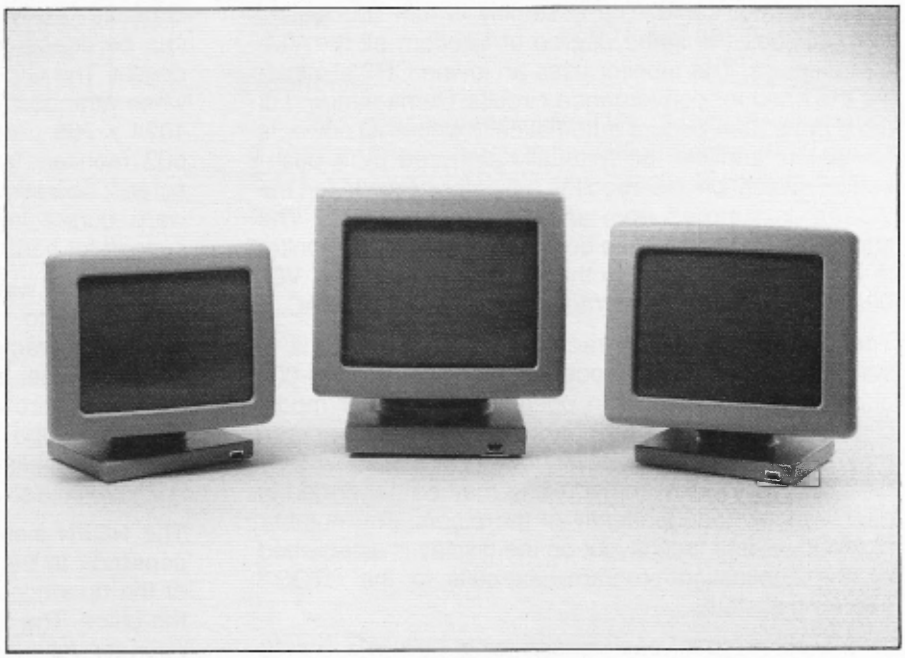
NGEN™ Video Modules

- **Display Options: High quality 12-inch, 14-inch and 15-inch monochrome and 15-inch color displays with 29 lines of 80 characters**
- **Video Options: Monochrome and color graphics with 720 x 348 pixel resolution, Monochrome graphics with 1024 x 768 pixel resolution**
- **Graphics Module Options: Intelligent monochrome/color Graphics Module with 3 display memory planes and 96 KB of display memory, High resolution monochrome Graphics Module with 128 KB of display memory**
- **Programmable palette of 64 available colors, 8 displayable at a time**
- **Can display color alphanumeric and graphics simultaneously**
- **Character fonts can be modified dynamically by applications software**

The Convergent™ family of modular NGEN workstations includes a variety of video options. Among these options are character-map monochrome or color video, and bit-map color or high resolution monochrome video.

The VM-001 monochrome monitor is a 12-inch freestanding display that can be used in both character and bit-map graphics applications. The base of the monitor is 7 inches by 9 inches, and contains a socket for connecting the KM-00X keyboard cable. The VM-001 is connected to the processor module with a 14-foot cable, which allows a great deal of flexibility in arranging the physical configuration of the video and system electronics. The display is fully articulated; it may be tilted from -5 to 30 degrees with respect to the horizontal plane and rotated +45 degrees for easy viewing. The display uses P-31 green phosphor, and is refreshed at a 60 Hz non-interlaced rate, assuring flicker free operation and low operator fatigue. Power for the VM-001 is supplied from the processor module. It does not require a separate power cord or external power source.



The VM-002 monochrome monitor is a 14-inch, free-standing display, and can be used in both character and bit-map graphics applications. The base of the monitor is 10 inches by 10.5 inches, and contains a socket for connecting the KM-00X keyboard cable. In all regards except dimension and weight, the VM-002 is comparable to the VM-001. There are no software-visible differences between the two monitors, and either device may be used interchangeably in any NGEN configuration.

The VM-003 monochrome monitor is a 15-inch, free-standing display, which is used for bit-map graphics applications. The base of the monitor is 10 inches by 10.5 inches, and contains a socket for connecting the KM-00X keyboard cable. The VM-003 is a fully articulated monitor that displays a positive image on a PC-191 phosphor; it is refreshed at a 60 Hz non-interlaced rate for flicker free operation. The monitor is controlled by the GC-003 monochrome graphics controller, which provides it with 1024 x 768-pixel resolution, allowing 38 lines of 80 or 146 characters to be displayed. Power for the VM-003 is supplied from the Graphics Controller Module. It does not require a separate power cord or external power source.

The VC-002 color monitor is a 15-inch freestanding display, and can be used in both character and bit-map graphics applications. The base of the monitor is 10 inches by 10.5 inches, and contains a socket for connecting the KM-00X keyboard cable. The VC-002 is connected to the GC-001 Graphics Controller Module with a 14-foot cable. The assembly is fully articulated, and provides the same degree of freedom as the VM-00X displays. The monitor uses an in-line CRT, eliminating the need for convergence circuits. Demagnetizing of the picture tube occurs automatically when AC power is turned on, and can be manually activated by a push-button switch on the monitor assembly. Power for the VC-002 is supplied from an external AC source. The supply is an autoselecting design that allows the monitor to automatically adjust to the voltage applied. The VC-002 operates in a voltage range of 110 to 220 volts AC.

