Software Product Description

PRODUCT NAME: HP GKS for OpenVMS **SPD 42.60.09**

DESCRIPTION

This is a software product description for HP GKS Version 7.O for OpenVMS for Integrity Servers and HP GKS for OpenVMS Alpha Version 6.5..

HP GKS (Graphical Kernel System) (formerly DIGITAL GKS) for OpenVMS for Integrity Servers and OpenVMS Alpha is a two-dimensional and three-dimensional graphics support system that provides a set of programming functions for creating in- teractive and noninteractive graphics applications. As a development tool, HP GKS is a solid base for portable, device-independent applications that define and display graphical images, using a variety of graphics devices.

HP GKS for OpenVMS is HP's implementation of the 1988 ISO 8805 standard GKS for Three Dimensions (GKS-3D) and the ISO 7942 standard GKS. HP GKS conforms to level 2c of this standard, providing full output capabilities, including workstation- independent segment storage (level 2), and full synchronous and asynchronous input capabilities (level c).

HP GKS is the merger of two earlier products:

- DEC GKS-3D Version 1.2, a three-dimensional product
- DEC GKS Version 4.2, a two-dimensional product

The resulting product provides both two-dimensional and three-dimensional capabilities in a single package, and was first made available as DEC GKS Version 5.0. HP GKS supports DECwindows Motif for OpenVMS Alpha and OpenVMS Integrity, and is supported on most HP processors running the OpenVMS Alpha or OpenVMS Integrity Operating Systems.

HP GKS is device-independent; the same program can generate graph- ical output on different devices without modification to the source code. The graphical output formats supported by HP GKS include:

- CGM (Computer Graphics Metafile)
- DDIF (DIGITAL Document Interchange Format)
- Hewlett-Packard Graphics Language (HP-GL)
- Hewlett-Packard Printer Control Language (HP PCL)
- PostScript

HP GKS provides four language bindings in which graphical data can be created and managed. These bindings are: C, ISO FORTRAN, GKS$ (a two-dimensional, language-independent binding), and GKS3D$ (a three-dimensional, language-independent binding).

HP GKS is a subroutine library packaged as a set of shareable im- ages with which application programs are linked. The shareable images are activated at run-time as needed.

NIST Certification

The two-dimensional subset of DIGITAL GKS for OpenVMS Alpha received certification from the U.S. National Institute of Standards and Tech- nology in December 1994. Since then, HP GKS has been the only cer- tified GKS implementation in the industry.

Besides conforming to the ISO 7942, ISO 8805, and ISO 8806/1 (Fortran binding) standards, DIGITAL GKS satisfies the requirements of FIPS PUB 120-1.

Floating Point Formats

HP GKS provides support for both IEEE and VAXfloat floating point formats.

PEX Support

HP GKS supports output to the DIGITAL implementation of PEX Ver- sion 5.0 and PEX Version 5.1 servers. For OpenVMS Alpha, the PEX server extension and the PEXlib object library are available as part of the Open3D for OpenVMS Alpha product.

Output Modes

With HP GKS, you can describe a graphical object using either segments or immediate mode. A segment is a set of output primitives that are created, manipulated, and deleted as a group, but are not modifiable. HP GKS manages segments internally and automatically redraws them if the display is damaged (for example, if the display window is obscured and then exposed).

In immediate mode, primitives are rendered directly to the display surface without being stored internally in HP GKS. This mode is useful when graphical data is temporary, or will be refreshed by the application.

Output Primitives

HP GKS provides a variety of output primitives for creating basic two-dimensional and three-dimensional graphics. These primitives are:

Cell Array	A rectangular image specified by a two-dimensional array of rectangular color cells on a plane arbitrarily placed in three-dimensional space.
Fill Area	A polygonal area that can be hollow or filled with a uniform color, a pattern, or a hatch style. The edges of the area are not defined and cannot be controlled.
Fill Area Set	A set of polygonal areas with holes or disjointed regions that are treated as a single entity. These areas can be hollow or filled with a uniform color, patterns, or hatch styles. Control of edge attributes is provided.
Generalized Drawing Primitive (GDP)	A primitive providing access to drawing capabilities of graphics devices not used by the other primitives listed here; circles and arcs are two common GDPs.
Polyline	A set of connected lines defined by a series of points and having line type, line width, and color attributes defined.
Polymarker	One or more symbols that can mark significant points in a display and have type, size, scale, and color attributes defined.
Text	A character string at a given position in world coordinates. This string can be in 8-bit or 16-bit format, and can be displayed in a variety of fonts, orientations, sizes, and colors. Text size is affected by transformations.

