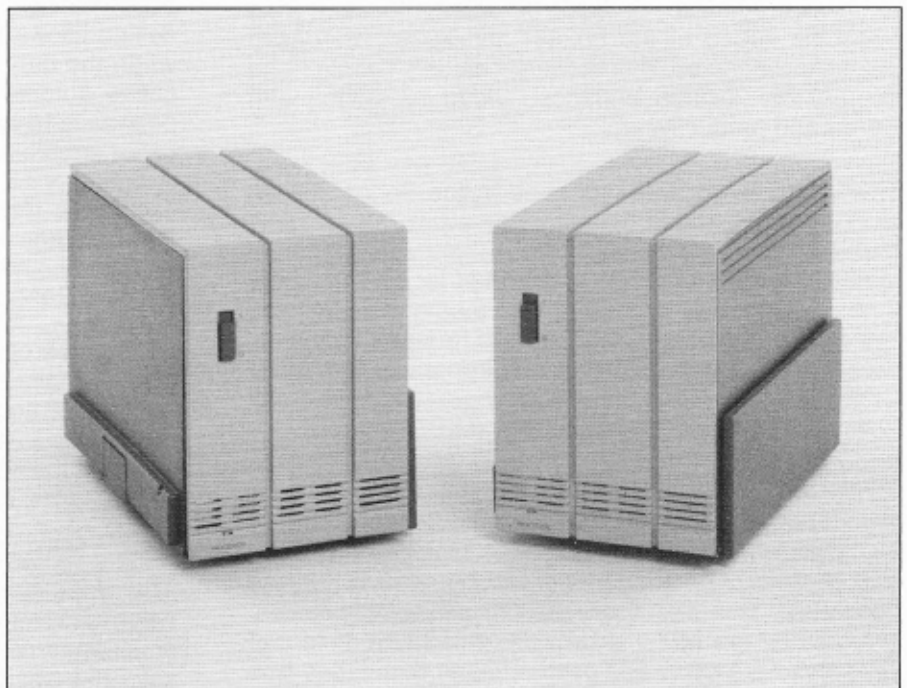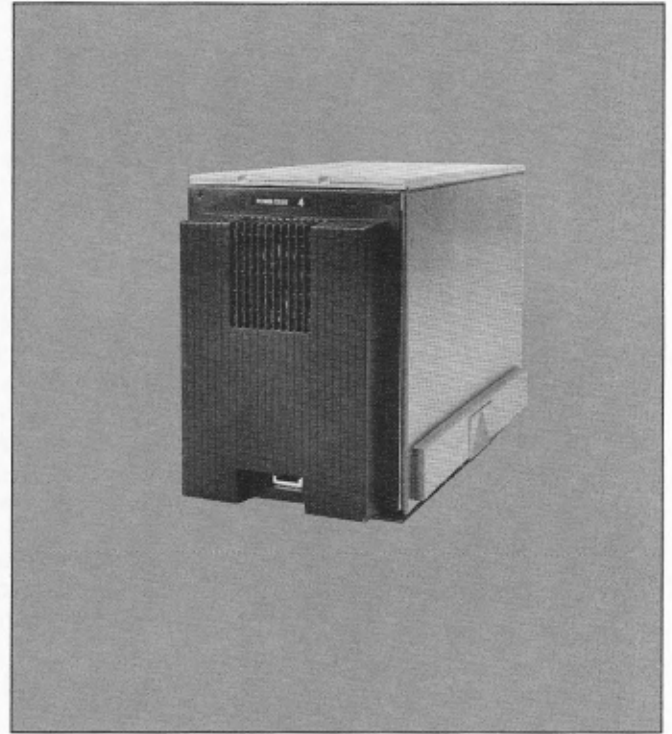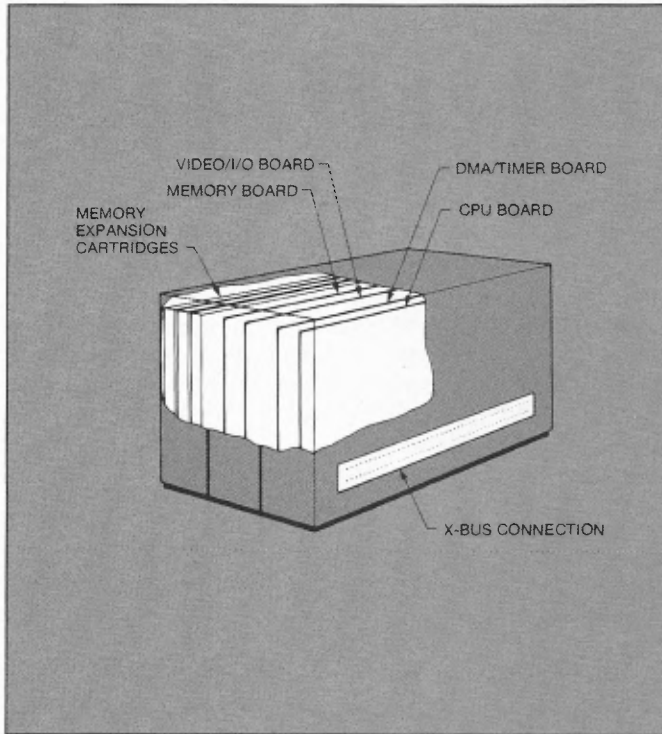# Convergent

