

MEGAFRAME

PRODUCT OVERVIEW

Revision 1.02 1/24/85

Specification #B-02-00129-00

TABLE OF CONTENTS

1.0 Overview

1.1	Introduction
1.2	Hardware
1.2.1	Elements
1.2.1.1	The System Bus
1.2.1.2	File Processor
1.2.1.3	Cluster Processor
1.2.1.4	Applications Processor
1.2.1.5	Terminal Processor
1.2.1.6	Storage Processor
1.2.1.6.1	SMD Controller
1.2.1.7	Memory Expansion
1.2.1.8	Bus Repeater
1.2.1.9	Multibus Adapter
1.2.1.10	Operator Panel
1.2.1.11	Panel Interface
1.2.1.12	Quarter Inch Tape Interface
1.3	Software
1.3.1	Operating Systems
1.3.1.1	CTOS
1.3.1.2	CTIX
1.3.2	Programming Languages
1.3.2.1	BASIC Interpreter
1.3.2.2	BASIC Compiler
1.3.2.3	FORTRAN Compiler
1.3.2.4	PASCAL Compiler
1.3.2.5	COBOL Compiler
1.3.2.6	"C" Language Compiler
1.3.3	Data Management Facilities
1.3.3.1	Multikey ISAM
1.3.3.2	Forms Editor
1.3.3.3	Sort/Merge
1.3.4	Communications Software
1.3.4.1	X.25 Gateway
1.3.4.2	SNA Gateway
1.3.4.3	IBM 2780/3780 Emulation
1.3.4.4	IBM 3270 Emulation

2.0 PHYSICAL DESCRIPTION AND INSTALLATION REQUIREMENTS

- 2.1 Cabinet Description
 - 2.1.1 MegaFrame Enclosure Types
 - 2.1.1.1 Card Cage
 - 2.1.1.2 System Power Supply Module
 - 2.1.1.3 Fixed Disk Module
 - 2.1.1.4 Removable Backup Module
 - 2.1.1.5 Tape Module
 - 2.1.2 Enclosure Physical Characteristics
- 2.2 Site Requirements
 - 2.2.1 General
 - 2.2.2 Electrical
 - 2.2.3 Ambient Temperature
 - 2.2.4 Relative Humidity
 - 2.2.5 Altitude Range
 - 2.2.6 Shock
 - 2.2.7 Acoustical Noise
 - 2.2.8 Shipping Container
 - 2.2.9 Safety/Emissions/ESD Specifications
- 2.3 Reliability Data

1.0 FUNCTIONAL DESCRIPTION

1.1 Introduction

MegaFrame replaces the shared logic approach of a single CPU for multiple users with a distributed intelligence architecture. It is a system of multiple processing units tied together on a high speed 32-bit wide asynchronous bus. Each of the processing units on the bus consists of at least a CPU and memory and most of them also have I/O interfaces. The bus can be extended across a maximum of six enclosures. Each enclosure contains a 6-processor-slot backplane for a total of 36 slots. Each enclosure may support integral mass storage.

The system starts with a base enclosure, into which up to six processors may be installed. When the base enclosure is full, additional expansion enclosures each holding up to six additional processors may be connected, providing up to a 36 processor system. An active Bus Repeater regenerates the 11 Mbyte/sec system bus from enclosure to enclosure.

MegaFrame supports three base enclosure versions for system disk and backup: 1) A removable 5 Mbyte (formatted capacity) cartridge Winchester disk drive with one to three 37.5 Mbyte (minimum formatted) fixed disk drive modules. 2) A 55 Mbyte (formatted capacity) cartridge quarter inch tape drive module with one to three 37.5 Mbyte (minimum formatted) fixed disk drive modules. 3) Interfaces for one to eight external Pertec compatible 1/2" tape drives and from one to six external SMD compatible disk drives.

Two versions of expansion enclosures are also provided: 1) Capacity for up to four 37.5 Mbyte (minimum formatted) fixed disk drive modules. 2) A 55 Mbyte (formatted capacity) cartridge quarter inch tape drive module with provision for up to three 37.5 Mbyte (minimum formatted) fixed disk drive modules.

