters:	
INTEGER AFID	archive file identifier
INTEGER STRID	structure identifier
INTEGER PTHORD	path order (PPOTOP,PPOBOT)
INTEGER PTHDEP	path depth
INTEGER IPTHSZ	size of path buffer
INTEGER N	element of list of paths
Output Parameters:	
INTEGER OL	number of paths available
INTEGER APTHSZ	actual size of the Nth structure path
INTEGER PATHS(2,IPTHSZ)	Nth structure path

DELETE STRUCTURES FROM ARCHIVE

```
SUBROUTINE PDSTAR (AFID,N,LSTRID)
```

Input Parameters:	
INTEGER AFID	archive file identifier
INTEGER N	number of structure identifiers in the list
INTEGER LSTRID(N)	list of structure identifiers

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DELETE STRUCTURE NETWORKS FROM ARCHIVE

SUBROUTINE PDSNAR (AFID,N,LSTRID)

Input Parameters:

INTEGER AFID	archive file identifier
INTEGER N	number of structure identifiers in the list
INTEGER LSTRID(N)	list of structure identifiers

DELETE ALL STRUCTURES FROM ARCHIVE

SUBROUTINE PDASAR (AFID)

Input Parameters:

INTEGER AFID	archive file identifier

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9.10 Input functions

9.10.1 Pick related structure elements

SET PICK IDENTIFIER

SUBROUTINE PSPKID (PKID)

Input Parameters:

INTEGER PKID	pick identifier

SET PICK FILTER

SUBROUTINE PSPKFT (WKID, PKDNR, ISN, IS, ESN, ES)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PKDNR	pick device number
INTEGER ISN	number of names in the inclusion set
INTEGER IS (ISN)	inclusion set
INTEGER ESN	number of names in the exclusion set
INTEGER ES (ESN)	exclusion set

9.10.2 Initialization of input devices

INITIALIZE LOCATOR 3

SUBROUTINE PINLC3 (WKID,LCDNR,IVIEWI,IPX,IPY,IPZ,PET,EVOL,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER LCDNR	locator device number
INTEGER IVIEWI	initial view index
REAL IPX,IPY,IPZ	initial locator position (WC)
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build LOCATOR INPUT DATA RECORD for PET = 4:
IL=7
IA=(*unused*, linetype ASF, linewidth scale factor ASF, polyline colour index ASF, polyline index, linetype, polyline colour index)
RL=1
RA=(linewidth scale factor)
SL=0

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LSTR=()
STR=()

PPREC parameters to build LOCATOR INPUT DATA RECORD for PET = 5 and polyline/fill area control flag=PPLINE:
IL=8
IA=(polyline/fill area control flag, *unused*, linetype ASF, linewidth scale factor ASF, polyline colour index ASF, polyline index, linetype, polyline colour index)
RL=1
RA=(linewidth scale factor)
SL=0
LSTR=()
STR=()

PPREC parameters to build LOCATOR INPUT DATA RECORD for PET = 5 and polyline/fill area control flag=PFILLA:
IL=9
IA=(polyline/fill area control flag, *unused*, interior style ASF, interior style index ASF, interior colour index ASF, interior index, interior style, interior style index, interior colour index)
RL=0
RA=()
SL=0
LSTR=()
STR=()

PPREC parameters to build LOCATOR INPUT DATA RECORD for PET = 5 and polyline/fill area control flag=PFILAS:
IL=16
IA=(polyline/fill area control flag, *unused*, interior style ASF, interior style index ASF, interior colour index ASF, interior index, interior style, interior style index, interior colour index, edge flag ASF, edgetype ASF, edgewidth scale factor ASF, edge color index ASF, edge flag, edgetype, edge colour index)
RL=1
RA=(edgewidth scale factor)
SL=0
LSTR=()
STR=()

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INITIALIZE LOCATOR

SUBROUTINE PINLC (WKID,LCDNR,IVIEWI,IPX,IPY,PET,XMIN,XMAX,YMIN,
*YMAX,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER LCDNR	locator device number
INTEGER IVIEWI	initial view index
REAL IPX,IPY	initial locator position (WC)
INTEGER PET	prompt and echo type
REAL XMIN,XMAX,YMIN,YMAX	echo area (DC)
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build LOCATOR INPUT DATA RECORD for PET = 4:
IL=7
IA=(*unused*, linetype ASF, linewidth scale factor ASF, polyline colour index ASF, polyline index, linetype, polyline colour index)
RL=1
RA=(linewidth scale factor)
SL=0
LSTR=()
STR=()

PPREC parameters to build LOCATOR INPUT DATA RECORD for PET = 5 and polyline/fill area control flag=PPLINE:
IL=8
IA=(polyline/fill area control flag, *unused*, linetype ASF, linewidth scale factor ASF, polyline colour index ASF, polyline index, linetype, polyline colour index)
RL=1
RA=(linewidth scale factor)
SL=0
LSTR=()
STR=()

PPREC parameters to build LOCATOR INPUT DATA RECORD for PET = 5 and polyline/fill area control flag=PFILLA:
IL=9
IA=(polyline/fill area control flag, *unused*, interior style ASF, interior style index ASF, interior colour index ASF, interior index, interior style, interior style index, interior colour index)
RL=0
RA=()
SL=0
LSTR=()
STR=()

PPREC parameters to build LOCATOR INPUT DATA RECORD for PET = 5 and polyline/fill area control flag=PFILAS:
IL=16

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IA=(polyline/fill area control flag, *unused*, interior style ASF, interior style index ASF, interior colour index ASF, interior index, interior style, interior style index, interior colour index, edge flag ASF, edgetype ASF, edgewidth scale factor ASF, edge color index ASF, edge flag, edgetype, edge colour index)
RL=1
RA=(edgewidth scale factor)
SL=0
LSTR=()
STR=()

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INITIALIZE STROKE 3

SUBROUTINE PINSK3 (WKID,SKDNR,IVIEWI,N,IPX,IPY,IPZ,PET,EVOL, *LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER SKDNR	stroke device number
INTEGER IVIEWI	initial view index
INTEGER N	number of coordinates of initial stroke
REAL IPX (*), IPY (*), IPZ (*)	coordinates of initial stroke (WC) (the actual arguments are dimensioned by at least MAX(1,N))
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build STROKE INPUT DATA RECORD for PET = 1 or 2:
IL=2
IA=(input buffer size, editing position)
RL=4
RA=(x interval, y interval, z interval, time interval in seconds)
SL=0
LSTR=()
STR=()

PPREC parameters to build STROKE INPUT DATA RECORD for PET = 3:
IL=9
IA=(input buffer size, editing position, *unused*, marker type ASF, marker size scale factor ASF, polymarker colour index ASF, polymarker index, marker type, polymarker colour index)
RL=5
RA=(x interval, y interval, z interval, time interval in seconds, marker size scale factor)
SL=0
LSTR=()
STR=()

PPREC parameters to build STROKE INPUT DATA RECORD for PET = 4:
IL=9
IA=(input buffer size, editing position, *unused*, linetype ASF, linewidth scale factor ASF, polyline colour index ASF, polyline index, linetype, polyline colour index)
RL=5
RA=(x interval, y interval, z interval time interval in seconds, linewidth scale factor)
SL=0
LSTR=()
STR=()

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INITIALIZE STROKE

SUBROUTINE PINSK (WKID,SKDNR,IVIEWI,N,IPX,IPY,PET,XMIN,XMAX,
*YMIN,YMAX,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER SKDNR	stroke device number
INTEGER IVIEWI	initial view index
INTEGER N	number of coordinates of initial stroke
REAL IPX (*), IPY (*)	coordinates of initial stroke (WC) (the actual arguments are dimensioned by at least MAX(1,N))
INTEGER PET	prompt and echo type
REAL XMIN,XMAX,YMIN,YMAX	echo area (DC)
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build STROKE INPUT DATA RECORD for PET = 1 or 2:
IL=2
IA=(input buffer size, editing position)
RL=3
RA=(x interval, y interval, time interval in seconds)
SL=0
LSTR=()
STR=()

PPREC parameters to build STROKE INPUT DATA RECORD for PET = 3:
IL=9
IA=(input buffer size, editing position, *unused*, marker type ASF, marker size scale factor ASF, polymarker colour index ASF, polymarker index, marker type, polymarker colour index)
RL=4
RA=(x interval, y interval, time interval in seconds, marker size scale factor)
SL=0
LSTR=()
STR=()

PPREC parameters to build STROKE INPUT DATA RECORD for PET = 4:
IL=9
IA=(input buffer size, editing position, *unused*, linetype ASF, linewidth scale factor ASF, polyline colour index ASF, polyline index, linetype, polyline colour index)
RL=4
RA=(x interval, y interval, time interval in seconds, linewidth scale factor)
SL=0
LSTR=()
STR=()

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INITIALIZE VALUATOR 3

SUBROUTINE PINVL3 (WKID,VLDNR,IVAL,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER VLDNR	valuator device number
REAL IVAL	initial value
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build VALUATOR INPUT DATA RECORD:
IL=0
IA=()
RL=2
RA=(low value of valuator range, high value of valuator range)
SL=0
LSTR=()
STR=()

INITIALIZE VALUATOR

SUBROUTINE PINVL (WKID,VLDNR,IVAL,PET,XMIN,XMAX,YMIN,YMAX,
*LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER VLDNR	valuator device number
REAL IVAL	initial value
INTEGER PET	prompt and echo type
REAL XMIN,XMAX,YMIN,YMAX	echo area (DC)
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build VALUATOR INPUT DATA RECORD:
IL=0
IA=()
RL=2
RA=(low value of valuator range, high value of valuator range)
SL=0
LSTR=()
STR=()

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INITIALIZE CHOICE 3

SUBROUTINE PINCH3 (WKID,CHDNR,ISTAT,ICHNR,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER CHDNR	choice device number
INTEGER ISTAT	initial status (POK,PNCHOI)
INTEGER ICHNR	initial choice number
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build CHOICE INPUT DATA RECORD for PET = 2:
IL=number of choice alternatives
IA=(list of prompts)
RL=0
RA=()
SL=0
LSTR=()
STR=()

PPREC parameters to build CHOICE INPUT DATA RECORD for PET = 3 or 4:
IL=0
IA=()
RL=0
RA=()
SL=number of choice strings
LSTR=(list of lengths of choice strings)
STR=(list of strings)

PPREC parameters to build CHOICE INPUT DATA RECORD for PET = 5:
IL=1 + (number of choice alternatives (=N))
IA(1)=(structure identifier)
IA(1+I)=Ith pick identifier, I=1,...,N
RL=0
RA=()
SL=0
LSTR=()
STR=()

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INITIALIZE CHOICE

SUBROUTINE PINCH (WKID,CHDNR,ISTAT,ICHNR,PET,XMIN,XMAX,YMIN,
*YMAX,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER CHDNR	choice device number
INTEGER ISTAT	initial status (POK,PNCHOI)
INTEGER ICHNR	initial choice number
INTEGER PET	prompt and echo type
REAL XMIN,XMAX,YMIN,YMAX	echo area (DC)
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build CHOICE INPUT DATA RECORD for PET = 2:
IL=number of choice alternatives
IA=(list of prompts)
RL=0
RA=()
SL=0
LSTR=()
STR=()

PPREC parameters to build CHOICE INPUT DATA RECORD for PET = 3 or 4:
IL=0
IA=()
RL=0
RA=()
SL=number of choice strings
LSTR=(list of lengths of choice strings)
STR=(list of strings)

PPREC parameters to build CHOICE INPUT DATA RECORD for PET = 5:
IL=1 + (number of choice alternatives (=N))
IA(1)=(structure identifier)
IA(1+I)=Ith pick identifier, I=1,...,N
RL=0
RA=()
SL=0
LSTR=()
STR=()

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INITIALIZE PICK 3

SUBROUTINE PINPK3 (WKID,PKDNR,ISTAT,IPPD,PP,PET,EVOL,LDR,DATREC,PPORDR)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER PKDNR	pick device number
INTEGER ISTAT	initial status (POK,PNPICK)
INTEGER IPPD	depth of initial pick path
INTEGER PP(3,IPPD)	initial pick path
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record
INTEGER PPORDR	pick path order (PPOTOP, PPOBOT)

INITIALIZE PICK

SUBROUTINE PINPK (WKID,PKDNR,ISTAT,IPPD,PP,PET,XMIN,XMAX,YMIN,YMAX,
*LDR,DATREC,PPORDR)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER PKDNR	pick device number
INTEGER ISTAT	initial status (POK,PNPICK)
INTEGER IPPD	depth of initial pick path
INTEGER PP(3,IPPD)	initial pick path
INTEGER PET	prompt and echo type
REAL XMIN,XMAX,YMIN,YMAX	echo area (DC)
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record
INTEGER PPORDR	pick path order (PPOTOP, PPOBOT)

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INITIALIZE STRING 3
Full FORTRAN 77 version

SUBROUTINE PINST3 (WKID,STDNR,LSTR,ISTR,PET,EVOL,LDR,DATREC)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
INTEGER LSTR	length of the initial string (≥0). The number of characters actually used is the minimum of LSTR and the length of ISTR.
CHARACTER*(*) ISTR	initial string
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build STRING INPUT DATA RECORD:
IL=2
IA=(input buffer size, initial editing position)
RL=0
RA=()
SL=0
LSTR=()
STR=()

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INITIALIZE STRING 3
FORTRAN 77 subset version

SUBROUTINE PINST3 (WKID,STDNR,LSTR,ISTR,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
INTEGER LSTR	length of the initial string
CHARACTER*80 ISTR	initial string
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build STRING INPUT DATA RECORD:
IL=2
IA=(input buffer size, initial editing position)
RL=0
RA=()
SL=0
LSTR=()
STR=()

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INITIALIZE STRING
Full FORTRAN 77 version

```
      SUBROUTINE PINST (WKID,STDNR,LSTR,ISTR,PET,XMIN,XMAX,YMIN,
     *YMAX,LDR,DATREC)
```

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
INTEGER LSTR	length of the initial string (≥0). The number of characters actually used is the minimum of LSTR and the length of ISTR.
CHARACTER*(*) ISTR	initial string
INTEGER PET	prompt and echo type
REAL XMIN,XMAX,YMIN,YMAX	echo area (DC)
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build STRING INPUT DATA RECORD:
IL=2
IA=(input buffer size, initial editing position)
RL=0
RA=()
SL=0
LSTR=()
STR=()

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INITIALIZE STRING
FORTRAN 77 subset version

```
SUBROUTINE PINST (WKID,STDNR,LSTR,ISTR,PET,XMIN,XMAX,YMIN,
*YMAX,LDR,DATREC)
```

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
INTEGER LSTR	length of the initial string
CHARACTER*80 ISTR	initial string
INTEGER PET	prompt and echo type
REAL XMIN,XMAX,YMIN,YMAX	echo area (DC)
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

PPREC parameters to build STRING INPUT DATA RECORD:
IL=2
IA=(input buffer size, initial editing position)
RL=0
RA=()
SL=0
LSTR=()
STR=()

9.10.3 Setting mode of input devices

SET LOCATOR MODE

```
SUBROUTINE PSLCM (WKID,LCDNR,MODE,ESW)
```

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER LCDNR	locator device number
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)

SET STROKE MODE

```
SUBROUTINE PSSKM (WKID,SKDNR,MODE,ESW)
```

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER SKDNR	stroke device number
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)

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SET VALUATOR MODE

SUBROUTINE PSVLM (WKID,VLDNR,MODE,ESW)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER VLDNR	valuator device number
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)

SET CHOICE MODE

SUBROUTINE PSCHM (WKID,CHDNR,MODE,ESW)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER CHDNR	choice device number
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)

SET PICK MODE

SUBROUTINE PSPKM (WKID,PKDNR,MODE,ESW)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PKDNR	pick device number
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)

SET STRING MODE

SUBROUTINE PSSTM (WKID,STDNR,MODE,ESW)

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)

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9.10.4 Request input functions

REQUEST LOCATOR 3

SUBROUTINE PRQLC3 (WKID,LCDNR,STAT,VIEWI,PX,PY,PZ)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER LCDNR	locator device number
Output Parameters:	
INTEGER STAT	status (PNONE,POK)
INTEGER VIEWI	view index
REAL PX,PY,PZ	locator position (WC)

REQUEST LOCATOR

SUBROUTINE PRQLC (WKID,LCDNR,STAT,VIEWI,PX,PY)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER LCDNR	locator device number
Output Parameters:	
INTEGER STAT	status (PNONE,POK)
INTEGER VIEWI	view index
REAL PX,PY	locator position (WC)

REQUEST STROKE 3

SUBROUTINE PRQSK3 (WKID,SKDNR,N,STAT,VIEWI,NP,PXA,PYA,PZA)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER SKDNR	stroke device number
INTEGER N	dimension of arrays for stroke points
Output Parameters:	
INTEGER STAT	status (PNONE,POK)
INTEGER VIEWI	view index
INTEGER NP	number of points
REAL PXA (N), PYA (N), PZA (N)	coordinates of points in stroke (WC)

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REQUEST STROKE

SUBROUTINE PRQSK (WKID,SKDNR,N,STAT,VIEWI,NP,PXA,PYA)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER SKDNR	stroke device number
INTEGER N	dimension of arrays for stroke points
Output Parameters:	
INTEGER STAT	status (PNONE,POK)
INTEGER VIEWI	view index
INTEGER NP	number of points
REAL PXA (N), PYA (N)	coordinates of points in stroke (WC)

REQUEST VALUATOR

SUBROUTINE PRQVL (WKID,VLDNR,STAT,VAL)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER VLDNR	valuator device number
Output Parameters:	
INTEGER STAT	status (PNONE,POK)
REAL VAL	value

REQUEST CHOICE

SUBROUTINE PRQCH (WKID,CHDNR,STAT,CHNR)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER CHDNR	choice device number
Output Parameters:	
INTEGER STAT	status (PNONE,POK,PNCHOI)
INTEGER CHNR	choice number

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REQUEST PICK

SUBROUTINE PRQPK (WKID,PKDNR,IPPD,STAT,PPD,PP)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER PKDNR	pick device number
INTEGER IPPD	depth of pick path to return
Output Parameters:	
INTEGER STAT	status (PNONE,POK,PNPICK)
INTEGER PPD	depth of actual pick path
INTEGER PP (3,IPPD)	pick path

REQUEST STRING
Full FORTRAN 77 version

SUBROUTINE PRQST (WKID,STDNR,STAT,LOSTR,STR)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
Output Parameters:	
INTEGER STAT	status (PNONE,POK)
INTEGER LOSTR	number of characters returned
CHARACTER*(*) STR	character string

REQUEST STRING
FORTRAN 77 subset version

SUBROUTINE PRQST (WKID,STDNR,STAT,LOSTR,STR)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
Output Parameters:	
INTEGER STAT	status (PNONE,POK)
INTEGER LOSTR	number of characters returned
CHARACTER*80 STR	character string

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9.10.5 Sample input functions

