# Jupiter 12

## Color Raster Graphics System

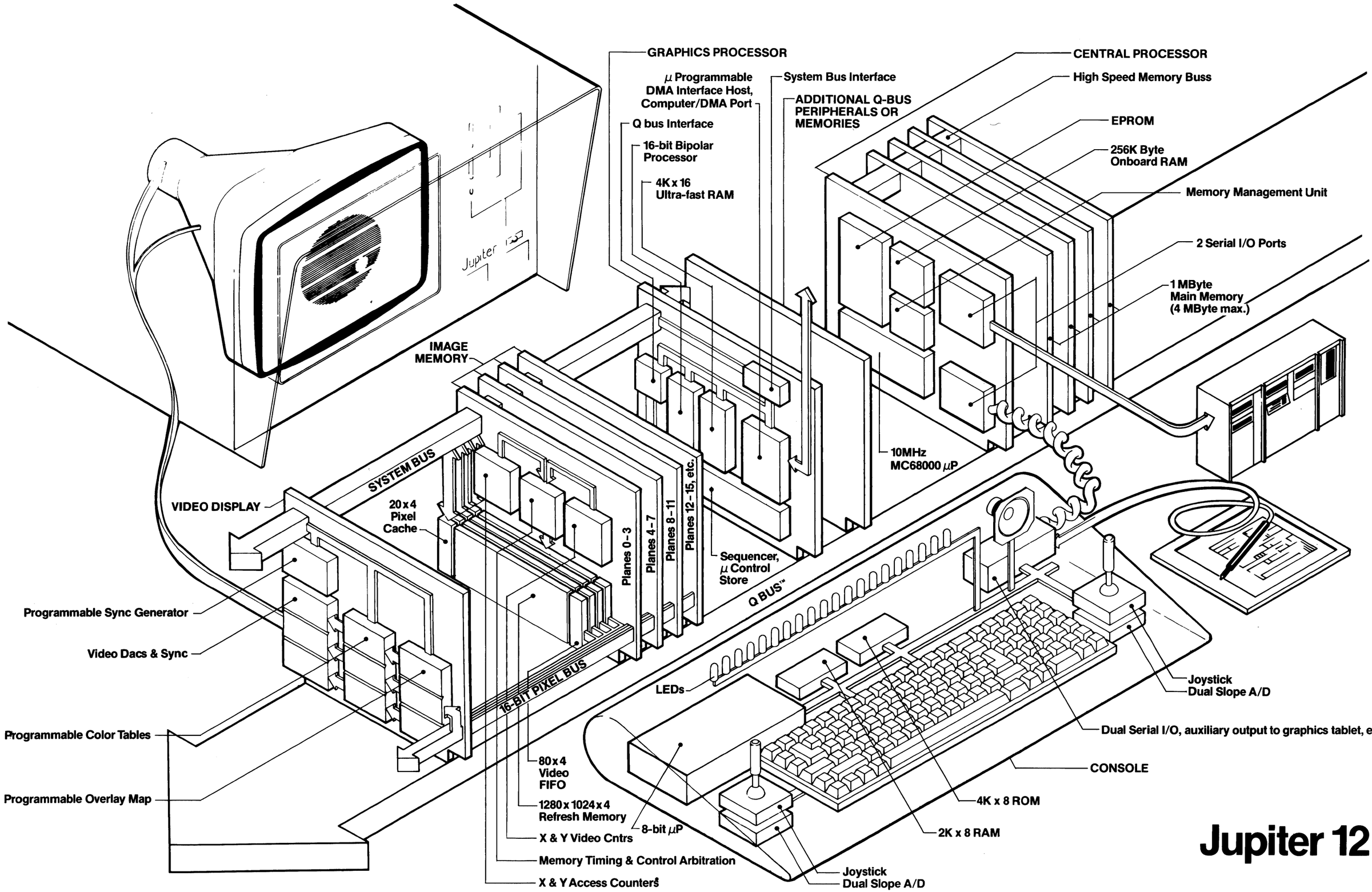

Jupiter 12 is a high resolution, high speed color graphics terminal that can also be used as a stand alone communicating workstation. It is based on the powerful MC68000 processor and has many graphics features available that until now have been found only on systems costing much more.

Among the standard graphics capabilities are antialiased vectors, solids, and text, as well as display list management with three dimensional transformations into multiple windows. Expandable memory planes (from 4 to 32), and a unique color handling system offer a wide variety of configurations. The user can choose between a color lookup table system with a 16.7 million color palette or two different RGB options with up to 8 bits per color and 8 bits of overlay.

Views from any perspective of complex solid models can be generated rapidly, with smooth shading and anti-aliased edges. Hidden surfaces are removed via polygon Z-sort or pixel based Z-buffer techniques.

Display rate of the system is limited only by the state of the art of available monitors. Jupiter 12 will support a non-interlaced refresh rate of 60 Hz at maximum resolution. The standard 19" display provides a 37 Hz interlaced refresh rate at the full 1280 x 1024 resolution.

In the workstation configuration, the Jupiter 12 supports the UNIX™ System III operating system with Programmer's Workbench and many of the BSD enhancements. A variety of peripherals is supported including hard discs, floppy discs, magnetic tape and Ethernet.™ Page-oriented memory management is used to allocate up to 4 megabytes of physical memory.


