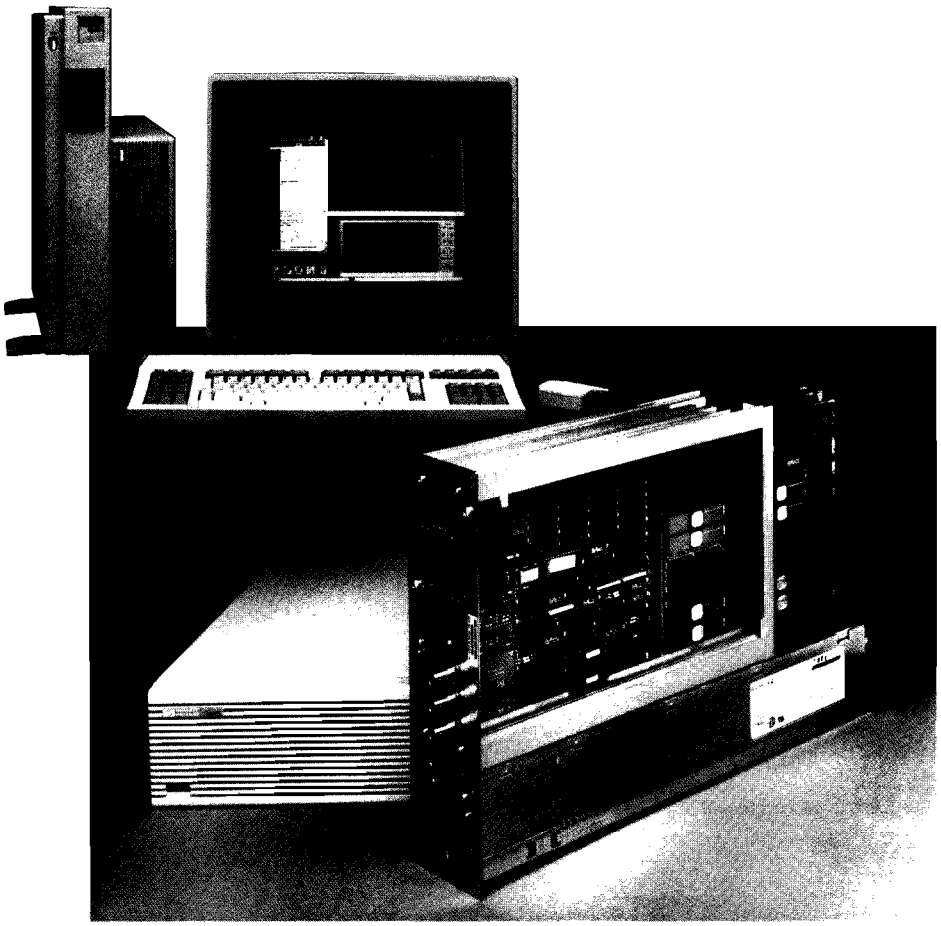
HEWLETT PACKARD

PersonalVRX 3D Graphics System

Technical Data



July 1990

Fast, powerful 3D graphics for every workstation.

Now you can put the power of realistic 3D graphic applications into more hands - boosting productivity and accelerating your time to finished products. The PersonalVRX is a graphics system designed specifically for MCAD/MCAE applications. It delivers advanced 3D graphics to the HP Apollo 9000 family of workstations.

The PersonalVRX accelerates graphics performance through a transform engine that off-loads graphics processing tasks from the CPU - boosting overall performance levels significantly.

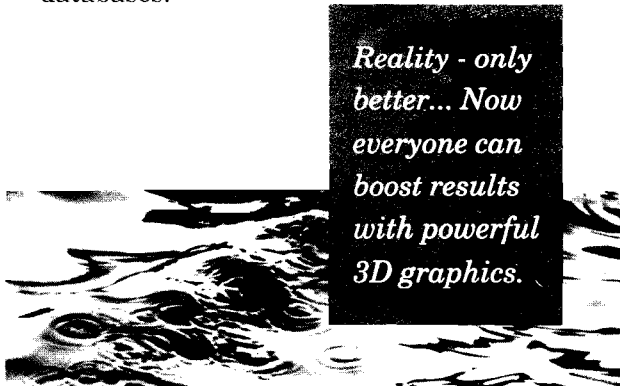
The graphics transform engine utilizes the revolutionary Intel i860™ RISC processor achieving speeds of up to 270K 3D vectors per second. The power of the i860 is balanced with custom VLSI technology accelerating throughput of the graphics pipeline.

16 color planes, a 16 bit Z-buffer and 6th order NURBS are supported in the PersonalVRX. It is available in three configurations to match your application needs, and you can choose either the HP-UX or the Domain/OS operating system.

The P1 is designed for entry-level 3D applications, while the mid-level P2 is ideal for advanced 3D applications. And the P3 is tuned for powerful graphics applications that produce 3D solids and dynamic shading.

The PersonalVRX includes such features as, virtual 24 plane dithering, depth cuing, the HP Personal Visualizer, and primitives in hardware to accelerate MCAD applications.