SAMPLE LOCATOR 3

SUBROUTINE PSMLC3 (WKID,LCDNR,VIEWI,LPX,LPY,LPZ)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER LCDNR	locator device number
Output Parameters:	
INTEGER VIEWI	view index
REAL LPX,LPY,LPZ	locator position (WC)

SAMPLE LOCATOR

SUBROUTINE PSMLC (WKID,LCDNR,VIEWI,LPX,LPY)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER LCDNR	locator device number
Output Parameters:	
INTEGER VIEWI	view index
REAL LPX,LPY	locator position (WC)

SAMPLE STROKE 3

SUBROUTINE PSMSK3 (WKID,SKDNR,N,VIEWI,NP,PXA,PYA,PZA)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER SKDNR	stroke device number
INTEGER N	dimension of arrays for stroke points
Output Parameters:	
INTEGER VIEWI	view index
INTEGER NP	number of points
REAL PXA (N), PYA (N), PZA (N)	coordinates of points in stroke (WC)

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SAMPLE STROKE

SUBROUTINE PSMSK (WKID,SKDNR,N,VIEWI,NP,PXA,PYA)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER SKDNR	stroke device number
INTEGER N	dimension of arrays for stroke points
Output Parameters:	
INTEGER VIEWI	view index
INTEGER NP	number of points
REAL PXA (N), PYA (N)	coordinates of points in stroke (WC)

SAMPLE VALUATOR

SUBROUTINE PSMVL (WKID,VLDNR,VAL)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER VLDNR	valuator device number
Output Parameters:	
REAL VAL	value

SAMPLE CHOICE

SUBROUTINE PSMCH (WKID,CHDNR,STAT,CHNR)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER CHDNR	choice device number
Output Parameters:	
INTEGER STAT	status (POK,PNCHOI)
INTEGER CHNR	choice number

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SAMPLE PICK

SUBROUTINE PSMPK (WKID,PKDNR,IPPD,STAT,PPD,PP)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER PKDNR	pick device number
INTEGER IPPD	depth of pick path to return
Output Parameters:	
INTEGER STAT	status (POK,PNPICK)
INTEGER PPD	depth of actual pick path
INTEGER PP (3,IPPD)	pick path

SAMPLE STRING
Full FORTRAN 77 version

SUBROUTINE PSMST (WKID,STDNR,LOSTR,STR)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
Output Parameters:	
INTEGER LOSTR	number of characters returned
CHARACTER*(*) STR	string

SAMPLE STRING
FORTRAN 77 subset version

SUBROUTINE PSMST (WKID,STDNR,LOSTR,STR)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
Output Parameters:	
INTEGER LOSTR	number of characters returned
CHARACTER*80 STR	string

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9.10.6 Event input functions

AWAIT EVENT

SUBROUTINE PWAIT (TOUT,WKID,ICL,IDNR)

Input Parameters:	
REAL TOUT	time out (seconds)
Output Parameters:	
INTEGER WKID	workstation identifier
INTEGER ICL	input class (PNCLAS,PLOCAT,PSTROK, PVALUA,PCHOIC,PPICK,PSTRIN)
INTEGER IDNR	logical input device number

FLUSH DEVICE EVENTS

SUBROUTINE PFLUSH (WKID,ICL,IDNR)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER ICL	input class (PLOCAT,PSTROK,PVALUA, PCHOIC,PPICK,PSTRIN)
INTEGER IDNR	logical input device number

GET LOCATOR 3

SUBROUTINE PGTLC3 (VIEWI,LPX,LPY,LPZ)

Output Parameters:	
INTEGER VIEWI	view index
REAL LPX,LPY,LPZ	locator position (WC)

GET LOCATOR

SUBROUTINE PGTLC (VIEWI,LPX,LPY)

Output Parameters:	
INTEGER VIEWI	view index
REAL LPX,LPY	locator position (WC)

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GET STROKE 3

SUBROUTINE PGTSK3 (N,VIEWI,NP,PXA,PYA,PZA)

Input Parameters:	
INTEGER N	dimension of arrays for stroke points
Output Parameters:	
INTEGER VIEWI	view index
INTEGER NP	number of points
REAL PXA (N), PYA (N), PZA (N)	coordinates of points in stroke (WC)

GET STROKE

SUBROUTINE PGTSK (N,VIEWI,NP,PXA,PYA)

Input Parameters:	
INTEGER N	dimension of arrays for stroke points
Output Parameters:	
INTEGER VIEWI	view index
INTEGER NP	number of points
REAL PXA (N), PYA (N)	coordinates of points in stroke (WC)

GET VALUATOR

SUBROUTINE PGTVL (VAL)

Output Parameters:	
REAL VAL	value

GET CHOICE

SUBROUTINE PGTCH (STAT,CHNR)

Output Parameters:	
INTEGER STAT	status (POK,PNCHOI)
INTEGER CHNR	choice number

GET PICK

SUBROUTINE PGTPK (IPPD,STAT,PPD,PP)

Input Parameters:	
INTEGER IPPD	depth of pick path to return
Output Parameters:	
INTEGER STAT	status (POK,PNPICK)

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INTEGER PPD	depth of actual pick path
INTEGER PP (3,IPPD)	pick path

GET STRING
Full FORTRAN 77 version

SUBROUTINE PGTST (LOSTR,STR)

Output Parameters:

INTEGER LOSTR	number of characters returned
CHARACTER*(*) STR	string

GET STRING
FORTRAN 77 subset version

SUBROUTINE PGTST (LOSTR,STR)

Output Parameters:

INTEGER LOSTR	number of characters returned
CHARACTER*80 STR	string

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9.11 Metafile functions

WRITE ITEM TO METAFILE

SUBROUTINE PWITM (WKID,TYPE,IDRL,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER TYPE	item type
INTEGER IDRL	item data record length (number characters in data record array)
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

GET ITEM TYPE FROM METAFILE

SUBROUTINE PGTITM (WKID,TYPE,IDRL)

Input Parameters:	
INTEGER WKID	workstation identifier
Output Parameters:	
INTEGER TYPE	item type
INTEGER IDRL	item data record length (this may be passed to PRDITM as MIDRL)

READ ITEM FROM METAFILE

SUBROUTINE PRDITM (WKID,MIDRL,MLDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER MIDRL	maximum item data record length (number of characters in the data record array). Range is 0...IDRL. If MIDRL=0, then skip the record; if MIDRL<IDRL, the excess is lost; if MIDRL≥IDRL, a full record is read (IDRL is returned by PGTITM).
INTEGER MLDR	dimension of item data record
Output Parameters:	
CHARACTER*80 DATREC(MLDR)	data record

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INTERPRET ITEM

SUBROUTINE PIITM (TYPE,IDRL,LDR,DATREC)

Input Parameters:

INTEGER TYPE	item type
INTEGER IDRL	item data record length (number characters in data record array)
INTEGER LDR	dimension of data record array
CHARACTER*80 DATREC(LDR)	data record

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9.12 Inquiry functions

9.12.1 Inquiry functions for operating state value

INQUIRE SYSTEM STATE VALUE

SUBROUTINE PQSYS (SYSSTA)

Output Parameters:
INTEGER SYSSTA system state value (PPHCL,PPHOP)

INQUIRE WORKSTATION STATE VALUE

SUBROUTINE PQWKST (WKSTA)

Output Parameters:
INTEGER WKSTA workstation state value (PWSCL,PWSOP)

INQUIRE STRUCTURE STATE VALUE

SUBROUTINE PQSTRS (STRSTA)

Output Parameters:
INTEGER STRSTA structure state value (PSTCL,PSTOP)

INQUIRE ARCHIVE STATE VALUE

SUBROUTINE PQARS (ARSTA)

Output Parameters:
INTEGER ARSTA archive state value (PARCL,PAROP)

9.12.2 Inquiry functions for PHIGS description table

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INQUIRE LIST element OF AVAILABLE WORKSTATION TYPES

SUBROUTINE PQEWK (N,ERRIND,NUMBER,WKTYP)

Input Parameters:	
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NUMBER	number of workstation types
INTEGER WKTYP	Nth element of list of available workstation types

INQUIRE PHIGS FACILITIES

SUBROUTINE PQPHF (NCS,ERRIND,SIMOPW,SIMOPA,NAMESN,OLCS,CS,NFLN,IFLN)

Input Parameters:	
INTEGER NCS	character set requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER SIMOPW	maximum number of simultaneously open workstations
INTEGER SIMOPA	maximum number of simultaneously open archive files
INTEGER NAMESN	maximum number of available names for name sets
INTEGER OLCS	number of available character sets
INTEGER CS	NCSth available character set
INTEGER NFLN	maximum length of normal filter list for ISS
INTEGER IFLN	maximum length of inverted filter list for ISS

INQUIRE GENERALIZED STRUCTURE ELEMENT FACILITIES

SUBROUTINE PQGSEF (N,ERRIND,OL,GSEID,WSDIND)

Input Parameters:	
INTEGER N	element of the list of available GSEs
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of available GSEs
INTEGER GSEID	GSE identifier of Nth element of the list of available GSEs
INTEGER WSDIND	workstation dependency indicator of Nth element of the list of available GSEs (PWKI,PWKD)

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INQUIRE MODELLING CLIPPING FACILITIES

SUBROUTINE PQMCLF (N,ERRIND,NDPMCV,OL,MCLPOP)

Input Parameters:	
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NDPMCV	number of distinct planes in modelling clipping volume
INTEGER OL	number of modelling clipping operators
INTEGER MCLPOP	Nth element of list of modelling clipping operators

9.12.3 Inquiry functions for PHIGS state list

INQUIRE EDIT MODE

SUBROUTINE PQEDM (ERRIND,EDITMO)

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER EDITMO	edit mode (PINSRT, PREPLC)

INQUIRE SET member OF OPEN WORKSTATIONS

SUBROUTINE PQOPWK (N,ERRIND,OL,WKID)

Input Parameters:	
INTEGER N	set member requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of open workstations
INTEGER WKID	Nth member of set of open workstations

INQUIRE STRUCTURE IDENTIFIERS

SUBROUTINE PQSID (N,ERRIND,NUMBER,STRID)

Input Parameters:	
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NUMBER	number of structure identifiers
INTEGER STRID	Nth structure identifier

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INQUIRE ARCHIVE FILES

SUBROUTINE PQARF (N,ERRIND,NUMBER,AFID,ARCFIL)

Input Parameters:	
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NUMBER	number of archive files open
INTEGER AFID	Nth open archive file identifier
INTEGER ARCFIL	Nth open archive file name

INQUIRE CONFLICT RESOLUTION

SUBROUTINE PQCNRS (ERRIND,ARCCR,RETCR)

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER ARCCR	archival conflict resolution (PCRMNT, PCRABA, PCRUPD)
INTEGER RETCR	retrieval conflict resolution (PCRMNT, PCRABA, PCRUPD)

INQUIRE ALL CONFLICTING STRUCTURES

SUBROUTINE PQCST (AFID,N,ERRIND,OL,OSTRID)

Input Parameters:	
INTEGER AFID	archive file identifier
INTEGER N	element of the structure identifier list to return
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of structure identifiers in list
INTEGER OSTRID	Nth structure identifier in list

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INQUIRE CONFLICTING STRUCTURES IN NETWORK

SUBROUTINE PQCSTN (AFID,STRID,SNSRC,N,ERRIND,OL,OSTRID)

Input Parameters:	
INTEGER AFID	archive file identifier
INTEGER STRID	structure identifier
INTEGER SNSRC	structure network source (PCSS,PARCHV)
INTEGER N	element of the structure identifier list to return

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of structure identifiers in list
INTEGER OSTRID	Nth structure identifier in list

INQUIRE MORE SIMULTANEOUS EVENTS

SUBROUTINE PQSIM (ERRIND,FLAG)

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER FLAG	more simultaneous events (PNMORE,PMORE)

9.12.4 Inquiry functions for workstation state list

INQUIRE WORKSTATION CONNECTION AND TYPE

SUBROUTINE PQWKC (WKID,ERRIND,CONID,WTYPE)

Input Parameters:	
INTEGER WKID	workstation identifier

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER CONID	connection identifier
INTEGER WTYPE	workstation type

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INQUIRE LIST element OF VIEW INDICES

SUBROUTINE PQEVWI (WKID,N,ERRIND,NVWIX,VIEWI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NVWIX	number of view bundle table entries
INTEGER VIEWI	Nth element of list of defined view indices

INQUIRE VIEW REPRESENTATION

SUBROUTINE PQVWR (WKID, VIEWI, CURQ, ERRIND,
*VWUPD, VWORMT, VWMPMT, VWCPLM, XYCLPI, BCLIPI, FCLIPI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER VIEWI	view index requested
INTEGER CURQ	whether current or requested values are to be returned (PCURVL,PRQSVL)
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER VWUPD	viewing transformation update state (PNPEND,PPEND)
REAL VWORMT(4,4)	view orientation matrix
REAL VWMPMT(4,4)	view mapping matrix
REAL VWCPLM(6)	view clipping limits (NPC) xmin,xmax,ymin,ymax,zmin,zmax
INTEGER XYCLPI	x-y clipping indicator (PNCLIP,PCLIP)
INTEGER BCLIPI	back clipping indicator (PNCLIP,PCLIP)
INTEGER FCLIPI	front clipping indicator (PNCLIP,PCLIP)

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INQUIRE HLHSR MODE

SUBROUTINE PQHRM (WKID, ERRIND, HUPD, CHRM, RHRM)

Input Parameters:	
INTEGER WKID	workstation identifier
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER HUPD	HLHSR mode update state (PNPEND,PPEND)
INTEGER CHRM	current HLHSR mode
INTEGER RHRM	requested HLHSR mode

INQUIRE POSTED STRUCTURES

SUBROUTINE PQPOST (WKID,N,ERRIND,NUMBER,STRID,PRIORT)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NUMBER	number of structures posted to that workstation
INTEGER STRID	identifier of the Nth structure posted to that workstation
REAL PRIORT	input priority of the Nth structure posted to that workstation

INQUIRE DISPLAY UPDATE STATE

SUBROUTINE PQDUS (WKID,ERRIND,DEFMOD,MODMOD,DEMPTY,STOFVR)

Input Parameters:	
INTEGER WKID	workstation identifier
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER DEFMOD	deferral mode (PASAP,PBNIG,PBNIL,PASTI,PWAITD)
INTEGER MODMOD	modification mode (PNIVE,PUWOR,PUQUM)
INTEGER DEMPTY	display surface empty (PNEMPT,PEMPTY)
INTEGER STOFVR	state of visual representation (PVROK,PVRDRF,PVRSIM)

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INQUIRE LIST element OF POLYLINE INDICES

SUBROUTINE PQEPLI (WKID,N,ERRIND,OL,PLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of polyline bundle table entries
INTEGER PLI	Nth element of list of defined polyline indices

INQUIRE POLYLINE REPRESENTATION

SUBROUTINE PQPLR (WKID,PLI,TYPE,ERRIND,LTYPE,LWIDTH,COLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER PLI	polyline index
INTEGER TYPE	type of returned values (PSET,PREALI)
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER LTYPE	linetype
REAL LWIDTH	linewidth scale factor
INTEGER COLI	polyline colour index

INQUIRE LIST element OF POLYMARKER INDICES

SUBROUTINE PQEPMI (WKID,N,ERRIND,OL,PMI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of polymarker bundle table entries
INTEGER PMI	Nth element of list of defined polymarker indices

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INQUIRE POLYMARKER REPRESENTATION

SUBROUTINE PQPMR (WKID,PMI,TYPE,ERRIND,MTYPE,MSZSF,COLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER PMI	polymarker index
INTEGER TYPE	type of returned values (PSET,PREALI)

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MTYPE	marker type
REAL MSZSF	marker size scale factor
INTEGER COLI	polymarker colour index

INQUIRE LIST element OF TEXT INDICES

SUBROUTINE PQETXI (WKID,N,ERRIND,OL,TXI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER N	list element requested

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of text bundle table entries
INTEGER TXI	Nth element of list of defined text indices

INQUIRE TEXT REPRESENTATION

SUBROUTINE PQTXR (WKID,TXI,TYPE,ERRIND,FONT,PREC,CHXP,CHSP,
*COLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER TXI	text index
INTEGER TYPE	type of returned values (PSET,PREALI)

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER FONT	text font
INTEGER PREC	text precision (PSTRP,PCHARP,PSTRKP)
REAL CHXP	character expansion factor
REAL CHSP	character spacing
INTEGER COLI	text colour index

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INQUIRE LIST element OF INTERIOR INDICES

SUBROUTINE PQEII (WKID,N,ERRIND,OL,II)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of interior bundle table entries
INTEGER II	Nth element of list of defined interior indices

INQUIRE INTERIOR REPRESENTATION

SUBROUTINE PQIR (WKID,II,TYPE,ERRIND,INTS,ISTYLI,COLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER II	interior index
INTEGER TYPE	type of returned values (PSET,PREALI)
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER INTS	interior style (PHOLLO,PSOLID,PPATTR,PHATCH,PISEMP)
INTEGER ISTYLI	interior style index
INTEGER COLI	interior colour index

INQUIRE LIST element OF EDGE INDICES

SUBROUTINE PQEEDI (WKID,N,ERRIND,OL,EDI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of edge bundle table entries
INTEGER EDI	Nth element of list of defined edge indices

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INQUIRE EDGE REPRESENTATION

SUBROUTINE PQEDR (WKID,EDI,TYPE,ERRIND,EDFLAG,EDTYPE,EWIDTH,COLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER EDI	edge index
INTEGER TYPE	type of returned values (PSET,PREALI)
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER EDFLAG	edge flag (POFF, PON)
INTEGER EDTYPE	edgetype
REAL EWIDTH	edgewidth scale factor
INTEGER COLI	edge colour index

INQUIRE LIST element OF PATTERN INDICES

SUBROUTINE PQEPAI (WKID,N,ERRIND,OL,PAI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of pattern table entries
INTEGER PAI	Nth element of list of pattern indices

INQUIRE PATTERN REPRESENTATION

SUBROUTINE PQPAR (WKID,PAI,TYPE,DIMX,DIMY,ERRIND,DX,DY,COLIA)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER PAI	pattern index
INTEGER TYPE	type of returned values (PSET,PREALI)
INTEGER DIMX,DIMY	maximum pattern array dimensions
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER DX,DY	pattern colour index array dimensions
INTEGER COLIA (DIMX,DIMY)	pattern colour index array

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INQUIRE COLOUR MODEL

SUBROUTINE PQCMD (WKID,ERRIND,CMODEL)

Input Parameters:	
INTEGER WKID	workstation identifier
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER CMODEL	current colour model

INQUIRE LIST element OF COLOUR INDICES

SUBROUTINE PQECI (WKID,N,ERRIND,OL,COLI)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of colour table entries
INTEGER COLI	Nth element of list of colour indices

