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**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)*.

### 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.*

### **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<sub>1</sub>,REAL<sub>2</sub>,REAL<sub>3</sub>,...REAL<sub>n</sub>** containing  $C_1, C_2, C_3, \dots, C_n$  ( $n=NCC$ ) when CTYPE is not INDIRECT

**COLRVH** homogeneous colour value

**REAL<sub>1</sub>,REAL<sub>2</sub>,REAL<sub>3</sub>,...REAL<sub>n</sub>** and **REAL** containing  $WC_1, WC_2, WC_3, \dots, WC_n$  and  $W$  ( $n=NCC$ )

**GCOLOR** 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

is not INDIRECT

**REAL VNXA(\*),VNAYA(\*)** 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(\*),VNAYA(\*),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) × NFS, when CTYPE is not INDIRECT

**REAL FNXA(\*),FNAYA(\*),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) × NP, when CTYPE is not INDIRECT

**REAL VNXA(\*),VNAYA(\*),VNZA(\*)** vertex normal data(\*=NP)

**INTEGER VDLEN** length of application-specific data

**REAL VDATA(\*)** vertex application-specific data(\*=VDLEN × 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) × NP, when CTYPE is not INDIRECT

**REAL VNXA(\*),VNAYA(\*),VNZA(\*)** vertex normal data(\*=NP)

**INTEGER VDLEN** length of application-specific data

**REAL VDATA(\*)** vertex application-specific data(\*=VDLEN × 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

**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**(\*),**FNZA**(\*),**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)

**INTEGER NTCCP(\*)** number of trimming 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<sub>1</sub>,d<sub>2</sub>,d<sub>3</sub>,...,d<sub>n</sub>,w) when DRTYPE(i) is PRAT.

DDIMS(i) = n (n = d<sub>1</sub>,d<sub>2</sub>,d<sub>3</sub>,...,d<sub>n</sub>) 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<sub>1</sub>,d<sub>2</sub>,d<sub>3</sub>,...,d<sub>n</sub>,w) when DRTYPE(i) is PRAT.

DDIMS(i) = n (n = d<sub>1</sub>,d<sub>2</sub>,d<sub>3</sub>,...,d<sub>n</sub>) 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

## **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 characteristic 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

	<i>polyline colour ....</i>					
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

	<i>true</i>	<i>pseudo</i>	<i>pseudo-n</i>
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

	<i>indirect</i>
INTEGER	PINDIR
PARAMETER(	PINDIR=0 )

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

### culling mode

	<i>none</i>	<i>backfacing</i>	<i>frontfacing</i>
INTEGER	PNOFC,	PBKFC,	PFTFC
PARAMETER(	PNOFC=0,	PBKFC=1,	PFTFC=2 )

**curve approximation criteria type**

	<i>workstation dependent chordal deviation in WC relative DC</i>	<i>constant between knots chordal deviation in NPC</i>	<i>chordal size in WC chordal deviation in DC</i>	<i>chordal size in NPC relative WC</i>	<i>chordal size in DC relative NPC</i>
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)**

	<i>over surface</i>	<i>between knots</i>
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**

	<i>colour</i>	<i>single uniform</i>	<i>single non-uniform</i>	<i>BI uniform</i>	<i>BI non-uniform</i>
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**

	<i>suppressed</i>	<i>allowed</i>
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**

	<i>none</i>	<i>edge visibility flag</i>
INTEGER	PENO	PEVF
PARAMETER(	PENO=0,	PEVF=1 )

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

## element type

<i>polyline set 3 with data .....</i>					
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,	PECFMI)		
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,	PECFMI=118)		

## facet data flag

	<i>no facet data</i>	<i>colour</i>	<i>normal</i>	<i>data</i>	<i>colour/normal</i>
	<i>colour/data</i>	<i>normal/data</i>	<i>colour/normal/data</i>		
INTEGER	PFNO,	PFC,	PEN,	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

	<i>reflectance</i>	<i>parametric surface</i>
INTEGER	PRFATT,	PPSATT
PARAMETER(	PRFATT=5,	PPSATT=6 )

## interior shading method

	<i>none</i>	<i>colour</i>	<i>data</i>	<i>data/dot</i>	<i>data/normal</i>
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

	<i>ambient</i>	<i>directional</i>	<i>positional</i>	<i>spot</i>
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

	<i>none</i>	<i>workstation dependent</i>	<i>isoparametric curve</i>	<i>level curve in MC</i>	<i>level curve in WC</i>
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.

