Symmetry 2000 Hardware Maintenance

1003-54362-00

SEQUENT COMPUTER SYSTEMS, INC.

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Symmetry 2000 Hardware Maintenance Course Description

Course Goals: Provide students with a theoretical and practical working knowledge of the Symmetry 2000 hardware and the necessary skills to install, maintain and repair the Symmetry 2000 system.

Audience: This course is designed for people who need to install, maintain, and service the Symmetry 2000 hardware.

Prerequisites: Familiarity with computer hardware concepts and some experience maintaining computer hardware.

Duration: 4.5 days

Course Objectives: During this course, each student will:

- describe the functions of the major hardware components of the Symmetry 2000 system
- initialize the system configuration and boot parameters
- execute the hardware diagnostics
- perform startup and shutdown procedures
- install and configure the hardware system
- install and configure various peripherals
- identify, remove, and replace the Field Replaceable Units (FRUs) of the Symmetry 2000 system

Welcome

- **Instructor Introduction**
  - Name
  - Background
  - Expectations

- **Student Introductions**
  - Name
  - Background
  - Expectations

- **Schedule**
  - Breaks
  - Lunch
  - Start/stop time

- **Facilities**
  - Building access
  - Messages
  - Telephones
  - Restrooms
  - Smoking policy
  - Parking
  - Emergency exits

Chapter 1
Product Overview

Product Overview
Objectives

You will:

a. list two features of the S2000/200 system

b. list two features of the S2000/400 system

c. list two features of the S2000/700 system

Introduction

- **Sequent manufactures high performance systems**

  STARTED IN 1983

- **Family line of products**
  - small, 16-user, single-processor system
  - large, 256+ users, 32-processor system

- **Binary-compatible between systems**

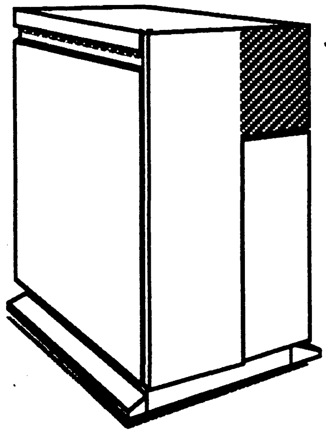
- **Interconnectivity between systems**

- **Industry standard hardware**

  SCSI BUS

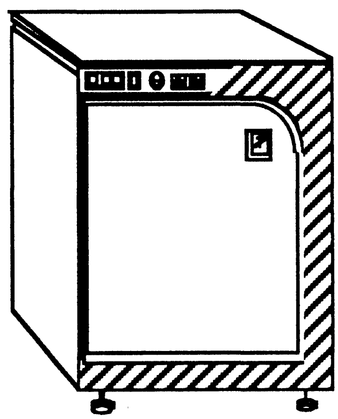
Symmetry 2000 Product Line

S2000/200



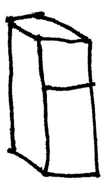
+6 PROCESSORS
UP TO 80MEG
VME BUS
3 SNCR. SCSI