INQUIRE COLOUR REPRESENTATION

SUBROUTINE PQCR (WKID,COLI,CCSBSZ,TYPE,ERRIND,OL,CSPEC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER COLI	colour index
INTEGER CCSBSZ	colour component specification buffer size
INTEGER TYPE	type of returned values (PSET,PREALI)
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of colour components in the colour specification
REAL CSPEC(CCSBSZ)	colour specification

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INQUIRE HIGHLIGHTING FILTER

SUBROUTINE PQHLFT (WKID,ISBSZ,ESBSZ,ERRIND,ISN,IS,ESN,ES)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER ISBSZ	inclusion set buffer size
INTEGER ESBSZ	exclusion set buffer size

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER ISN	number of names in the inclusion set
INTEGER IS (ISBSZ)	inclusion set
INTEGER ESN	number of names in the exclusion set
INTEGER ES (ESBSZ)	exclusion set

INQUIRE INVISIBILITY FILTER

SUBROUTINE PQIVFT (WKID,ISBSZ,ESBSZ,ERRIND,ISN,IS,ESN,ES)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER ISBSZ	inclusion set buffer size
INTEGER ESBSZ	exclusion set buffer size

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER ISN	number of names in the inclusion set
INTEGER IS (ISBSZ)	inclusion set
INTEGER ESN	number of names in the exclusion set
INTEGER ES (ESBSZ)	exclusion set

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INQUIRE WORKSTATION TRANSFORMATION 3

SUBROUTINE PQWKT3 (WKID,ERRIND,TUS,RWINDO,CWINDO, *RVIEWP,CVIEWP)

Input Parameters:	
INTEGER WKID	workstation identifier
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER TUS	workstation transformation update state (PNPEND,PPEND)
REAL RWINDO(6)	requested workstation window in NPC RWXMIN,RWXMAX,RWYMIN, RWYMAX,RWZMIN,RWZMAX
REAL CWINDO(6)	current workstation window in NPC CWXMIN,CWXMAX,CWYMIN CWYMAX,CWZMIN,CWZMAX
REAL RVIEWP(6)	requested workstation viewport in DC RVXMIN,RVXMAX,RVYMIN RVYMAX,RVZMIN,RVZMAX
REAL CVIEWP(6)	current workstation viewport in DC CVXMIN,CVXMAX,CVYMIN CVYMAX,CVZMIN,CVZMAX

INQUIRE WORKSTATION TRANSFORMATION

SUBROUTINE PQWKT (WKID,ERRIND,TUS,RWINDO,CWINDO, *RVIEWP,CVIEWP)

Input Parameters:	
INTEGER WKID	workstation identifier
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER TUS	workstation transformation update state (PNPEND,PPEND)
REAL RWINDO(4)	requested workstation window in NPC RWXMIN, RWXMAX, RWYMIN, RWYMAX
REAL CWINDO(4)	current workstation window in NPC CWXMIN, CWXMAX, CWYMIN, CWYMAX
REAL RVIEWP(4)	requested workstation viewport in DC RVXMIN, RVXMAX, RVYMIN, RVYMAX
REAL CVIEWP(4)	current workstation viewport in DC CVXMIN, CVXMAX, CVYMIN, CVYMAX

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INQUIRE LOCATOR DEVICE STATE 3

SUBROUTINE PQLCS3 (WKID,LCDNR,TYPE,MLDR,ERRIND,MODE,ESW,IVIEWI, *IPX,IPY,IPZ,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER LCDNR	locator device number
INTEGER TYPE	type of returned values (PSET,PREALI)
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
INTEGER IVIEWI	initial view index
REAL IPX, IPY, IPZ	initial locator position (WC)
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

INQUIRE LOCATOR DEVICE STATE

SUBROUTINE PQLCS (WKID,LCDNR,TYPE,MLDR,ERRIND,MODE,ESW,IVIEWI, *IPX,IPY,PET,EAREA,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER LCDNR	locator device number
INTEGER TYPE	type of returned values (PSET,PREALI)
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
INTEGER IVIEWI	initial view index
REAL IPX, IPY	initial locator position (WC)
INTEGER PET	prompt and echo type
REAL EAREA(4)	echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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INQUIRE STROKE DEVICE STATE 3

SUBROUTINE PQSKS3 (WKID,SKDNR,TYPE,N,MLDR,ERRIND,MODE,ESW,IVIEWI, *NP,IPXA,IPYA,IPZA,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER SKDNR	stroke device number
INTEGER TYPE	type of returned values (PSET,PREALI)
INTEGER N	maximum number of points
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
INTEGER IVIEWI	initial view index
INTEGER NP	number of points
REAL IPXA(N), IPYA(N), IPZA(N)	coordinates of initial stroke (WC)
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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INQUIRE STROKE DEVICE STATE

SUBROUTINE PQSKS (WKID,SKDNR,TYPE,N,MLDR,ERRIND,MODE,ESW,IVIEWI, *NP,IPXA,IPYA,PET,EAREA,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER SKDNR	stroke device number
INTEGER TYPE	type of returned values (PSET,PREALI)
INTEGER N	maximum number of points
INTEGER MLDR	dimension of data record array

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
INTEGER IVIEWI	initial view index
INTEGER NP	number of points
REAL IPXA(N), IPYA(N)	coordinates of initial stroke (WC)
INTEGER PET	prompt and echo type
REAL EAREA(4)	echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

INQUIRE VALUATOR DEVICE STATE 3

SUBROUTINE PQVLS3 (WKID,VLDNR,MLDR,ERRIND,MODE,ESW,IVAL,PET, *EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER VLDNR	valuator device number
INTEGER MLDR	dimension of data record array

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
REAL IVAL	initial value
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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INQUIRE VALUATOR DEVICE STATE

SUBROUTINE PQVLS (WKID,VLDNR,MLDR,ERRIND,MODE,ESW,IVAL,PET, *EAREA,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER VLDNR	valuator device number
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
REAL IVAL	initial value
INTEGER PET	prompt and echo type
REAL EAREA(4)	echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

INQUIRE CHOICE DEVICE STATE 3

SUBROUTINE PQCHS3 (WKID,CHDNR,MLDR,ERRIND,MODE,ESW,ISTAT, *ICHNR,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER CHDNR	choice device number
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
INTEGER ISTAT	initial status (POK,PNCHOI)
INTEGER ICHNR	initial choice number
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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INQUIRE CHOICE DEVICE STATE

SUBROUTINE PQCHS (WKID,CHDNR,MLDR,ERRIND,MODE,ESW,ISTAT,
*ICHNR,PET,EAREA,LDR,DATREC)

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER CHDNR	choice device number
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
INTEGER ISTAT	initial status (POK,PNCHOI)
INTEGER ICHNR	initial choice number
INTEGER PET	prompt and echo type
REAL EAREA(4)	echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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INQUIRE PICK DEVICE STATE 3

```
SUBROUTINE PQPKS3 (WKID,PKDNR,TYPE,MLDR,IPISSZ,IPESSZ,IPPSZ,
*          ERRIND,MODE,ESW,PISSZ,PINS,PESSZ,PES,ISTAT,PPD,PP,
*          PET,EVOL,LDR,DATREC,PPORDR)
```

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER PKDNR	pick device number
INTEGER TYPE	type of returned values (PSET,PREALI)
INTEGER MLDR	dimension of data record array
INTEGER IPISSZ	pick inclusion set buffer size
INTEGER IPESSZ	pick exclusion set buffer size
INTEGER IPPSZ	pick path buffer size

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
INTEGER PISSZ	pick inclusion set size
INTEGER PINS(IPISSZ)	pick inclusion set
INTEGER PESSZ	pick exclusion set size
INTEGER PES(IPESSZ)	pick exclusion set
INTEGER ISTAT	initial status (POK,PNPICK)
INTEGER PPD	initial pick path depth
INTEGER PP(3,IPPSZ)	initial pick path
INTEGER PET	prompt and echo type
REAL EVOL(6)	echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record
INTEGER PPORDR	pick path order (PPOTOP, PPOBOT)

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INQUIRE PICK DEVICE STATE

```
SUBROUTINE PQPKS (WKID,PKDNR,TYPE,MLDR,IPISSZ,IPESSZ,IPPSZ,
*                 ERRIND,MODE,ESW,PISSZ,PINS,PESSZ,PES,ISTAT,PPD,PP,
*                 PET,EAREA,LDR,DATREC,PPORDR)
```

Input Parameters:

INTEGER WKID	workstation identifier
INTEGER PKDNR	pick device number
INTEGER TYPE	type of returned values (PSET,PREALI)
INTEGER MLDR	dimension of data record array
INTEGER IPISSZ	pick inclusion set buffer size
INTEGER IPESSZ	pick exclusion set buffer size
INTEGER IPPSZ	pick path buffer size

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
INTEGER PISSZ	pick inclusion set size
INTEGER PINS(IPISSZ)	pick inclusion set
INTEGER PESSZ	pick exclusion set size
INTEGER PES(IPESSZ)	pick exclusion set
INTEGER ISTAT	initial status (POK,PNPICK)
INTEGER PPD	initial pick path depth
INTEGER PP(3,IPPSZ)	initial pick path
INTEGER PET	prompt and echo type
REAL EAREA(4)	echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record
INTEGER PPORDR	pick path order (PPOTOP, PPOBOT)

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INQUIRE STRING DEVICE STATE 3
Full FORTRAN 77 version

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SUBROUTINE PQSTS3 (WKID,STDNR,MLDR,ERRIND,MODE,ESW,LOSTR,ISTR,
*PET,EVOL,LDR,DATREC)

Input Parameters:
INTEGER WKID                    workstation identifier
INTEGER STDNR                   string device number
INTEGER MLDR                    dimension of data record array

Output Parameters:
INTEGER ERRIND                  error indicator
INTEGER MODE                    operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW                     echo switch (PNECHO,PECHO)
INTEGER LOSTR                   number of characters returned
CHARACTER*(*) ISTR              initial string
INTEGER PET                     prompt and echo type
REAL EVOL(6)                    echo volume (DC)
                                XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR                     number of array elements used in data record
CHARACTER*80 DATREC(MLDR)
                                data record
```

INQUIRE STRING DEVICE STATE 3
FORTRAN 77 subset version

```
SUBROUTINE PQSTS3 (WKID,STDNR,MLDR,ERRIND,MODE,ESW,
*LOSTR,ISTR,PET,EVOL,LDR,DATREC)

Input Parameters:
INTEGER WKID                    workstation identifier
INTEGER STDNR                   string device number
INTEGER MLDR                    dimension of data record array

Output Parameters:
INTEGER ERRIND                  error indicator
INTEGER MODE                    operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW                     echo switch (PNECHO,PECHO)
INTEGER LOSTR                   number of characters returned
CHARACTER*80 ISTR               initial string
INTEGER PET                     prompt and echo type
REAL EVOL(6)                    echo area (DC)
                                XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR                     number of array elements used in data record
CHARACTER*80 DATREC(MLDR)
                                data record
```


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INQUIRE STRING DEVICE STATE
Full FORTRAN 77 version

```
SUBROUTINE PQSTS (WKID,STDNR,MLDR,ERRIND,MODE,ESW,LOSTR,ISTR,
*PET,EAREA,LDR,DATREC)
```

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
INTEGER LOSTR	number of characters returned
CHARACTER*(*) ISTR	initial string
INTEGER PET	prompt and echo type
REAL EAREA(4)	echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

INQUIRE STRING DEVICE STATE
FORTRAN 77 subset version