In addition, PersonalVRX is relink compatible with other HP-UX graphics systems, and object code compatible with Domain systems letting you take advantage of existing graphics applications and databases.



Graphics Performance

	P1	P2	P3
3D vectors/sec*	95K	270K	270K
Triangles/sec†	17K	50K	50K
Quad's/sec§	7K	20K	20K

* 5 pixel, 300 vectors/polyline, no clip check
† 3 pixel, gouraud shaded, no Z buffer, triangle strip, 100 veticies
§ 84 pixel, gouraud shaded, no clip, no Z buffer

Features and Benefits

Speed

Feature	Benefit
6th Order NURBS with trimming	Increase accuracy control and interactivity of splined based models
Sectioning*	Permits arbitrary clipping to view internals of models
Capping*	Makes sectioned models appear solid
Interference checking*	Instant visual check for interference
Contour mapping*	Contours calculated in real time
Deformation animation*	Deformations can be amplified in real time
Polyhedron primitive	Improved application performance
Triangle strip	Improved application performance
Quadrilateral mesh	Improved application performance
Hardware cursors	Increased cursor performance with no effect on application performance
MOMA 3D windows	Fast multiple accelerated windows that can be interactively moved

* Available with HP-UX 8.0

Realism

Feature	Benefit
HP Personal Visualizer	Easy, advanced rendering
Radiosity through progressive refinement	Quick view independent rendering of the diffuse quality of light
Ray tracing	Photorealistic rendering with reflections and sharp shadows
Virtual 24 plane dithering (P2)	Increased realism with fewer image planes
Screen door transparency	Achieves transparency that can be easily layered
Depth cuing	Wireframe clarity
Gouraud shading	Provides smooth color transitions across polygons
Phong lighting	Adds reflections to gouraud shaded models
Advanced lighting models	Increased realism with no loss in performance
16 lights	Increased accuracy of lighting environments
Wireframe lighting	Improved wireframe clarity
Gamma correction	Corrects non-linearity of monitors
6 Axis interpolation	Rapid lighting interpolation
Video in/out support	Easy real time documentation and communication

Standards

Standard	Benefit
HP PHIGS (PHIGS and PHIGS+ based)	HPs high-performance implementation of the ANSI/ISO standard. Includes proposed extentions.
Based on ANSI PHIGS standard	Insures portability of applications across other PHIGS based platforms.
Support for PHIGS PLUS extensions.	Provides lighting, shading and complex curves and surfaces such as NURBS.
Native implementation	Since PHIGS is not layered on another graphics library it takes advantage of the full performance available from the hardware. It also takes advantage of the hardware support for its feature set. With HP-PHIGS there is no performance penalty for using an industry standard.
MOMA windows	Up to 16 accelerated simultaneous windows are supported. Integration with X11 windows also allows the user to access multiple high performance text windows concurrently with graphics windows.
Input through either PHIGS or X11	This flexibility allows menu input to be done through X11 and graphics input through PHIGS.
Pre and post pick highlighting	The software architecture has been specifically designed to provide exceptional picking performance. Pre-pick highlighting has been supported to provide the user with quick, positive feedback on items to be picked. (HP-UX only)
Post to view	Allows applications to display and update multiple views of the same model without explicitly handling each view.
Quick update methods	Provides fast display updates during model editing (supported on Domain only).
OSF/Motif	Standard look and feel.
The X Window System	Access to numerous applications.
GKS	Standard 2D/3D API facilitates porting.
CGM	Standard picture metafile.

Hardware Specifications

3D Graphics Systems Data

Characteristic	P1	P2	P3
Accelerator	i860	i860	i860
Clock Speed	33 MHz	33 MHz	33 MHz
MFLOPS (Peak Graphics)	66	66	66
Color planes	8	8 (upgradable)	16
Virtual 24 planes	Yes	Yes	Yes
Color Palette	16.7 M	16.7 M	16.7 M
Simultaneously displayable colors	256	256	256
Double buffer	4/4	4/4	8/8
Z buffer	na	na (upgradable)	16 bit
Overlay planes	4	4	4
Frame buffer size	2048x1024	2048x1024	2048x1024
Resolution	1280x1024	1280x1024	1280x1024
Color Monitor	16" or 19"	16" or 19"	16" or 19"

