IRIS 3100 SERIES WORKSTATIONS

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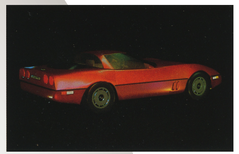
IRIS 3100 Series Workstations	3120	3130
CPU	68020	68020
RAM	4MB	8MB
DISK	72 MB Std	170 MB Std.
10 MHz Geometry Engines	12 Std.	12 Std.
Z-Clipping	Std.	Std.
Floating Point Accelerator	Opt.	Std.
Display Memory	8 Bit Planes	32 Bit Planes
Cartridge Tape	Opt.	Std.
Ethernet	Std.	Std.

IRIS 3120 Workstation

For applications development and execution requiring fast, 3-D graphics, the IRIS 3120 Workstation delivers the computing power of the MC68020 in a unique UNIX-based system. The IRIS 3120 offers a substantial set of standard features and options designed to meet the demanding requirements of 3-D design, analysis, simulation, animation and modeling users. The standard IRIS 3120 system includes Z-clipping, 4 MB of memory expandable to 16 MB, 19″ 60 Hz non-interlaced color graphics and a 72 MB Winchester disk drive. Silicon Graphics' enhanced version of the UNIX System V operating system and a complete set of programming tools are provided standard. Options include floppy disks and tape drives, a floating point accelerator and an optional 170 MB Winchester disk to replace the standard 72 MB drive.



Produced by WACS Production using ALIAS/1 3-D Computer Graphics Animation System.

Flight simulator produced by Silicon Graphics.

IRIS 3130 Workstation

Many animation, simulation and modeling applications require a workstation that combines superior computing and graphics performance. The IRIS 3130 is a fully featured workstation designed to meet the most demanding real-time 3-D requirements. The IRIS 3130 includes 8 MB of memory expandable to 16 MB, 32 bit-planes of display memory, Ethernet with the TCP/IP protocol, a 170 MB high performance disk drive, a floating point accelerator, Z-clipping and a ¼″cartridge tape drive, standard with the system. Options include a digitizer tablet, a dial and button box for real time interactive image control, hardcopy printers and RS-170A and European Video Standard RGB outputs.

System Specifications

Processors:
- 16 MHz MC68020 central processor 32-bit internal registers, 32-bit address space
- 12 100-nanosecond Geometry Engines
- 16-bit bit-slice frame buffer controller Independent microcoded display processor with 32 KB memory for fonts, textures, and cursors
- Z-clipping

CPU Memory:
- 4 MB dynamic RAM (8 MB on IRIS 3130) with parity error detection, expandable to 16 MB
- 256 KB EPROM for hardware initialization, self-configuration, and diagnostics, expandable to four 256/512 KB EPROMS

Image Memory:
- 8 1024 ×1024 bit-planes standard, (32 bit-planes on IRIS 3130), expandable to 32 with 16-bit Z-buffer

Video Interface:
- RGB levels 0.7 Vp-p into 75 ohms
- Separate composite 2 Vp-p sync into 75 ohms
- 60 Hz non-interlaced 1024 x 768 resolution frame
- Other frame resolutions and rates available
  - 30 Hz interlaced 1024x768
  - 30 Hz interlaced 636x485
  - 25 Hz interlaced 768x575
- Genlock available with 485 and 575 visible line frames

Color Range:
- Color map mode (12 bit, single or double buffered)
- 4096 simultaneous colors displayable from palette of 16.7 million
- RGB mode (24-bit), 16.7 million colors displayable

Standard Peripherals:
- 72 MB unformatted 5.25″ Winchester disk drive using ST506 interface, (170 MB on IRIS 3130 using an ESDI interface)
- 83-key up-down encoded keyboard with user definable keys
- 19 inch diagonal 60 Hz non-interlaced RGB tilt and swivel monitor
- Optical mouse X-Y encoder with three buttons

Communications:
- Ethernet local area network with TCP/IP software
- Four RS-232C ports for keyboard and serial communications (up to 38.4K baud)

Standard Software:
- UNIX System V operating system with Berkeley 4.2 and Silicon Graphics enhancements
- C compiler and development environment
- IRIS Graphics Library
- IRIS Window Manager
- IRIS Programming Tutorial