# NGEN Series 386

- ■ **Four models:**
  - **CP-003: 16-MHz 80386 CPU**
  - **CP-003/287: 16-MHz 80386 CPU with 10-MHz 80287 math coprocessor**
  - **CP-0A3: 16-MHz 80386 CPU with enhanced video**
  - **CP-0A3/287: 16-MHz 80386 CPU with 10-MHz 80287 math coprocessor and enhanced video**

- ■ **Twice the data throughput as 286-based systems for faster, extended transactions**

- ■ **16 KB of 32-bit cache memory for additional operational efficiency**

- ■ **Peer-to-peer networking support through state-of-the-art LANs and TeleCluster**

- ■ **Supports up to 20 additional workstations**

- ■ **Supports full range of office automation applications**

- ■ **MS-DOS runs in virtual-8086 mode for compatibility with installed applications**

- ■ **Modular design extends capabilities, protects initial investment, and accepts NGEN X-Bus and SCSI expansion**

- ■ **I/O includes RS-232-C, RS-422, RS-485, and parallel port**

- ■ **Enhanced Video supports 132-column and bidirectional port for financial, scientific, and office automation applications**

- ■ **User-friendly with easy installation, upgrades, and on-screen diagnostics**

The Convergent™ NGEN® Series 386™ processor module is a high-performance processor option for the expandable NGEN workstation/server. The modular design of the Series 386 provides for easy upgradability and expanded capability. Users can add the latest technology processor without the need to replace peripheral NGEN modules. The Series 386 processor maintains compatibility with all of Convergent's office automation application programs, operating systems, and vast array of X-Bus™ modules and Small Computer System Interface (SCSI) peripherals ('HSD' upgrade modules). Whether used as a new workstation/server or as an upgrade, the Series 386 adds full-featured 80386 microprocessor performance and functionality.

In addition to supporting the vast array of CTOS™ applications, the Series 386, in conjunction with CTOS/VM™, simultaneously supports CTOS and MS-DOS® operating systems and applications.

The Series 386 processor module includes an Intel® 16-MHz 80386 microprocessor with 16 KB of 32-bit high-speed, dual-mode cache and support logic. The system's RAM, input/output (I/O) control devices for external communications, and logic to drive the video display and keyboard are also housed within this 5.75-inch wide module. Each processor module contains four standard printed circuit assemblies and has room to accommodate three optional RAM expansion cartridges, providing up to a maximum of 4 MB of system memory. Input/output support includes two RS-232-C ports, an RS-422 cluster communications channel (RS-485 for enhanced video models), and a Centronics-compatible parallel printer port.