S2000/400

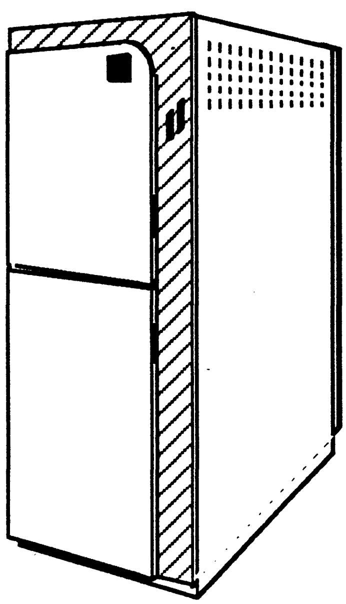


+10 PROCESSORS
128 MEG
MULTIBUS-1
16 SWALLOW

S2000/40



S2000/700



+20 PROCESSORS
384 MEG
256 DIRECTLY CONN. SERIAL PORTS
56 SWALLOW
MULTIBUS-1

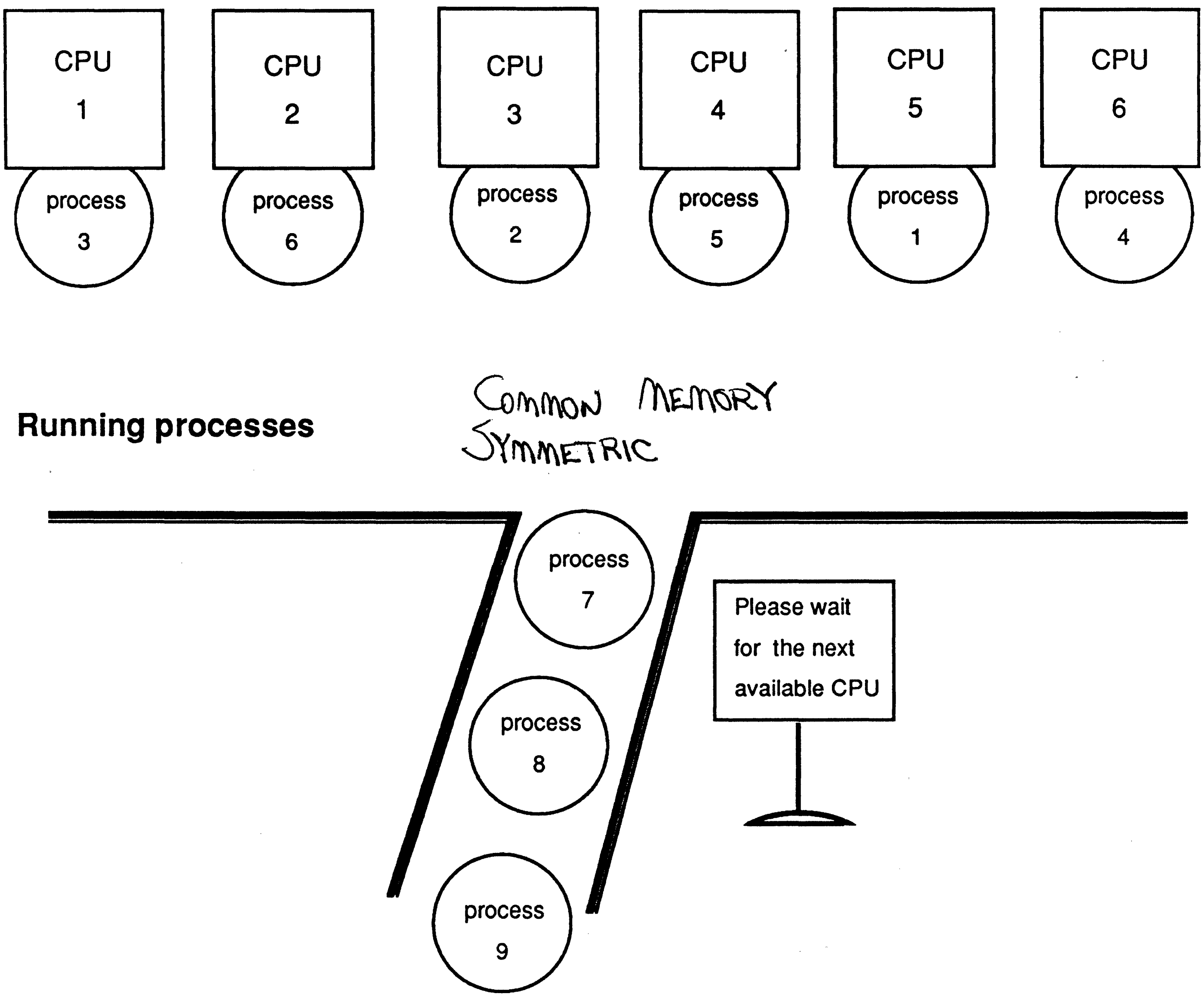
System Features

- **Symmetry systems offer:**
  - Multiprocessing MULTIPLE CPU'S WORKING TOGETHER-
  - Multitasking/Multiuser EACH JOB IS SPLIT INTO PIECES
    (ONE JOB BROKEN UP OVER MULTIPLE CPU'S)
  - Industry standards INTEL 486 VME BUSS
    SCSI
    SMD DRIVES
  - Expandable
  - UNIX-based operating system SYSTEM 5 BASE
    DYNIX PTX