Monitor

	98789A Color (16 in.)	98754A Color (19 in.)
Alphanumeric capacity (default font)	128 characters, 48 lines	128 characters, 48 lines
Character height and width	3.2 mm tall, 2.3 mm wide	3.8 mm tall, 2.7 mm wide
Graphics capability: Resolution	1280 dots horizontal, 1024 dots vertical	1280 dots horizontal, 1024 dots vertical
Raster size	295mm x 236mm	343mm x 274mm
ROM character set	276 characters	276 characters
Character font	10x15 character in a 10x21 cell	10x15 character in a 10x21 cell
Brightness (adjustable up to)	35 FL	27 FL
Refresh rate	60 Hz	60 Hz
Scan rate	63.3 KHz	63.3 KHz
Implosion protection	Safety glass, bonded panel with silica, anti-glare coating	Safety glass, bonded panel with thin-film, anti-glare coating
Tube phosphor	p 22	p 22
Chromaticity coordinates	X Y Red 0.62 0.34 Green 0.28 0.60 Blue 0.16 0.07	X Y Red 0.63 0.34 Green 0.28 0.60 Blue 0.16 0.07
Compatible interfaces	98550A, 98720A, 98730A	98550A, 98720A, 98730A
Mask	Aperture grill	Aperture grill
CRT geometry	Cylindrical	Cylindrical
Heat dissipation	682 BTU/hr	1432 BTU/hr

Supported SPU's

PersonalVRX	P1	P2	P3	Operating Systems
HP 9000 Series 300 Model 375	No	Yes	Yes	HP-UX
HP 9000 Series 400 Model 400t	Yes	Yes	Yes	HP-UX and Domain/OS
HP 9000 Series 400 Model 425t	Yes	Yes	Yes	HP-UX and Domain/OS
HP 9000 Series 400 Model 400s	No	Yes	Yes	HP-UX and Domain/OS
HP 9000 Series 400 Model 433s	No	Yes	Yes	HP-UX and Domain/OS
Supported through SRX upgrades on 360 and 370	No	Yes	Yes	HP-UX

HP 9000 Series 360 Upgrades	
P2 to P3	Additional 16 color planes and 16 bit Z buffer
SRX to P2	Trade in SRX for P2
SRX to P3	Trade in SRX for P3

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

System Electrical Specifications*

Component	Line Voltage	Voltage Tolerance	Line Frequency	Maximum Current	Power Consumption
PersonalVRX	115 V 230 V	88-135 VAC 176-269 VAC	48-66 Hz 48-66 Hz	4.0 A 2.5 A	241 Watts 822 BTU/hour
16-inch Color Monitor (HP98789A)	120V 240V	90-125 VAC 198-250 VAC	48-66 Hz	2.6 A 1.5 A	200 Watts 680 BTU/hr
19-inch Color Monitor (HP98754A)	120 V 240 V	90-125 VAC 198-250 VAC	48-66 Hz	3.5 A 1.8 A	420 Watts 1432 BTU/hr
Model 400s†	115 V 230 V	88-135 VAC 193-269 VAC	47-63 Hz	7.6A 3.8 A	560 Watts 1910 BTU/hr

System Environmental Characteristics

Characteristic	PersonalVRX	Model 400s SPU	16-inch Monitor	19-inch Monitor
Temperature: Operating Non-operating	0 to 55°C -40 to 70°C	0 to 55°C -40 to 70°C	10° to 40° C -40° to 65° C	10° to 40° C -40° to 65° C
Humidity Operating 40° C	10% to 90%	15% to 95%	10% to 80%	10% to 80%
Maximum Altitude Operating Non-operating	4570m (15,000 ft.) 15,240m (50,000 ft.)	4570m (15,000 ft.) 15,240m (50,000 ft.)	3352m (10,997 ft) 15240m (50,000 ft)	4570m (15,000 ft.) 15,240m (50,000 ft.)
Shock	B2	B2	B2§	B2§
Vibration	B2	B2	B2	B2

System Regulatory Compliance

Characteristic	PersonalVRX	Model 400s SPU	16-inch Monitor	19-inch Monitor
VDE level	B	B	B	B
FCC class	A	A	A	A
VCCI class	1	1	1	1
Safety	UL, CSA, IEC	UL, CSA, M, IEC	UL, CSA, IEC	UL, CSA, IEC

System Physical Characteristics

Characteristic	PersonalVRX	Model 400s SPU	16-inch Monitor	19-inch Monitor
Height	100 mm (3.9 in)	600 mm (23.5 in)	380 mm (15 in)	431 mm (17.0 in)
Width	325 mm (12.8 in)	215 mm (8.5 in)	406 mm (16 in)	480 mm (18.9 in)
Depth	455 mm (17.5 in)	570 mm (22.4 in)	450 mm (17.7 in)	533 mm (19.9 in)
Weight	9.1 kg (20 lbs)	39.5 kg (87 lbs)	26.5 kg (58.3 lbs)	30 kg (66.5 lbs)

* Specifications listed are for a full system including graphics accelerator with full 16-bit Z-buffer, 16-plane frame buffer memory and four overlay planes.

† Model 400s is a typical SPU used with the PersonalVRX. For additional SPU specifications see other appropriate data sheets.

§ End use - waived to 20G, Transport - waived to 20G

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Support Services

A wide range of hardware and software support services is available worldwide for all HP products. Contact your HP sales representative for details on available support services.

Warranty Information

The warranty covering a specific system is determined by the HP WARRANTY AND INSTALLATION TERMS in effect at the time of purchase.

For more information, call 1-800-752-0900 for the location of your local HP sales office. Or, call one of the regional Hewlett-Packard sales offices listed here.

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