Attributes

Each output primitive has an associated set of attributes that control the primitive's appearance. Attributes can be defined in groups (bundles) or individually. Some examples of attributes are:

Line Type	The style of a line, for example, dotted or dashed.
Line Width	The width of the line.
Color	The color of a primitive. You can select one of the predefined colors or specify the red, green, and blue intensities required to define a particular color on color devices.
Character Attributes	Text attributes, including font, character spacing, height, angle, path, and alignment.

Viewing Operations

HP GKS allows you to specify views of three-dimensional objects and define the "working" or world coordinate system used in these views. World coordinates can have any scale. For example, one application might have a maximum range from 0 to 1000.0; another application might limit the range from 0.01 to 0.1.

You can control multiple, simultaneous views of the same objects on one or more display surfaces, as well as the position and size of the image on the surface. For example, one application program can display an image of a cube in one window on a workstation, and at the same time, the program can display a detail of the back of the cube in another window (on another workstation, if required).

Control Functions

Control functions are used to perform system management tasks related to the HP GKS environment, the workstation environment, and the graphics display. These tasks include turning HP GKS on and off when requested by the application, directing the flow of graphics data to logical output devices and managing the picture process.

Inquiry Functions

HP GKS includes a complete set of inquiry functions. These functions are used to obtain information about the HP GKS state, segment storage, workstation capabilities, or the workstation state. This information is essential for developing modular, device-independent programs.

Escape Functions

Escape functions are included with HP GKS to enable access to functionality not provided in the GKS standard. The HP GKS escape functions include:

- Double buffering control
- Background pixmap control

- Screen dumps

Logical Input Devices

HP GKS supports synchronous and asynchronous input from the following logical input devices:

Locator	Allows the user to select a point on the display.
Stroke	Allows the user to input a series of points on the display.
Valuator	Allows the user to select a real number from a range of numbers, for example, by sliding a pointer to a position on a radio dial.
Choice	Allows the user to make a selection, for example, from a list of choices in a menu.
String	Allows the user to input a character string, for example, as input to a prompt.
Pick	Allows the user to select an object that is visible on the display. The information returned consists of a segment name, a pick identifier, and the segment status. Primitives outside segments cannot be picked.

Character Fonts and Sets

HP GKS includes a series of stroke-precision character fonts. These character fonts were digitized by Dr. Allen V. Hershey of the Naval Surface Weapons Laboratory, and supplied to Digital Equipment Corporation by the National Bureau of Standards.

HP GKS also provides text support for the native character sets of the supported graphical devices.

Language Bindings

HP GKS functions can be accessed by four sets of subroutine calls or "bindings," as they are referred to by the GKS standards. These bindings are:

- A FORTRAN binding that conforms to the ISO (DIS 8806/1) FORTRAN binding to GKS-3D.
- A C binding that conforms to a three-dimensional extension of theISO (DP 8651/4) C language binding to GKS.
- GKS3D$, a language-independent, three-dimensional binding that follows the standard calling conventions and is callable by many different languages.
- GKS$, a language-independent, two-dimensional binding that follows the standard calling conventions and is callable by many different languages.

GKS-3D Metafile

HP GKS provides the capability of reading and writing sequential files in two formats: the ISO 8805 suggested GKS-3D Metafile format and the ISO 7942 suggested two-dimensional GKSM Metafile format. The metafiles can be used to:

- Save and restore graphical information between sessions in a deviceindependent format
- Transfer graphical information between systems with compatible versions of HP GKS
- Transfer graphical information between two DIGITAL GKS applications
- Transfer graphical information from a DEC GKS-3D application to an HP GKS application
- Store accompanying nongraphical information

HP Document Interchange Format (DDIF) Output

HP GKS provides support for storing two-dimensional views of three-dimensional objects encoded in DIGITAL Document Interchange Format (DDIF). Views stored in DDIF can be processed by applications that conform to the DIGITAL Compound Document Architecture (CDA).