MULTIPROGRAM- MULTIPLE PEOPLE RUNNING DIFFERENT PROGRAMS AT THE SAME TIME-

RELIABLE- 1 FAILURE A YEAR MTBF

Multiprocessing
Process Distribution



Running processes

Processes waiting for CPU time

Industry Standards

- **Intel 80486 microprocessor**
  HIGH PERFORMANCE FLOATING POINT BUILT IN
- **VMEbus** FASTER 32 BIT
- **MULTIBUS** 400 & 700 MODELS 16 BIT
- **SCSI bus and devices**
- **Ethernet**
- **UNIX operating system** DYNIX PTX 1.3

Expandable

- Wide range of expandability within a system
- Expand processing power without changing system cabinets or operating system
- Increase system memory
- Expand storage capabilities
- Increase I/O capabilities

UNIX-based Operating System

- **Supports SystemV or Berkeley versions of UNIX**

  DYNIX/ptx   SYSTEM 5
  DYNIX 3.1   BERKELY VER.
                 DYNAMIC UNIX

- **Complete UNIX system ports**

- **Support for multiprocessing**

Self Check

1. Write the letter of the correct answer in the blank.

E CPU used in Symmetry systems

B Industry standard medium for inter-system communication

A Sequent's version of UNIX

A DYNIX/ptx™

B Ethernet

C NSC 32032

D MULTICS

E Intel 80486

F Expandable

2. List two features of each Symmetry 2000 system.

200 80 MEG
VME

400 128 MEG
MULTIBUS-I

700 384 MEG
MULTIBUS-I

Chapter 2

Architecture Overview

Architecture Overview
Objectives

You will:

a. identify the major functional blocks of a S2000/200, S2000/400 & S2000/700 from system block diagrams

b. describe the function of the following system boards:
- SSM2 (System Services Module)
- SSM (System Services Module)
- PROC (Dual Processor Board)
- MEMC (Memory Controller)
- MEMX (Memory Expansion)
- MBAD (MULTIBUS Adapter)
- DCC (Dual-channel controller)
- SCED (Ethernet board)
- CADM (Clock, arbitration board)

c. describe the function of these buses in an S2000 system:
- System bus
- SLIC bus
- SCSI bus
- VMEbus
- MULTIBUS