MegaFrame is designed as a series of independent parallel processors. All File, Terminal, Cluster, Application, and Storage Processors each run their own operating system and execute in parallel. As more users are added, multiple Application, File, Terminal, Cluster, and Storage Processors can be added to meet the additional computing requirements.

MegaFrame is field upgradeable to its maximal configuration without system software changes, though CTOS system generation and file system reconfiguration for load balancing may be required.

MegaFrame incorporates multiple operating systems: Convergent Technologies Operating System (CTOS); and a distributed version of the industry-standard UNIX (Unix is a trademark of Western Electric Co., Inc.), CTIX (Convergent Technologies' derivative of UNIX), for compatibility with many existing software packages. This architecture enables these two operating systems to transparently share hardware resources, thus allowing users to run applications at either terminals or workstations. This architecture distributes processing across multiple processors.

MegaFrame offers the user selective entry points and upgrade paths without recompiling any existing application software. Modular designs allows incremental additions to processing power by adding new File, Application, Storage, Terminal or Cluster Processors.

An optional Multibus adapter allows the addition of commercial multibus interfaces to customer equipment with a minimum of effort.

1.2 Hardware

1.2.1 Elements

The Megaframe consists of the following elements:

- File Processor
- Cluster Processor
- Applications Processor
- Terminal Processor
- Storage Processor
- SMD Controller
- 1 MB Memory Expansion
- 1/2 MB Memory Expansion
- Multibus Adapter
- Multibus Expansion Adapter
- Quarter Inch Tape Interface
- Panel Interface
- Fixed Disk Drive Module
- Removable Cartridge Disk Drive Module
- Quarter Inch Tape Drive Module

Base Enclosures**A Enclosure (includes the following)**

File Processor
Removable Disk Drive Module
Backplane (includes System Bus)
Power Supply Module
Power Distribution (cabling)
Operator Panel
Fans

C Enclosure (includes the following)

File Processor
Quarter Inch Tape Interface
Quarter Inch Tape Drive Module
Backplane (includes System Bus)
Power Supply Module
Power Distribution (cabling)
Operator Panel
Fans

E Enclosure (includes the following)

Storage Processor
SMD Controller
Panel Interface
Backplane (includes System Bus)
Power Supply Module
Power Distribution (cabling)
Operator Panel
Fans

Expansion Enclosures**B Enclosure (includes the following)**

Backplane (includes System Bus)
Power Supply Module
Power Distribution (cabling)
System Bus Repeaters (includes cables)
Fans

D Enclosure (includes the following)

Quarter Inch Tape Interface
Quarter Inch Tape Drive Module
Backplane (includes System Bus)
Power Supply Module
Power Distribution (cabling)
System Bus Repeater (includes cables)
Fans

Table 1.1 MegaFrame Enclosure Summary

	Enc. Type	Backup Device	Disk Support	Max. Enc. per System
Base Enclosures	A	Disk Cartridge	1-3 Fixed	1
	C	1/4" Tape	1-3 Fixed	1
	E	External 1/2" Tape	External SMD	1
Expansion Enclosures	B	N/A	0-4 Fixed	5
	D	1/4" Tape	1-3 Fixed	1

Note 1: There is a maximum of one base enclosure per system.

Note 2: There is a maximum of five expansion enclosures per system.

Note 3: The "D" expansion enclosure can not be added to a system with a "C" base enclosure.

Note 4: A File Processor board can not be installed in an "E" base enclosure.

Table 1.2 MegaFrame Processor Summary

Processor Board	CPU	On-board RAM	Max. RAM per Processor	Max. Proc's per System
Application	68010 (10MHz)	512K	4M	8
File	80186 (8 MHz)	256K	768K	4
Terminal	80186 (8 MHz)	256K	768K	16
Cluster	80186 (8 Mhz)	256K	768K	16
Storage	80186 (8 Mhz)	256K	768K	6
SMD	8X300	Used in conjunction with Storage Processor		2

Note 1: There is a maximum of 4 FP's or 2 (SP + SC) (each SP + SC equals 2 FP's) in any system.