Chassis:
- 20-Slot Multibus™ card cage
- 720Watt power supply

Options

Hardware:
- 4 MB CPU memory cards
- 4 bit-plane image memory cards
- Floating point accelerator (standard on IRIS 3130)

Peripheral:
- Floppy disk drive
- Second 170 MB Winchester disk drive on IRIS 3130
- 60 MB ¼″ cartridge tape drive for IRIS 3120
- ½″ tape drive and controller
- Color printer or controller
- 11″ × 11″ digitizer tablet
- Dial and button box
- Programming Terminal
- 19″ diagonal 30 Hz interlaced RGB monitor
- 15″ diagonal 60 Hz non-interlaced RGB tilt and swivel monitor

Software:
- FORTRAN and Pascal compilers
- EMACS text editor

Communication:
- Network File System software
- IEEE-488 interface
- IBM link for 3278-9 emulation and file transfer
- Communication with DEC VAX systems via Ethernet

Physical and Environmental Specifications

Power Requirements:
U.S. and Canadian model UL and CSA approved
- AC voltage 93-132
- AC frequency 47-63 Hz
- Chassis: 1250 VA, 1000 W, 3410 BTU/hr
- 19″ monitor: 225VA, 150 W, 512 BTU/hr

International models available upon request

Size and Weight:
- 19″ monitor: 18.5″H × 20″W × 21.5″D (51 × 48 × 54 cm), 84 lb. (38 Kg)
- Chassis: 29″H × 18″W × 27″D (74 × 46 × 69 cm), 190 lb. (86 Kg)

Environment:
- Operating: 50-86° F (10-30° C), 20-80% relative humidity, no condensation
- Shipping/storage: 32-122° F (0-50° C), 10-90% relative humidity, no condensation

Specifications are subject to change without notice.

LW-3100-01 Printed in U.S.A. 11/86

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SiliconGraphics Computer Systems

SiliconGraphics Computer Systems

The IRIS screen displays 3-D thermal data surrounding a space platform produced by Creative Visual Software.

The IRIS 3100 Series Workstations combine the general-purpose computing power of the MC68020 with the *real-time* 3-D graphics processing capabilities of the Geometry Engine™ providing an ideal solution for applications requiring fast, high-resolution, color graphics.

The IRIS 3120 and 3130 come in a package designed to complement the users work environment. The chassis accommodates up to 16 MB of CPU memory, 32 bit-planes of image memory, and two high-performance 170 MB Winchester disks. The IRIS 3100 Series supports sophisticated rendering features, including Gouraud shading, depth-cuing, and Z-buffering, with up to 16.7 million colors available simultaneously. The IRIS 3120 and 3130 include a 19″ 60 Hz non-interlaced color monitor with tilt and swivel, a keyboard and an optical mouse.

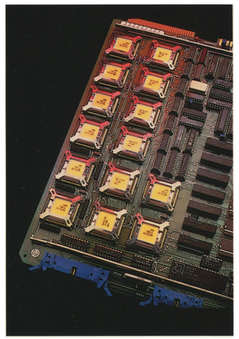
The IRIS 3120 and 3130 operate as personal workstations or as nodes in a networked computing environment. Supporting a large, expanding base of applications software, the IRIS 3100 Series provides an ideal hardware platform for professionals requiring *real-time* 3-D graphics in applications such as mechanical computer-aided engineering (MCAE), visual and manufacturing simulation, industrial and product design, animation, VLSI design and molecular modeling.

The IRIS 3120 and IRIS 3130 feature:

- MC68020 with 4 MB memory (8 MB for IRIS 3130), expandable to 16 MB
- Fast 10 MHz Geometry Engines for real-time 2-D and 3-D graphics transformations
- UNIX™ operating system with demand paged virtual memory and an Extent File System
- Up to 64 MB of virtual address space per process
- Ethernet™ local area network with TCP/IP protocol
- C compiler and software development environment
- 72 MB or 170 MB (IRIS 3130) Winchester disk drive with controller
- 1024 × 1024 (1024 × 768 viewable) resolution
- Real-time Gouraud shading and depth cuing
- 16-bit Z-buffer for hidden surface removal
- IRIS Window Manager™
- IRIS Programming Tutorial
- Genlocked RS-170A and European Video Standard output (optional)
- IBM Link for 3278/9 emulation and file transfer (optional)

Processor, Memory

The IRIS 3100 Series Workstations are based on the Motorola 68020 central processor, operating at a 16 MHz CPU clock speed with true 32-bit addressing, data, and I/O. To take advantage of the hardware features, an Extent File System has been incorporated to speed file access and reduce unnecessary overhead.



