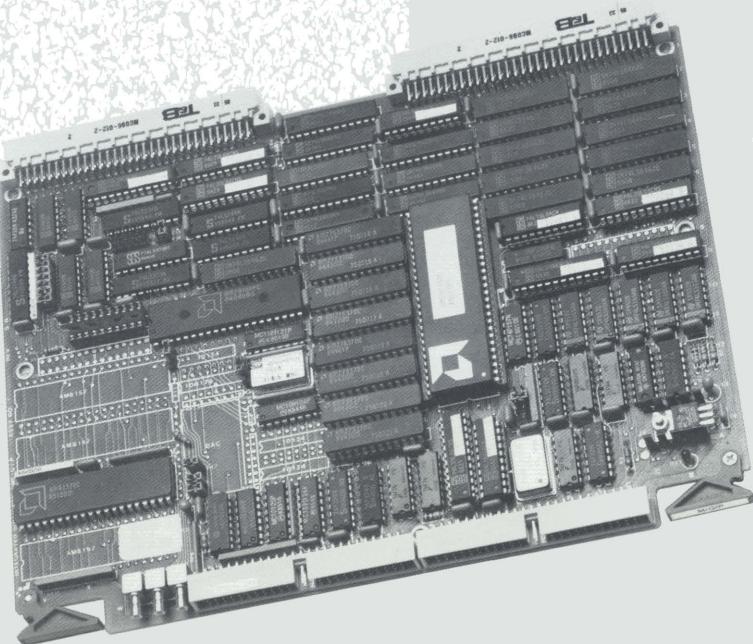


**Features**

- Area fill rate of 51 million pixels per second
- Bit block transfer of 21 million pixels per second
- Vector drawing rate of 300K pixels per second
- 512 KByte display memory
- 1280 by 1024 display memory (dual-frame buffers)
- 192 KByte of off-screen memory available for storing menus, fonts, display tables, etc.

The Integrated Solutions VME-Monochrome Graphics Subsystem is a high-speed graphics subsystem that supports CRT window management and general screen drawing in a VME bus environment. The VME-Monochrome Graphics Subsystem is composed of a display controller board and a dual-ported memory board. The display controller board contains a bipolar graphics processor that draws and manipulates graphics primitives and controls the video logic to refresh the display. The Graphics Processor handles such operations as vector generation, area fill, and bit block transfers (BITBLT), freeing the host CPU to manage other tasks. This results in a very responsive environment for applications involving both graphics and computational loads.



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## **Architecture**

The VME-Monochrome Graphics Subsystem logic is implemented on two VME double-wide printed circuit boards: 1) the monochrome graphics display controller and 2) the monochrome graphics memory board with dual 50-pin ribbon cable interconnects.

### **Monochrome Graphics Display Controller**

The Monochrome Display Controller is composed of three major functional units: the Graphics Processor, Video Logic, and the Display Memory Access Manager.

#### **Graphics Processor**

The Graphics Processor executes the microcode instruction set with commands and operands supplied by the host CPU over the VME bus. The Graphics Processor is implemented using a high-performance, bipolar AM 29116 microprocessor optimized for bit-manipulation operations. The AM 29116 supports a 100ns cycle time providing 10 million instructions per second and has a 16-bit barrel shifter that supports high-performance rotates and merges. The Graphics Processor receives commands and operands via a 64-word FIFO. The command FIFO is a Read/Write register to which the host CPU writes commands to be executed by the Graphics Processor. The Graphics Processor executes these commands with no further CPU intervention. The host CPU either polls for a FIFO empty status bit or programs the Graphics Processor to interrupt on a FIFO empty condition. The CPU then writes a group of command parameters to the FIFO.

#### **Monochrome Graphics Memory**

The Graphics Memory is a dual-ported 512 KByte RAM organized as 64K by 64. The video logic reads 64 bits on each video refresh cycle, while VME and Graphics Processor accesses via the external port may be either 16 or 32 bits.

The Graphics Memory board provides 512 KBytes of memory for monochrome video operations. The memory is divided into two frame buffers of 1280 by 1024 pixels, with an additional 192 KBytes of non-displayable memory available for storing such data as menus, fonts, and display tables. Dual-frame buffers enable the user to display an image from one frame buffer, while updating the second frame buffer, for usage in animation, etc.

#### **Form Factor**

The form factor for the VME-Monochrome Graphics Subsystem is two standard double-wide VME boards, 160mm by 233.33mm.

#### **Video Interface Specifications**

Screen Format	1280 by 1024 pixels
Screen Refresh	63.0 Hz non-interlaced
Vertical Retrace	682.3 microseconds
Horizontal Scan Time	14.83 microseconds (67.4 KHz)
Horizontal Retrace	3.845 microseconds
Pixel Cell Time	8.6 nanoseconds
Monitor Interface	ECL video and separate TTL Vertical and Horizontal

#### **Diagnostic Indicators**

An LED (DS1) is located on the Display Controller board: when this LED is on, the Graphics Processor is executing graphics instructions from the FIFO; when off, the LED indicates that the Graphics Processor is idle.

#### **Electrical Requirements**

The VME-Monochrome Graphics Subsystem electrical requirements are +5 volts, 11.5 amps and -12 volts, 0.6 amps.

#### **Environmental Requirements**

The VME-Monochrome Graphics Subsystem has the following environmental requirements:

Temperature:

0 to 50 degrees centigrade (operating)

-40 to 65 degrees centigrade (non-operating)

Humidity:

10 to 85 percent (non-condensing)

#### **VME Specifications**

The VME-Monochrome Graphics Subsystem is an A24, D16/D32, DTB slave. Interrupter at levels 4, 5, and 6 (jumper selectable).



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