The logic to drive character-mode operations is a standard part of NGEN processor modules. The VM-001 and VM-002 monitors can operate in character mode, displaying 29 lines of 80 characters each. The screen may be split into multiple windows. Each window may have its own cursor, and scrolling may be performed in each window independently of the others. The number of windows, and their layout on the display is established by the application program, via calls to the CTOS™ operating system.

In character mode, each character is built in a 9 x 12 pixel cell. The standard character set contains a full 256 characters, including the entire printing ASCII character set, graphics characters, common symbols, and selected foreign alphabetic characters. The character set is stored in a high speed RAM array, known as "Font RAM," which contains 4096 10-bit entries. The character set may be easily changed under software control by loading another character set into Font RAM. This way, the number of character sets that may be used in the same application is virtually without limit. In character mode, each character on the screen may have any combination of the following attributes associated with it: underline, half-bright, bold, blink, reverse video, and struckthrough.

The logic to drive VM-001/VM-002 monochrome and color bit-map operations is provided in the optional GC-001 Graphics Controller, which attaches to the processor module via the X-Bus™. This module contains 96 KB of dual-ported display memory. Because the memory is dual-ported, the processor can access it directly, and thus manipulate any bit of memory. The GC-001 provides a bit-mapped screen resolution of 720 x 348 pixels. Each pixel defined by the bit-map corresponds to a pixel in the character map, allowing both text and graphic information to be displayed simultaneously. The display memory is organized into three bits per pixel. The output from this memory is routed through an eight entry color mapper array, which selects the intensity levels of the red, green, and blue color guns in the VC-002 color display. In this manner, each pixel on the color display can be set to any of 64 colors, with eight different colors displayed at any given instant.

The VM-001, VM-002, and VM-003 monochrome monitors may also be driven in bit-map operations by the GC-003 monochrome graphics controller module, which attaches to the processor via the X-Bus. This module contains 128 KB of dual-ported display memory, which can be directly accessed and manipulated by the processor. The GC-003 provides 720 x 348 pixel resolution when attached to the VM-001 or VM-002 monitors, and 1024 x 768 pixel resolution when attached to the VM-003 monitor. To significantly increase performance in screen operations, the GC-003 also provides a hardware cursor in a 32 x 64 pixel cell, and hardware support for horizontal panning, and vertical scrolling.

When used with the VM-003, the graphics controller displays 80 to 146 characters per line of proportionally spaced characters and multiple fonts. The number of characters per line and number of lines per screen are under software control. When displaying 38 lines of 80 characters, the character cell is 12 x 20 pixels. When displaying 34 lines of 146 characters, the character cell is 7 x 20 pixels.

The NGEN workstation family has been designed with sensitivity to the physiological and psychological needs of the operator, as well as the physical environment of the office. The flicker-free video display greatly reduces operator fatigue. The small monitor "footprint" means that NGEN takes up minimal space on a desk. The electronic modules (processors, mass storage, and various options) need not be placed on the work surface, but can be up to 16 feet from the video display. These modules have been designed to fit neatly on the surfaces and shelves of contemporary office furniture.

SPECIFICATIONS

Module Power Requirements

Module	Power Code
VM-001	3
VM-002	3
VM-003	5
VC-002	0
GC-001	2
GC-003	1

Cable Length

Module	Cable Length
VM-001/VM-002	14 feet (4.27 m)
VM-003	16 feet (4.88 m)
VC-002	14 feet (4.27 m)

Electrical

AC Power: 85 to 130 Vrms @ 47 Hz - 440 Hz

Physical

	Height		Width		Length		Weight	
Module	In.	mm	In.	mm	In.	mm	Lbs	Kgs
VM-001	12.0	304.8	12.25	311.2	12.0	304.8	16.1	7.3
VM-002	15.0	381.0	13.75	349.3	14.0	355.6	20.0	9.1
VM-003	15.0	381.0	13.75	349.3	15.0	381.0	26.5	12.0
VC-002	15.0	381.0	13.75	349.3	15.0	381.0	37.2	16.9
GC-001	8.0	203.2	2.52	64.0	12.0	304.8	4.1	1.9
GC-003	8.0	203.2	2.52	64.0	12.0	304.8	4.1	1.9

ENVIRONMENTAL, SAFETY, AND ERGONOMIC

Safety

Meets UL 478 (EDP) and 114 (Office Equipment)
Meets CSA 154 (EDP) and 143 (Office Equipment)
Meets VDE 0806 (Office Equipment)
Meets BSI 5850 (Office Equipment)

Emissions

Meets VDE 0871 Level A (Emissions)
Meets FCC Part 15, Sub-part J for Class A Emissions

ESD

5,000 Volts:	No observable effect
12,500 Volts:	Errors corrected via software intervention
17,500 Volts:	Errors corrected via operator intervention
25,000 Volts:	No permanent damage

Altitude

Operating:	15,000 feet ASL
Non-operating:	25,000 feet ASL

Acoustic Noise Level

NR30

Temperature/Humidity

Operating:	0°C to 40°C, 5%-95% RH
Non-operating:	-20°C to 65°C, 90% RH @ 65°C for 12 hours

Ergonomic

Designed in accordance with DIN "Safety Regulations for Display Workstations in the Office Sector" (Standard 66234, December 1979), and "Basic Ergonomics for Desktop Workstations."

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Convergent

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