```
SUBROUTINE PQSTS (WKID,STDNR,MLDR,ERRIND,MODE,ESW,
*LOSTR,ISTR,PET,EAREA,LDR,DATREC)
```

Input Parameters:	
INTEGER WKID	workstation identifier
INTEGER STDNR	string device number
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MODE	operating mode (PREQU,PSAMPL,PEVENT)
INTEGER ESW	echo switch (PNECHO,PECHO)
INTEGER LOSTR	number of characters returned
CHARACTER*80 ISTR	initial string
INTEGER PET	prompt and echo type
REAL EAREA(4)	echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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9.12.5 Inquiry functions for workstation description table

INQUIRE WORKSTATION CATEGORY

SUBROUTINE PQWKCA (WTYPE,ERRIND,WKCAT)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER WKCAT	workstation category (POUTPT,PINPUT, POUTIN,PMO,PMI)

INQUIRE DISPLAY SPACE SIZE 3

SUBROUTINE PQDSP3 (WTYPE,ERRIND,DCUNIT,DX,DY,DZ,RX,RY,RZ)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER DCUNIT	device coordinate units (PMETRE,POTHU)
REAL DX,DY,DZ	maximum display volume size (DC)
INTEGER RX,RY,RZ	maximum display volume size (raster units)

INQUIRE DISPLAY SPACE SIZE

SUBROUTINE PQDSP (WTYPE,ERRIND,DCUNIT,DX,DY,RX,RY)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER DCUNIT	device coordinate units (PMETRE,POTHU)
REAL DX,DY	maximum display space size (DC)
INTEGER RX,RY	maximum display space size (raster units)

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INQUIRE HLHSR (IDENTIFIER) FACILITIES

SUBROUTINE PQHRIF (WTYPE, NI, ERRIND, NHRID, HRID)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER NI	sequence number of HLHSR identifier list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NHRID	number of available HLHSR identifiers
INTEGER HRID	NIth element of list of available HLHSR identifiers

INQUIRE HLHSR (MODE) FACILITIES

SUBROUTINE PQHRMF (WTYPE, NM, ERRIND, NHRMD, HRMD)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER NM	sequence number of HLHSR mode list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NHRMD	number of available HLHSR modes
INTEGER HRMD	NMth element of list of available HLHSR modes

INQUIRE VIEW FACILITIES

SUBROUTINE PQVWF (WTYPE, ERRIND, NPVWI)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NPVWI	number of predefined view indices

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INQUIRE PREDEFINED VIEW REPRESENTATION

SUBROUTINE PQPVWR (WTYPE,PVWI,ERRIND,VWORMT,VWMPMT,VWCPLM, *XYCLPI,BCLIPI,FCLIPI)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER PVWI	predefined view index
Output Parameters:	
INTEGER ERRIND	error indicator
REAL VWORMT(4,4)	view orientation matrix
REAL VWMPMT(4,4)	view mapping matrix
REAL VWCPLM(6)	view clipping limits (NPC) xmin,xmax,ymin,ymax,zmin,zmax
INTEGER XYCLPI	x-y clipping indicator (PNCLIP,PCLIP)
INTEGER BCLIPI	back clipping indicator (PNCLIP,PCLIP)
INTEGER FCLIPI	front clipping indicator (PNCLIP,PCLIP)

INQUIRE WORKSTATION CLASSIFICATION

SUBROUTINE PQWKCL (WTYPE,ERRIND,VRTYPE)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER VRTYPE	workstation classification - vector/raster/other type (PVECTR,PRASTR,POTHWK)

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INQUIRE DYNAMICS OF WORKSTATION ATTRIBUTES

SUBROUTINE PQDSWA (WTYPE,ERRIND,PLBUN,PMBUN,TXBUN,INBUN,
*EDBUN,PAREP,COLREP,VWREP,WKTR,HLFLTR,INFLTR,HLHSR)

Input Parameters:

INTEGER WTYPE	workstation type

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER PLBUN	polyline representation changeable (PIRG,PIMM,PCBS)
INTEGER PMBUN	polymarker representation changeable (PIRG,PIMM,PCBS)
INTEGER TXBUN	text representation changeable (PIRG,PIMM,PCBS)
INTEGER INBUN	interior representation changeable (PIRG,PIMM,PCBS)
INTEGER EDBUN	edge representation changeable (PIRG,PIMM,PCBS)
INTEGER PAREP	pattern representation changeable (PIRG,PIMM,PCBS)
INTEGER COLREP	colour representation changeable (PIRG,PIMM,PCBS)
INTEGER VWREP	view representation changeable (PIRG,PIMM,PCBS)
INTEGER WKTR	workstation transformation changeable (PIRG,PIMM,PCBS)
INTEGER HIFLTR	highlighting filter changeable (PIRG,PIMM,PCBS)
INTEGER INFLTR	invisibility filter changeable (PIRG,PIMM,PCBS)
INTEGER HLHSR	HLHSR mode changeable (PIRG,PIMM,PCBS)

INQUIRE DEFAULT DISPLAY UPDATE STATE

SUBROUTINE PQDDUS (WTYPE,ERRIND,DEFMOD,MODMOD)

Input Parameters:

INTEGER WTYPE	workstation type

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER DEFMOD	default value for deferral mode (PASAP,PBNIG,PBNIL,PASTI,PWAITD)
INTEGER MODMOD	default value for modification mode (PNIVE,PUWOR,PUQUM)

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INQUIRE POLYLINE FACILITIES

SUBROUTINE PQPLF (WTYPE,N,ERRIND,NLT,LT,NLW,NOMLW,
*RLWMIN,RLWMAX,NPPLI)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER N	list element requested

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NLT	number of available linetypes
INTEGER LT	Nth element of list of available linetypes
INTEGER NLW	number of available linewidths
REAL NOMLW	nominal linewidth (DC)
REAL RLWMIN, RLWMAX	range of linewidths (DC)
INTEGER NPPLI	number of predefined polyline indices

INQUIRE PREDEFINED POLYLINE REPRESENTATION

SUBROUTINE PQPPLR (WTYPE,PLI,ERRIND,LTYPE,LWIDTH,COLI)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER PLI	predefined polyline index

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER LTYPE	linetype
REAL LWIDTH	linewidth scale factor
INTEGER COLI	polyline colour index

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INQUIRE POLYMARKER FACILITIES

SUBROUTINE PQPMF (WTYPE,N,ERRIND,NMT,MT,NMS,NOMMS,
*RMSMIN,RMSMAX,NPPMI)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER N	list element requested

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NMT	number of available marker types
INTEGER MT	Nth element of list of available marker types
INTEGER NMS	number of available marker sizes
REAL NOMMS	nominal marker size (DC)
REAL RMSMIN, RMSMAX	range of marker sizes (DC)
INTEGER NPPMI	number of predefined polymarker indices

INQUIRE PREDEFINED POLYMARKER REPRESENTATION

SUBROUTINE PQPPMR (WTYPE,PMI,ERRIND,MTYPE,MSZSF,COLI)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER PMI	predefined polymarker index

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MTYPE	marker type
REAL MSZSF	marker size scale factor
INTEGER COLI	polymarker colour index

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INQUIRE TEXT FACILITIES

SUBROUTINE PQTXF (WTYPE,N,ERRIND,NFPP,FONT,PREC,NCHH,MINCHH,
*MAXCHH,NCHX,MINCHX,MAXCHX,NPTXI)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER N	list element requested

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER NFPP	number of text font and precision pairs
INTEGER FONT	Nth element of list of text fonts
INTEGER PREC	Nth element of list of text precisions (PSTRP,PCHARP,PSTRKP)
INTEGER NCHH	number of available character heights
REAL MINCHH	minimum character height (DC)
REAL MAXCHH	maximum character height (DC)
INTEGER NCHX	number of available character expansion factors
REAL MINCHX	minimum character expansion factor
REAL MAXCHX	maximum character expansion factor
INTEGER NPTXI	number of predefined text indices

INQUIRE PREDEFINED TEXT REPRESENTATION

SUBROUTINE PQPTXR (WTYPE,PTXI,ERRIND,FONT,PREC,CHXP,CHSP,
*COLI)

Input Parameters:

INTEGER WTYPE	workstation type
INTEGER PTXI	predefined text index

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER FONT	text font
INTEGER PREC	text precision (PSTRP,PCHARP,PSTRKP)
REAL CHXP	character expansion factor
REAL CHSP	character spacing
INTEGER COLI	text colour index

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INQUIRE ANNOTATION FACILITIES

SUBROUTINE PQANF (WTYPE,N,ERRIND,NAS,AS,NCHH,MINCHH,MAXCHH)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER N	list element of annotation styles requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NAS	number of available annotation styles
INTEGER AS	Nth element of list of available annotation styles
INTEGER NCHH	number of available annotation text character heights
REAL MINCHH	minimum annotation text character height (DC)
REAL MAXCHH	maximum annotation text character height (DC)

INQUIRE TEXT EXTENT
Full FORTRAN 77 version

SUBROUTINE PQTXX (WKTYPE,FONT,CHXP,CHSP,CHH,TXP,TXALH,TXALV,STR,
*ERRIND,TXEXRX,TXEXRY,COPX,COPY)

Input Parameters:	
INTEGER WKTYPE	workstation type
INTEGER FONT	text font
REAL CHXP	character expansion factor
REAL CHSP	character spacing
REAL CHH	character height
INTEGER TXP	text path (PRIGHT,PLEFT,PUP,PDOWN)
INTEGER TXALH	text alignment horizontal (PAHNOR,PALEFT,PACENT,PARITE)
INTEGER TXALV	text alignment vertical (PAVNOR,PATOP,PACAP,PAHALF,PABASE,PABOTT)
CHARACTER*(*) STR	character string
Output Parameters:	
INTEGER ERRIND	error indicator
REAL TXEXRX(2), TXEXRY(2)	text extent rectangle
REAL COPX,COPY	concatenation offset

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INQUIRE TEXT EXTENT
FORTRAN 77 subset version

SUBROUTINE PQTXXS (WKTYPE,FONT,CHXP,CHSP,CHH,TXP,TXALH,TXALV,LSTR,STR,
*ERRIND,TXEXRX,TXEXRY,COPX,COPY)

Input Parameters:	
INTEGER WKTYPE	workstation type
INTEGER FONT	text font
REAL CHXP	character expansion factor
REAL CHSP	character spacing
REAL CHH	character height
INTEGER TXP	text path (PRIGHT,PLEFT,PUP,PDOWN)
INTEGER TXALH	text alignment horizontal (PAHNOR,PALEFT,PACENT,PARITE)
INTEGER TXALV	text alignment vertical (PAVNOR,PATOP,PACAP,PAHALF,PABASE,PABOTT)
INTEGER LSTR	length of string (in characters)
CHARACTER*80 STR	character string

Output Parameters:	
INTEGER ERRIND	error indicator
REAL TXEXRX(2), TXEXRY(2)	text extent rectangle
REAL COPX,COPY	concatenation offset

INQUIRE INTERIOR FACILITIES

SUBROUTINE PQIF (WTYPE,NI,NH,ERRIND,NIS,IS,NHS,HS,NPFAI)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER NI	list element of interior styles requested
INTEGER NH	list element of hatch styles requested

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NIS	number of available interior styles
INTEGER IS	NIth element of list of available interior styles (PHOLLO,PSOLID,PPATTR,PHATCH,PISEMP)
INTEGER NHS	number of available hatch styles
INTEGER HS	NHth element of list of available hatch style indices
INTEGER NPFAI	number of predefined interior indices

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INQUIRE PREDEFINED INTERIOR REPRESENTATION

SUBROUTINE PQPIR (WTYPE,PII,ERRIND,STYLE,STYLID,COLI)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER PII	predefined interior index
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER STYLE	interior style (PHOLLO,PSOLID,PPATTR,PHATCH,PISEMP)
INTEGER STYLID	interior style index
INTEGER COLI	interior colour index

INQUIRE EDGE FACILITIES

SUBROUTINE PQEDF (WTYPE,N,ERRIND,NEDT,EDT,NEDW,NOMEDW,
*REDWMN,REDWMX,NPEDI)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NEDT	number of available edgetypes
INTEGER EDT	Nth element of list of available edgetypes
INTEGER NEDW	number of available edgewidths
REAL NOMEDW	nominal edgewidth
REAL REDWMN, REDWMX	range of edgewidths
INTEGER NPEDI	number of predefined edge indices

INQUIRE PREDEFINED EDGE REPRESENTATION

SUBROUTINE PQPEDR (WTYPE,PEDI,ERRIND,EDFLAG,EDTYPE,EWIDTH,COLI)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER PEDI	predefined edge index
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER EDFLAG	edge flag (POFF,PON)
INTEGER EDTYPE	edgetype
REAL EWIDTH	edgewidth scale factor
INTEGER COLI	edge colour index

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INQUIRE PATTERN FACILITIES

SUBROUTINE PQPAF (WTYPE,ERRIND,NPPAI)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NPPAI	number of predefined pattern indices

INQUIRE PREDEFINED PATTERN REPRESENTATION

SUBROUTINE PQPPAR (WTYPE,PPAI,DIMX,DIMY,ERRIND,DX,DY,COLIA)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER PPAI	predefined pattern index
INTEGER DIMX,DIMY	maximum pattern array dimensions
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER DX,DY	pattern colour index array dimensions
INTEGER COLIA (DIMX,DIMY)	pattern colour index array

INQUIRE COLOUR MODEL FACILITIES

SUBROUTINE PQCMDF (WTYPE,N,ERRIND,OL,CMOD,DFCMOD)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER N	element of list of available colour models
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of available colour models
INTEGER CMOD	Nth available colour model
INTEGER DFCMOD	default colour model

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INQUIRE COLOUR FACILITIES

SUBROUTINE PQCF (WTYPE,ERRIND,NCOLI,COLA,NPCI,CC)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NCOLI	number of colour indices
INTEGER COLA	colour available (PMONOC,PCOLOR)
INTEGER NPCI	number of predefined colour indices
REAL CC(9)	primary colours - chromaticity coefficients and luminance value for the primaries for the display device $R_{u'}$, $R_{v'}$, R_Y, $G_{u'}$, $G_{v'}$, G_Y, $B_{u'}$, $B_{v'}$, B_Y

INQUIRE PREDEFINED COLOUR REPRESENTATION

SUBROUTINE PQPCR (WTYPE,PCI,CCSBSZ,ERRIND,OL,CSPEC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER PCI	predefined colour index
INTEGER CCSBSZ	colour component specification buffer size
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of colour components in the colour specification
REAL CSPEC(CCSBSZ)	colour specification

INQUIRE LIST element OF AVAILABLE GENERALIZED DRAWING PRIMITIVES 3

SUBROUTINE PQEGD3 (WTYPE,N,ERRIND,NGDP,GDPL)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NGDP	number of available 3D generalized drawing primitives
INTEGER GDPL	Nth element of list of 3D GDP identifiers

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INQUIRE LIST element OF AVAILABLE GENERALIZED DRAWING PRIMITIVES

SUBROUTINE PQEGDP (WTYPE,N,ERRIND,NGDP,GDPL)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NGDP	number of available generalized drawing primitives
INTEGER GDPL	Nth element of list of GDP identifiers

INQUIRE GENERALIZED DRAWING PRIMITIVE 3

SUBROUTINE PQGDP3 (WTYPE,GDP,ERRIND,NBND,BNDL)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER GDP	3D GDP identifier
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NBND	number of sets of attributes used
INTEGER BNDL(5)	list of sets of attributes used (PPLATT,PPMATT,PTXATT,PINATT,PEDATT)

INQUIRE GENERALIZED DRAWING PRIMITIVE

SUBROUTINE PQGDP (WTYPE,GDP,ERRIND,NBND,BNDL)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER GDP	GDP identifier
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NBND	number of sets of attributes used
INTEGER BNDL(5)	list of sets of attributes used (PPLATT,PPMATT,PTXATT,PINATT,PEDATT)

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INQUIRE LIST element OF AVAILABLE GENERALIZED STRUCTURE ELEMENTS

SUBROUTINE PQEGSE (WTYPE,N,ERRIND,NGSE,GSEL)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER N	list element requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NGSE	number of available generalized structure elements
INTEGER GSEL	Nth element of list of GSE identifiers

INQUIRE NUMBER OF DISPLAY PRIORITIES SUPPORTED

SUBROUTINE PQDP (WTYPE,ERRIND,NSPSUP)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NSPSUP	number of display priorities supported

INQUIRE WORKSTATION STATE TABLE LENGTHS

SUBROUTINE PQWKSL (WTYPE,ERRIND,MPLBTE,MPMBTE,MTXBTE,MINBTE, *MEDBTE,MPAI,MCOLI,VWTBI)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MPLBTE	maximum number of polyline bundle table entries
INTEGER MPMBTE	maximum number of polymarker bundle table entries
INTEGER MTXBTE	maximum number of text bundle table entries
INTEGER MINBTE	maximum number of interior bundle table entries
INTEGER MEDBTE	maximum number of edge bundle table entries
INTEGER MPAI	maximum number of pattern indices
INTEGER MCOLI	maximum number of colour indices
INTEGER VWTBI	maximum number of view table indices

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INQUIRE DYNAMICS OF STRUCTURES

SUBROUTINE PQDSTR (WTYPE,ERRIND,STRCON,POST,UNPOST,
*DELETE,REFMOD)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER STRCON	structure content modification (PIRG,PIMM,PCBS)
INTEGER POST	post structure (PIRG,PIMM,PCBS)
INTEGER UNPOST	unpost structure (PIRG,PIMM,PCBS)
INTEGER DELETE	delete structure (PIRG,PIMM,PCBS)
INTEGER REFMOD	reference modification (PIRG,PIMM,PCBS)

INQUIRE NUMBER OF AVAILABLE LOGICAL INPUT DEVICES

SUBROUTINE PQLI (WTYPE,ERRIND,NLCD,NSKD,NVLD,NCHD,NPKD,NSTD)

Input Parameters:	
INTEGER WTYPE	workstation type
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER NLCD	number of locator devices
INTEGER NSKD	number of stroke devices
INTEGER NVLD	number of valuator devices
INTEGER NCHD	number of choice devices
INTEGER NPKD	number of pick devices
INTEGER NSTD	number of string devices

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INQUIRE DEFAULT LOCATOR DEVICE DATA 3

SUBROUTINE PQDLC3 (WTYPE,DEVNO,N,MLDR,ERRIND,DPX,DPY,DPZ,
*OL,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
REAL DPX,DPY,DPZ	default initial locator position (WC)
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EVOL(6)	default echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

INQUIRE DEFAULT LOCATOR DEVICE DATA

SUBROUTINE PQDLC (WTYPE,DEVNO,N,MLDR,ERRIND,DPX,DPY,
*OL,PET,EAREA,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
REAL DPX,DPY	default initial locator position (WC)
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EAREA(4)	default echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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INQUIRE DEFAULT STROKE DEVICE DATA 3

SUBROUTINE PQDSK3 (WTYPE,DEVNO,N,MLDR,ERRIND,MBUFF,
*OL,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MBUFF	available input buffer size
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EVOL(6)	default echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

INQUIRE DEFAULT STROKE DEVICE DATA

SUBROUTINE PQDSK (WTYPE,DEVNO,N,MLDR,ERRIND,MBUFF,
*OL,PET,EAREA,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MBUFF	available input buffer size
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EAREA(4)	default echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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INQUIRE DEFAULT VALUATOR DEVICE DATA 3

SUBROUTINE PQDVL3 (WTYPE,DEVNO,N,MLDR,ERRIND,DVAL,
*OL,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
REAL DVAL	default initial value
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EVOL(6)	default echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

INQUIRE DEFAULT VALUATOR DEVICE DATA

SUBROUTINE PQDVL (WTYPE,DEVNO,N,MLDR,ERRIND,DVAL,
*OL,PET,EAREA,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
REAL DVAL	default initial value
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EAREA(4)	default echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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INQUIRE DEFAULT CHOICE DEVICE DATA 3

SUBROUTINE PQDCH3 (WTYPE,DEVNO,N,MLDR,ERRIND,MALT,
*OL,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MALT	maximum number of choice alternatives
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EVOL(6)	default echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

INQUIRE DEFAULT CHOICE DEVICE DATA

SUBROUTINE PQDCH (WTYPE,DEVNO,N,MLDR,ERRIND,MALT,
*OL,PET,EAREA,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MALT	maximum number of choice alternatives
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EAREA(4)	default echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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INQUIRE DEFAULT PICK DEVICE DATA 3

SUBROUTINE PQDPK3 (WTYPE,DEVNO,N,MLDR,ERRIND,
*OL,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EVOL(6)	default echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

INQUIRE DEFAULT PICK DEVICE DATA

SUBROUTINE PQDPK (WTYPE,DEVNO,N,MLDR,ERRIND,
*OL,PET,EAREA,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EAREA(4)	default echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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INQUIRE DEFAULT STRING DEVICE DATA 3

SUBROUTINE PQDST3 (WTYPE,DEVNO,N,MLDR,ERRIND,MBUFF,
*OL,PET,EVOL,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MBUFF	available string buffer size
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EVOL(6)	default echo volume (DC) XMIN, XMAX, YMIN, YMAX, ZMIN, ZMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

INQUIRE DEFAULT STRING DEVICE DATA

SUBROUTINE PQDST (WTYPE,DEVNO,N,MLDR,ERRIND,MBUFF,
*OL,PET,EAREA,LDR,DATREC)

Input Parameters:	
INTEGER WTYPE	workstation type
INTEGER DEVNO	logical input device number
INTEGER N	list element requested
INTEGER MLDR	dimension of data record array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER MBUFF	available string buffer size
INTEGER OL	number of available prompt and echo types
INTEGER PET	Nth element of list of available prompt and echo types
REAL EAREA(4)	default echo area (DC) XMIN, XMAX, YMIN, YMAX
INTEGER LDR	number of array elements used in data record
CHARACTER*80 DATREC(MLDR)	data record

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9.12.6 Inquiry functions for structure state list

INQUIRE SET member OF WORKSTATIONS TO WHICH POSTED

SUBROUTINE PQWKPO (STRID,N,ERRIND,OL,WKID)

Input Parameters:	
INTEGER STRID	structure identifier
INTEGER N	set member requested
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of workstations to which the structure is posted
INTEGER WKID	Nth member of set of workstations to which the structure is posted

9.12.7 Inquiry functions for structure content

INQUIRE OPEN STRUCTURE

SUBROUTINE PQOPST (ERRIND,STYPE,STRID)

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER STYPE	open structure status (PNONST,POPNST)
INTEGER STRID	structure identifer

INQUIRE ELEMENT POINTER

SUBROUTINE PQEP (ERRIND,EP)

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER EP	element position value

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INQUIRE CURRENT ELEMENT TYPE AND SIZE

SUBROUTINE PQCETS (ERRIND,ELTYPE,IL,RL,SL)

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER ELTYPE	element type (PENIL, PEPL3, PEPL, PEPM3, PEPM, PETX3, PETX, PEATR3, PEATR, PEFA3, PEFA, PEFAS3, PEFAS, PECA3, PECA, PEGDP3, PEGDP, PEPLI, PEPMI, PETXI, PEII, PEEDI, PELN, PELWSC, PEPLCI, PEMK, PEMKSC, PEPMCI, PETXFN, PETXPR, PECHXP, PECHSP, PETXCI, PECHH, PECHUP, PETXP, PETXAL, PEATCH, PEATCU, PEATP, PEATAL, PEANST, PEIS, PEISI, PEICI, PEEDFG, PEEDT, PEEWSC, PEEDCI, PEPA, PEPRPV, PEPARF, PEADS, PERES, PEIASF, PEHRID, PELMT3, PELMT, PEGMT3, PEGMT, PEMCV3, PEMCV, PEMCLI, PERMCV, PEVWI, PEEXST, PELB, PEAP, PEGSE, PEPKID)
INTEGER IL	dimension of integer array
INTEGER RL	dimension of real array
INTEGER SL	dimension of character array

INQUIRE CURRENT ELEMENT CONTENT
Full FORTRAN 77 version

SUBROUTINE PQCECO (IIL,IRL,ISL,ERRIND,IL,IA,RL,RA,SL,LSTR,STR)

Input Parameters:	
INTEGER IIL	dimension of integer array
INTEGER IRL	dimension of real array
INTEGER ISL	dimension of character array

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER IL	number of integer entries
INTEGER IA (IIL)	array containing integer entries
INTEGER RL	number of real entries
REAL RA (IRL)	array containing real entries
INTEGER SL	number of character string entries
INTEGER LSTR(ISL)	length of each character string entry
CHARACTER*(*) STR(ISL)	character string entries

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PENIL:
IL=0
IA=()
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPL3:
IL=1
IA(1)=number of points in the polyline 3
RL=3*IA(1)
RA=elements 1 through IA(1) contain the X components of the polyline 3
elements IA(1)+1 through 2*IA(1) contain the Y components of the polyline 3
elements 2*IA(1)+1 through 3*IA(1) contain the Z components of the polyline 3
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPL:
IL=1
IA(1)=number of points in the polyline
RL=2*IA(1)
RA=elements 1 through IA(1) contain the X components of the polyline
elements IA(1)+1 through 2*IA(1) contain the Y components of the polyline
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPM3:
IL=1
IA(1)=number of points in the polymarker 3
RL=3*IA(1)
RA=elements 1 through IA(1) contain the X components of the polymarker 3
elements IA(1)+1 through 2*IA(1) contain the Y components of the polymarker 3
elements 2*IA(1)+1 through 3*IA(1) contain the Z components of the polymarker 3
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPM:
IL=1
IA(1)=number of points in the polymarker
RL=2*IA(1)
RA=elements 1 through IA(1) contain the X components of the polymarker
elements IA(1)+1 through 2*IA(1) contain the Y components of the polymarker
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PETX3:
IL=0
IA=()
RL=9
RA(1)=x-coordinate of text point (MC)
RA(2)=y-coordinate of text point (MC)
RA(3)=z-coordinate of text point (MC)
RA(4)=x-coordinate of first text direction vector (MC)
RA(5)=y-coordinate of first text direction vector (MC)
RA(6)=z-coordinate of first text direction vector (MC)
RA(7)=x-coordinate of second text direction vector (MC)
RA(8)=y-coordinate of second text direction vector (MC)
RA(9)=z-coordinate of second text direction vector (MC)
SL=1
LSTR(1)=length of string
STR(1)=string

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PETX:
IL=0
IA=()
RL=2
RA(1)=x-coordinate of text point (MC)
RA(2)=y-coordinate of text point (MC)
SL=1
LSTR(1)=length of string
STR(1)=string

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEATR3:
IL=0
IA=()
RL=6
RA(1)=x-coordinate of reference point (MC)
RA(2)=y-coordinate of reference point (MC)
RA(3)=z-coordinate of reference point (MC)
RA(4)=x-coordinate of annotation point (NPC)
RA(5)=y-coordinate of annotation point (NPC)
RA(6)=z-coordinate of annotation point (NPC)
SL=1
LSTR(1)=length of string
STR(1)=string

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEATR:
IL=0
IA=()
RL=4
RA(1)=x-coordinate of reference point (MC)
RA(2)=y-coordinate of reference point (MC)
RA(3)=x-coordinate of annotation point (NPC)
RA(4)=y-coordinate of annotation point (NPC)
SL=1
LSTR(1)=length of string
STR(1)=string

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEFA3:
IL=1
IA(1)=number of points in the fill area 3
RL=3*IA(1)
RA=elements 1 through IA(1) contain the X components of the fill area 3
elements IA(1)+1 through 2*IA(1) contain the Y components of the fill area 3
elements 2*IA(1)+1 through 3*IA(1) contain the Z components of the fill area 3
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEFA:
IL=1
IA(1)=number of points in the fill area
RL=2*IA(1)
RA=elements 1 through IA(1) contain the X components of the fill area
elements IA(1)+1 through 2*IA(1) contain the Y components of the fill area
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEFAS3:
IL=number of point lists in fill area set 3
IA()=array of end indices for point lists in fill area set 3
RL=3*(IA(IL))
RA=elements 1 through (IA(IL)) contain the X components of the fill area set 3
elements IA(IL)+1 through 2*(IA(IL)) contain the Y components of the fill area set 3
elements 2*IA(IL)+1 through 3*(IA(IL)) contain the Z components of the fill area set 3
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEFAS:
IL=number of point lists in fill area set
IA()=array of end indices for point lists in fill area set
RL=2*(IA(IL))
RA=elements 1 through (IA(IL)) contain the X components of the fill area set
elements IA(IL)+1 through 2*(IA(IL)) contain the Y components of the fill area set
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PECA3:
IL=2+(IA(1)*IA(2))
IA(1)=x dimension of cell index array
IA(2)=y dimension of cell index array
IA(3) to IA(IA(1)*IA(2)+2)=cell index array in column major order
e.g. IA(3)=COLIA(1,1), IA(4)=COLIA(2,1), ...
RL=9
RA(1)=x-coordinate of P (MC)
RA(2)=y-coordinate of P (MC)
RA(3)=z-coordinate of P (MC)
RA(4)=x-coordinate of Q (MC)
RA(5)=y-coordinate of Q (MC)
RA(6)=z-coordinate of Q (MC)
RA(7)=x-coordinate of R (MC)
RA(8)=y-coordinate of R (MC)
RA(9)=z-coordinate of R (MC)
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PECA:
IL=2+(IA(1)*IA(2))
IA(1)=x dimension of cell index array
IA(2)=y dimension of cell index array
IA(3) to IA((IA(1)*IA(2))+2)=cell index array in column major order
e.g. IA(3)=COLIA(1,1), IA(4)=COLIA(2,1), ...
RL=4
RA(1)=x-coordinate of P (MC)
RA(2)=y-coordinate of P (MC)
RA(3)=x-coordinate of Q (MC)
RA(4)=y-coordinate of Q (MC)
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEGDP3:
IL=2
IA(1)=number of points in the generalized drawing primitive 3
IA(2)=generalized drawing primitive 3 identifier
RL=3*IA(1)
RA=elements 1 through IA(1) contain the X components of the GDP 3 point list
elements IA(1)+1 through 2*IA(1) contain the Y components of the GDP 3 point list
elements 2*IA(1)+1 through 3*IA(1) contain the Z components of the GDP 3 point list
SL=number of 80 character data records (LDR for PGDP3 subroutine)
LSTR(1) to LSTR(SL) = 80
STR(1) to STR(SL) = GDP data records (DATREC(1) to DATREC(SL) for PGDP3 subroutine)

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEGDP:
IL=2
IA(1)=number of points in the generalized drawing primitive
IA(2)=generalized drawing primitive identifier
RL=2*IA(1)
RA=elements 1 through IA(1) contain the X components of the GDP point list
elements IA(1)+1 through 2*IA(1) contain the Y components of the GDP point list
SL=number of 80 character data records (LDR for PGDP subroutine)
LSTR(1) to LSTR(SL) = 80
STR(1) to STR(SL) = GDP data records (DATREC(1) to DATREC(SL) for PGDP subroutine)

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPLI:
IL=1
IA(1)=polyline index
RL=0
RA=()
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPMI:
IL=1
IA(1)=polymarker index
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PETXI:
IL=1
IA(1)=text index
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEII:
IL=1
IA(1)=interior index
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEEDI:
IL=1
IA(1)=edge index
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PELN:
IL=1
IA(1)=linetype
RL=0
RA=()
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PELWSC:
IL=0
IA=()
RL=1
RA(1)=linewidth scale factor
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPLCI:
IL=1
IA(1)=polyline colour index
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEMK:
IL=1
IA(1)=marker type
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEMKSC:
IL=0
IA=()
RL=1
RA(1)=marker size scale factor
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPMCI:
IL=1
IA(1)=polymarker colour index
RL=0
RA=()
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PETXFN:
IL=1
IA(1)=text font
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PETXPR:
IL=1
IA(1)=text precision (PSTRP,PCHARP,PSTRKP)
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PECHXP:
IL=0
IA=()
RL=1
RA(1)=character expansion factor
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PECHSP:
IL=0
IA=()
RL=1
RA(1)=character spacing
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PETXCI:
IL=1
IA(1)=text colour index
RL=0
RA=()
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PECHH:
IL=0
IA=()
RL=1
RA(1)=character height
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PECHUP:
IL=0
IA=()
RL=2
RA(1)=x component of character up vector
RA(2)=y component of character up vector
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PETXP:
IL=1
IA(1)=text path (PRIGHT,PLEFT,PUP,PDOWN)
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PETXAL:
IL=2
IA(1)=horizontal text alignment (PAHNOR,PALEFT,PACENT,PARITE)
IA(2)=vertical text alignment (PAVNOR,PATOP,PACAP,PAHALF,PABASE,PABOTT)
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEATCH:
IL=0
IA=()
RL=1
RA(1)=annotation text character height
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEATCU:
IL=0
IA=()
RL=2
RA(1)=x component of annotation text character up vector
RA(2)=y component of annotation text character up vector
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEATP:
IL=1
IA(1)=annotation text path (PRIGHT,PLEFT,PUP,PDOWN)
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEATAL:
IL=2
IA(1)=horizontal text alignment (PAHNOR,PALEFT,PACENT,PARITE)
IA(2)=vertical text alignment (PAVNOR,PATOP,PACAP,PAHALF,PABASE,PABOTT)
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEANST:
IL=1
IA(1)=annotation style
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEIS:
IL=1
IA(1)=interior style (PHOLLO,PSOLID,PPATTR,PHATCH,PISEMP)
RL=0
RA=()
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEISI:
IL=1
IA(1)=interior style index
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEICI:
IL=1
IA(1)=interior colour index
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEEDFG:
IL=1
IA(1)=edge flag (POFF, PON)
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEEDT:
IL=1
IA(1)=edgetype
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEEWSC:
IL=0
IA=()
RL=1
RA(1)=edgewidth scale factor
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEEDCI:
IL=1
IA(1)=edge colour index
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPA:
IL=0
IA=()
RL=2
RA(1)=x-component of pattern size (MC)
RA(2)=y-component of pattern size (MC)
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPRPV:
IL=0
IA=()
RL=9
RA(1)=x-coordinate of pattern reference point (MC)
RA(2)=y-coordinate of pattern reference point (MC)
RA(3)=z-coordinate of pattern reference point (MC)
RA(4)=x-component of pattern reference vector 1 (MC) (i.e. DVX(1))
RA(5)=y-component of pattern reference vector 1 (MC) (i.e. DVY(1))
RA(6)=z-component of pattern reference vector 1 (MC) (i.e. DVZ(1))
RA(7)=x-component of pattern reference vector 2 (MC) (i.e. DVX(2))
RA(8)=y-component of pattern reference vector 2 (MC) (i.e. DVY(2))
RA(9)=z-component of pattern reference vector 2 (MC) (i.e. DVZ(2))
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPARF:
IL=0
IA=()
RL=2
RA(1)=x-coordinate of pattern reference point (MC) (i.e. RFX)
RA(2)=y-coordinate of pattern reference point (MC) (i.e. RFY)
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEADS:
IL=number of names in the set
IA=array of name set elements
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PERES:
IL=number of names in the set
IA=array of name set elements
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEIASF:
IL=2
IA(1)=attribute identifier (PLN,PLWSC,PPLCI,PMK,PMKSC,PPMCI,PTXFN,PTXPR, PCHXP,PCHSP,PTXCI,PIS,PISI,PICI,PEDFG,PEDT,PEWSC,PEDCI)
IA(2)=aspect source flag value (PBUNDL,PINDIV)
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEHRID:
IL=1
IA(1)=HLHSR identifier
RL=0
RA=()
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PELMT3:
IL=1
IA(1)=composition type (PCPRE,PCPOST,PCREPL)
RL=16
RA(1)=(1,1) component of local transformation matrix
RA(2)=(2,1) component of local transformation matrix
RA(3)=(3,1) component of local transformation matrix
RA(4)=(4,1) component of local transformation matrix
RA(5)=(1,2) component of local transformation matrix
RA(6)=(2,2) component of local transformation matrix
RA(7)=(3,2) component of local transformation matrix
RA(8)=(4,2) component of local transformation matrix
RA(9)=(1,3) component of local transformation matrix
RA(10)=(2,3) component of local transformation matrix
RA(11)=(3,3) component of local transformation matrix
RA(12)=(4,3) component of local transformation matrix
RA(13)=(1,4) component of local transformation matrix
RA(14)=(2,4) component of local transformation matrix
RA(15)=(3,4) component of local transformation matrix
RA(16)=(4,4) component of local transformation matrix
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PELMT:
IL=1
IA(1)=composition type (PCPRE,PCPOST,PCREPL)
RL=9
RA(1)=(1,1) component of local transformation matrix
RA(2)=(2,1) component of local transformation matrix
RA(3)=(3,1) component of local transformation matrix
RA(4)=(1,2) component of local transformation matrix
RA(5)=(2,2) component of local transformation matrix
RA(6)=(3,2) component of local transformation matrix
RA(7)=(1,3) component of local transformation matrix
RA(8)=(2,3) component of local transformation matrix
RA(9)=(3,3) component of local transformation matrix
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEGMT3:
IL=0
IA=()
RL=16
RA(1)=(1,1) component of global transformation matrix
RA(2)=(2,1) component of global transformation matrix
RA(3)=(3,1) component of global transformation matrix
RA(4)=(4,1) component of global transformation matrix
RA(5)=(1,2) component of global transformation matrix
RA(6)=(2,2) component of global transformation matrix
RA(7)=(3,2) component of global transformation matrix
RA(8)=(4,2) component of global transformation matrix
RA(9)=(1,3) component of global transformation matrix
RA(10)=(2,3) component of global transformation matrix
RA(11)=(3,3) component of global transformation matrix
RA(12)=(4,3) component of global transformation matrix
RA(13)=(1,4) component of global transformation matrix
RA(14)=(2,4) component of global transformation matrix
RA(15)=(3,4) component of global transformation matrix
RA(16)=(4,4) component of global transformation matrix
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEGMT:
IL=0
IA=()
RL=9
RA(1)=(1,1) component of global transformation matrix
RA(2)=(2,1) component of global transformation matrix
RA(3)=(3,1) component of global transformation matrix
RA(4)=(1,2) component of global transformation matrix
RA(5)=(2,2) component of global transformation matrix
RA(6)=(3,2) component of global transformation matrix
RA(7)=(1,3) component of global transformation matrix
RA(8)=(2,3) component of global transformation matrix
RA(9)=(3,3) component of global transformation matrix
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEMCV3:
IL=2
IA(1)=modelling clipping operator
IA(2)=number of modelling clipping half-spaces in list
RL=6*IA(2)
FOR i=0 TO IA(2)-1
RA((6*i)+1)=x-coordinate of point defining plane of half-space (MC)
RA((6*i)+2)=y-coordinate of point defining plane of half-space (MC)
RA((6*i)+3)=z-coordinate of point defining plane of half-space (MC)
RA((6*i)+4)=dx component of normal vector defining the plane of half-space (MC)
RA((6*i)+5)=dy component of normal vector defining the plane of half-space (MC)
RA((6*i)+6)=dz component of normal vector defining the plane of half-space (MC)
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEMCV:
IL=2
IA(1)=modelling clipping operator
IA(2)=number of modelling clipping half-spaces in list
RL=4*IA(2)
FOR i=0 TO IA(2)-1
RA((4*i)+1)=x-coordinate of point defining plane of half-space (MC)
RA((4*i)+2)=y-coordinate of point defining plane of half-space (MC)
RA((4*i)+3)=dx component of normal vector defining the plane of half-space (MC)
RA((4*i)+4)=dy component of normal vector defining the plane of half-space (MC)
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEMCLI:
IL=1
IA(1)=modelling clipping indicator (PNCLIP,PCLIP)
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PERMCV:
IL=0
IA()
RL=0
RA=()
SL=0
LSTR=()
STR=()

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEVWI:
IL=1
IA(1)=view index
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEEXST:
IL=1
IA(1)=structure identifier
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PELB:
IL=1
IA(1)=label identifier
RL=0
RA=()
SL=0
LSTR=()
STR=()

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEAP:
IL=0
IA=()
RL=0
RA=()
SL=number of application data records (LDR for PAP subroutine)
LSTR(1) to LSTR(SL) = 80
STR(1) to STR(SL) = application data records (DATREC(1) to DATREC(SL) for PAP subroutine)

Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEGSE:
IL=1
IA(1)=generalized structure element identifier
RL=0
RA=()
SL=number of GSE data records (LDR for PGSE subroutine)
LSTR(1) to LSTR(SL) = 80
STR(1) to STR(SL) = GSE data records (DATREC(1) to DATREC(SL) for PGSE subroutine)

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Output parameters for STRUCTURE CONTENT DATA RECORD for ELTYPE = PEPKID:
IL=1
IA(1)=pick identifier
RL=0
RA=()
SL=0
LSTR=()
STR=()

INQUIRE CURRENT ELEMENT CONTENT
FORTRAN 77 subset version