GRAPHICS PROCESSOR
μ Programmable DMA Interface Host, Computer/DMA Port
System Bus Interface
ADDITIONAL Q-BUS PERIPHERALS OR MEMORIES
Q bus Interface
16-bit Bipolar Processor
4K x 16 Ultra-fast RAM
CENTRAL PROCESSOR
High Speed Memory Buss
EPROM
256K Byte Onboard RAM
Memory Management Unit
2 Serial I/O Ports
1 MByte Main Memory (4 MByte max.)
10MHz MC68000 μP
IMAGE MEMORY
SYSTEM BUS
VIDEO DISPLAY
20 x 4 Pixel Cache
Planes 0-3
Planes 4-7
Planes 8-11
Planes 12-15, etc.
Sequencer, μ Control Store
Q BUS™
Programmable Sync Generator
Video Dacs & Sync
16-BIT PIXEL BUS
LEDs
Joystick
Dual Slope A/D
Dual Serial I/O, auxiliary output to graphics tablet, etc.
CONSOLE
Programmable Color Tables
Programmable Overlay Map
80 x 4 Video FIFO
1280 x 1024 x 4 Refresh Memory
8-bit μP
4K x 8 ROM
2K x 8 RAM
X & Y Video Cntrs
Memory Timing & Control Arbitration
X & Y Access Counters
Joystick
Dual Slope A/D

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# JUPITER 12 SPECIFICATIONS

## Colors Available
CLT mode: 256 simultaneous colors out of a 16.7 million color palette with up to eight additional overlay planes.

12-bit RGB Mode: 4096 simultaneous colors from a palette of 16.7 million colors with an option of four additional overlay planes.

24-bit RGB Mode: 16.7 million simultaneous colors with an option of four additional overlay planes.

## Display Window Size
1280 x 1024 (Fully programmable for other sizes, including 1024 x 1024, 1024 x 768, 768 x 575 and 640 x 480).

## Refresh Rate
Jupiter 12 will support a non-interlaced refresh rate of 60 Hz at maximum resolution when monitors with higher speeds and resolution become available. The standard monitor provides 37 Hz refresh with 1280 x 1024 resolution. Other display window sizes and refresh rates can be programmed, for example, 1024 x 768 at 45 Hz.

## Coordinates
32-bit fixed point with automatic scaling provides accuracy and high speed.

## Performance
Filled Polygons: 20 ns/pixel.

Vectors: 300 ns/pixel.

Random Pixels: 1.2 $\mu$s.

Dejagged RGB Vectors, 4 bits per primary: 800 ns/pixel.

Dejagged RGB Vectors, 8 bits per primary: 2 $\mu$s/pixel.

## MC6800 16/32-bit Microprocessor
10 MHz clock rate with no wait states.

Programmed in C.

Communications control.

Display list maintenance: Retained segments, 3D transforms, multiple windows, 32 bit x, y, z coordinates.

Loads and controls Bipolar Processor.

High level graphics functions.

Three dimensional transformations: rotate, scale, translate and clip.

Directly addresses entire pixel array.

## Bipolar Processor
Hardware vector generation.

Antialiased vectors (de-jagging).

Graphics primitive generation.

All microcode resident in writable control store. May be modified or added to by user.

2900 family bit-slice, 150 - 250 ns cycle time, 16 bit data word, 64 bit control word.

## Memory
### Main Memory
256K bytes, expandable to 4M bytes.

### Display Memory
4 to 32 memory planes, each 1280 x 1024, 150 ns 64K DRAMS, 20 per plane.

### Pixel Cache
20 x 1 ECL cache for each memory plane to create a 20 pixel cache allowing immediate access to local pixels while display memory cycles are being carried out. The display memory can be updated during a scan line.

## Zoom and Pan
Each card of 4 memory planes has independent zoom and pan control. Hardware "drag" of any object is accomplished by smoothly panning one memory board relative to the others. Capabilities include single pixel panning (any pixel can be the upper left hand corner), integer zoom (1 to 16), and scrolling within any arbitrary horizontal band. Any horizontal memory line can be displayed as any scan line.

## Scan Map
Lookup table assigns refresh memory y-addresses to scan lines. This makes possible vertical zooms and scrolling of isolated screen segments. One scan map is provided on each memory board for maximum flexibility.

## Programmable Overlay Map
256 x 24 map allows display of up to sixteen simultaneous overlays.

## Color Lookup Table
Three 256 x 8 tables covert 4, 8, or 16 bit pixel value into 65 thousand discrete colors (out of 16.7 million) by setting each color DAC to a value between 0 and 255.

## Cursors
Gunsight and full screen crosshairs, variable sized rectangle, and user definable matrix.

## Video DACs
8 bit DACs for RGB provide a palette of 16.7 million colors.

## Hardware Blink

## Character Generator
80 characters per line, 64 lines.

## Packaging
Available for 19" rack mount or a floor-mount pedestal.

## Console
Detachable console with 103 programmable key array, including full ASCII character set. 30 re-legendable special function keys with LED indicators. Dual joysticks built in. Internal 6502 processor performs N-key rollover, auto repeat, shift lock, 10 bit joystick A/D conversion, digitizer control.

## Standard Monitor
19 inch high-resolution CRT with easily accessible controls for brightness and degaussing. Optically coated glass face plate.

## Input/Output
2 Serial RS-232/422/423 (1 used by console).

DMA (via bit-slice) LSI-11 or PDP/VAX.

Any Q bus compatible card.

SCSI Port for floppy and hard disk.

## Power
115/220 VAC, 47 - 63 Hz, 300 VA, with integral RFI filters.

## External Connections
Host Serial Interface — 25 pin "D" connector.

Parallel Direct Video Memory Access — 50 pin ribbon cable.

Aux. Serial (Console) — 6 pin modular jack.

Red, Green, Blue composite video — BNC connectors.

Console to Controller — 8 pin modular jacks located on front and rear of controller.

Specifications subject to change without notice.

UNIX is a trademark of Bell Laboratories.

Ethernet is a trademark of Xerox Corporation.

Q bus is a trademark of Digital Equipment Corporation.

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