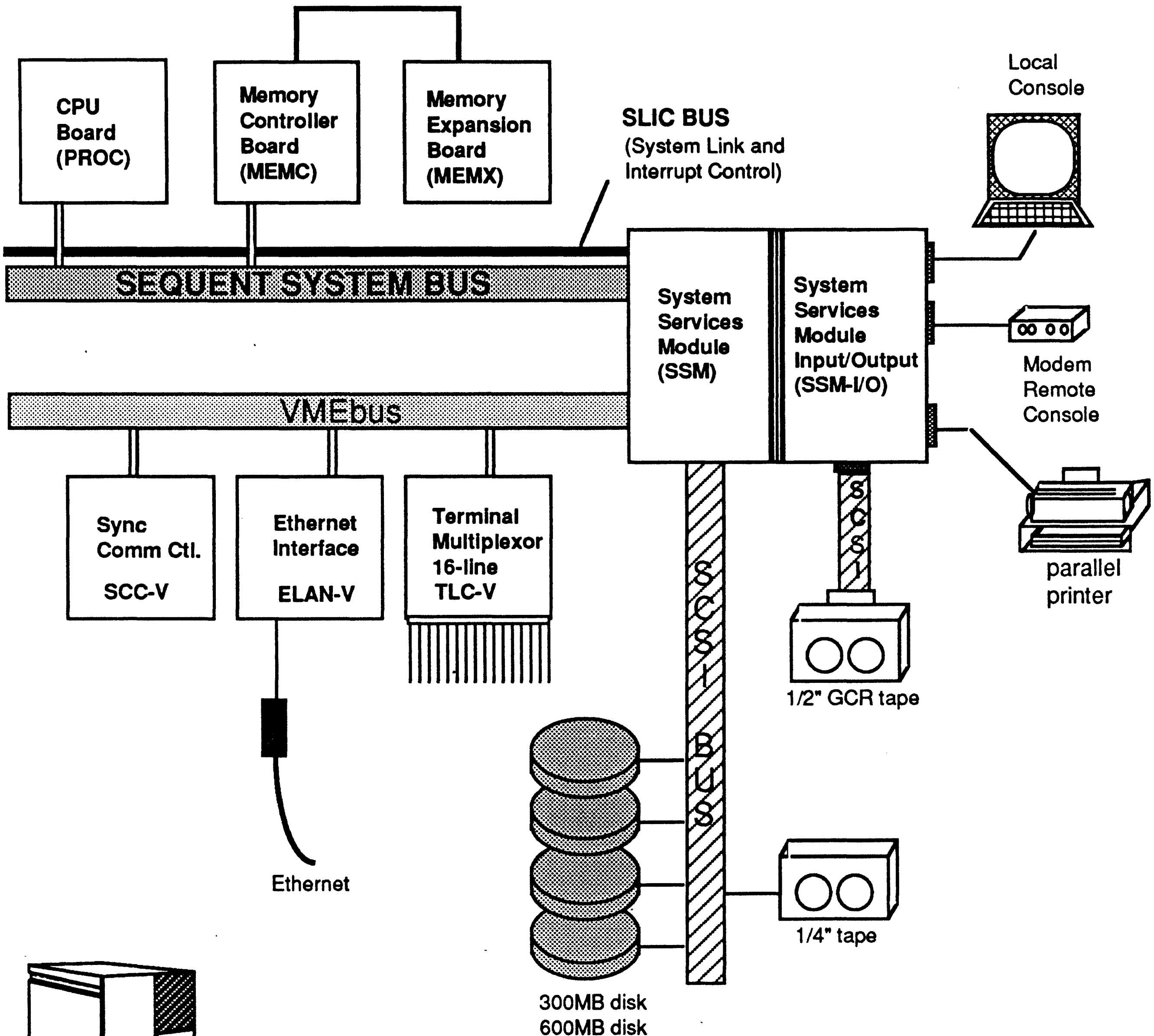
Architectural Overview Objectives

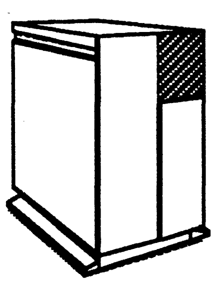
d. describe the function of the following MULTIBUS boards:
   - MBIF (MULTIBUS Interface board)
   - TLC-M (Terminal multiplexor board)
   - SCC-M (Synchronous Communications Controller)
   - PPC (Parallel printer controller)

e. describe the function of the following VMEbus boards:
   - ELAN-V (Ethernet Interface Board)
   - TLC-V (Terminal Multiplexer)
   - SCC-V (Synchronous Communication Controller)

f. describe the function of the following peripherals:
   - SCSI Disk
   - SCSI 1/4" Cartridge Tape Drive
   - SCSI 1/2" Tape Drive
   - SMD Disks