```
SUBROUTINE PQCECO (IIL,IRL,ISL,ERRIND,IL,IA,RL,RA,SL,LSTR,STR)
```

Input Parameters:	
INTEGER IIL	dimension of integer array
INTEGER IRL	dimension of real array
INTEGER ISL	dimension of character array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER IL	number of integer entries
INTEGER IA (IIL)	array containing integer entries
INTEGER RL	number of real entries
REAL RA (IRL)	array containing real entries
INTEGER SL	number of character string entries
INTEGER LSTR(ISL)	length of each character string entry
CHARACTER*80 STR(ISL)	character string entries

See INQUIRE CURRENT ELEMENT CONTENT (PQCECO) for details on interpreting the information returned in the integer, real, and character arrays.

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INQUIRE ELEMENT TYPE AND SIZE

SUBROUTINE PQETS (STRID,ELENUM,ERRIND,ELTYPE,IL,RL,SL)

Input Parameters:	
INTEGER STRID	structure identifier
INTEGER ELENUM	element position
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER ELTYPE	element type (PENIL, PEPL3, PEPL, PEPM3, PEPM, PETX3, PETX, PEATR3, PEATR, PEFA3, PEFA, PEFAS3, PEFAS, PECA3, PECA, PEGDP3, PEGDP, PEPLI, PEPMI, PETXI, PEII, PEEDI, PELN, PELWSC, PEPLCI, PEMK, PEMKSC, PEPMCI, PETXFN, PETXPR, PECHXP, PECHSP, PETXCI, PECHH, PECHUP, PETXP, PETXAL, PEATCH, PEATCU, PEATP, PEATAL, PEANST, PEIS, PEISI, PEICI, PEEDFG, PEEDT, PEEWSC, PEEDCI, PEPA, PEPRPV, PEPARF, PEADS, PERES, PEIASF, PEHRID, PELMT3, PELMT, PEGMT3, PEGMT, PEMCV3, PEMCV, PEMCLI, PERMCV, PEVWI, PEEXST, PELB, PEAP, PEGSE, PEPKID)
INTEGER IL	dimension of integer array
INTEGER RL	dimension of real array
INTEGER SL	dimension of character array

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INQUIRE ELEMENT CONTENT
Full FORTRAN 77 version

```
SUBROUTINE PQECO (STRID,ELENUM,IIL,IRL,ISL,ERRIND,
*IL,IA,RL,RA,SL,LSTR,STR)
```

Input Parameters:	
INTEGER STRID	structure identifier
INTEGER ELENUM	element position
INTEGER IIL	dimension of integer array
INTEGER IRL	dimension of real array
INTEGER ISL	dimension of character array

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER IL	number of integer entries
INTEGER IA (IIL)	array containing integer entries
INTEGER RL	number of real entries
REAL RA (IRL)	array containing real entries
INTEGER SL	number of character string entries
INTEGER LSTR(ISL)	length of each character string entry
CHARACTER*(*) STR(ISL)	character string entries

See INQUIRE CURRENT ELEMENT CONTENT (PQCECO) for details on interpreting the information returned in the integer, real and character arrays.

INQUIRE ELEMENT CONTENT
FORTRAN 77 subset version

