A.1 DISTRIBUTED SYSTEMS DIVISION
a. NGEN

NGEN PRODUCT DESCRIPTION

CP-001 CENTRAL PROCESSOR

The Processor Module contains the majority of the electronic components of the basic NGEN system. It includes the processor itself, the system RAM, input/output devices for external communications, and logic to drive the video display and keyboard. The module contains four standard printed circuit assemblies, and has room to accommodate three optional RAM expansion cartridges of 256KB each.

The system processor uses an Intel iAPX 80186 VLSI microprocessor, operating at 6 or 8 MHz. The board containing this device also includes an 8237 DMA controller, 8 KB of ROM for bootstrap operations, device control logic for I/O port decoding, a programmable interrupt controller, and a programmable interval timer. DMA operations on the X-Bus operate at speeds up to 4 megabytes/second, when transferring 16 bit data.

The standard memory board contains 256KB of dynamic RAM storage, with byte parity error detection, and the logic to control and refresh all system memory, including the optional RAM expansion cartridges.

The video/keyboard board contains a Motorola 6845 character mapped video controller, which drives the display of 29 lines by 80 characters. A 256 character font RAM on this board may be loaded by user applications software. The video board allows up to six attributes to be set on a per-character basis: underline, blink, reverse video, bold, half-bright, and struck-through.

The I/O board contains logic and connectors for the standard I/ of the system. This includes two RS-232-C ports, with full mode control, which may be operated in both synchronous an asynchronous modes at speeds up to 19.2 kilobaud; an RS-422 por for cluster operations at speeds up to 1.8 megabaud; a paralle printer interface, set up for Centronics-compatible printers, an the connector for the video/keyboard cable going to the monito assembly. All external cables enter the processor box through small opening, and are attached directly to the I/O board. Th left side panel of the module snaps open, and a small door insid the box provides easy access to these connectors, and allows th unit to have a finished appearance on all sides, with no visibl cable connectors.

The three optional RAM expansion cartridges also fit inside the processor module. Access to the RAM expansion cavity within the box is provided by removing the side panel of the unit. Each 256KB cartridge is inserted in the cavity, and locked in place by the cartridge handle. In this manner, the basic system can be extended to include up to 1024KB of RAM.

A low speed fan draws air into the bottom-front of the module, and expels it at the top-rear of the cabinet.

As is the case with all NGEN modules, a female X-Bus connector and latch mechanism occupies the right side panel of the Processor module.

XM-001 RAM Expansion Cartridge

Memory expansion is accomplished by the use of one, two, or three 256KB RAM expansion cartridges. Each cartridge is encased in plastic shell, and is user-installable. Cartridges are completely interchangeable, and no switch settings or other adjustments are required to expand the system memory up to the maximum 1024 KB.

KM-00x Keyboard Module

A range of keyboards are available to satisfy various national character set requirements. All contain 98 keys, and are arranged in a typewriter style layout. Keys are arranged in functional clusters, including the QWERTY portion, a 14-key numeric pad, an 8-key status/control pad, a 6-key cursor control pad, a 4-key page control pad, and 10 user-definable function keys. The keyboard also provides software controllable LED indicators on 3 keys. The keyboard is connected to the base or the monitor by a 6-foot coiled cable, which may be connected to either the right side or left side of the keyboard itself. The unused connector port may in turn be used to connect a second serial input device, such as a special-purpose keyboard or mouse.

The keyboard contains an Intel 8051 microprocessor, which senses the state of all keys, and reports any changes of state (key depression and release) to the central processor module. This feature allows the keyboard to be utilized in sophisticated applications, in which multiple key sequences or the length of time a key is held down, can be used to enhance the operator interface. Data which enters the keyboard through its auxiliary port are passed to the central processor, with identifying codes that distinguish this data from that entered on the KM-00x itself.

PS-001 Power Supplies

The PS-001 power supplies provide power to all NGEN components except the color Monitor, which is powered independently. The PS-001 operates over an input voltage ranges of 85V to 130V RMS, and 180V to 260V RMS, and is UL Recognized, CSA Certified, and conforms to BSI, and VDE specifications. It operates over an input line frequency of 47 to 440 Hz, using a three wire, single phase AC voltage source. The supply protects itself from input transients and output overloads.

The output of the PS-001 is 4.2 amps at 36 VDC, or approximately 150 Watts. This is sufficient to drive most system configurations that do not include hard disk drives. A second PS-001 is required in most hard disk configurations.

The PS-001 is designed to sit on the floor, beneath the surface containing the system electronics. A six foot cable connects the supply to the Processor Module. If additional supplies are required, an AC jumper cable allows each additional supply to be connected to the first, so only one line cord is required. The output from each additional supply is connected to the first module in the system whose power requirements exceed the output of the first supply.

Mass Storage Subsystems

The NGEN family contains a variety of mass storage modules, all based on 5 1/4-inch slimline technology. Each module is packaged in its own enclosure, and attaches to the rest of the system via the X-bus. Modules can be installed, and systems can be reconfigured, by non-technically trained customer personnel. These options include a dual floppy module (FD-001), a floppy/hard disk module, with hard disk capacities of 10MB, or 20MB (HD-002, HD-003), or a hard disk module with the same capacities (HD-005, HD-006). The FD-001 module includes a controller and two 96 TPI drives, each with 630KB capacity. The formats used are compatible with those on the Convergent AT Turbo series. These drives can also read diskettes written at 48 TPI by the IBM Personal Computer. Each module in the HD-00x series contains both disks and controllers for the included disks. One hard disk expansion unit in 10MB, and 20MB capacities (HX-002,HX-003), can be attached to each HD-00x module. The maximum hard disk storage that can be configured in a single workstation is 80MB; this is achieved using two HD-003 20MB modules, each with an HX-003 expansion module. Alternatively, an HD-003 and an HD-006 could be used, each with an HX-003 expansion unit.