S2000/200
System Diagram





S2000/200
System Components

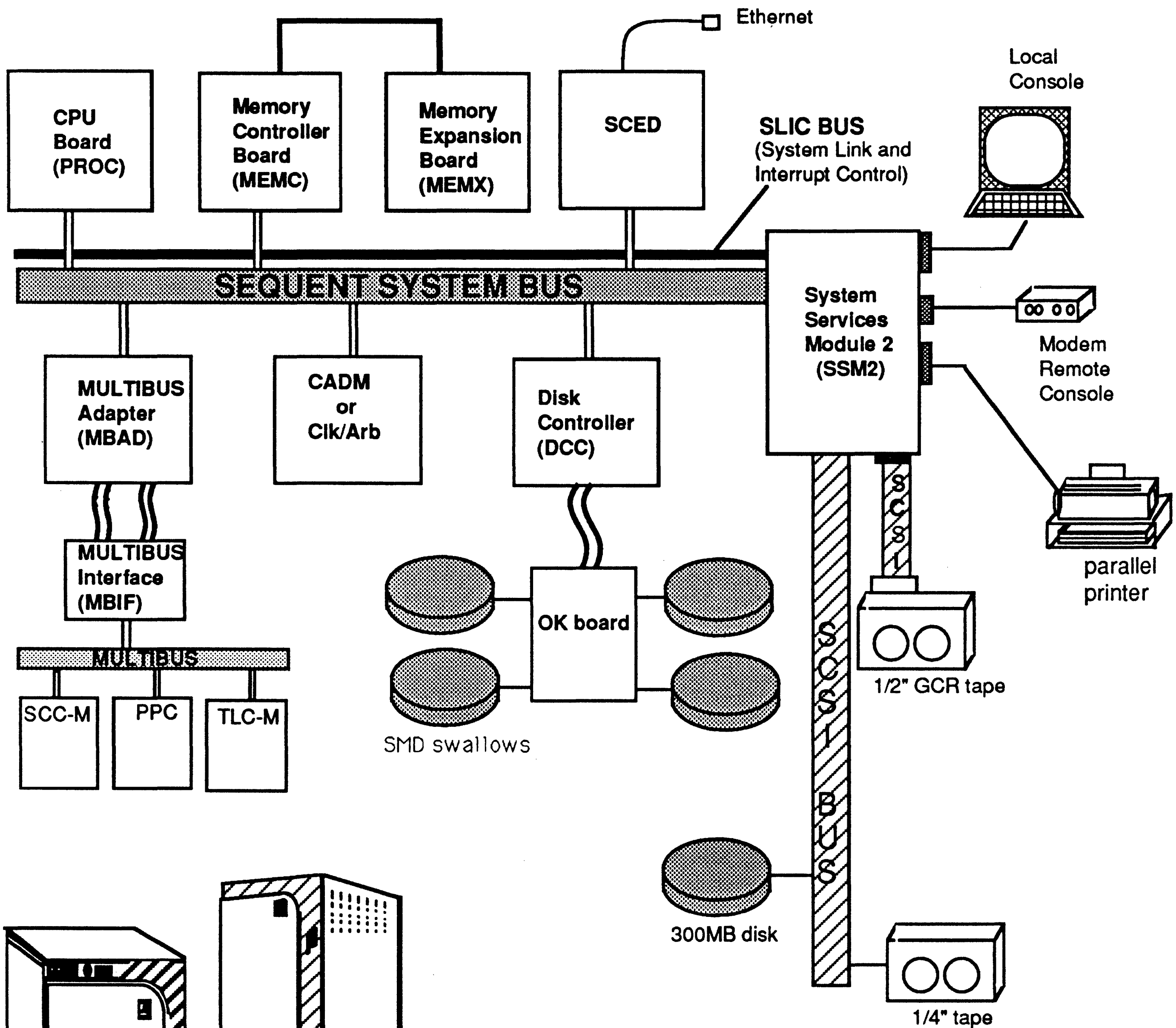
- **System boards**
  - System Services Module — **SSM**
  - Processor Board — **PROC**
  - Memory Controller (8MB or 16MB) — **MEMC**
  - Memory Expansion (24MB or 48MB) — **MEMX**

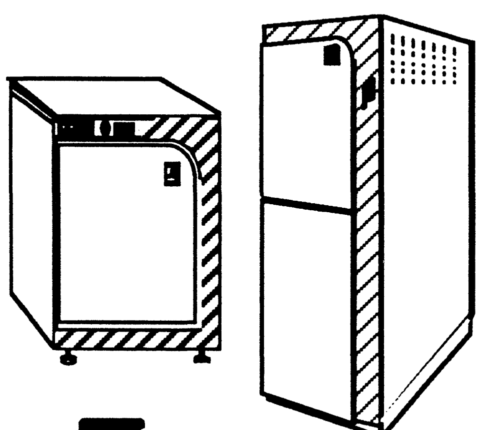
- **Buses**
  - Sequent System Bus — **SSB** SB 8000
  - System Link Interrupt Control Bus — **SLIC**
  - Small Computer Systems Interface — **SCSI**
  - VMEbus — **VMEbus**

- **VMEbus boards**
  - Ethernet LAN Controller — **ELAN-V**
  - Terminal Line Controller — **TLC-V**
  - Synchronous Comm. Controller — **SCC-V**

- **Peripherals**
  - SCSI 1/4" tape drive
  - SCSI 5 1/4" disk drives
  - SCSI GCR 1/2" tape drive

S2000/400 & S2000/700
System Diagram





S2000/400 & S2000/700
System Components

- **System boards**

- System Services Module 2	**SSM2**
- Processor Board	**PROC**
- Memory Controller (8MB or 16MB)	**MEMC**
- Memory Expansion (24MB or 48MB)	**MEMX**
- Dual Channel Disk Controller	**DCC/OK**
- MULTIBUS Adapter	**MBAD**
- Ethernet Controller	**SCED**
- Clock Arbitration Board	**CADM**

- **Buses**

- Sequent System Bus	**SSB**
- System Link Interrupt Control Bus	**SLIC**
- Small Computer Systems Interface	**SCSI**
- MULTIBUS	**MULTIBUS**