Computer Graphics Metafile (CGM) Output

HP GKS provides support for storing information using the Computer Graphics Metafile (CGM), an approved ANSI standard format (ANSI X3.122-1986). HP GKS supports CGM output for the following formats:

- Clear Text Encoding - Graphical output data stored in this format is easily created, viewed, and modified using a common text editor. This format is also suitable for transferring graphical output data through networks that support the transfer of text files only.
- Character Encoding - Graphical output data is typically stored in this format to reduce the file size. This format is especially suited to transfers through networks that do not support binary transfers.
- Binary Encoding - Graphical output data stored in this format is very compact and the fastest to read and write. This format is the least suitable for transmission over communication lines because all 8 bits in each byte are meaningful.

Graphics Handlers

HP GKS includes support for a wide variety of graphics devices provided by HP and other vendors. For devices that are not supported by HP, users can develop their own graphics device handlers using the HP GKS device handler interface.

Device handlers can be developed in HP Fortran and HP C. For more information on this interface, refer to the Building a Device Handler System for DEC GKS and DEC PHIGS manual (Order No. QA-810AK-GZ), which can be purchased separately.

CONFORMANCE TO STANDARDS

HP GKS is designed to conform to the following standards:

- NIST Certification-HP GKS has obtained this certification and satisfies the requirements of FIPS PUB 120-1.
- ISO 8805 standard GKS for Three Dimensions (GKS-3D).
- ISO 7942 standard GKS.
- MIT X Window System Version 11 Release 5 (X11R5).
- PEX Version 5.0 and 5.1.
- The FORTRAN binding conforms to the ISO (DIS 8806/1) FORTRAN bind- ing to GKS-3D.

HARDWARE REQUIREMENTS

The following Integrity Servers are supported by HP GKS:

- rx1620
- rx2620
- rx3600
- rx6600

Note: For 3D graphics support in Integrity servers an AB551A needs to be added onto your Integrity Servers Options. The following Alpha Servers are supported by HP GKS:

- DEC 2000 Model 300 Alpha Workstation
- DEC 3000 Model 300 Alpha Workstation
- DEC 3000 Model 300L Alpha Workstation
- DEC 3000 Model 300LX Alpha Workstation
- DEC 3000 Model 300X Alpha Workstation
- DEC 3000 Model 400 AlphaServer
- DEC 3000 Model 400 Alpha Workstation
- DEC 3000 Model 500 AlphaServer
- DEC 3000 Model 500 Alpha Workstation
- DEC 3000 Model 500X Server
- DEC 3000 Model 600 AlphaServer
- DEC 3000 Model 600 Alpha Workstation
- DEC 3000 Model 700 Alpha Workstation
- DEC 3000 Model 800 AlphaServer
- DEC 3000 Model 800 Alpha Workstation
- DEC 3000 Model 900 Alpha Workstation
- DEC 4000 Model 610 Alpha System
- DEC 4000 Model 700 Alpha System
- DEC 7000 Model 610 Alpha System
- DEC 10000 Model 610 Alpha System
- DIGITAL AlphaStation 200 4/166 and 200 4
- DIGITAL AlphaStation 250 4/266
- DIGITAL AlphaStation 400 4/233
- DIGITAL AlphaServer 2100 4/200 and 4/275

Memory Requirements for DECwindows Motif Support

The minimum supported memory for HP GKS running in a standalone DECwindows Motif environment, with both the client and server execut- ing on the same system, is 32 MB. The memory size suggested for most typical hardware configurations, however, is 64 MB or more, depend- ing on the system.

The system configuration and performance requirements of DECwindows Motif applications can determine the memory needed on your system as follows:

- Less memory may be required on the client system (where the software is installed and executed) if the server (component displaying the application) resides on another system.
- More memory may be required on a system where improved performance is desired, or where several applications are running.

