

Implementation of ISO/IEC 9593-1 : 1990

**Information processing
systems —
Computer graphics —
Programmer's hierarchical
interactive graphics system
(PHIGS) language bindings**

Part 1. Fortran

National foreword

This British Standard reproduces verbatim ISO/IEC 9593-1 : 1990 and implements it as the UK national standard.

This British Standard is published under the direction of the Information Technology Systems Standards Policy Committee whose Technical Committee IST/31 has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international committee any enquiries on interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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**Implementation of Technical Corrigendum 1
published and effective from 15 December 1993
to BS ISO/IEC 9593-1 : 1990**

**Information processing systems – Computer graphics –
Programmer's hierarchical interactive graphics system
(PHIGS) language bindings
Part 1. Fortran**

National foreword

In line 1, after 'ISO/IEC 9593-1 : 1990' insert ', including Technical Corrigendum 1,'.

AMD 8029/December 1993

ISO text

Amend as shown in the attached.

AMD 8029/December 1993



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

Published 1993-07-15

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

Part 1: FORTRAN

TECHNICAL CORRIGENDUM 1

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

Partie 1: FORTRAN

RECTIFICATIF TECHNIQUE 1

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

Page 9

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

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

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

Page 35

Delete all of the text for error 2005.

UDC 681.3.01:681.3.04(084):800.92

Ref. No. ISO/IEC 9593-1:1990/Cor.1:1993(E)

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

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ISO/IEC 9593-1:1990/Cor.1:1993(E)

Page 75

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

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

Page 76

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

Page 77

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

Page 148

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

Page 149

For element type PEFAS, change (IA(IL)) to IA(IL) in 3 places.

Page 166

Inquire structure status, change (PNOEXS, PEMPTY, PNOEMP) to (PSNOEX, PSEMPT, PSNEMP).

Implementation of Technical Corrigendum 2
published and effective from 15 March 1995
to BS ISO/IEC 9593-1 : 1990

Information processing systems — Computer graphics —
Programmer's hierarchical interactive graphics system
(PHIGS) language bindings
Part 1. Fortran

National foreword (as amended by Technical Corrigendum 1)
In line 1, after, 'Technical Corrigendum 1' insert 'and Technical Corrigendum 2'.
AMD 8470/March 1995

ISO text
Insert the attached corrigendum text as appropriate.
AMD 8470/March 1995



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

Part 1: FORTRAN

TECHNICAL CORRIGENDUM 2

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

Partie 1: FORTRAN

RECTIFICATIF TECHNIQUE 2

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

Page 8

Clause 5

Change the $4 \times 4 \times \text{REAL}$ matrix description to be:

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

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

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

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

UDC 681.3.01:681.3.04(084):800.92

Ref. No. ISO/IEC 9593-1:1990/Cor.2:1994(E)

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

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Page 21

Clause 6

After the text precision entry, add the following text:

truncation method	head (returns head portion of path)	
	tail (returns tail portion of path)	
INTEGER	PHEAD	PTAIL
PARAMETER (	PHEAD=0,	PTAIL=1)

Page 72

Subclause 9.9

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

INTEGER TRUNCM truncation method (PHEAD, PTAIL)

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

INTEGER TRUNCM truncation method (PHEAD, PTAIL)

Page 166

Subclause 9.12.7

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

INTEGER TRUNCM truncation method (PHEAD, PTAIL)

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

INTEGER TRUNCM truncation method (PHEAD, PTAIL)



Implementation of Amendment No. 1
published and effective from 15 October 1995
to BS ISO/IEC 9593-1 : 1990

Information processing systems — Computer graphics —
Programmer's Hierarchical Interactive Graphics System
(PHIGS) language bindings —
Part 1. FORTRAN

Revised text

National foreword

In line 1, after 'ISO/IEC 9593-1' insert 'including Amendment 1'.

AMD 8815/October 1995

ISO text

Insert the attached as appropriate.

AMD 8815/October 1995

INTERNATIONAL STANDARD

ISO/IEC
9593-1

First edition
1990-06-01

AMENDMENT 1
1995-04-15

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

**Part 1:
FORTRAN**

AMENDMENT 1

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

Partie 1: FORTRAN

AMENDEMENT 1



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

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Foreword

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

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

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

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.