- **MULTIBUS boards**

- Terminal Line Controller	**TLC-M**
- Synchronous Comm. Controller	**SCC-M**
- Parallel Printer Controller	**PPC**

- **Peripherals**
  - SCSI 1/4" tape drive
  - SCSI 5/14" disk drives
  - SCSI GCR 1/2" tape drive
  - SMD disks

SSM Board

- **Resides only in the S2000/200 system**

- **Two board set**

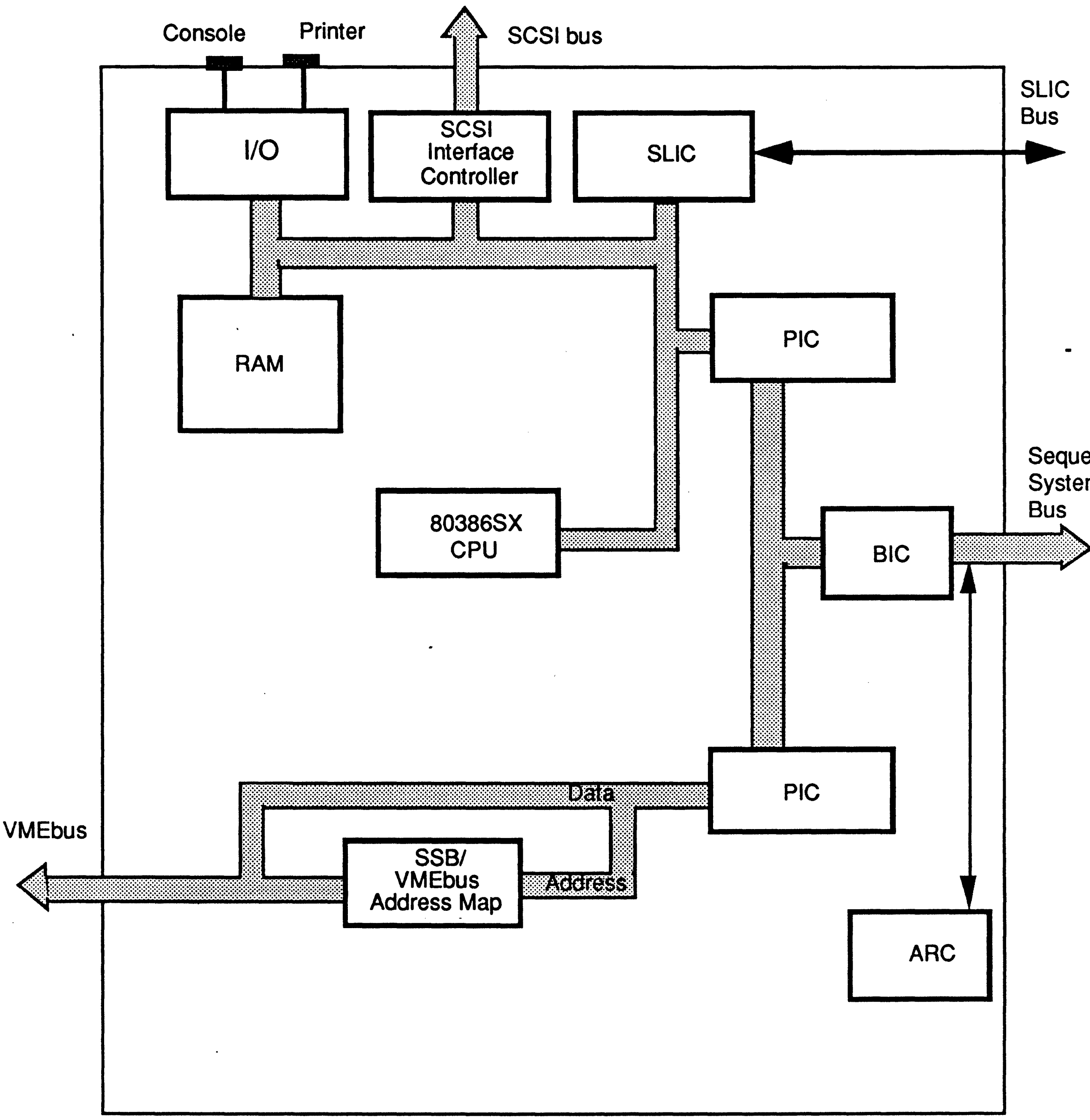
  - SSM
  - SSM-I/O

- **Two main functions:**

  - **system initialization**
    - SSM self-test boot phase
    - Booting of operational firmware
    - Diagnostic processor
    - System configuration
    - Testing system configuration
    - Booting of operating system