OPTIONAL HARDWARE

HP GKS supports a variety of interactive and hard copy devices. At least one of these devices is required to display graphics output.

Terminal for DECwindows Motif Clients:

- DECterminal VXT 2000

Terminals:

- VT125 with black and white or optional color monitor (ReGIS)
- VT240 with black and white monitor (ReGIS)
- VT241 with color monitor (ReGIS)
- VT330 with black and white monitor
- VT340 with color monitor

- TEKTRONIX 4014 with enhanced graphics module (Option 34) or equivalent Note: The emulation of a TEKTRONIX 4014 is not supported on any hardware.
- TEKTRONIX 4107 terminal
- TEKTRONIX 4128 terminal
- TEKTRONIX 4129 terminal
- TEKTRONIX 4207 terminal

Compatible Sixel Devices:

- DIGITAL DEClaser 1100, 2100, 2150, 2200, 2250, 2300, 2400 Laser Printers
- DIGITAL LN03 with LN03S-UA upgrade kit
- DIGITAL LN03 PLUS Laser Printer
- DIGITAL LN03S-JA Laser Printer
- DIGITAL LA50 (restricted to a 2:1 aspect ratio)
- DIGITAL LA75
- DIGITAL LA84
- DIGITAL LA86
- DIGITAL LA100
- DIGITAL LA280
- DIGITAL LA324 (Color Sixel Printer)
- DIGITAL LA380
- TEKTRONIX 4611 hard copy unit when connected to the TEKTRONIX 4014 computer display terminal

Compatible Hewlett-Packard Graphics Language Devices:

- DIGITAL LVP16 Pen Plotter
- HP7475 Hewlett-Packard Pen Plotter
- HP7550 Hewlett-Packard Pen Plotter
- HP7580 Hewlett-Packard Pen Plotter
- HP7585 Hewlett-Packard Pen Plotter
- LASERGRAPHICS MPS-2000 Film Recorder

Compatible Hewlett-Packard PCL Level 4 Devices:

- Hewlett-Packard LaserJet II

Ink Jet Plotters:

- DIGITAL LCG01 Color Ink Jet Plotter (ReGIS)
- DIGITAL LJ250 (Color Sixel)

Compatible PostScript Devices:

- Apple LaserWriter
- Apple LaserWriter Plus
- DIGITAL DEClaser 1150, 2150, 2250
- DIGITAL LN03R ScriptPrinter
- DIGITAL LPS20 Laser Printer
- DIGITAL LPS20-GJ Laser Printer
- DIGITAL LPS32 Laser Printer
- DIGITAL LPS40 Laser Printer
- DIGITAL LPS40-AJ Laser Printer
- DIGITAL LPS40-DJ Laser Printer

SOFTWARE REQUIREMENTS

The software requirements for HP GKS for OpenVMS Integrity Version 7.0 are:

- HP OpenVMS Integrity Operating System Version 8.2-1 or higher

The software requirements for HP GKS for OpenVMS Alpha Version 6.5 are:

- HP OpenVMS Alpha Operating System Version 6.1 or higher
- DECwindows Motif Version 1.2 or higher for OpenVMS Alpha

For the development of applications and programs that use HP GKS on OpenVMS, one of the languages supported by HP GKS is also required.

OpenVMS Alpha Tailoring

The following OpenVMS Alpha classes are required for full HP GKS Alpha functionality:

- OpenVMS Alpha required save set
- Network support
- Programming support
- OpenVMS Alpha workstation support-if you are using HP GKS Alpha on a workstation

OPTIONAL SOFTWARE

The following software is required to use HP GKS on PEX worksta- tion types:

- Open3D-the version supported by the OpenVMS Alpha version installed on your machine

HP GKS for OpenVMS Alpha supports the following languages:

- DEC Ada Version 3.0 or higher
- HP C Version 5.0 or higher
- HP Fortran Version 6.3 or higher
- HP Pascal Version 5.0 or higher

HP GKS for OpenVMS Integrity supprts the following languages:

- HP C Version 7.2 or higher
- HP Fortran Version 8.1 or higher
- HP Pascal Version 6.0 or higher

Note: Certain versions of these products depend on a specific version of the operating system. Please refer to the Software Product Description (SPD) of the product in question to determine which version is necessary.