VIDEO DISPLAY SUBSYSTEMS

The NGEN family includes a variety of video options, with both character and bit-map graphics capability, and both monochrome and color displays.

The logic to drive character mode operations is a standard part of the Processor Module. All displays 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 call to the CTOS operating system.

Each character is built in a 9 by 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 the Font RAM. This way, the number of character sets that may be used in the same application is virtually without limit. Each character on the screen may have any combination of the following attributes associated with it: underline, half-bright, bold, blink, reverse video, and strike through.

The logic to drive 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 128 KB of dual-ported display memory. Application software in the CP-001 can access directly any bit or group of bits in the display memory. The Graphics Controller provides a bit-mapped screen resolution of 720 by 348 pixels. Each pixel defined by the bit map corresponds to a pixel in the character map, thus allowing the simultaneous display of both text and graphic information. 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-001 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 Monochrome Monitor is a 12 inch, free-standing display, and can be used in both character and bit-map graphic 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 16 foot cable, which allows a great deal of flexibility in arranging the physical configuration of the video and system electronics. The monitor assembly is fully articulated, and tilts -5° to 30° the horizontal plane, and rotates 45° in either direction. The display uses a P31 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 line cord or external power source.

The VC-001 Color Monitor is a 15 inch, free-standing display, and can be used in both character and bit-map graphic 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-001 is connected to the GC-001 Graphics Controller Module with a 16 foot cable. The assembly is fully articulated, and provides the same degrees of freedom as the VM-001 display. The monitor uses an in-line CRT, eliminating the need for convergence circuits. Simplified circuits satisfy the DC-bias range requirements, and also provide electronic and horizontal pin-cushion correction for the picture tube. Demagnetizing of the picture tube occurs automatically at AC power turn-on time, and can also be manually activated by a push button switch on the monitor assembly. Power for the VC-001 is supplied from an external AC source; the supply is switch selectable for nominal 100 Volt or 220 Volt operation.

SPECIFICATIONS

STORAGE CAPACITY:

RAM: 1024 KB, Maximum
ROM: 8 KB

MASS STORAGE OPTIONS:

OPTION	CAPACITY (FORMATTED)	CAPACITY (UNFORMATTED)	DRIVE TRANSFER RATE	ACCESS TIME AVERAGE	ACCESS TIME TRACK TO
FD-001	630 KB	1MB	250bps	94ms	6ms
HD-002	10 MB	12.76MB	5Mbps	91ms	3ms
HD-003	20 MB	TBD	5Mbps	TBD	TBD
HD-005	10 MB	12.76MB	5Mbps	91ms	3ms
HD-006	20 MB	TBD	5Mbps	TBD	TBD
HX-002	10 MB	12.76MB	5Mbps	91ms	3ms
HX-003	20 MB	TBD	5Mbps	TBD	TBD

SERIAL I/O RATES:

External Clock: RS-232-C: 110 Baud to 19.2 KBaud
Internal Clock: RS-232-C: 50 to 19.2 KBaud
RS-422: 110 to 1.8 MBaud

PARALLEL I/O RATE (Printer Interface):

Programmed I/O -- 9600 Characters/second (typical)

ELECTRICAL:

AC Power: 85 to 130 Vrms @ 60 Hz $\pm$ .5 Hz
180 to 260 Vrms @ 50 Hz $\pm$ .5 Hz

AC Power Requirements: Configuration Dependent--See Above

PHYSICAL:

MODULE	HEIGHT		WIDTH		LENGTH		WEIGHT	
	Inches	MMs	Inches	MMs	Inches	MMs	Lbs	
PS-001	3.0	76.2	4.5	114.3	10.5	266.7	2.0	
CP-001	8.0	203.2	5.75	146.1	12.0	304.8	10.0	4
VM-001	12.0	304.8	12.25	311.2	12.0	304.8	16.0	7
VC-001	15.0	301.0	13.75	349.3	15.0	301.0	27.0	12
KM-001	1.18	30.0	18.0	457.2	9.0	228.6	4.0	1
FD-001	8.0	203.2	5.75	146.1	12.0	304.8	13.0	5
HD-002	8.0	203.2	5.75	146.1	12.0	304.8	14.0	6
HD-003	8.0	203.2	5.75	146.1	12.0	304.8	14.0	6
HD-005	8.0	203.2	5.75	146.1	12.0	304.8	14.0	6
HD-006	8.0	203.2	5.75	146.1	12.0	304.8	14.0	6
HX-002	8.0	203.2	2.52	64.0	12.0	304.8	TBD	1
HX-003	8.0	203.2	2.52	64.0	12.0	304.8	TBD	1
GC-001	8.0	203.2	2.52	64.0	12.0	304.8	TBD	

ENVIRONMENTAL, SAFETY, AND ERGONOMIC:

Safety:

Meets UL 478 (EDP)

Meets CSA Standard C22.2 154 (EDP)

Meets VDE 0806 (Office Equipment)

Meets BSI 5850 (office Equipment)

Emissions:

Meets VDE 0871 Level A(Emissions Standards)

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: NR 30

Temperature/Humidity:

Non-mass storage products:
Operating: 0 to 40° C, 5%-95% RH
Non-Operating: -40° to 75° C, 90% @ 65° for 12 hours

Mass storage products:
Operating: 0 to 40° C, 20%-80% RH
Non-Operating: -20° to 65° C, 90% @ 65° for 12 hours

Cable Lengths:

Keyboard: 14 Inches coiled, 6 feet extended

Monitor: 16 feet

Cluster: 1200 feet, maximum

Ergonomic:

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