Note 2: There is a maximum of 36 slots, some of which will be memory boards.

1.2.1.1 The System Bus

The System Bus is a high-speed asynchronous backplane interconnect. The system bus provides the throughput necessary to insure that all of the processors on the system can communicate and process in parallel. The system bus provides a 32-bit wide data path and has a maximum transfer rate of 11 Mbytes/sec.

Common system access to the bus is provided by:

- o a doorbell interrupt that enables one processor to pass requests to another
- o separate hardware addresses for local and system bus memory access
- o shared memory access

Each processor board is assigned a unique slot number which is established by its physical location within the system. The slot number is used in conjunction with a 32-bit address to completely specify a memory location within the system. Certain memory locations are reserved for generating interrupts used for inter-CPU communication. The inter-CPU bus traffic consists of request and response blocks between processor boards as well as DMA transfers between the processor boards and the disks. Each processor board controls hardware registers that allow a portion of its CPU address space to point to the memory of another board in the system. This allows memory to be shared between all boards in the system.

1.2.1.2 File Processor

The File Processor contains an 8 MHz Intel 80186 processor with 256 KBytes (expandable offboard to 768 KBytes) of RAM with full Error correction (ECC) memory and a LSI Winchester disk controller. The high speed System Bus has sufficient bandwidth to support multiple DMA disk transfers in progress from Multiple File Processors.

The File Processor board runs the CTIX file system while the application runs on the Applications Processor. In addition, the File Processor runs file-oriented data management tools such as ISAM and a relational DBMS.

The File Processor can support one removable 5 Mbyte (formatted capacity) cartridge, and from one to four 5-1/4" 37.5 MByte (minimum formatted capacity) Winchester drives depending on enclosure configuration. As more users are added to the system, additional File processors, each with their own file system and up to four additional disks, can be added, offloading disk and file system overhead. Each File Processor need deal only with the disks and files that reside on them. All File Processors are "known" to the first File Processor installed which is designated the master File Processor. The master File Processor redirects file requests to the appropriate File Processor.

1.2.1.3 Cluster Processor

The Cluster Processor contains an 8 MHz Intel 80186 processor with 256 KBytes (expandable offboard to 768 KBytes) of RAM with full Error Correction (ECC). It controls two cluster RS-422 ports each of which can transmit at 307 Kbaud or 1.8 Mbaud and receive at any speed from 307 Kbaud to 1.8 Mbaud. The RS-422 drivers are capable of transmitting at a distance of up to 1100 ft (335 m). RS-422 lines have DMA to provide high throughput.

The Cluster Processor supports three RS-232 ports, each capable of a baud rate of up to 19.2 Kbaud. The aggregate throughput will be dependant on the software, and it will be lower than the hardware baud rate. Two RS-232 lines are synchronous, asynchronous, or bit synchronous while the third line is an asynchronous only interface. The Centronics compatible parallel port has a DMA interface for high throughput. The RS-232 drivers will be capable of transmitting at a distance of 50 ft (15.25m). The printer interface drivers are capable of transmitting at a distance of up to 10 ft (3m).

The Cluster Processor runs CTOS allowing the use of all families of CT workstations, and the PT and GT terminals, concurrently with application execution on the Application Processor. In addition, the Cluster Processor runs communications oriented products such as SNA, IBM 3270, X.25, and IBM 2780/3780.

1.2.1.4 Applications Processor

The Applications Processor contains:

- A 10MHz Motorola 68010 CPU
- Memory Management Unit (MMU) hardware to support a two-level paging scheme
- 512 KBytes (expandable offboard to 4 MBytes) of Error Correcting RAM

The Applications Processor is dedicated to run both the CTIX kernel and CTIX applications.

Multiple Applications Processors can be added to the system to increase available processing power.

The Memory Management Unit (MMU) provides a highspeed (no wait states for the majority of instruction fetches), two level paging scheme with up to 4 MBytes of address space per Applications Processor. Each page is 4 Kbytes and each page has a status associated with it. A page is either not present, present but not accessed, accessed but not written, or written. There are up to 32 pages per segment.