**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.

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
-----------	-------------	------

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

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

REAL₁,REAL₂,REAL₃,...REAL_n containing $C_1, C_2, C_3, \dots, C_n$ ($n=NCC$) when CTYPE is not INDIRECT

COLRVH homogeneous colour value

REAL₁,REAL₂,REAL₃,...REAL_n 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 FDLN length of application-specific data

REAL FDATA(FDLN) 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(*),VNYA(*) vertex normal data(*=NP)

INTEGER VDLEN length of application-specific data

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

L(L(P3{,COLRV}{,NORM}{,L(R)}))

REAL PXA(*),PYA(*),PZA(*) *=last value of array of end indices for point lists(NP)

INTEGER VCOLI(*) *=NP, when CTYPE is INDIRECT

REAL VCOLR(*) *=number of components of colour value(NCC) × NP, when CTYPE is not INDIRECT

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

INTEGER VDLEN length of application-specific data

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

L(L(L(I))) list of lists of vertex indices lists

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

L(L(L(E))) list of lists of edge flags lists

INTEGER EDATA(*) *=last value of array of end vertex indices for each fill area

L({COLRV}{,NORM}{,L(R)}) list of facet data

INTEGER FCOLI(*) *=number of fill area sets(N) in set of fill area sets 3 with data or set of fill area sets with data, number of triangles(N) at following 4 functions, triangle set 3 with data, triangle set with data, triangle strip 3 with data and triangle strip with data, when CTYPE is INDIRECT

REAL FCOLR(*) *=number of components of colour value(NCC) × NFS, when CTYPE is not INDIRECT

REAL FNXA(*),FNYA(*),FNZA(*) facet normal data(*=N)

INTEGER FDLEN length of application-specific data

REAL FDATA(*) facet application-specific data(*=FDLEN × N)

L(P3{,COLRV}{,NORM}{,L(R)}) list of vertex data

REAL PXA(*),PYA(*),PZA(*) *=number of points(NP)

INTEGER VCOLI(*) *=NP, when CTYPE is INDIRECT

REAL VCOLR(*) *=number of components of colour value(NCC) × NP, when CTYPE is not INDIRECT

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

INTEGER VDLEN length of application-specific data

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

L(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(*),VNYA(*),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(*),FNXA(*),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(*),VNXA(*),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(*),VNXA(*),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 CTYPE is PRAT

REAL PXA(*),PYA(*),PZA(*) *=number of control points, when CTYPE 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 CTYPE is PRAT

REAL CSCR(*) *=number of components of colour value(NCC) ×
number of colour spline control points(NCSCP), when CTYPE 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 CTYPE is PRAT

REAL PXA(*),PYA(*),PZA(*) *=u number of control points dimension(UNCP) ×
v number of control points dimension(VNCP), when CTYPE 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 = d₁,d₂,d₃,...,d_n,w) when DRTYPE(i) is PRAT.

DDIMS(i) = n (n = d₁,d₂,d₃,...,d_n) when DRTYPE(i) is PNRAT.

A(DATAH)|A(DATA) control points of data spline

REAL DSCP(*) *=

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

DDIMS(i) = n+1 (n = d₁,d₂,d₃,...,d_n,w) when DRTYPE(i) is PRAT.

DDIMS(i) = n (n = d₁,d₂,d₃,...,d_n) when DRTYPE(i) is PNRAT.

NDS=number of data spline

NUDSCP=u number of data spline control points dimension

NVDSCP=v number of data spline control points dimension

DDIMS=data dimension for spline

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.

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,	PECM1)		
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,	PECM1=118)		

facet data flag

	<i>no facet data</i>	<i>colour</i>	<i>normal</i>	<i>data</i>	<i>colour/normal</i>
INTEGER	<i>colour/data</i>	<i>normal/data</i>	<i>colour/normal/data</i>		
1	PFNO,	PFC,	PFN,	PFD,	PFCN,
PARAMETER(	PFCD,	PFND,	PFCND		
1	PFNO=0,	PFC=1,	PFN=2,	PFD=3,	PFCN=4,
	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.