  - **run-time responsibilities**
    - Sequent system bus functions
    - On-board communications functions
    - VMEbus interface

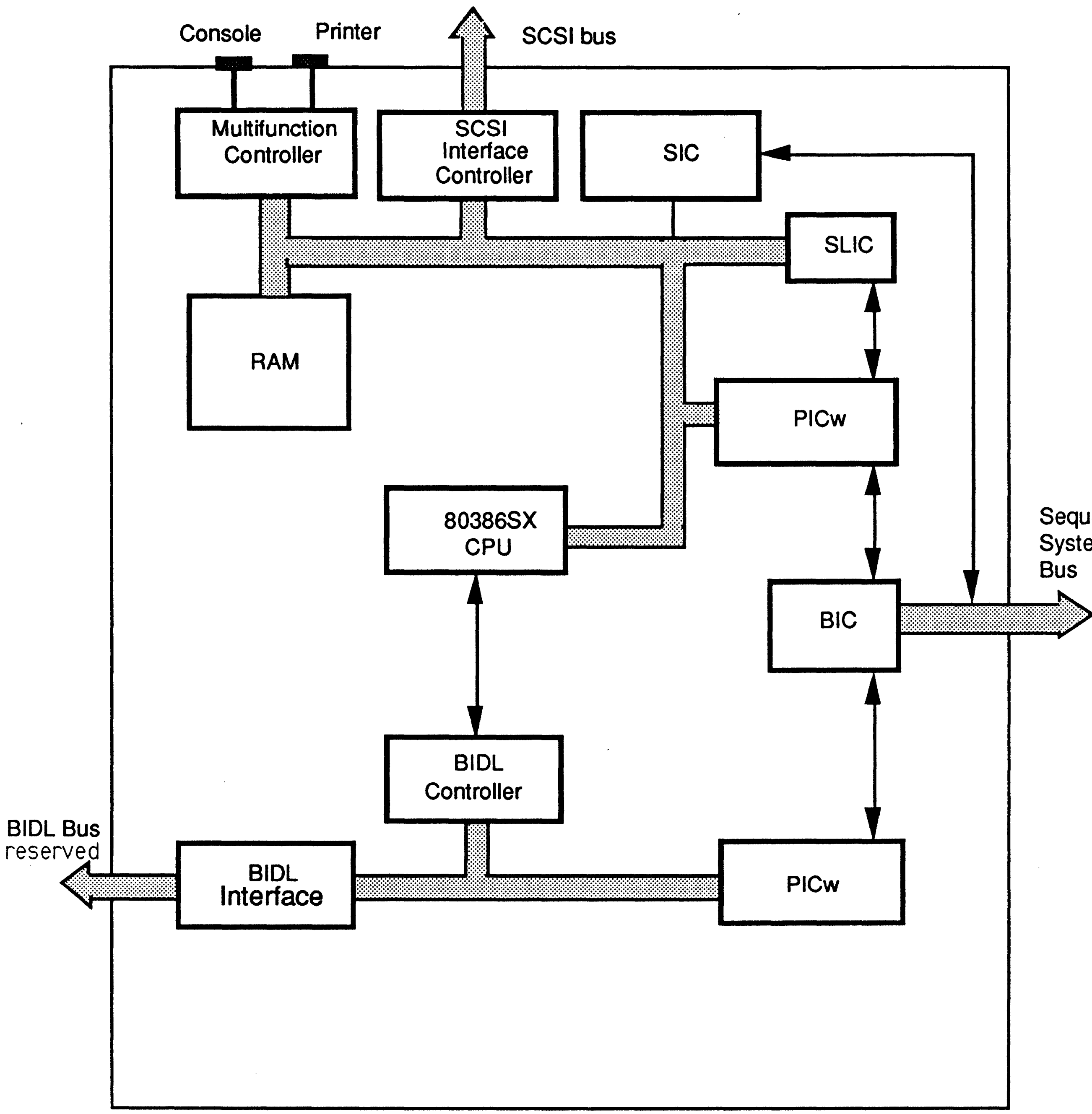
SSM Board Block Diagram



SSM2 Board

- **Resides in the S2000/400 & S2000/700 only**
- **Single board**
- **Two main functions:**
  - **system initialization**
    - SSM self-test boot phase
    - Booting of operational firmware
    - Diagnostic processor
    - System configuration
    - Testing system configuration
    - Booting of operating system
  - **run-time responsibilities**
    - On-board communications functions
    - SCSI bus interface