The segment map provides protection for up to 64 system segments. Each segment can be execute only, read only, writable, or User Segment.

The system handles multiple processor addressing via an extended address. When addressing memory off board the processors issue a five byte address (CPU number/address). The appropriate CPU recognizes its CPU number and uses the address as input to its map.

1.2.1.5 Terminal Processor

The Terminal Processor contains an 8 MHz Intel 80186 processor with 256 KBytes (expandable offboard to 768 KBytes) of RAM with full Error Correction (ECC). The Terminal Processor contains ten RS-232 ports, four of which support synchronous, asynchronous or bit synchronous operation and the remaining six support asynchronous operations only. Each RS-232 line can operate at a baud rate of up to 19.2 Kbaud. The aggregate throughput will be dependant on the software, and will be less than the hardware baud rate. In addition, a Centronics compatible parallel printer interface port with DMA is provided.

The RS-232 drivers will be capable of transmitting at a distance of 50 ft (15.25 m); the parallel printer interface drivers will be capable of transmitting at a distance of up to 10 ft (3m)

The Terminal Processor runs the CTOS operating system kernel and provides a terminal interface for dumb terminals. The Terminal Processor provides terminal handling for CTIX programs concurrently with application execution on the Applications Processor. In addition, the Terminal Processor runs communications oriented products such as SNA, IBM 3270, X.25, and IBM 2780/3780.

1.2.1.6 Storage Processor

The Storage Processor contains an 8 MHz Intel 80186 processor with 256 KBytes (expandable offboard to 768 KBytes) of RAM with full Error Correction (ECC). It provides a tape interface for Pertec, Cipher, Kennedy and other compatible 1/2" tape drives. The interface drivers are capable of transmitting at a distance of 20 ft (6.1m). The Storage Processor also provides memory, DMA, and compute power for the SMD Controller and will support four tape drives.

1.2.1.6.1 SMD Controller

The SMD Controller uses a Signetics 8X300-family microcontroller and controls up to 6 external SMD drives. The controller interfaces to the system bus via the Storage Processor. The SMD interface drivers are capable of transmitting at a distance of 50 ft (15m).

1.2.1.7 Memory Expansion

There are two types of memory expansion in the MegaFrame, 1/2 MegaByte boards and 1 MegaByte boards. 1/2 Megabyte memory expansion boards can be used with Application Processor, Terminal Processor, Cluster Processor, Storage Processor, or File Processor boards in the system. 1 MegaByte memory expansion boards can be used to provide up to 4 Megabytes for each Application Processor. Each memory expansion board attaches to its processor board through a private bus. All memory (including that on the various Processor boards) utilizes 64 Kbit RAMs.

1.2.1.8 Bus Repeater

The Bus Repeater provides for a fully buffered, reliable interconnect between enclosures, allowing up to six enclosures.

1.2.1.9 Multibus Adapter

The Multibus adapter uses one backplane slot. A Multibus adapter is logically connected to a MegaFrame processor (File Processor, Cluster Processor, Storage Processor, or Terminal Processor). It cannot be logically connected to an Application Processor. Each Multibus extender board uses one backplane slot and expands the Multibus from the Multibus adapter. Up to two extenders may be connected to extend the Multibus to a total of three slots. Each extender occupies one backplane slot.

1.2.1.10 Operator Panel

The Operator Panel has a two character hexadecimal display showing system status and error conditions. It also has a System Reset button and a four position keyswitch control.

1.2.1.11 Panel Interface

The Panel Interface board occupies an unused slot in a base enclosure and provides an operator panel interface and system clocks.

1.2.1.12 Quarter Inch Tape Interface

The Quarter Inch Tape Interface provides an interface to the QIC-02 compatible tape drives. This board occupies an unused bus repeater slot in a base or expansion enclosure.