**polyline shading method**

	<i>none</i>	<i>colour</i>
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**

	<i>rational</i>	<i>non-rational</i>
INTEGER	PRAT,	PNRAT
PARAMETER(	PRAT=0,	PNRAT=1 )

**reflectance model**

	<i>no reflectance</i>	<i>ambient</i>	<i>ambient/diffuse</i>	<i>ambient/diffuse/specular</i>
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**

	<i>simple reflectance</i>
INTEGER	PSRPT
PARAMETER(	PSRPT=1)

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

**surface approximation criteria**

	<i>workstation dependent planar deviation in WC relative in DC</i>	<i>constant between knots planar deviation in NPC</i>	<i>chordal size in WC planar deviation in DC</i>	<i>chordal size in NPC relative in WC</i>	<i>chordal size in DC relative in NPC</i>
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**

	<i>colour aspect</i>	<i>vertex colour</i>	<i>vertex data</i>	<i>facet colour</i>	<i>facet data</i>
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**

	<i>coordinate only colour/data</i>	<i>colour normal/data</i>	<i>normal colour/normal/data</i>	<i>data</i>	<i>colour/normal</i>
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 )		

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

**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,	ESCFM,	ESPLP,	ESPMP
PARAMETER(	ESRCM=228,	ESDPCI=229,	ESCFM=230,	ESPLP=231,	ESPMP=232)
INTEGER	ESTXRP,	ESIP,	ESEDP,	ESDMR,	ESFRF
PARAMETER(	ESTXRP=233,	ESIP=234,	ESEDP=235,	ESDMR=236,	ESFRF=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
PQEFSI	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
PQPPI	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
PQPISR	Q-P-L-S-R	INQUIRE PREDEFINED LIGHT SOURCE REPRESENTATION
PQPMP	Q-PM-P	INQUIRE POLYMARKER REPRESENTATION PLUS
PQPAP	Q-P-PA-P	INQUIRE PREDEFINED PATTERN REPRESENTATION PLUS
PQPPLP	Q-P-PL-P	INQUIRE PREDEFINED POLYLINE REPRESENTATION PLUS
PQPMP	Q-P-PM-P	INQUIRE PREDEFINED POLYMARKER REPRESENTATION PLUS
PQPISR	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

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

**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
PQECSI	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
PQPMF	Q-PM-F	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
PQPDOR	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
PQPMP	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

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
PS PAP	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

## 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

## 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,PFOND)
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,PFN,PCFN,PCFD,PFND,PCFND)
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

## 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,PFCN,PFCN,PFCN)
INTEGER EFLAG	data per edge data flag (PENNO,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

## 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 (PEN0,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

## 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,PFDP,PCFN,PCFD,PFND,PCFND)
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,  
 \*VNZA,VNZA,VDLEN,VDATA,VIND)

*Input Parameters:*

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFID,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

## 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,  
 \*VNZA,VNZA,VDLEN,VDATA)

*Input Parameters:*

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFN,PFCD,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),VNZA(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,PFDP,PCFN,PCFD,PFND,PCFND)
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

## 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 (PEN0,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



**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 <sup>1</sup>

**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

<sup>1</sup>See PACK COLOUR SPLINE CURVE and UNPACK COLOUR SPLINE CURVE for a description of the colour spline curve data record.

CHARACTER\*80 TCREC(TCLDR) trimming curve data record<sup>2</sup>

### 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 <sup>2</sup>
INTEGER CSSLDR	number of array elements used in CSSREC
CHARACTER*80 CSSREC(CSSLDR)	colour spline surface data record <sup>4</sup>
INTEGER DSSLDR	number of array elements used in DSSREC
CHARACTER*80 DSSREC(DSSLDR)	data spline surface data record <sup>5</sup>

<sup>2</sup>See PACK TRIMMING CURVE and UNPACK TRIMMING CURVE for a description of the trimming curve data record.

<sup>3</sup>See PACK TRIMMING CURVE and UNPACK TRIMMING CURVE for a description of the trimming curve data record.

<sup>4</sup>See PACK COLOUR SPLINE SURFACE and UNPACK COLOUR SPLINE SURFACE for a description of the colour spline surface data record.

<sup>5</sup>See PACK DATA SPLINE SURFACE and UNPACK DATA SPLINE SURFACE for a description of the data spline surface data record.