```
SUBROUTINE PQECO (STRID,ELENUM,IIL,IRL,ISL,ERRIND,
*IL,IA,RL,RA,SL,LSTR,STR)
```

Input Parameters:	
INTEGER STRID	structure identifier
INTEGER ELENUM	element position
INTEGER IIL	dimension of integer array
INTEGER IRL	dimension of real array
INTEGER ISL	dimension of character array

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER IL	number of integer entries
INTEGER IA (IIL)	array containing integer entries
INTEGER RL	number of real entries
REAL RA (IRL)	array containing real entries
INTEGER SL	number of character string entries
INTEGER LSTR(ISL)	length of each character string entry
CHARACTER*80 STR(ISL)	character string entries

See INQUIRE CURRENT ELEMENT CONTENT (PQCECO) for details on interpreting the information returned in the integer, real and character arrays.

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INQUIRE STRUCTURE STATUS

SUBROUTINE PQSTST (STRID,ERRIND,STRSTI)

Input Parameters:	
INTEGER STRID	structure identifier
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER STRSTI	structure status indicator (PNOEXS,PEMPTY,PNOEMP)

INQUIRE PATHS TO ANCESTORS

SUBROUTINE PQPAN (STRID,PTHORD,PTHDEP,IPTHSZ,N,ERRIND,OL,APTHSZ,PATHS)

Input Parameters:	
INTEGER STRID	structure identifier
INTEGER PTHORD	path order (PPOTOP,PPOBOT)
INTEGER PTHDEP	path depth
INTEGER IPTHSZ	size of path buffer
INTEGER N	element of the list of paths
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of paths available
INTEGER APTHSZ	actual size of the Nth structure path
INTEGER PATHS(2,IPTHSZ)	Nth structure path

INQUIRE PATHS TO DESCENDANTS

SUBROUTINE PQPDE (STRID,PTHORD,PTHDEP,IPTHSZ,N,ERRIND,OL,APTHSZ,PATHS)

Input Parameters:	
INTEGER STRID	structure identifier
INTEGER PTHORD	path order (PPOTOP,PPOBOT)
INTEGER PTHDEP	path depth
INTEGER IPTHSZ	size of path buffer
INTEGER N	element of the list of paths
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER OL	number of paths available
INTEGER APTHSZ	actual size of the Nth structure path
INTEGER PATHS(2,IPTHSZ)	Nth structure path

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ELEMENT SEARCH

SUBROUTINE PELS (STRID,STRTEP,SRCDIR,EISN,EIS,EESN,EES,ERRIND,STATUS,FNDEP)

Input Parameters:	
INTEGER STRID	structure identifier
INTEGER STRTEP	start element position
INTEGER SRCDIR	search direction (PBWD, PFWD)
INTEGER EISN	number of elements in element inclusion set
INTEGER EIS(EISN)	element inclusion set (PEALL, PENIL, PEPL3, PEPL, PEPM3, PEPM, PETX3, PETX, PEATR3, PEATR, PEFA3, PEFA, PEFAS3, PEFAS, PECA3, PECA, PEGDP3, PEGDP, PEPLI, PEPMI, PETXI, PEII, PEEDI, PELN, PELWSC, PEPLCI, PEMK, PEMKSC, PEPMCI, PETXFN, PETXPR, PECHXP, PECHSP, PETXCI, PECHH, PECHUP, PETXP, PETXAL, PEATCH, PEATCU, PEATP, PEATAL, PEANST, PEIS, PEISI, PEICI, PEEDFG, PEEDT, PEEWSC, PEEDCI, PEPA, PEPRPV, PEPARF, PEADS, PERES, PEIASF, PEHRID, PELMT3, PELMT, PEGMT3, PEGMT, PEMCV3, PEMCV, PEMCLI, PERMCV, PEVWI, PEEXST, PELB, PEAP, PEGSE, PEPKID)
INTEGER EESN	number of elements in element exclusion set
INTEGER EES(EESN)	element exclusion set (*enumerated type the same as that of element inclusion set*)

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER STATUS	status indicator (PFAIL, PSUCC)
INTEGER FNDEP	found element position

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INCREMENTAL SPATIAL SEARCH 3

```
SUBROUTINE PISS3 (SRPX,SRPY,SRPZ,SDIST,SPTHSZ,SPATH,MCLIPF,SRCHCI,
* NFLN,NFLISX,NFLIS,NFLESX,NFLES,IFLN,IFLISX,IFLIS,IFLESX,IFLES,
* IPTHSZ,ERRIND,FPTHSZ,FPATH)
```

Input Parameters:

REAL SRPX,SRPY,SRPZ	search reference point (WC)
REAL SDIST	search distance
INTEGER SPTHSZ	number of elements in starting path
INTEGER SPATH(2,SPTHSZ)	starting path
INTEGER MCLIPF	modelling clip flag (PNCLIP,PCLIP)
INTEGER SRCHCI	search ceiling index
INTEGER NFLN	number of "normal" filters
INTEGER NFLISX(NFLN)	array of end indices of "normal" filter inclusion sets
INTEGER NFLIS(*)	"normal" filter inclusion sets
INTEGER NFLESX(NFLN)	array of end indices of "normal" filter exclusion sets
INTEGER NFLES(*)	"normal" filter exclusion sets
INTEGER IFLN	number of "inverted" filters
INTEGER IFLISX(IFLN)	array of end indices of "inverted" filter inclusion sets
INTEGER IFLIS(*)	"inverted" filter inclusion sets
INTEGER IFLESX(IFLN)	array of end indices of "inverted" filter exclusion sets
INTEGER IFLES(*)	"inverted" filter exclusion sets
INTEGER IPTHSZ	size of found path array

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER FPTHSZ	found path size
INTEGER FPATH(2,IPTHSZ)	found path

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INCREMENTAL SPATIAL SEARCH

```
SUBROUTINE PISS (SRPX,SRPY,SDIST,SPTHSZ,SPATH,MCLIPF,SRCHCI,
* NFLN,NFLISX,NFLIS,NFLESX,NFLES,IFLN,IFLISX,IFLIS,IFLESX,IFLES,
* IPTHSZ,ERRIND,FPTHSZ,FPATH)
```

Input Parameters:	
REAL SRPX,SRPY	search reference point (WC)
REAL SDIST	search distance
INTEGER SPTHSZ	number of elements in starting path
INTEGER SPATH(2,SPTHSZ)	starting path
INTEGER MCLIPF	modelling clip flag (PNCLIP,PCLIP)
INTEGER SRCHCI	search ceiling index
INTEGER NFLN	number of "normal" filters
INTEGER NFLISX(NFLN)	array of end indices of "normal" filter inclusion sets
INTEGER NFLIS(*)	"normal" filter inclusion sets
INTEGER NFLESX(NFLN)	array of end indices of "normal" filter exclusion sets
INTEGER NFLES(*)	"normal" filter exclusion sets
INTEGER IFLN	number of "inverted" filters
INTEGER IFLISX(IFLN)	array of end indices of "inverted" filter inclusion sets
INTEGER IFLIS(*)	"inverted" filter inclusion sets
INTEGER IFLESX(IFLN)	array of end indices of "inverted" filter exclusion sets
INTEGER IFLES(*)	"inverted" filter exclusion sets
INTEGER IPTHSZ	size of found path array
Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER FPTHSZ	found path size
INTEGER FPATH(2,IPTHSZ)	found path

9.12.8 Inquiry function for PHIGS error state list

INQUIRE INPUT QUEUE OVERFLOW

```
SUBROUTINE PQIQOV (ERRIND,WKID,ICL,IDN)
```

Output Parameters:	
INTEGER ERRIND	error indicator
INTEGER WKID	workstation identifier
INTEGER ICL	input class (PLOCAT,PSTROK,PVALUA,PCHOIC, PPICK,PSTRIN)
INTEGER IDN	input device number

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INQUIRE ERROR HANDLING MODE

SUBROUTINE PQERHM (ERRIND,ERHM)

Output Parameters:

INTEGER ERRIND	error indicator
INTEGER ERHM	error handling mode (POFF,PON)

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9.13 Error control

EMERGENCY CLOSE PHIGS

SUBROUTINE PECLPH

ERROR HANDLING

SUBROUTINE PERHND (ERRNR,FCTID,ERRFIL)

Input Parameters:

INTEGER ERRNR	error number
INTEGER FCTID	function identification
INTEGER ERRFIL	error file

ERROR LOGGING

SUBROUTINE PERLOG (ERRNR,FCTID,ERRFIL)

Input Parameters:

INTEGER ERRNR	error number
INTEGER FCTID	function identification
INTEGER ERRFIL	error file

SET ERROR HANDLING MODE

SUBROUTINE PSERHM (ERHM)

Input Parameters:

INTEGER ERHM	error handling mode (POFF, PON)

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9.14 Special interfaces

ESCAPE

SUBROUTINE PESC (FCTID,LIDR,IDR,MLODR,LODR,ODR)

Input Parameters:	
INTEGER FCTID	function identification
INTEGER LIDR	dimension of input data record array
CHARACTER*80 IDR (LIDR)	input data record
INTEGER MLODR	maximum length of output data record
Output Parameters:	
INTEGER LODR	number of array elements occupied in ODR
CHARACTER*80 ODR(MLODR)	output data record

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10 Utility functions not defined in PHIGS

The mechanism used for providing the error indicator of these utilities is the same as that used by the inquiry functions. The following language binding dependent errors may occur: 2001 and 2003. However, implementation dependent errors may also occur.

PACK DATA RECORD
Full FORTRAN 77 version

SUBROUTINE PPREC(IL,IA,RL,RA,SL,LSTR,STR,MLDR,ERRIND,LDR,DATREC)

Input Parameters:	
INTEGER IL	number of integer entries (≥0)
INTEGER IA (*)	array containing integer entries
INTEGER RL	number of real entries (≥0)
REAL RA (*)	array containing real entries
INTEGER SL	number of character string entries (≥0)
INTEGER LSTR(*)	lengths of each character string entry (≥0)
CHARACTER*(*) STR(*)	character string entries
INTEGER MLDR	dimension of data record array

Output Parameters:	
INTEGER ERRIND	error indicator (zero if no error)
INTEGER LDR	number of array elements used in DATREC
CHARACTER*80 DATREC(MLDR)	data record

PACK DATA RECORD
FORTRAN 77 subset version

SUBROUTINE PPREC (IL,IA,RL,RA,SL,LSTR,STR,MLDR,ERRIND,LDR,DATREC)

Input Parameters:	
INTEGER IL	number of integer entries (≥0)
INTEGER IA (IL)	array containing integer entries
INTEGER RL	number of real entries (≥0)
REAL RA (RL)	array containing real entries
INTEGER SL	number of character string entries (≥0)
INTEGER LSTR(SL)	lengths of each character string entry (≥0)
CHARACTER*80 STR(*)	character string entries
INTEGER MLDR	dimension of data record array

Output Parameters:	
INTEGER ERRIND	error indicator (zero if no error)
INTEGER LDR	number of array elements used in DATREC
CHARACTER*80 DATREC(MLDR)	data record

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UNPACK DATA RECORD
Full FORTRAN 77 version

```
SUBROUTINE PUREC (LDR,DATREC,IIL,IRL,ISL,ERRIND,IL,IA,RL,RA,
*SL,LSTR,STR)
```

Input Parameters:	
INTEGER LDR	number of array elements used in DATREC
CHARACTER*80 DATREC(LDR)	data record
INTEGER IIL	dimension of integer array
INTEGER IRL	dimension of real array
INTEGER ISL	dimension of character array

Output Parameters:	
INTEGER ERRIND	error indicator (zero if no error)
INTEGER IL	number of integer entries
INTEGER IA (IIL)	array containing integer entries
INTEGER RL	number of real entries
REAL RA (IRL)	array containing real entries
INTEGER SL	number of character string entries
INTEGER LSTR(ISL)	length of each character string entry
CHARACTER*(*) STR(ISL)	character string entries

UNPACK DATA RECORD
FORTRAN 77 subset version

```
SUBROUTINE PUREC (LDR,DATREC,IIL,IRL,ISL,ERRIND,IL,IA,RL,RA,
*SL,LSTR,STR)
```

Input Parameters:	
INTEGER LDR	number of array elements used in DATREC
CHARACTER*80 DATREC(LDR)	data record
INTEGER IIL	dimension of integer array
INTEGER IRL	dimension of real array
INTEGER ISL	dimension of character array

Output Parameters:	
INTEGER ERRIND	error indicator (zero if no error)
INTEGER IL	number of integer entries
INTEGER IA (IIL)	array containing integer entries
INTEGER RL	number of real entries
REAL RA (IRL)	array containing real entries
INTEGER SL	number of character string entries
INTEGER LSTR(ISL)	length of each character string entry
CHARACTER*80 STR(ISL)	character string entries

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Annex A

FORTRAN Examples

(informative)

The following sample programs, using the PHIGS FORTRAN binding, illustrate the use of PHIGS functions.

Example 1:

```
C     PROGRAM STAR
C
C     DESCRIPTION:
C       This program draws a yellow star on a blue background and writes
C       the title 'Star' in green under the star.
C     CONFORMANCE:
C       FORTRAN-77 binding with FORTRAN-77 subset comments.
C       At least one OUTPUT or OUTIN workstation.
C
C     Define PHIGS constants.
C
      INTEGER PSOLID, PRGB, PCLIP
      PARAMETER ( PSOLID = 1, PRGB = 1, PCLIP = 1 )
      INTEGER PACENT, PAHALF
      PARAMETER ( PACENT = 2, PAHALF = 3 )
C
C     Implementation dependent constants.
C
      INTEGER ERROUT,TTOUT,WSTYPE,NBYTES
      PARAMETER ( ERROUT = 1, TTOUT = 5, WSTYPE = 0, NBYTES = 0 )
C
C     Define coordinates for drawing the star.
C
      REAL STARX( 5 ),STARY( 5 )
      DATA STARX / 0.951057, -0.951057, 0.587785, 0.0, -0.587785 /
      DATA STARY / 0.309017, 0.309017, -0.951057, 1.0, -0.951057 /
C
C     Define an identity transformation.
C
      REAL IDENTX (3, 3)
      DATA IDENTX(1,1), IDENTX(1,2), IDENTX(1,3) / 1.0, 0.0, 0.0 /
      DATA IDENTX(2,1), IDENTX(2,2), IDENTX(2,3) / 0.0, 1.0, 0.0 /
      DATA IDENTX(3,1), IDENTX(3,2), IDENTX(3,3) / 0.0, 0.0, 1.0 /
C
C     Local variables
C
      REAL VWWNLM(4), PJVPLM(4), VWMPMT(3,3)
      INTEGER ERRIND
      REAL COLSPC(3)
C
C     Perform implementation dependent initialization.
```


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```
C
      OPEN ( TTOUT,STATUS='NEW' )
C
C     Open PHIGS and a workstation.
C
      CALL POPPH ( ERROUT,NBYTES )
      CALL POPWK ( 1,TTOUT,WSTYPE )
C
C     Post the structure to the workstation.
C
      CALL PPOST ( 1, 1, 1.0 )
C
C     Center the window around the origin.
C
      VWWNLM(1) = -1.25
      VWWNLM(2) =  1.25
      VWWNLM(3) = -1.25
      VWWNLM(4) =  1.25
      PJVPLM(1) =  0.0
      PJVPLM(2) =  1.0
      PJVPLM(3) =  0.0
      PJVPLM(4) =  1.0
      CALL PEVMM ( VWWNLM, PJVPLM, ERRIND, VWMPMT )
      CALL PSVWR ( 1, 1, IDENTX, VWMPMT, PJVPLM, PCLIP )
C
C     Define the colours we'll be using.
C
      CALL PSCMD ( 1, PRGB )
      COLSPC(1) = 0.0
      COLSPC(2) = 0.0
      COLSPC(3) = 1.0
      CALL PSCR ( 1,0,3,COLSPC)
      COLSPC(1) = 1.0
      COLSPC(2) = 1.0
      COLSPC(3) = 0.0
      CALL PSCR ( 1,1,3,COLSPC)
      COLSPC(1) = 1.0
      COLSPC(2) = 1.0
      COLSPC(3) = 1.0
      CALL PSCR ( 1,2,3,COLSPC)
C
C     Open the structure.
C
      CALL POPST ( 1 )
C
C     Select the view index for the star.
C
      CALL PSVWI ( 1 )
C
C     Fill the star with solid yellow.
C
      CALL PSIS ( PSOLID )
```


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```
      CALL PSICI ( 1 )
C
C     Draw the star.
C
      CALL PFA ( 5, STARX, STARY )
C
C     Select large characters centred under the star.
C
      CALL PSCHH ( 0.15 )
      CALL PSTXAL ( PACENT, PAHALF )
      CALL PSTXCI ( 2 )
C
C     Draw the title.
C
      CALL PTX ( 0.0,-1.1,'Star' )
C
C     FORTRAN 77 subset version.
C     CALL PTXS ( 0.0,-1.1,4,'Star' )
C
C     Close the structure, unpost it and close the workstation and PHIGS.
C
      CALL PCLST
      CALL PUPOST ( 1,1 )
      CALL PCLWK ( 1 )
      CALL PCLPH
      STOP
      END
```


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Example 2:

```
C     PROGRAM IRON
C
C     DESCRIPTION:
C       This program draws a horizontal bar chart illustrating costs within
C       the iron industry. The user can select the data to be displayed using
C       a PHIGS choice device. The plot is adapted from 'Scientific American'
C       May 1984 page 39.
C     CONFORMANCE:
C       Choice device must support prompt and echo type 3
C
C     PHIGS constants:
C
      INTEGER PBUNDL,PINDIV
      PARAMETER ( PBUNDL = 0, PINDIV = 1 )
      INTEGER POK,PNCHOI
      PARAMETER ( POK = 0, PNCHOI = 1 )
      INTEGER PIS, PISI, PRGB, PCLIP
      PARAMETER ( PIS=12, PISI=13, PRGB=1, PCLIP=1 )
C
C     Implementation dependent constants:
C
      INTEGER ERROUT,TTOUT,WSTYPE,NBYTES
      PARAMETER ( ERROUT = 5,TTOUT = 5, WSTYPE = 0, NBYTES = 0 )
C
C     Returned data from inquire choice device state:
C
      INTEGER ERRIND,MODE,ESW,ISTAT,ICHNR,PET,LDR
      REAL EAREA( 4 )
      CHARACTER*80 DATREC( 10 )
C
C     Data for initialising choice device state:
C
      CHARACTER*12 CHSTRS( 4 )
      INTEGER CHLENS( 4 )
      INTEGER IDUMMY(1)
      REAL RDUMMY(1)
      INTEGER STATUS,CHOICE
C
C     Window Aspect ratio
C
     REAL EXPAN
     COMMON EXPAN
C
C     Arrays for plot data:
C
      REAL USDAT1( 6 ),USDAT2( 6 ),GDAT1( 6 ),GDAT2( 6 ),JDAT1( 6 ),
     *     JDAT2( 6 )
C
C     Define an identity transformation.
C
```


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```
      REAL IDENTX (3, 3)
      DATA IDENTX(1,1), IDENTX(1,2), IDENTX(1,3) / 1.0, 0.0, 0.0 /
      DATA IDENTX(2,1), IDENTX(2,2), IDENTX(2,3) / 0.0, 1.0, 0.0 /
      DATA IDENTX(3,1), IDENTX(3,2), IDENTX(3,3) / 0.0, 0.0, 1.0 /
C
C     Local variables
C
      REAL VWWNLM(4), PJVPLM(4), VWMPMT(3,3)
      REAL COLSPC(3)
C
C     Initialize the prompt data:
C
      DATA CHSTRS / 'U.S.', 'W. GERMANY', 'JAPAN', 'EXIT' /
      DATA CHLENS /   4 ,       10 ,    5 ,   4 /
C
C     Data to plot:
C
      DATA USDAT1 / 69.0, 50.0, 15.0, 53.0, 57.0, 150.0 /
      DATA USDAT2 / 72.0, 50.0, 103.0, 0.0, 0.0, 56.0 /
      DATA GDAT1 / 65.0, 42.0, 3.0, 89.0, 52.0, 93.0 /
      DATA GDAT2 / 70.0, 53.0, 102.0, 0.0, 0.0, 49.0 /
      DATA JDAT1 / 65.0, 47.0, 2.0, 60.0, 52.0, 55.0 /
      DATA JDAT2 / 70.0, 57.0, 105.0, 0.0, 0.0, 41.0 /
C
C     Open PHIGS and a workstation.
C
      CALL POPPH ( ERROUT,NBYTES )
      CALL POPWK ( 1,TTOUT,WSTYPE )
C
C     Post the structure to the workstation.
C
      CALL PPOST ( 1, 1, 1.0 )
C
C     Specify the window onto chart.
C
      VWWNLM(1) = -115.0
      VWWNLM(2) =  160.0
      VWWNLM(3) = -2.0
      VWWNLM(4) =  14.0
      PJVPLM(1) =  0.0
      PJVPLM(2) =  1.0
      PJVPLM(3) =  0.0
      PJVPLM(4) =  1.0
      CALL PEVMM ( VWWNLM, PJVPLM, ERRIND, VWMPMT )
      CALL PSVWR ( 1, 1, IDENTX, VWMPMT, PJVPLM, PCLIP )
      EXPAN = (160.0 - (-115.0)) / (14.0 - 2.0)
C
C     Define the colours we'll be using.
C
      CALL PSCMD ( 1, PRGB )
      COLSPC(1) = 0.0
      COLSPC(2) = 1.0
```