1.3 Software

All of the existing software that presently runs on the Convergent's family of cluster workstations will continue to run with the MegaFrame as a master station without change. In addition, all user-written cluster workstation applications also continue to execute without modification. The MegaFrame simply provides a faster vehicle to execute file and communications oriented services, serving in place of a master workstation. Functional capabilities of service programs such as communications servers (X.25, SNA, IBM 2780/3780, IBM 3270), and file servers (ISAM, Sort/Merge), that had previously executed in the master workstation will run in the MegaFrame. Besides the workstation software there are many other software packages available for use with the MegaFrame.

1.3.1 Operating Systems

The MegaFrame combines the proprietary CTOS message passing operating system with the CTIX system. This maximizes reliability and software compatibility while retaining UNIX (TM) System V compatibility. The two operating systems run concurrently in a manner transparent to the application of the user.

1.3.1.1 CTOS

The CTOS operating system is a real-time multi-tasking operating system for the Convergent family of workstations. It provides a reliable high performance base around which to build real-time, interactive applications. In addition, it provides facilities for multi-partition operations with a batch manager.

The CTOS operating system uses an event driven priority based scheduling algorithm to ensure that processor resources are always assigned to the active processing task with the highest priority. Inter-Process Communication (IPC) is performed via system calls to pass data and control information to other processes and synchronize their execution.

CTOS file management services provide reliable and efficient access to data files. Speed and efficiency are attained through careful placement of control data structures to minimize disk arm movement, and hashing techniques to reduce access to these structures. Frequently used control structures are maintained in system memory.

The integrity of file data is protected against hardware malfunction through duplication of critical control structures, and against unauthorized access through multi-mode file access control and multi-level file password protection.

The CTOS operating system is convenient and easy to use. It provides dynamic file expansion and contraction, a three level hierarchical organization, device independence, long file names, and selection of exclusive or shared access modes.

Modified forms of the CTOS operating system known as FpCtos, CpCtos, TpCtos, and SpCtos run in the File Processor, Cluster Processor, Terminal Processor, and Storage Processor of the MegaFrame respectively.

1.3.1.2 CTIX

The Applications Processor runs a virtual memory version of the CTIX operating system, based on and compatible with UNIX (TM) System V. CTIX provides a time-shared operating system for various terminals. The CTIX operating system consists of the following components:

1. The "Kernel" schedules tasks and manages data storage
2. The "CTIX Utilities" perform a variety of routine and special system maintenance functions
3. The Bourne Shell provides the standard CTIX Shell
4. CTIXOA (CTIX Office Automation)

CTIXOA is the default interface for a Programmable Terminal (PT) that connects and interprets the commands typed by a user. It is an object oriented interface for the office environment. The Bourne Shell is provided for systems programmers already familiar with CTIX.

CTIX file management services provide reliable and efficient access to data files. Speed and efficiency are attained by placing the file system on the File Processor to offload CTIX file processing overhead. CTIX also allows access to the ISAM facilities of CTOS.

CTIX terminal handling has been offloaded from the Application Processor and is handled by the Cluster Processor board for CT's PT terminals (PT terminals process some of the character manipulations), or the Terminal Processor board for conventional RS-232 terminals.

Reliability enhancements to UNIX (TM) System V include forced updating of disk whenever a file is closed and at other critical times and forced sequence of critical disk updates. Functional enhancements include demand paging, a printer spooler, automatic system startup and shutdown, and access to CTOS supported services.

Convergent's CTIXOA incorporates a window manager which provides multiwindow, multiapplication environment in which a user may view and manipulate multiple applications on the same PT terminal screen. The window manager allows users to run existing CTIX applications within a window and copy and move information between financial spreadsheets, word processor documents, electronic mail, query, and any existing user written applications.

1.3.2 Programming Languages

CTIX based languages are a BASIC Interpreter, BASIC Compiler, FORTRAN Compiler, PASCAL Compiler, COBOL Compiler, and "C" Language Compiler.