VIDEO/I/O BOARD
MEMORY BOARD
MEMORY EXPANSION CARTRIDGES
DMA/TIMER BOARD
CPU BOARD
X-BUS CONNECTION

Four models of the Series 386 are available. All share the same functional characteristics, but vary in computational performance for floating-point operations. The CP-003/287 and CP-0A3/287 use both an Intel 16-MHz 80386 microprocessor and a 10-MHz 80287 math coprocessor, to perform floating-point operations and give enhanced performance in computationally intensive applications. All of these modules operate at more than twice the speed of the 80286- and 80286/287-based processor modules, respectively. Models CP-0A3 and CP-0A3/287 include enhanced video for added efficiency and productivity.

The 80386 microprocessor used in the Series 386 includes many features that enhance overall system performance and software flexibility. The on-chip Memory Management Unit (MMU) is designed for off-chip code/data caching and permits 32-bit memory addressing and data transfers. Built-in address translation caches, allowing translation to take place in parallel with other CPU activities, allows an effective operating speed of 3 to 4 million instructions per second (MIPS).

## MEMORY MANAGEMENT

The 80386 MMU plays a crucial role in the chip's high-performance, virtual-memory, multitasking capabilities. Memory management, which performs address translation, is a necessary part of all memory accesses. Since the MMU is built into the 80386 chip, access times are 50 to 150 percent faster than those with off-chip memory management. Because microprocessors must reach main memory thousands or millions of times every second, this translates into a substantial boost in overall performance.

The ability of the 80386 microprocessor to address up to 64 Terrabytes of virtual memory ensures that it will match the requirements of the most complex systems.
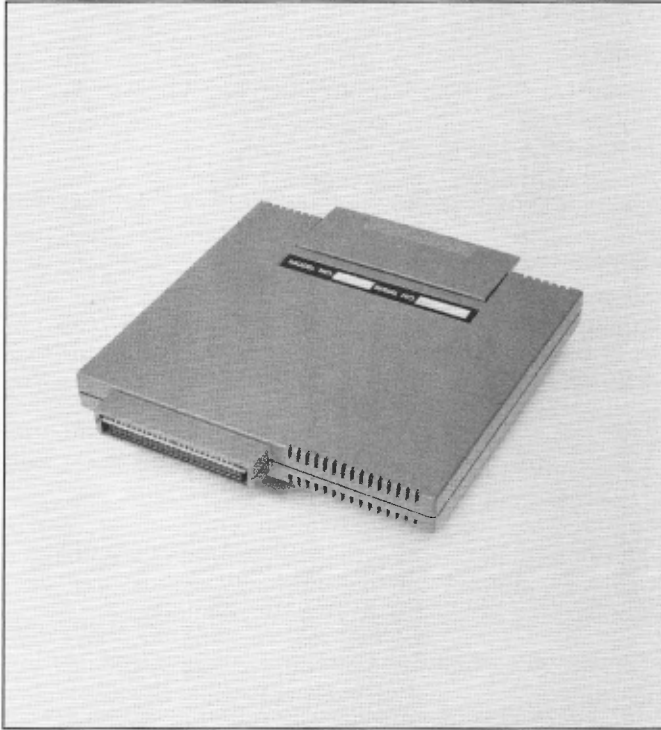
To obtain the highest possible performance from the 16-MHz 80386, Convergent has implemented a unique cache design that provides an additional increase in performance over typical cache implementations. This design allows the processor to run without wait states when the data fetched is in cache. The 16K by 32-bit cache automatically changes its configuration to appear as a 16-bit or as a 32-bit cache, depending on the data currently fetched.

The basic Series 386 workstation contains 1 MB of RAM storage with byte parity error detection and logic to control and refresh all system memory, including optional RAM expansion cartridges.