Geometry Pipeline.

Advanced VLSI Technology

The Geometry Engine™ and the Geometry Accelerator,™ two custom VLSI circuits, are responsible for the *real-time* graphics performance of the IRIS Workstations. A pipeline of twelve 100-nanosecond Geometry Engines handles object rotation, translation and scaling, four- or six-plane clipping, perspective or orthographic viewing, and scaling to screen coordinates, at a rate of up to 110,000 3-D floating point coordinates per second. This is a 25-30 percent improvement in graphics transformation performance over IRIS Series 3000 systems that contain 125-nanosecond chips. The Geometry Accelerator, installed at each end of the pipeline, provides buffering and floating point conversion allowing the full speed of the pipeline to be attained.

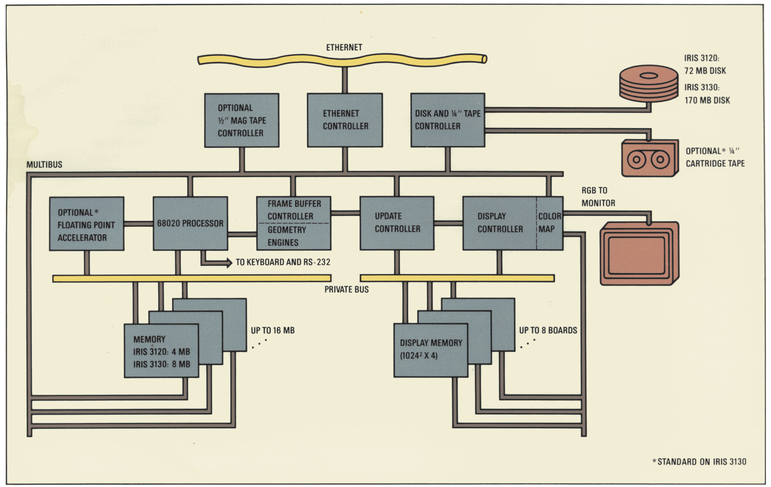
The Geometry Engine and the Geometry Accelerator are examples of full-custom integrated circuits with highly parallel architectures dedicated to a specific application. The result is a dramatic increase in real-time graphics performance. Other advantages include much greater reliability, lower power consumption and space requirements, and significantly lower cost.

Greater Floating Point Performance

Floating point performance can make a big difference in project productivity. To meet the modern engineering challenge, Silicon Graphics designed a floating point accelerator that significantly boosts IRIS floating point performance. The floating point accelerator uses the Weitek 1064/1065 64-bit floating point processor chip set. Using standard Whetstone and LINPACK benchmarks, the IRIS 3100 Series Workstations with the FPA demonstrate performance that is one and a half to two times greater than that of a VAX/VMS 11/780 with hardware floating point assist.

The floating point accelerator incorporates several features:

- 32-bit read/write operations
- Full 64-bit arithmetic for each cycle
- Performs single and double precision integer conversions
- User accessible on-board registers
- Overlap and debugging modes



Operating System and Programming Tools

A superior program development environment is available on the IRIS 3100 Series Workstations through the industry standard AT&T UNIX System V operating system. Silicon Graphics has incorporated many features of the Berkeley 4.2 UNIX release as well as local system enhancements to support interactive *real-time* graphics. In order to take advantage of the IRIS' new hardware features, Silicon Graphics has incorporated a new Extent File System. This unique UNIX file structure handler provides a four- to six-fold improvement in file handling performance over the standard System V architecture. The IRIS software environment supports C, FORTRAN 77 and Pascal compilers which have been optimized to generate 68020 instructions. In addition, each language is closely coupled with an optional hardware floating point accelerator through kernel and compiler enhancements.