1.3.2.1 BASIC Interpreter

1. Conforms to the ANSI X3.60-78 standard
2. Extensive screen formatting capability with the print using command
3. Video cursor addressing and attribute manipulation using escape sequences
4. Access to external subprograms written in "C" and Assembler
5. Access to DBMS, ISAM, Sort/Merge, and the Forms facility

1.3.2.2 BASIC Compiler

1. Compatible with the BASIC Interpreter

1.3.2.3 FORTRAN Compiler

1. Full FORTRAN 77 ANSI X3.9-78
2. 3.5 MByte virtual address
3. Extensive error messages
4. Data types allowed are:
 - a. Integer 1, 2, 4
 - b. Real 4,8
 - c. Complex
 - d. Logical 1, 2, 4
 - e. Character
5. Cross reference listing
6. IEEE standard representation of Real Data

1.3.2.4 PASCAL Compiler

1. Conformance to ISO 1980 draft standard, with the following exceptions:
 - MegaFrame Pascal provides three nonstandard data types: LONGINT, STRING, and DOUBLE.
 - In MegaFrame Pascal, an AND, OR, or NOT on INTEGER values are valid operations.
 - A MegaFrame Pascal CASE statement can have an OTHERWISE clause.
 - MegaFrame Pascal provides many features of UCSD Pascal that are not in ISO Pascal.
 - MegaFrame Pascal uses only the first eight characters in an identifier.
 - MegaFrame Pascal does not implement the standard procedures PACK and UNPACK
 - MegaFrame Pascal does not implement conformant arrays.
 - A MegaFrame Pascal program does not handle interactive terminals in the way the standard prescribes for text files.
2. 3.5 MByte virtual address
3. Extensive error messages
4. IEEE standard representation of Floating Point Data

1.3.2.5 COBOL Compiler

1. ANSI X3.23 1974
2. GSA High except for Report Writer and Communications
3. Screen handling facilities
4. Symbolic debug

1.3.2.6 "C" Language Compiler

1. Conforms to "The C Programming Language" - Kernighan/Ritchie 1978 plus added "Standard System V" extensions.

1.3.3 Data Management Facilities

Data Management Facilities include Forms Facility, Sort/Merge, and Multikey ISAM.

1.3.3.1 Multikey ISAM

CT's ISAM supports multi-user access to common information. Each ISAM Data Set can be created with up to 100 keys, each key can be up to 64 bytes long. Each key is described by its position in the record, the key length, and the key type. Twelve key types are allowed: byte string, character string, binary, long real, short real, decimal (even), decimal (odd), display, integer, long IEEE, short IEEE, and extended IEEE. Transactions with record locks and queueing are supported.

To increase flexibility, several parameters can be specified for each key when an ISAM Data Set is created.

1. Whether duplicates are allowed
2. Whether the index is to be kept in ascending or descending order
3. Whether indexing of null value fields is to be suppressed

1.3.3.2 Forms Editor

1. Takes full advantage of the PT terminal's video capacity
2. Usable only on PT and GT terminals.
3. Interactive design and test of sophisticated business and graphics forms
4. Protected and unprotected text and graphics rulings
5. Application control of run time sequencing between fields and specification of data validation routings
6. Forms run time modules are called from application programs

1.3.3.3 Sort/Merge

The Sort/Merge Facility is an efficient means of sorting and merging data. The Sort/Merge Package provides:

1. Variable length and fixed length records
2. Multi-level sorts of up to 15 levels
3. Procedural interface from application program
4. User specified collating sequence is optional

1.3.4 Communications Software

1.3.4.1 X.25 Gateway

1. Provides services necessary to operate on public packet switching networks
2. Full implementation of CCITT X.25
3. Provides three levels of access: Packet Level, Bytestream Level, terminal Emulator executing on a workstation

1.3.4.2 SNA Gateway

1. PU.T2 (3276) functionality
2. LU.T2 (3278) and LU.T3 (3287) support
3. Line speed to 9600 bps
4. Provide access from workstations only

1.3.4.3 IBM 2780/3780 Emulation

1. Conform to ANSI X3.28 subcategory 2.1, Message Transfer subcategories B2 and D1 (EBCDIC Code Transmission)
2. Files can be queued and transmitted automatically
3. Spooled printing of output
4. Baud rate up to 9600 bps

1.3.4.4 IBM 3270 Emulation

1. Emulation of IBM 3271-1/2 Controller
2. Provides access from workstations only.

2.0 PHYSICAL DESCRIPTION AND INSTALLATION REQUIREMENTS

2.1 Cabinet Description

2.1.1 MegaFrame Enclosure Types

The A Base Enclosure consists of a card cage with 6 Processor/Memory slots and 2 Bus Repeater slots. One of the Processor slots contains the File Processor which controls the Operator Panel, one to three Fixed Disk Drive Modules, and a Removable Disk Drive Module.