### 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 PPSI(PSI)

*Input Parameters:*

INTEGER PSI

parametric surface index

**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)
---------------	----------------------------------

**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:

- 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 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 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:

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 = PBU DM:

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 = PBNU DM:

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 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)

- 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

**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 <sup>6</sup>

**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 <sup>7</sup>

**SET BACK REFLECTANCE MODEL**

SUBROUTINE PSBRFM(RFM)

*Input Parameters:*

INTEGER RFM	reflectance model
-------------	-------------------

<sup>6</sup>See SET DATA MAPPING METHOD for a description of the data mapping method data records.

<sup>7</sup>See SET REFLECTANCE PROPERTIES for a description of the reflectance properties data records.

**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

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=PWDC: 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= ( )

## SET PARAMETRIC SURFACE CHARACTERISTICS

SUBROUTINE PSPSC(PSTY,LDR,DATREC)

*Input Parameters:*

INTEGER PSTY	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 PSTY = PNOPC or PWDPC: No data record

DATREC parameters to build PARAMETRIC SURFACE CHARACTERISTICS DATA RECORD for PSTY = 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 PSTY = 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

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

**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,<sup>8</sup>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.

---

<sup>8</sup>already defined in PHIGS

### 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 <sup>9</sup>

#### 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

<sup>9</sup>See SET CURVE APPROXIMATION CRITERIA for a description of the curve approximation criteria data records.

**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

**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 <sup>10</sup>

**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 <sup>11</sup>

**SET PARAMETRIC SURFACE REPRESENTATION**

SUBROUTINE PPSR(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 <sup>12</sup>
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 <sup>13</sup>

<sup>10</sup>See SET DATA MAPPING METHOD for a description of the data mapping method data records.

<sup>11</sup>See SET REFLECTANCE PROPERTIES for a description of the reflectance properties data records.

<sup>12</sup>See SET SURFACE APPROXIMATION CRITERIA for a description of the surface approximation criteria data records.

<sup>13</sup>See SET PARAMETRIC SURFACE CHARACTERISTICS for a description of the parametric surface characteristics data records.

## 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 PLSR(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.

- 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)

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 attenuation 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

## 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

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 <sup>14</sup>

#### INQUIRE POLYMARKER REPRESENTATION PLUS

SUBROUTINE POPMP(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

<sup>14</sup>See SET CURVE APPROXIMATION CRITERIA for a description of the curve approximation criteria data records.

**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

**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 <sup>15</sup>

<sup>15</sup>See SET DATA MAPPING METHOD for a description of the data mapping method data records.

**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 property type
INTEGER LDR	length of data record array
CHARACTER*80 DATREC(MLDR)	reflectance property colour value data record <sup>16</sup>

**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

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<sup>16</sup>See SET REFLECTANCE PROPERTIES for a description of the reflectance properties data records.

## 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 <sup>17</sup>
INTEGER PSCH	parametric surface characteristics type
INTEGER LDRPS	length of parametric surface characteristics data record
CHARACTER*80 DARECP(MLDRPS)	parametric surface characteristics data record <sup>18</sup>

## 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

<sup>17</sup>See SET SURFACE APPROXIMATION CRITERIA for a description of the surface approximation criteria data records.

<sup>18</sup>See SET PARAMETRIC SURFACE CHARACTERISTICS for a description of the parametric surface characteristics data records.

**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 <sup>19</sup>

**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

<sup>19</sup>See SET LIGHT SOURCE REPRESENTATION for a description of the light source data record.

**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

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 <sup>20</sup>

<sup>20</sup>See SET COLOUR MAPPING REPRESENTATION for a description of the colour mapping data record.

### 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
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*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)

**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 <sup>21</sup>

<sup>21</sup>See SET CURVE APPROXIMATION CRITERIA for a description of the curve approximation criteria data records.

**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

**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

**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 <sup>22</sup>

**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 <sup>23</sup>

<sup>22</sup>See SET DATA MAPPING METHOD for a description of the data mapping data records.<sup>23</sup>See SET REFLECTANCE PROPERTIES for a description of the reflectance properties data records.