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```
      COLSPC(3) = 0.0
      CALL PSCR ( 1,1,3,COLSPC)
      COLSPC(1) = 1.0
      COLSPC(2) = 0.0
      COLSPC(3) = 0.0
      CALL PSCR ( 1,2,3,COLSPC)
C
C     Initialize the choice device.
C
      CALL PQCHS ( 1,1,10,ERRIND,MODE,ESW,ISTAT,ICHNR,PET,EAREA,
     *             LDR,DATREC )
      CALL PPREC ( 0,IDUMMY,0,RDUMMY,4,CHLENS,CHSTRS,10,ERRIND,
i*~*            LDR,DATREC )
      CALL PINCH ( 1,1,POK,1,3,EAREA( 1 ),EAREA( 2 ),EAREA( 3 ),
     *             EAREA( 4 ),LDR,DATREC )
C
C     Get the operator's choice (U.S, W. Germany, Japan, or exit ).
C
 20   CONTINUE
      CALL PRQCH ( 1,1,STATUS,CHOICE )
C
C     Display data depending on the choice.
C
      IF ( CHOICE.EQ.1 ) THEN
         CALL DRAW ( USDAT1,USDAT2,CHSTRS(1) )
      ELSE IF ( CHOICE.EQ.2 ) THEN
         CALL DRAW ( GDAT1,GDAT2,CHSTRS(2) )
      ELSE IF ( CHOICE.EQ.3 ) THEN
         CALL DRAW ( JDAT1,JDAT2,CHSTRS(3) )
      ELSE
         GO TO 29
      ENDIF
      GO TO 20
 29   CONTINUE
C
C     Unpost the structure and close the workstation and PHIGS.
C
      CALL PUPOST ( 1, 1 )
      CALL PCLWK ( 1 )
      CALL PCLPH
      STOP
      END

      SUBROUTINE DRAW ( DAT1,DAT2,NATION )
      CHARACTER*(*) NATION
      REAL DAT1( 6 ),DAT2( 6 )
C
C     Draw the border of the graph and plot the two sets of data associated
C     with this country.
C
      INTEGER I
C
```


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```
C     Y-coordinate of the current data bar:
C
      REAL POS
C
C     Open up the structure and empty it out to put new stuff in it.
C
      CALL POPST( 1 )
      CALL PEMST( 1 )
C
C     Use bundled attributes except for interior style and interior style index.
C
      DO 10 I=0,17
         CALL PSIASF ( I, PBUNDL )
 10   CONTINUE
C
      CALL PSIASF ( PIS, PINDIV )
      CALL PSIASF ( PISI, PINDIV )
C
C     Select the view index
C
      CALL PSVWI ( 1 )
C
C     Draw the border.
C
      CALL BORDER( NATION )
C
C     Draw the black bars.
C
      CALL PSFACI ( 1 )
      CALL PSTXCI ( 1 )
      CALL PSFAI ( 1 )
      DO 11 I = 1,6
         POS = 2.0 * FLOAT( I - 1 ) + 1.6
         CALL BAR( DAT1( I ),POS )
 11   CONTINUE
C
C     Draw the red bars.
C
      CALL PSFACI ( 2 )
      CALL PSTXCI ( 2 )
      CALL PSFAI ( 2 )
      DO 21 I = 1,6
         POS = 2.0 * FLOAT ( I - 1 ) + 0.8
         CALL BAR( DAT2( I ),POS )
 21   CONTINUE
C
C     Close the structure.
C
      CALL PCLST ( 1 )
C
      RETURN
      END
```


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```
      SUBROUTINE BORDER( NATION )
      CHARACTER*(*) NATION
C
C     Draw the border surrounding the data.
C
C     PHIGS constants:
C
      INTEGER PCONDI
      PARAMETER ( PCONDI = 0 )
      INTEGER PALEFT,PACENT,PAHALF,PATOP,PABOTT,PACAP
      PARAMETER ( PALEFT = 1, PACENT = 2, PAHALF = 3, PATOP = 1 )
      PARAMETER ( PABOTT = 5, PACAP = 2 )
C
C     Window Aspect ratio
C
      REAL EXPAN
      COMMON EXPAN
C
C     Coordinates of box surrounding bars:
C
      REAL BOXX( 5 ),BOXY( 5 )
C
C     Labels for the bars:
C
      CHARACTER*16 LABEL( 6 )
      DATA LABEL / 'LABOR', 'IRON ORE', 'COKE OR COAL',
     *             'PURCHASED SCRAP', 'OTHER COSTS', 'OTHER ENERGY' /
C
C     Initialize the box surrounding the bars:
C
      DATA BOXX / 0.0, 150.0, 150.0, 0.0, 0.0 /
      DATA BOXY / 0.0, 0.0, 12.0, 12.0, 0.0 /
C
C     Draw the box surrounding the chart area.
C
      CALL PPL ( 5,BOXX,BOXY )
C
C     Draw the labels centred on the bar and flush left.
C
      CALL PSTXAL ( PALEFT,PAHALF )
      CALL PSCHH ( 0.5 )
      CALL PSCHXP ( EXPAN )
      CALL PSTXCI ( 1 )
      DO 11 I = 1,6
         POSY = 2.0 * FLOAT( I - 1 ) + 1.2
         CALL PTX ( -114.0,POSY,LABEL( I ) )
 11   CONTINUE
C
C     Draw the top and bottom tick marks (bottom in red).
C
      CALL PSTXAL ( PACENT,PABOTT )
      CALL TICKS ( 12.0,12.2 )
```


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```
      CALL PSTXAL ( PACENT,PATOP )
      CALL PSTXCI ( 2 )
      CALL TICKS ( 0.0,-0.2 )
C
C     Draw the title text in bigger characters.
C
      CALL PSTXCI ( 1 )
      CALL PSTXAL ( PACENT,PABOTT )
      CALL PSCHXP ( EXPAN )
      CALL PTX ( 0.0,-2.0,'PRODUCTION COST' )
      CALL PSCHH ( 0.7 )
      CALL PSTXAL ( PACENT,PATOP )
      CALL PTX ( 0.0,14.0,NATION )
      CALL PSCHH ( 0.5 )
      RETURN
      END

      SUBROUTINE TICKS ( TSTART,TEND )
      REAL TSTART,TEND
C
C     Draw the tick mark along the edges.
C
C     Tick mark coordinates:
C
      REAL TICKX( 2 ),TICKY( 2 )
C
C     Determine the direction of the tick.
C
      TICKX( 1 ) = 0.0
      TICKX( 2 ) = 0.0
      TICKY( 1 ) = TSTART
      TICKY( 2 ) = TEND
C
C     Draw each tick mark.
C
      DO 11 I = 1,4
         CALL PPL ( 2,TICKX,TICKY )
         TICKX( 1 ) = TICKX( 1 ) + 50.0
         TICKX( 2 ) = TICKX( 2 ) + 50.0
 11   CONTINUE
C
C     Draw the tick mark labels.
C
      CALL PTX ( 0.0,TSTART,'0' )
      CALL PTX ( 50.0,TSTART,'50' )
      CALL PTX ( 100.0,TSTART,'100' )
      CALL PTX ( 150.0,TSTART,'150' )
C
      RETURN
      END
```


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FORTRAN Examples **Annex A**

```
      SUBROUTINE BAR ( LENGTH,POS )
      REAL LENGTH,POS
C
C     This subroutine draws a horizontal bar of the specified length and
C     at position pos.
C
C     PHIGS constants:
C
      INTEGER PALEFT,PACENT,PAHALF,PATOP,PABOTT
      PARAMETER ( PALEFT = 1, PACENT = 2, PAHALF = 3, PATOP = 1 )
      PARAMETER ( PABOTT = 5 )
C
C     Coordinates of the bar:
C
      REAL BARX( 4 ),BARY( 4 )
C
C     If the value is too small, print a zero.
C
      IF ( LENGTH.LE.0.0 ) THEN
         CALL PSTXAL ( PALEFT,PAHALF )
         CALL PTX ( 0.0,POS,'0' )
      ELSE
C
C     Otherwise draw the bar.
C
         BARX( 1 ) = 0.0
         BARX( 2 ) = LENGTH
         BARX( 3 ) = LENGTH
         BARX( 4 ) = 0.0
         BARY( 1 ) = POS + 0.4
         BARY( 2 ) = POS + 0.4
         BARY( 3 ) = POS - 0.4
         BARY( 4 ) = POS - 0.4
         CALL PFA ( 4,BARX,BARY )
      ENDIF
C
      RETURN
      END
```


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Example 3:

```
C     PROGRAM DYNASTAR
C
C     DESCRIPTION:
C       This program draws a yellow star on a blue background and writes
C       the title 'Star' in green under the star.
C       It changes the viewing parameters to zoom and pan on the star
C       independent of the title.
C       It then demonstrates some of the dynamics of PHIGS by rolling
C       the star back and forth across the display by modifying the
C       star's modelling transformation.
C     CONFORMANCE:
C       FORTRAN-77 binding with FORTRAN-77 subset comments.
C       At least one OUTPUT or OUTIN workstation.
C
C     Define PHIGS constants.
C
      INTEGER PSOLID
      PARAMETER ( PSOLID = 1 )
      INTEGER PACENT,PAHALF
      PARAMETER ( PACENT = 2, PAHALF = 3 )
      INTEGER PCPRE, PCPOST, PCREPL, PCLIP
      PARAMETER  ( PCPRE = 0, PCPOST = 1, PCREPL = 2, PCLIP = 1 )
      INTEGER PASAP, PWAITD, PPERFO, PUWOR, PNIVE
      PARAMETER ( PASAP=0, PWAITD=4, PPERFO=1, PUWOR=1, PNIVE=0 )
      INTEGER PREPLC
      PARAMETER ( PREPLC=1 )
C
C     Implementation dependent constants.
C
      INTEGER ERROUT,TTOUT,WSTYPE,NBYTES
      PARAMETER ( ERROUT = 1, TTOUT = 5, WSTYPE = 0, NBYTES = 0 )
C
C     Define coordinates for drawing the star.
C
      REAL STARX( 5 ),STARY( 5 )
      DATA STARX / 0.951057, -0.951057, 0.587785, 0.0, -0.587785 /
      DATA STARY / 0.309017, 0.309017, -0.951057, 1.0, -0.951057 /
C
C     Define an identity transformation.
C
      REAL IDENTX (3, 3)
      DATA IDENTX(1,1), IDENTX(1,2), IDENTX(1,3) / 1.0, 0.0, 0.0 /
      DATA IDENTX(2,1), IDENTX(2,2), IDENTX(2,3) / 0.0, 1.0, 0.0 /
      DATA IDENTX(3,1), IDENTX(3,2), IDENTX(3,3) / 0.0, 0.0, 1.0 /
      REAL XFRMS (3,3)
C
C     Local variables
C
      REAL VWWNLM(4), PJVPLM(4), VWMPMT(3,3)
      INTEGER ERRIND, I
```


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```
      REAL COLSPC(3)
C
C     Perform implementation dependent initialization.
C
      OPEN ( TTOUT,STATUS='NEW' )
C
C     Open PHIGS and a workstation.
C
      CALL POPPH ( ERROUT,NBYTES )
      CALL POPWK ( 1,TTOUT,WSTYPE )
C
C     Define two 2D viewing transformations centred around the origin.
C     One will be used for the title and will remained unchanged.  The
C     other will be used for the star and will be changed for panning and
C     zooming.
C
      VWWNLM(1) = -1.25
      VWWNLM(2) =  1.25
      VWWNLM(3) = -1.25
      VWWNLM(4) =  1.25
      PJVPLM(1) =  0.0
      PJVPLM(2) =  1.0
      PJVPLM(3) =  0.0
      PJVPLM(4) =  1.0
      CALL PEVMM ( VWWNLM, PJVPLM, ERRIND, VWMPMT )
      CALL PSVWR ( 1, 1, IDENTX, VWMPMT, PJVPLM, PCLIP )
      CALL PSVWR ( 1, 2, IDENTX, VWMPMT, PJVPLM, PCLIP )
C
C     Define the colours we'll be using.
C
      CALL PSCMD ( 1, PRGB )
      COLSPC(1) = 0.0
      COLSPC(2) = 0.0
      COLSPC(3) = 1.0
      CALL PSCR ( 1,0,3,COLSPC)
      COLSPC(1) = 1.0
      COLSPC(2) = 1.0
      COLSPC(3) = 0.0
      CALL PSCR ( 1,1,3,COLSPC)
      COLSPC(1) = 1.0
      COLSPC(2) = 1.0
      COLSPC(3) = 1.0
      CALL PSCR ( 1,2,3,COLSPC)
C
C     Open the structure containing the star and title.
C
      CALL POPST ( 1 )
C
C     Select the view index for the star.
C
      CALL PSVWI ( 1 )
C
```


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```
C     Fill the star with solid yellow.
C
      CALL PSIS ( PSOLID )
      CALL PSICI ( 1 )
C
C     Draw the star.
C
      CALL PFA ( 5, STARX, STARY )
C
C     Select the view index for the title.
C
      CALL PSVWI ( 2 )
C
C     Select large characters centred under the star.
C
      CALL PSCHH ( 0.15 )
      CALL PSTXAL ( PACENT, PAHALF )
      CALL PSTXCI ( 2 )
C
C     Draw the title.
C
      CALL PTX ( 0.0,-1.1,'Star' )
C
C     FORTRAN 77 subset version.
C     CALL PTXS ( 0.0,-1.1,4,'Star' )
C
C     Close the structure.
C
      CALL PCLST
C
C     Set the deferral and update modes so that changes happen immediately.
C
      CALL PSDUS ( 1, PASAP, PUWOR )
C
C     Post the structure to the open workstation.
C
      CALL PPOST ( 1, 1, 1.0 )
C
C     Successively change the view mapping to zoom in and out.
C
      DO 100 I=2,10
           ZMWIND = 1.25 / FLOAT(I)
           VWWNLM(1) = -ZMWIND
           VWWNLM(2) =  ZMWIND
           VWWNLM(3) = -ZMWIND
           VWWNLM(4) =  ZMWIND
           CALL PEVMM ( VWWNLM, PJVPLM, ERRIND, VWMPMT )
           CALL PSVWR ( 1, 1, IDENTX, VWMPMT, PJVPLM, PCLIP )
100   CONTINUE
C
      DO 200 I=9,1,-1
           ZMWIND = 1.25 / FLOAT(I)
```


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```
            VWWNLM(1) = -ZMWIND
            VWWNLM(2) =  ZMWIND
            VWWNLM(3) = -ZMWIND
            VWWNLM(4) =  ZMWIND
            CALL PEVMM ( VWWNLM, PJVPLM, ERRIND, VWMPMT )
            CALL PSVWR ( 1, 1, IDENTX, VWMPMT, PJVPLM, PCLIP )
200     CONTINUE
C
C       Successively change the view mapping to pan back and forth across
C       the display.
C
        DO 300 I=1,5
            VWWNLM(1) = (-1.25 - (I*0.1))
            VWWNLM(2) = (1.25 - (I*0.1))
            VWWNLM(3) = -1.25
            VWWNLM(4) = 1.25
            CALL PEVMM ( VWWNLM, PJVPLM, ERRIND, VWMPMT )
            CALL PSVWR ( 1, 1, IDENTX, VWMPMT, PJVPLM, PCLIP )
300     CONTINUE
        DO 400 I=4,0,-1
            VWWNLM(1) = (-1.25 - (I*0.1))
            VWWNLM(2) = (1.25 - (I*0.1))
            VWWNLM(3) = -1.25
            VWWNLM(4) = 1.25
            CALL PEVMM ( VWWNLM, PJVPLM, ERRIND, VWMPMT )
            CALL PSVWR ( 1, 1, IDENTX, VWMPMT, PJVPLM, PCLIP )
400     CONTINUE
C
C       Successively change the modelling transformation to "roll" the
C       Star back and forth across the display surface.
C
C       Open up the structure so it can be edited.
C
        CALL POPST ( 1 )
C
C       Insulate the title from changes to the modelling for the star.
C
        CALL PSEP ( 4 )
        CALL PSLMT ( IDENTX, PREPL )
C
C        First scale it down to get something more "rollable".
C
        CALL PSC ( 0.5, 0.5, XFRMS )
C
        CALL PSEP ( 3 )
        CALL PSLMT ( XFRMS, PREPL )
C
C       Insert the rolling transformation as identity for now.
C
        CALL PSLMT ( IDENTX, PCPOST )
C
C       Set up deferral mode so we don't get the deletes in it.
```


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9593 PT*1 90 ■ 4851903 0102459 2 ■


```
C
      CALL PSDUS ( 1, PWAITD, PNIVE )
C
C     All of the following modifications take place on the same element
C     of the open structure.  Set the element position there and use replace
C     edit mode.
C
      CALL PSEP ( 5 )
      CALL PSEDM ( PREPLC )
C
C     Let's roll to the left.
C
      DO 500 I=1,10
            CALL PBLTM ( 0.0, 0.0, -(I*0.05), 0.0, -(0.5236*I), 1.0, 1.0, XFRM )
            CALL PSLMT ( XFRM, PCPOST )
            CALL PUWK ( 1, PPERFO )
500   CONTINUE
C
C     Let's roll back to the right.
C
      DO 600 I=9,0,-1
            CALL PBLTM ( 0.0, 0.0, -(I*0.05), 0.0, (0.5236*I), 1.0, 1.0, XFRM )
            CALL PSLMT ( XFRM, PCPOST )
            CALL PUWK ( 1, PPERFO )
600   CONTINUE
C
C     Let's roll all the way to the right.
C
      DO 700 I=1,10
            CALL PBLTM ( 0.0, 0.0, (I*0.05), 0.0, (0.5236*I), 1.0, 1.0, XFRM )
            CALL PSLMT ( XFRM, PCPOST )
            CALL PUWK ( 1, PPERFO )
700   CONTINUE
C
C     Now let's roll back to the left, back to where we started.
C
      DO 800 I=9,0,-1
            CALL PBLTM ( 0.0, 0.0, (I*0.05), 0.0, -(0.5236*I), 1.0, 1.0, XFRM )
            CALL PSLMT ( XFRM, PCPOST )
            CALL PUWK ( 1, PPERFO )
800   CONTINUE
C
C     Close the open structure, workstation and PHIGS.
C
      CALL PCLST
      CALL PCLWK ( 1 )
      CALL PCLPH
      STOP
      END
```


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Example 4:

```
C     PROGRAM XFRMPL
C
C     DESCRIPTION:
C
C      This program applies one or more transformations to a closed
C      polyline connecting a user-supplied set of points and then
C      draws the result on a plotter.
C
C     CONFORMANCE:
C      FORTRAN-77 binding
C      The implementation must support at least an OUTIN workstation and
C      an OUTPUT workstation.
C      This example assumes that all the required input devices are
C      available on the same OUTIN workstation.
C
C*********************************************************************
C
C     Define the enumerated types to be used.
C
      INTEGER PSOLID, PRGB
      PARAMETER ( PSOLID = 1, PRGB = 1 )
      INTEGER PACENT,PAHALF
      PARAMETER ( PACENT = 2, PAHALF = 3 )
      INTEGER PCPRE, PCPOST, PCREPL, PCLIP
      PARAMETER  ( PCPRE = 0, PCPOST = 1, PCREPL = 2, PCLIP = 1 )
      INTEGER PASAP, PWAITD, PPERFO, PUWOR, PNIVE
      PARAMETER ( PASAP=0, PWAITD=4, PPERFO=1, PUWOR=1, PNIVE=0 )
      INTEGER PREPLC
      PARAMETER ( PREPLC = 1 )
C
C     Implementation dependent constants
C
      INTEGER ERRLUN, DVLUN, SSLUN, HCLUN
      PARAMETER (ERRLUN=7, DVLUN=5, SSLUN=1, HCLUN=4)
      INTEGER NBYTES
      PARAMETER (NBYTES=-1)
      INTEGER DISPLA, PLOTER, TTOUT
      PARAMETER (DISPLA=10, PLOTER=14, TTOUT=6)
C
C     Declarations
C
      INTEGER STAT, NTN, NP, CHNBR, I
      REAL PX(64), PY(64), DX, DY, ANGLE
      REAL SX, SY
      REAL IDENTX(3,3)
      REAL XFRMS (3,3)
      REAL VWWNLM(4), PJVPLM(4), VWMPMT(3,3)
      INTEGER ERRIND
      INTEGER IDUMMY(1), MODE, ESW, IVAL, PET, LDR
      REAL EAREA(4)
```


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```
      CHARACTER*80 DATREC(10)
      REAL VALRNG(2)
      CHARACTER*80 SDUMMY(1)
      REAL COLSPC(3)
C
C     Define valuator range
C
      DATA VALRNG(1), VALRNG(2)  / 0.0, 1.0 /
C
C     Define an identity transformation.
C
      DATA IDENTX(1,1), IDENTX(1,2), IDENTX(1,3) / 1.0, 0.0, 0.0 /
      DATA IDENTX(2,1), IDENTX(2,2), IDENTX(2,3) / 0.0, 1.0, 0.0 /
      DATA IDENTX(3,1), IDENTX(3,2), IDENTX(3,3) / 0.0, 0.0, 1.0 /
C
      DATA XFRMS(1,1), XFRMS(1,2), XFRMS(1,3) / 1.0, 0.0, 0.0 /
      DATA XFRMS(2,1), XFRMS(2,2), XFRMS(2,3) / 0.0, 1.0, 0.0 /
      DATA XFRMS(3,1), XFRMS(3,2), XFRMS(3,3) / 0.0, 0.0, 1.0 /
C
C     Perform initialization and opening of the OUTIN workstation.
C
      CALL POPPH( ERRLUN, NBYTES )
      CALL POPWK( 1, DVLUN, DISPLA )
C
C     Set valuator state such that values range from 0.0 to 1.0
C
      CALL PQVLS(1,1,10,ERRIND,MODE,ESW,IVAL,PET,EAREA,LDR,DATREC)
      CALL PPREC(0,IDUMMY,2,VALRNG,0,IDUMMY,SDUMMY,10,ERRIND,LDR,DATREC)
      CALL PINVL(1,1,IVAL,PET,EAREA(1),EAREA(2),EAREA(3),EAREA(4),LDR,DATREC)
C
C     Post the structure to the open workstation.
C
      CALL PPOST ( 1, 1, 1.0 )
C
C     Define two 2D viewing transformations centred around the origin.
C     One will be used for the title and will remained unchanged.  The
C     other will be used for the star and will be changed for panning and
C     zooming.
C
      VWWNLM(1) = -10.0
      VWWNLM(2) =  10.0
      VWWNLM(3) = -10.0
      VWWNLM(4) =  10.0
      PJVPLM(1) =  0.1
      PJVPLM(2) =  0.9
      PJVPLM(3) =  0.1
      PJVPLM(4) =  0.9
      CALL PEVMM ( VWWNLM, PJVPLM, ERRIND, VWMPMT )
      CALL PSVWR ( 1, 1, IDENTX, VWMPMT, PJVPLM, PCLIP )
C
C     Set the deferral and update modes such that changes happen immediately.
C
```


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```
      CALL PSDUS ( 1, PASAP, PUWOR )
C
C     Open the structure.
C
      CALL POPST ( 1 )
C
C     Select the view index
C
      CALL PSVWI ( 1 )
C
C     Insert the local transformation as identity for now.
C
      CALL PSLMT ( IDENTX, PCPOST )
C
C     Use bundle attributes exclusively.
C
      DO 5 I=0,17
          CALL PSIASF( I, PBUNDL )
 5    CONTINUE
C
C     Get the points.
C
      CALL PSPLI( 3 )
 10   CONTINUE
      WRITE(TTOUT,*) 'Stroke input needed for polyline ...'
      CALL PRQSK( 1, 1, 63, STAT, NTN, NP, PX, PY )
      WRITE(TTOUT,901) NP
 901  FORMAT('Got ',I5,' points.')
      IF ( STAT .NE. POK ) GOTO 29
      IF ( (NTN .NE. 1) .OR. (NP .LT. 2) ) GOTO 10
      PX(NP+1) = PX(1)
      PY(NP+1) = PY(1)
      CALL PPL( NP+1, PX, PY )
C
C     Apply repeated transformations to the structure.
C     Set the element position on the local modelling transformation
C     and put the edit mode in REPLACE.
C
      CALL PSEP( 1 )
      CALL PSEDM ( PREPLC )
C
C     Choose the transformation type:
C
 20   CONTINUE
       WRITE(TTOUT,*) 'Choice input needed ... '
       WRITE(TTOUT,*) '  1 - translate'
       WRITE(TTOUT,*) '  2 - rotate'
       WRITE(TTOUT,*) '  3 - scale'
       WRITE(TTOUT,*) '  4 - exit'
       CALL PRQCH( 1, 1, STAT, CHNBR )
       WRITE(TTOUT,902) CHNBR
 902  FORMAT('Got choice = ',I5)
```


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```
      IF ( (STAT .NE. POK) .OR. (CHNBR .EQ. 4) )GOTO 29
       IF ( (CHNBR .LT. 1) .OR. (CHNBR .GT. 4)) GOTO 20
       GOTO (21,22,23) CHNBR
C
C     Translate the structure.
C
 21   CONTINUE
       WRITE(TTOUT,*) 'Stroke input needed. 2 pts for translate ...'
       CALL PRQSK( 1, 1, 2, STAT, NTN, NP, PX, PY )
       WRITE(TTOUT,901) NP
       IF (STAT .NE. POK) GOTO 29
       IF ( (NTN .NE. 1) .OR. (NP .NE. 2 )) GOTO 21
       DX = PX(2) - PX(1)
       DY = PY(2) - PY(1)
       CALL PCOTM(XFRMS,0.0,0.0,DX,DY,0.0,1.0,1.0,XFRMS)
       GOTO 25
C
C     Rotate the structure.
C
 22   CONTINUE
       WRITE(TTOUT,*) 'Valuator input needed for angle ...'
       CALL PRQVL( 1, 1, STAT, ANGLE )
       ANGLE = ANGLE * 6.28
       WRITE(TTOUT,903) ANGLE
 903  FORMAT('Got angle = ',F10.5)
       IF (STAT .NE. POK) GOTO 22
       CALL PCOTM(XFRMS,0.0,0.0,0.0,0.0,ANGLE,1.0,1.0,XFRMS)
       GOTO 25
C
C     Scale the structure.
C
 23   CONTINUE
       WRITE(TTOUT,*) 'Valuator input needed for X scale factor ...'
       CALL PRQVL( 1, 1, STAT, SX )
       SX = SX * 2.0
       WRITE(TTOUT,904) SX
 904  FORMAT('Got X scale factor  = ',F10.5)
       IF (STAT .NE. POK) GOTO 23
       WRITE(TTOUT,*) 'Valuator input needed for Y scale factor ...'
 24   CALL PRQVL( 1, 1, STAT, SY )
       SY = SY * 2.0
       WRITE(TTOUT,905) SY
 905  FORMAT('Got Y scale factor  = ',F10.5)
       IF (STAT .NE. POK) GOTO 24
       CALL PCOTM(XFRMS,0.0,0.0,0.0,0.0,0.0,SX,SY,XFRMS)
       GOTO 25
C
C     Set the local modelling transformation.
C
 25   CONTINUE
      CALL PSLMT ( XFRM, PCPOST )
      CALL PUWK( 1, PPERFO )
```


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```
      GOTO 20
C
 29   CONTINUE
C
C     All done modifying, so close the structure.
C
      CALL PCLST
C
C     Now plot the structure on a hardcopy device.
C
      WRITE(TTOUT,*) 'Plotting on hardcopy device ...'
      CALL POPWK( 2, HCLUN, PLOTER )
C
C     Set the hardcopy representations.
C
      CALL PSCMD ( 2, PRGB )
      COLSPC(1) = 1.0
      COLSPC(2) = 1.0
      COLSPC(3) = 0.0
      CALL PSCR ( 2, 1, 3, COLSPC)
      CALL PSPLR( 2, 3, PLSOLI, 1.5, 1 )
      CALL PSTXR( 2, 2, 1, PSTRKP, 1.0, 0.0, 1 )
      CALL PPOST ( 2, 1, 1.0 )
C
C     Label the picture with some text.
C
      CALL PPOST ( 2, 2, 1.0 )
      CALL POPST ( 2 )
      CALL PSCHH( 1.0 )
      CALL PSTXI( 2 )
      CALL PSTXAL( PACAP, PABASE )
      CALL PTX( 0.0, 0.0, 'This is a polyline.' )
      CALL PCLST
      CALL PUWK( 2, PPERFO )
C
C     Shut down PHIGS.
C
      CALL PCLWK( 1 )
      CALL PCLWK( 2 )
      CALL PCLPH
C
      STOP
      END
```


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Example 5:

```
C
C     PROGRAM SHOWLN
C
C     DESCRIPTION:
C      This program illustrates the available linetypes on
C      a user selected workstation.
C      It contains PHIGS initialization and shutdown modules
C      and demonstrates how to program modules that
C      do not change any state list entries.
C
      INTEGER WTYPE,ERRIND
C
C
C     Call initialization module
C
      CALL OPENPH (WTYPE,ERRIND)
      IF (ERRIND.NE.0) GOTO 999
C
C     Call demonstration module for linetype capabilities
C
      CALL LNDEMO (WTYPE,ERRIND)
C
C     Close everything
C
  999 CALL CLOSPH
C
      STOP
      END
C
C
C
      SUBROUTINE OPENPH (WTYPE,ERRIND)
      INTEGER WTYPE,ERRIND
C
C     PHIGS initialization sequence.
C
C     Workstation category enumerated types.
C
      INTEGER POUTPT,POUTIN
      PARAMETER (POUTPT=0,POUTIN=2)
C
C     PHIGS and workstation state enumerated types.
C
      INTEGER PPHOP,PWSOP
      PARAMETER (PPHOP=1,PWSOP=1)
C
      INTEGER ERROUT,NBYTES,TTOUT,TTIN
      PARAMETER (ERROUT=6,NBYTES=-1,TTOUT=6,TTIN=5)
C
      INTEGER N,NUMBER,J,I,WKCAT,CONID,OPSTA
```


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```
C
C     Open PHIGS
C
      CALL POPPH (ERROUT,NBYTES)
C
C     Inquire available workstation types and print them
C
      N = 0
      CALL PQEWK (N,ERRIND,NUMBER,WTYPE)
      IF (ERRIND.NE.0) RETURN
C
      WRITE (TTOUT,*)
     * ' The available OUTPUT and OUTIN workstation types are:'
      J = NUMBER
      DO 100 I=1,J
            CALL PQEWK (I,ERRIND,NUMBER,WTYPE)
            CALL PQWKCA (WTYPE,ERRIND,WKCAT)
            IF (WKCAT.EQ.POUTPT.OR.WKCAT.EQ.POUTIN) WRITE (TTOUT,*) WTYPE
  100 CONTINUE
C
C     Choose one workstation and open it
C
      WRITE (TTOUT,*)
     * ' Please enter connection identifier and workstation type'
      READ (TTIN,*) CONID,WTYPE
C
      CALL POPWK (1,CONID,WTYPE)
C
C     Check operating state to ensure successful opening and activating
C
      CALL PQSYS (OPSTA)
      IF (OPSTA.NE.PPHOP) THEN
            ERRIND = 3
            RETURN
      ENDIF
C
      CALL PQWKST (OPSTA)
      IF (OPSTA.NE.PWSOP) THEN
            ERRIND = 3
            RETURN
      ENDIF
C
      ERRIND = 0
C
      RETURN
      END
C
C
C
      SUBROUTINE CLOSPH
C
C     PHIGS close sequence.
```


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```
C
      CALL PCLWK (1)
      CALL PCLPH
C
      RETURN
      END
C
C
C
      SUBROUTINE LNDEMO (WTYPE,ERRIND)
      INTEGER WTYPE,ERRIND
C
C     Demonstrate all available linetypes.
C     This module assumes one workstation with workstation identifier 1
C     and workstation type WTYPE to be open.
C     The display surface is not cleared and the OUTPUT stretches
C     accross the current workstation viewport.
C
      INTEGER PBUNDL,PINDIV
      PARAMETER (PBUNDL=0,PINDIV=1)
      INTEGER PPHOP,PWSOP
      PARAMETER (PPHOP=1,PWSOP=1)
      INTEGER PRIGHT,PLEFT,PUP,PDOWN
      PARAMETER (PRIGHT=0,PLEFT=1,PUP=2,PDOWN=3)
      INTEGER PAHNOR,PALEFT,PACENT,PARITE
      PARAMETER (PAHNOR=0,PALEFT=1,PACENT=2,PARITE=3)
      INTEGER PAVNOR,PATOP,PACAP,PAHALF,PABASE,PABOTT
      PARAMETER (PAVNOR=0,PATOP=1,PACAP=2,PAHALF=3,PABASE=4,PABOTT=5)
      INTEGER PSTRP,PCHARP,PSTRKP
      PARAMETER (PSTRP=0,PCHARP=1,PSTRKP=2)
C
      INTEGER OPSTA,TUS
      REAL RWINDO(4),CWINDO(4),RVIEWP(4),CVIEWP(4)
      INTEGER N,NLT,LT,NLW,NPPLI
      REAL NOMLW,RLWMIN,RLWMAX
      REAL DIST
      INTEGER J
      REAL X(2),Y(2)
      INTEGER I
      CHARACTER*8 CLT
C
C     Check operating state to ensure successful opening and activating
C
      CALL PQSYS (OPSTA)
      IF (OPSTA.NE.PPHOP) THEN
          ERRIND = 5
          RETURN
      ENDIF
C
      CALL PQWKST (OPSTA)
      IF (OPSTA.NE.PWSOP) THEN
          ERRIND = 5
```


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```
            RETURN
      ENDIF
C
C     Inquire workstation transformation
C
      CALL PQWKT (1,ERRIND,TUS,RWINDO,CWINDO,RVIEWP,CVIEWP)
      IF (ERRIND.NE.0) RETURN
C
C     Inquire polyline facilities (n=0 returns length of list)
C
      N = 0
      CALL PQPLF (WTYPE,N,ERRIND,NLT,LT,NLW,NOMLW,RLWMIN,RLWMAX,NPPLI)
      IF (ERRIND.NE.0) RETURN
C
C     Post the structure to a workstation.
C
      CALL PPOST (1,1,1.0)
C
C     Open a structure.
C
      CALL POPST (1)
C
C      Select the view index
C
      CALL PSVWI (1)
C
C     Set individual aspect source flags,
C     linewidth scale factor 1.0 and polyline colour index 1,
C     reasonable text attributes
C
      DO 50 I=0,17
            CALL PSIASF (I,PINDIV)
 50   CONTINUE
      CALL PSLWSC (1.0)
      CALL PSPLCI (1)
      CALL PSCHUP (0.0,1.0)
      CALL PSTXP  (PRIGHT)
      CALL PSTXAL (PALEFT,PAHALF)
      CALL PSTXFN (1)
      CALL PSTXPR (PCHARP)
      CALL PSCHXP (1.0)
      CALL PSCHSP (0.0)
      CALL PSTXCI (1)
C
C     Compute distance between lines
C
      DIST = (CWINDO(4)-CWINDO(3))/FLOAT(NLT)
C
C     Set character height to half of the distance between lines,
C     but not more than 1/20th of the height of the current
C     workstation viewport
C
```


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```
      CALL PSCHH  (AMIN1(DIST/2.0,(CWINDO(4)-CWINDO(3))/20.0))
C
C     Lines stretch from the left bound to the middle of the
C     current workstation viewport
C
      X(1) = CWINDO(1)
      X(2) = (CWINDO(1) + CWINDO(2)) / 2.0
      Y(1) = CWINDO(4) - DIST/2.0
C
C     Loop over available linetypes
C
      J = NLT
      DO 100 I=1,J
C
      CALL PQPLF (WTYPE,I,ERRIND,NLT,LT,NLW,NOMLW,RLWMIN,RLWMAX,NPPLI)
C
C     Draw line
C
      CALL PSLN (LT)
      Y(2) = Y(1)
      CALL PPL (2,X,Y)
      Y(1) = Y(1)-DIST
C
C     Annotate linetype
C
      WRITE (CLT,'(I8)') LT
      CALL PTX (X(2),Y(2),CLT)
C
C     FORTRAN 77 subset version.
C     CALL PTXS (X(2),Y(2),8,CLT)
C
  100 CONTINUE
C
C     Close the structure.
C
      CALL PCLST
C
      ERRIND = 0
C
      RETURN
      END
```


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Annex B

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(normative)

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UDC 681.3.01:681.3.04(084):800.92

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