The B Expansion Enclosure consists of a card cage with 6 Processor/Memory slots and 2 Bus Repeater slots, and provision for up to four Fixed Disk Drive Modules.

The C Base Enclosure consists of a card cage with 6 Processor/Memory slots and 2 Bus Repeater slots. One of the Processor slots contains the File Processor which controls the Operator Panel and one to three Fixed Disk Drive Modules. One of the Bus Repeater slots contains the Quarter-Inch Tape Interface Board which controls the Quarter Inch Tape Drive Module.

The D Expansion Enclosure consists of a card cage with 6 Processor/Memory slots and 2 Bus Repeater slots, and provision for up to three Fixed Disk Drive Modules. One of the Bus Repeater slots contains the Quarter-Inch Tape Interface Board which controls the Quarter Inch Tape Drive Module.

The E Base Enclosure consists of a card cage with 6 Processor/Memory slots and 2 Bus Repeater slots. Two of the Processor slots contain the Storage Processor and SMD Controller Boards for controlling external SMD Drives and 1/2" Tape Drives. One of the Bus Repeater slots contains the Panel Interface board which controls the Operator Panel.

2.1.1.1 Card Cage

The Card Cage assembly consists of a sheetmetal card cage, backplane, card guides, and receptacle for the System Power Supply Module. The backplane provides 6 logic card slots, 2 dedicated Bus Repeater slots, and accepts the plug-in System Power Supply module.

2.1.1.2 System Power Supply Module

The System Power Supply Module contains the AC line filter, ON/OFF switch, fuse, an AC distribution system (cabling), an optional 115/230 volts mod kit, and provides DC power for the logic. System Power Supply Modules can be reconfigured from 115V 50/60 Hz to 230V 50/60 Hz by moving a jumper and installing the optional 115/230 volts mod kit. In both configurations, 115 VAC is available for the Fixed Disk Modules, Removable Disk Module, Tape Module, and fans.

2.1.1.3 Fixed Disk Module

A Fixed Disk Module consists of a 5 1/4" Winchester disk drive with a dedicated Disk Power Supply. It is powered by 115 volts AC from the System Power Supply Module.

2.1.1.4 Removable Disk Module

A Removable Disk Module consists of a 5 1/4" removable disk cartridge with a dedicated Disk Power Supply. It is powered by 115 volts AC from the System Power Supply Module.

2.1.1.5 Tape Module

A Tape Module consists of a 5 1/4" removable 1/4" tape cartridge drive with a dedicated Power Supply. It is powered by 115 volts AC from the System Power Supply Module.

2.1.2 Enclosure Physical Characteristics

Enclosure Dimensions

Height: 29" (74cm)

Width: 16" (41cm)

Depth: 28" (72cm)

Weight: 150-200 lbs (68.1-90.8 kg) depending on configuration.

A maximum configuration of 6 cabinets (one base and five expansion) will be approximately 99" wide and 28" deep.

2.2 Site Requirements

2.2.1 General

Each enclosure should plug into a three-pronged electrical outlet conforming to electrical code requirements for the location. The system should be placed on a firm floor or foundation free from abrupt movement.

An operator or technician will need to access the ON/OFF switch, the control panel, doors, and components inside the enclosure. The ventilation grilles at the front and rear of the system should be free from obstruction. The front of the system must not be located near hot air exhaust from adjacent equipment.

2.2.2 Electrical

Maximum AC Power Requirements per Enclosure.

115V at 47 to 63 Hz, 8 amps, or
230V at 47 to 63 Hz, 4 amps.