**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  
INTEGER N

workstation type  
list element requested of curve approximation  
criteria types

*Output Parameters:*

INTEGER ERRIND  
INTEGER MNUBSC  
INTEGER NCACT  
INTEGER CACT

error indicator  
maximum non-uniform b-spline curve order supported  
number of available curve approximation criteria types  
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  
INTEGER N

workstation type  
list element requested of parametric surface  
characteristics types

*Output Parameters:*

INTEGER ERRIND  
INTEGER NPSCT  
INTEGER PSCT  
  
INTEGER NPPSI

error indicator  
number of available parametric surface characteristics  
Nth element of list of available parametric surface  
characteristics types  
number of predefined parametric surface indices

**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 FACILITIES**

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

## 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 <sup>24</sup>
INTEGER PSCH	parametric surface characteristics type
INTEGER LDRPS	length of parametric surface characteristics data record
CHARACTER*80 DARECP(MLDRPS)	parametric surface characteristics data record <sup>25</sup>

## 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

<sup>24</sup>See SET SURFACE APPROXIMATION CRITERIA for a description of the surface approximation criteria data records.

<sup>25</sup>See SET PARAMETRIC SURFACE CHARACTERISTICS for a description of the parametric surface characteristics data records.

**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<sup>26</sup>

**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

<sup>26</sup>See SET LIGHT SOURCE REPRESENTATION for a description of the light source data record.

**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

**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 <sup>27</sup>

**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, <sup>28</sup> PRFATT,PPSATT)

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

<sup>27</sup>See SET COLOUR MAPPING REPRESENTATION for a description of the colour mapping data record.

<sup>28</sup>already defined in PHIGS

## 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, <sup>29</sup> 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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<sup>29</sup>already defined in PHIGS

## INQUIRE CURRENT ELEMENT TYPE AND SIZE

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

*Output Parameters:*INTEGER ERRIND  
INTEGER ELTYPEerror indicator  
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,<sup>30</sup>  
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,PEDPIC,PECFMI)

INTEGER IL  
INTEGER RL  
INTEGER SLdimension of integer array  
dimension of real array  
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.

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<sup>30</sup>already defined in PHIGS



## 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 <sup>32</sup>

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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<sup>32</sup>See INQUIRE CURRENT ELEMENT CONTENT for details on interpreting the information returned in the integer, real and character arrays.

## 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.

example  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots$

RA=element IA(3) through IA(4) contain the vertex colour components

example(colour type =PRGB)  $r_1, g_1, b_1, r_2, g_2, b_2, \dots$

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)

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  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots$   
 RA=element NUM1+1 through NUM1+NCC=NUM2 contain the facet colour components  
 example(colour type =PRGB)  $r_1, g_1, b_1, r_2, g_2, b_2, \dots$   
 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  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots$   
 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

- 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,PECND)

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  $x_1, x_2, \dots, y_1, y_2, \dots$

RA=element NUM1+1 through NUM1+NCC=NUM2 contain the facet colour components

example (colour type = PRGB)  $r_1, g_1, b_1, r_2, g_2, b_2, \dots$

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  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots$

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:

- The cell parallelogram(P)
- The cell parallelogram(Q)
- The cell parallelogram(R)
- The list of colour values. There are  $NCC \cdot NC \cdot NR$  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  $NC \cdot NR + 3$  contain colour indices

CASE colour type=PRGB or PCIE or PHSV or PHLS:

RA=element 10 through  $NCC \cdot NC \cdot NR + 9$  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

- 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 (PEN0, 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,.....

RA=element IA(9) through IA(10) contain the facet normal data

example  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots$

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

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

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

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

- 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

(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 = PETS D:

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

- 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

$$N = 27 + 3 * IA(24) + (IA(2) - IA(1) + 1) + (IA(4) - IA(3) + 1) + (IA(6) - IA(5) + 1)$$

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 (PEN0, PEVE)

IA(21)= data per vertex flag

(PCD, PCDC, PCDD, 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  $x_1, x_2, \dots, y_1, y_2, \dots$

RA=element IA(7) through IA(8) contain the facet colour components

example (colour type = PRGB)  $r_1, g_1, b_1, r_2, g_2, b_2, \dots$

RA=element IA(9) through IA(10) contain the facet normal data

example  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots$

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 = 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

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

- 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,PFN,PCFN,PCFD,PFND,PCFND)

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  $x_1,x_2,\dots,y_1,y_2,\dots$

RA=element IA(7) through IA(8) contain the facet colour components

example(colour type =PRGB)  $r_1,g_1,b_1,r_2,g_2,b_2,\dots$

RA=element IA(9) through IA(10) contain the facet normal data

example  $x_1,x_2,\dots,y_1,y_2,\dots,z_1,z_2,\dots$

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 = 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