The IRIS Graphics Library™ provides an ideal applications development environment on the IRIS 3100 Series. This set of subroutines provides high- and low-level support for graphics programming. The IRIS Graphics Library features several capabilities which enhance the development environment including a window manager, depth cuing, Gouraud shading, faster polygon fill, high-resolution Z-buffer operation, improved support for curves and surfaces, and faster pixel access.

IRIS Programming Tutorial

The IRIS Programming Tutorial is a self-paced study program designed to acquaint users with the IRIS Graphics Library. The Tutorial includes both software and documentation which are included with each IRIS 3120 and 3130. The IRIS Tutorial provides extensive coverage of 3-D Graphics Library concepts including backface removal, curve drawing, depth cuing, double buffering, Gouraud shading, projections, viewports and Z-buffering.

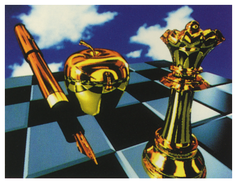
Color Display

All IRIS 3100 Series Workstations support a 60 Hz non-interlaced 19" or optional 15" tilt and swivel color monitor with a resolution of 1024 pixels by 768 lines, accurate digital dynamic convergence and an anti-glare screen.

Compatibility

The IRIS 3100 Series is compatible with the entire IRIS family, including 68020 based and 68010 based systems. Users need only recompile when moving between a 68020-based product to a 68010-based system.

This flexibility allows all members of the IRIS Series 3100, 3000 and 2000 families to use the same software and to use all IRIS systems interchangeably in networked environments. Silicon Graphics has a commitment to the compatibility of the entire product family. This commitment to compatibility will be upheld with any new releases.



A model study created by Abel Image Research.

GeometryNet

Silicon Graphics GeometryNet is a distributed computing environment for IRIS Workstation users. GeometryNet consists of a set of industry standard networking tools for data communi-cation, resource sharing and interfacing to three dimensional applications. It provides local area networking capability and includes the following tools:

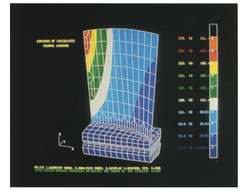
- Ethernet local area network with TCP/IP provided standard with IRIS 3120 and 3130 Workstations.
- Network capabilities including file transfer, remote graphics, electronic mail and remote boot service for IRIS systems.
- Network File System (NFS) software for accessing files within an Ethernet-TCP/IP based network.
- Hardware and software for DEC VAX computers using the VMS or ULTRIX operating systems.
- IBM Link high-speed communications link between IRIS Workstations and IBM mainframes using the MVS or VM/CMS operating systems allows for file transfer and for IBM 3278/3279 emulation.

Hardcopy and Video Output

Silicon Graphics supports a variety of hardcopy and video output devices on the IRIS Workstation representing a range of print technologies and performance to fit the user's needs. Features include accurate reproduction of the color and detail produced on the IRIS and the latest technology from leading hardcopy vendors. Film recorders can produce high quality photographs of screen images in a variety of print sizes.

The IRIS 3100 Series Workstations also support RS-170A and European Video Standard (PAL or SECAM) RGB outputs. The RS-170A option has a visible resolution of636 pixels by 485 lines and a frame rate of 30 Hz. The European Video Standard option has a visible resolution of 780 pixels by 575 lines and frame rate of 25 Hz. When set for either of these options, the IRIS Workstation provides Red, Green, Blue and Sync video outputs (RGBS). These two options are suitable for many applications that require simple video recording.

For operation with commercially available video tape recorders and mixing/keying equipment a genlock option is available. An external sync generator and NTSC encoder are also required, but not provided by Silicon Graphics.



Turbine blade generated with PATRAN from PDA Engineering.

IRIS Application Solutions

The IRIS 3100 Series combined with leading applications software provides the ideal solution for your specific applications problems. The IRIS' strong computing and powerful graphics capabilities have been coupled with state of the art applications software to address the needs of users in:

- Mechanical Computer-Aided Engineering
- Visual Simulation
- Animation
- Industrial and Product Design
- VLSI Design
- Manufacturing Simulation
- Molecular Modeling

VARs, OEMs and software vendors participating in Silicon Graphics' Geometry Partners third party software program benefit from using the IRIS as the high performance workstation for their applications.