2.2.3 Ambient Temperature Range

Operating: 10 degrees C to 40 degrees C
Non-Operating: -40 degrees C to 60 degrees C

2.2.4 Relative Humidity Range

Operating: 20% to 80% RH, non condensing
Non-Operating: 5% to 95% RH, non condensing

2.2.5 Altitude Range

Operating: Sea Level to 10,000 feet
Non-Operating: Sea Level to 30,000 feet

2.2.6 Shock

Operating: 5 g
Non-Operating: 15 g

2.2.7 Acoustical Noise

Maximum noise level of a single enclosure is 55 dbA as measured 3 feet away, 5 feet high, any direction from unit.

2.2.8 Shipping Containers

Packaging and shipping containers and procedures comply with the current NSTA preship test procedures.

2.2.9 Safety/Emissions/ESD Specifications

Meets or Exceeds the following requirements:

UL 478 (EDP) and 114 (Office Equipment)
CSA 154 (EDP) and 143 (Office Equipment)
FCC Part 15, Subpart J, Class A
VDE 0806/8.81 (Office Equipment)
VDE 0871/6.78, Level A
IEC 380 (Office Equipment)
ESD: Convergent Technologies Specification #02-00102-00

2.3 Reliability Data

<u>ITEM</u>	<u>MTBF (HRS)</u>	<u>ENCLOSURE MIN. USAGE</u>	<u>FAILURE RATE</u>	<u>NOTE</u>
Fans	10,000	A-E	100	1.b
Power Distribution Assy.	38,500	A-E	26	1.a,3
Back Plane	155,053	A-E	6	2
Control Panel	56,556	A,C,E	18	2
QICI Flex	5,807,201	C,D	0.2	2
Printed Circuit Boards:				
File Processor	13,530	A,C	74	2
Cluster Processor	12,664		79	2
Terminal Processor	10,756		93	2
Application Processor	13,128		76	2
Storage Processor	16,248	E	62	2
SMD Controller	39,138	E	26	2
1/2 MB Memory Expansion	25,821		39	2
1 MB Memory Expansion	18,630		54	2
2 Slot Bd-Bd Connector	6,016,847		0.2	2
3 Slot Bd-Bd Connector	5,737,235		0.2	2
4 Slot Bd-Bd Connector	5,482,456		0.2	2
QICI	36,583	C,D	27	2
PI	411,879	E	2	2
Bus Repeater (Qty 1 MTBF)	129,527	B,D (2 Rqd)	8	2
Multibus Adapter	75,356		13	2
Multibus Expansion	5,817,336		0.2	2
MBI2	6,016,847		0.2	2
MBI3	5,737,235		0.2	2
LBI2	6,016,847		0.2	2
LBI3	5,737,235		0.2	2
Storage Devices:				
5 MB formatted Disk				
Cartridge Module	8,620	A	116	
Disk Drive	11,000		91	1.b
Disk Power Supply	40,000		25	1.a
50 MB Unformatted Fixed				
Disk Module	8,620	A,C	116	
Disk Drive	11,000		91	1.b
Disk Power Supply	40,000		25	1.a
1/4" Tape Drive				
Cartridge Module	8,620	C,D	116	
Tape Drive	11,000		91	1.b
Tape Drive Supply	40,000		25	1.a

NOTES:

1. MTBF (Mean Time Between Failure) of Purchased Subassemblies

The MTBF of purchased subassemblies used in this product are derived as follows:

- a) If the subassembly is custom built to CT specification, the specification will call out a minimum MTBF required of that assembly.
- b) If the subassembly is purchased as a manufacturer's standard part, CT will use the manufacturers stated MTBF for that subassembly.

2. MTBF of CT Designed Assemblies

The MTBF for the assemblies designed and built by/for CT is CALCULATED using the MIL HDBK 217-D parts count method at ground benign environment. Commercial quality factors are used for all components except IC's where a level of one-half the commercial value is deemed reasonable due to product test/manufacturing process.

3. PDA

THE PDA (Power Distribution Assembly) refers to the combination of the Main Power Supply, the sheetmetal it is enclosed in, the line filter, and the AC cabling that is routed inside it. This constitutes the field removable unit.