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  $x_1,x_2,\dots,y_1,y_2,\dots,z_1,z_2,\dots$   
 RA=element IA(7) through IA(8) contain the facet colour components  
     example(colour type =PRGB)  $r_1,g_1,b_1,r_2,g_2,b_2,\dots$   
 RA=element IA(9) through IA(10) contain the facet normal data  
     example  $x_1,x_2,\dots,y_1,y_2,\dots,z_1,z_2,\dots$   
 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

- 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 (PEN0, 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

example  $x_1, x_2, \dots, y_1, y_2, \dots$

RA=element IA(7) through IA(8) contain the facet colour components

example (colour type =PRGB)  $r_1, g_1, b_1, r_2, g_2, b_2, \dots$

RA=element IA(9) through IA(10) contain the facet normal data

example  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots$

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  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots, w_1, w_2, \dots$

if rationality=PNRAT

RA=element IA(2)+3 through IA(2)+2+IA(4)\*3 contain the coordinates of points

example  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots$

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:

- 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

$RL = IA(3) + IA(4) + *$   
 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  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots, w_1, w_2, \dots$   
 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  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots$   
 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  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots, w_1, w_2, \dots$

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  $x_1, x_2, \dots, y_1, y_2, \dots, z_1, z_2, \dots$

SI = 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:

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= \*

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.

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 PHL5:

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

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<sup>33</sup>

Output parameters for STRUCTURE CONTENT DATA RECORD for

ELTYPE = PERFP:

The IA array contains:

- The properties type

The STR array contains:

- The reflectance properties data record

Common element:

IL= 1

IA(1)= properties type

<sup>33</sup>See SET DATA MAPPING METHOD for a description of the data mapping method data data record.

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

- 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<sup>34</sup>

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<sup>34</sup>

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

The IA array contains:

<sup>34</sup>See SET DATA MAPPING METHOD for a description of the data mapping method data data record.

- The properties type
- The STR array contains:
- The reflectance properties 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= reflectance properties 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:

- 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

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<sup>25</sup>

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= ( )

---

<sup>25</sup>See SET PARAMETRIC SURFACE CHARACTERISTICS for a description of the parametric surface characteristics data record.

## ELEMENT SEARCH

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

*Input Parameters:*

INTEGER STRID  
INTEGER STRTEP  
INTEGER SRCDIR  
INTEGER EISN  
INTEGER EIS(EISN)

structure identifier  
start element position  
search direction(PBWD,PFWD)  
number of elements in element inclusion set  
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,PECHL,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,<sup>36</sup>  
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,PEPDCI,PECFMI)

number of elements in element exclusion set  
element exclusion set  
(enumerated type the same as that of element  
inclusion set)

INTEGER EESN  
INTEGER EES(EESN)

*Output Parameters:*

INTEGER ERRIND  
INTEGER STATUS  
INTEGER FNDEP

error indicator  
status indicator(PFAIL,PSUCC)  
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.

<sup>36</sup>already defined in PHIGS

## 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

## 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 <sup>37</sup>
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
<i>Output Parameters:</i>	
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

<sup>37</sup>See SET CURVE APPROXIMATION CRITERIA for description of the curve approximation criteria data recode.

## 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 <sup>38</sup>
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)

<sup>38</sup>See SET CURVE APPROXIMATION CRITERIA for a description of the curve approximation criteria data recode.

## 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

## 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,UNDSOCP,UNDSOCP,DDIMS,DSCO,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 v 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 UNDSOCP	u number of data spline control points dimension
INTEGER UNDSOCP	v number of data spline control points dimension
INTEGER DDIMS	data dimension for spline
REAL DSCO(*)	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

## UNPACK DATA SPLINE SURFACE

SUBROUTINE PUDSS (DSSLDR,DSSREC,IDS,IDUNKA,IDVNKA,IDNSCP,ERRIND,  
 \*DUSORD,DVSORD,DUNKA,DVNKA,DUKNTS,DVKNTS,DRTYPE,UNDS CP,  
 \*UNDS CP,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 UNDS CP	u number of data spline control points dimension
INTEGER UNDS CP	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/

```

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 TPWVA/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,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,MLDR,ERRIND,LDR,DATREC)

```

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,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,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

```