Up to three optional RAM expansion cartridges can be easily installed in the Series 386. Each cartridge slides into a slot and locks in place. Expansion cartridges support up to 4 MB of system memory. Configurations between the base 1 MB and 4 MB can use a mixture of XM-002 (512 KB) and XM-003 (1 MB) cartridges.

## VIDEO MANAGEMENT

The video circuitry contains a Motorola® 6845 character-mapped video controller, which drives the display of 29 lines of 80 characters. The standard character set (256 characters) contains the entire print ASCII character set, graphics characters, common symbols, and selected foreign alphabetic characters.
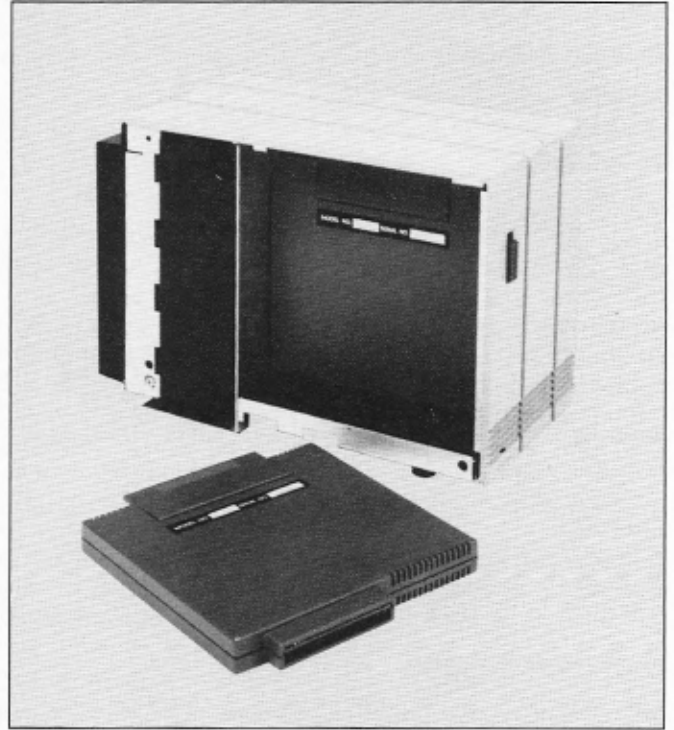
The character matrix is stored in a high-speed RAM array, known as *font RAM*, which contains 4096 10-bit entries. The character set may be easily changed under software control by loading another character set into the font RAM. This feature provides unlimited flexibility in displayable character sets. The video hardware allows characters to be displayed with up to six attributes: underline, blink, reverse video, bold, halfbright, and struckthrough.

### ENHANCED VIDEO

The CP-0A3 and CP-0A3/287 provide enhanced video (EV) capabilities. In addition to the standard video features supported by the Series 386, EV supports monochrome, color character, 34 lines of 132 character, and 64-color palette (8-color foreground and 8-color background). The Centronics-compatible bidirectional parallel port allows for the integration of additional peripherals and office automation applications such as image scanning.

### HARDWARE

The Series 386 processor module provides logic connectors to support the standard I/O capabilities, expected in a professional workstation or server, including two RS-232-C ports with full modem control (synchronous and asynchronous modes) at speeds up to 19,200 bits/sec; an RS-422 or RS-485 (models CP-0A3 and CP-0A3/287) port for cluster networking operations at a speed of 1.84 million bits/sec; a Centronics-compatible parallel printer interface; and a connector for the video/keyboard cable attachment to the monitor assembly.

The Series 386 processor module supports most NGEN X-Bus and SCSI peripheral modules. The X-Bus connector and latch mechanism are located on the right side panel of the processor module to allow for easy installation of the upgrade/expansion modules.

All external cables enter the processor module through a small opening and easily attach to connectors inside the module. The left side panel of the module easily detaches, providing access to these connectors. The unit, therefore, has a finished appearance on all sides with no visible cable connectors.