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

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.	ESCM.	ESPLP.	ESPM
PARAMETER(	ESRCM=228.	ESDPCI=229.	ESCM=230.	ESPLP=231.	ESPM=232)
INTEGER	ESTXRP.	ESIP.	ESEDP.	ESDMR.	ESRFR
PARAMETER(	ESTXRP=233.	ESIP=234.	ESEDP=235.	ESDMR=236.	ESRFR=237)
INTEGER	ESPSR.	ESPAP.	ESLSR.	ESDCR.	ESCMR
PARAMETER(	ESPSR=238.	ESPAP=239.	ESLSR=240.	ESDCR=241.	ESCMR=242)

12. List of the PHIGS PLUS function names

The complete list of PHIGS PLUS function names follows.

12.1. List of functions ordered alphabetically by bound name

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

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
PQECMI	Q-E-C-M-I	INQUIRE LIST element OF COLOUR MAPPING INDICES
PQEDMI	Q-E-D-M-I	INQUIRE LIST element OF DATA MAPPING INDICES
PQEDCI	Q-E-D-C-I	INQUIRE LIST element OF DEPTH CUE INDICES
PQELSI	Q-E-L-S-I	INQUIRE LIST element OF LIGHT SOURCE INDICES
PQEPSI	Q-E-P-S-I	INQUIRE LIST element OF PARAMETRIC SURFACE INDICES
PQERFI	Q-E-R-I	INQUIRE LIST element OF REFLECTANCE INDICES
PQPSF	Q-P-S-F	INQUIRE PARAMETRIC SURFACE FACILITIES
PQPSR	Q-P-S-R	INQUIRE PARAMETRIC SURFACE REPRESENTATION
PQPAP	Q-PA-P	INQUIRE PATTERN REPRESENTATION PLUS
PQPLFP	Q-PL-F-P	INQUIRE POLYLINE FACILITIES PLUS
PQPLP	Q-PL-P	INQUIRE POLYLINE REPRESENTATION PLUS
PQPMP	Q-PM-P	INQUIRE POLYMARKER REPRESENTATION PLUS
PQPCMR	Q-P-C-M-R	INQUIRE PREDEFINED COLOUR MAPPING REPRESENTATION
PQPDMR	Q-P-D-M-R	INQUIRE PREDEFINED DATA MAPPING REPRESENTATION
PQPDCR	Q-P-D-C-R	INQUIRE PREDEFINED DEPTH CUE REPRESENTATION
PQPEDP	Q-P-ED-P	INQUIRE PREDEFINED EDGE REPRESENTATION PLUS
PQPIR	Q-P-I-P	INQUIRE PREDEFINED INTERIOR REPRESENTATION PLUS
PQPLSR	Q-P-L-S-R	INQUIRE PREDEFINED LIGHT SOURCE REPRESENTATION
PQPPSR	Q-P-P-S-R	INQUIRE PREDEFINED PARAMETRIC SURFACE REPRESENTATION
PQPPAP	Q-P-PA-P	INQUIRE PREDEFINED PATTERN REPRESENTATION PLUS
PQPPLP	Q-P-PL-P	INQUIRE PREDEFINED POLYLINE REPRESENTATION PLUS
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	P-L-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

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

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,FXA,
*FNXA,FNZA,FDLEN,FDATA,NPL,IXA,EDATA,PXA,PYA,PZA,VCOLI,VCOLR,
*VNXA,VNZA,VDLEN,VDATA)

```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFGD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PEN,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 FXA,FNZA,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)),VNZA(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

FILL AREA SET WITH DATA

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

Input Parameters:

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

SET OF FILL AREA SETS WITH DATA

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

Input Parameters:

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

TRIANGLE SET 3 WITH DATA

```

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

```

Input Parameters:

INTEGER FFLAG	data per facet data flag (PFNO,PFC,PFN,PFD,PFCN,PFGD,PFND,PFCND)
INTEGER EFLAG	data per edge data flag (PEN,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

TRIANGLE SET WITH DATA

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

Input Parameters:

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

TRIANGLE STRIP 3 WITH DATA

```

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

```

Input Parameters:

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

TRIANGLE STRIP WITH DATA

```

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

```

Input Parameters:

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

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 (PEN,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

QUADRILATERAL MESH WITH DATA

```

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

```

Input Parameters:

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

NON-UNIFORM B-SPLINE SURFACE 3

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

Input Parameters:

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

¹See 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 record²

NON-UNIFORM B-SPLINE SURFACE 3 WITH DATA

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

Input Parameters:

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

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

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

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

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