GROWTH CONSIDERATIONS

The minimum hardware and software requirements for any future version of this product may be different from the requirements for the current version.

DISTRIBUTION MEDIA

HP GKS Alpha is distributed on the OpenVMS Alpha Software Library Package CD-ROM (order number QA-03XAA-H8).

HP GKS Integrity is distributed onthe OpenVMS Integrity Layered Products Library included with the original purchase of any of the the HP Operating Environment media kits for Foundation, Enterprise or Mission Critical Operating Environments beginning with the Q2, 2006 (June) quarterly update. (Order numbers are BA322AA, BA323AA or BA324AA.)

Online documentation for HP GKS is distributed on the OpenVMS Alpha and OpenVMS Integrity Online Documentation Libraries, included with OpenVMS Alpha and OpenVMS Integrity media kits.

ORDERING INFORMATION

Licenses

License types vary by platform.

HP GKS Development Alpha	
GKS Development Personal Use License:	QL-02UAA-2B
GKS Development Unlimited Use License:	QL-02UA*-AA[1]
GKS Run-Time Concurrent Use License:	QL-02VAA-3B
GKS Run-Time Unlimited Use License:	QL-02VA*-AA[1]

[1] "*" Denotes system tier. E=workgroup tier, G=departmental tier, Q=Enterprise tier.

OpenVMS Integrity	
GKS Development Per-processor Core License (PCL)[1]:	BA369AC

[1] Order one PCL license for each active processor core running OpenVMS.

Media and Documentation

Product binary kits and online documentation are delivered on consolidated media libraries. Delivery model varies by platform.

OpenVMS Alpha	
Software Library Package CD-ROM[1]	QA-03XAA-H8
Online Documentation Library[2]	QA-03XAA-H8

[1] Quarterly update subscription is available.

[2] Delivered with binaries. To order separately: QA-4KM8A-G8

OpenVMS Integrity[1]	
Foundation Operating Environment	BA322AA#AJR
Enterprise Operating Environment	BA323AA#AJR
Mission Critical Operating Environment	BA324AA#AJR

[1] Product ships in Layered Product Library all Operating Environment media kits. Updates available through SW Updates Services.

NOTE: Updates are ordered for individual products per rather than as a quarterly subscription. The following media product numbers must be pulled into the order if Software Updates Services is planned:

- GKS Development Media (for update only): BA369AA
- GKS Run-Time Media (for update only): BA370AA

SOFTWARE LICENSING

HP GKS is available in two forms: as a Development Kit and as a Run-Time-Only Kit. These kits are furnished only under a license.

The Development Kit license enables you to develop and run your own graphics applications. The Run-Time-Only Kit license allows you to run applications that were developed on a system where the full HP GKS product was installed. As a result, the Run-Time-Only Kit license is available at a substantially lower cost per system than the Develop- ment Kit license.

License Management Facility Support

HP GKS supports the OpenVMS Alpha License Management Facility (LMF). This facility allocates license units for HP GKS as follows:

- For the GKS Alpha Development option-on a Personal Use and Unlimited Use basis
- For the GKS Alpha Run-Time-Only option-on a Concurrent Use and Unlimited Use basis
- For the GKS Integrity Development and Run-Time-Only options-on a Per-processor Core basis.

Each Personal Use License allows one identified individual to use HP GKS.

Each Concurrent Use License allows only one individual at a time to use HP GKS.

Each Unlimited Use License allows any number of individuals to use HP GKS at the same time.

Each Per-processor Core (PCL) License allows any number of individuals to use HP GKS at the same time, with one PCL license required for each processor core running OpenVMS.

For further details on the License Management Facility, refer to the OpenVMS Operating System Software Product Description (SPD 82.35.xx) or the OpenVMS Operating System documentation. To obtain more information about the HP licensing terms and policies, contact your local HP office.

SOFTWARE PRODUCT SERVICES

A variety of service options are available from HP. For more information, contact your HP account representative or distributor. Information is also available on www.hp.com/hps/software.

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X Window System is a trademark of Massachusetts Institute of Technology.