The Series 386 processor module packaging continues to lead the industry for system modularity. The CPU, video logic, and base memory are contained in an internal compartment, not visible to end users. A low-speed fan draws air into the bottom front of the module and blows it out of the top-rear of the module. The NGEN provides the utmost in end-user configurability, while maintaining a streamline appearance, unmatched by any other workstation design.

### VISINOSTICS

All Series 386 processor modules can be installed by an end user using no special tools or equipment. With the Visinostics package, operators can troubleshoot system and component level problems using their own workstation. Visinostics provides a graphic representation of the NGEN configuration on the system display and allows the user to visually select which elements are to be tested. It then runs the selected test programs and highlights any components that do not run their diagnostics properly.

## SPECIFICATIONS

### POWER CODES

| Module | Power Code |
|---|---|
| CP-003 | 4 |
| CP-003/287 | 4 |
| CP-0A3 | 4 |
| CP-0A3/287 | 4 |
| XM-002 | 0 |
| XM-003 | 0.25 |

### STORAGE CAPACITIES

| Module | Base RAM (KB) | Max RAM (KB) | ROM (KB) | Cache RAM (KB) |
|---|---|---|---|---|
| CP-003 | 1024 | 4096 | 8 | 16 |
| CP-003/287 | 1024 | 4096 | 8 | 16 |
| CP-0A3 | 1024 | 4096 | 8 | 16 |
| CP-0A3/287 | 1024 | 4096 | 8 | 16 |
| XM-002 | 512 | | | |
| XM-003 | 1024 | | | |

### MICROPROCESSOR

| | |
|---|---|
| CP-003 | 80386 running at 16 MHz |
| CP-003/287 | 80386 running at 16 MHz and 80287 running at 10 MHz |
| CP-0A3 | 80386 running at 16 MHz |
| CP-0A3/287 | 80386 running at 16 MHz and 80287 running at 10 MHz |

### RS-232-C CLOCK RATE

| | |
|---|---|
| External: | 110 to 19,200 bps |
| Internal: | 50 to 19,200 bps |

### RS-422/RS-485 CLOCK RATE

| | |
|---|---|
| Internal: | 100 bps to 1.84 Mbps |

### PARALLEL I/O RATE

| | |
|---|---|
| Typical: | 9600 char/sec |
| Bidirectional: | 9600 char/sec (CP-0A3) |

### PHYSICAL

| | |
|---|---|
| Height: | 8 in. (203.2 mm) |
| Width: | 5.75 in. (146.1 mm) |
| Length: | 12 in. (304.8 mm) |
| Weight: | 10 lb (4.54 kg) |

## REGULATORY

### Safety

Meets UL 478, Fifth Edition (EDP) and 114 (Office Equipment)
Meets CSA 154 (EDP)
Meets VDE 0806 (Office Equipment)
Meets IEC 380 (Office Equipment)

### Emissions

Meets VDE 0871, Level A
Meets FCC Part 15, Subpart J, Class A

## ENVIRONMENTAL

### ESD

| | |
|---|---|
| 2,500/5,000V: | Software errors allowed at 4% rate |
| 12,500V: | Errors corrected via software intervention |
| 17,500V: | Errors corrected via operator intervention |
| 25,000V: | No permanent damage |

### Temperature/Relative Humidity

| | |
|---|---|
| Operating: | 13°C to 35°C 10% to 80% |
| Non-operating: | -40°C to 65°C 95% at 41°C for 8 hr |

### Altitude (above sea level)

| | |
|---|---|
| Operating: | 7,000 ft |
| Non-operating: | 40,000 ft |

### Shock

| | |
|---|---|
| Operating: | 5 g, X/Y/Z axes (10 g, Z axis only) |
| Non-operating: | 20 g, X/Y/Z axes |

### Vibration

| | |
|---|---|
| Operating: | 0.35 g, 20 to 500 Hz, X/Y/Z axes |
| Non-operating: | 0.75 g, 5 to 500 Hz, X/Y/Z axes |

### Acoustic Noise Level

60 dB(A)

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