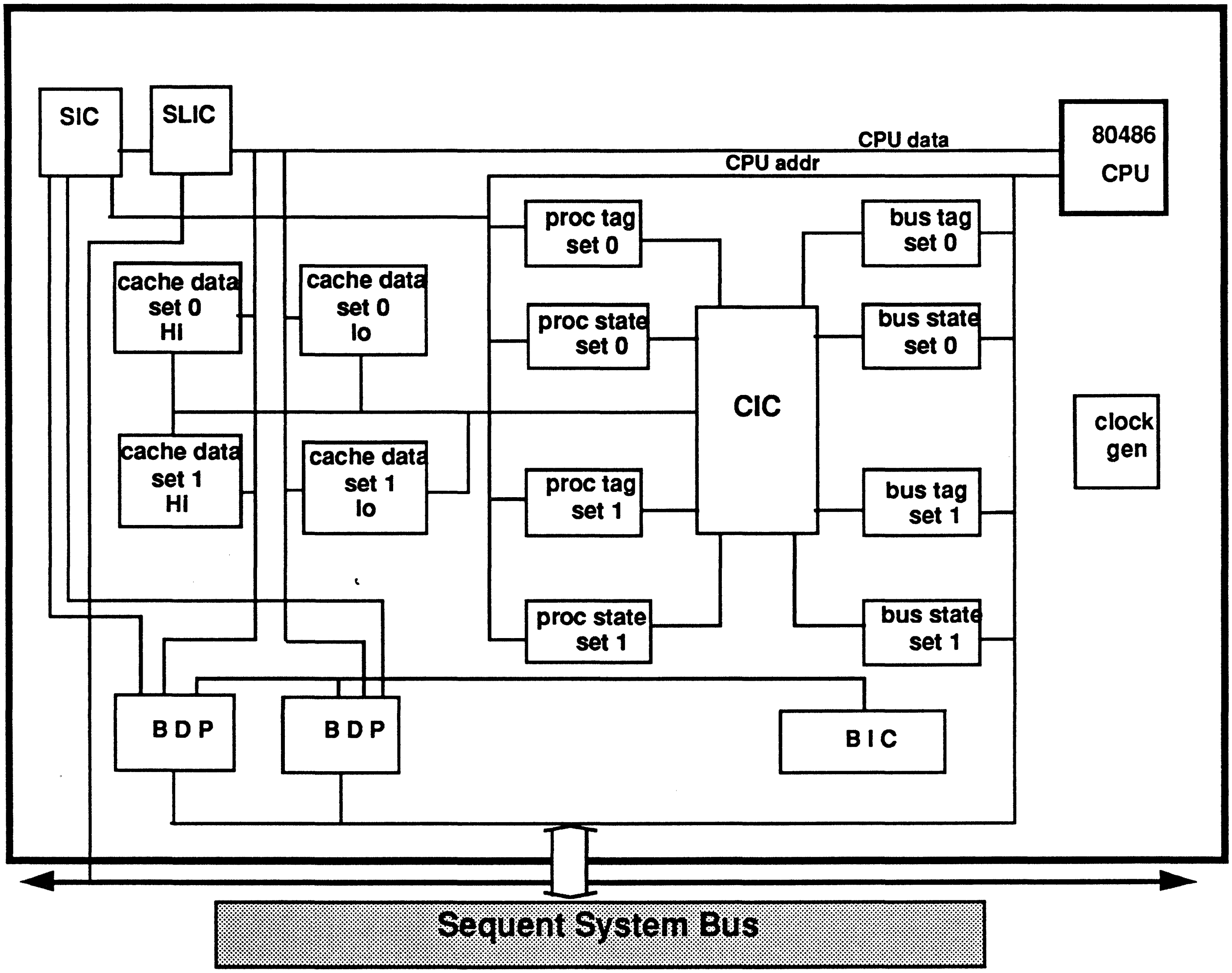
SSM2 Board Block Diagram



Processor Board

- Based on Intel 80486 processors
- Two CPU's per board
- 25MHZ clock
- 512k byte cache per processor
- Supports 64-bit operations
- Memory management

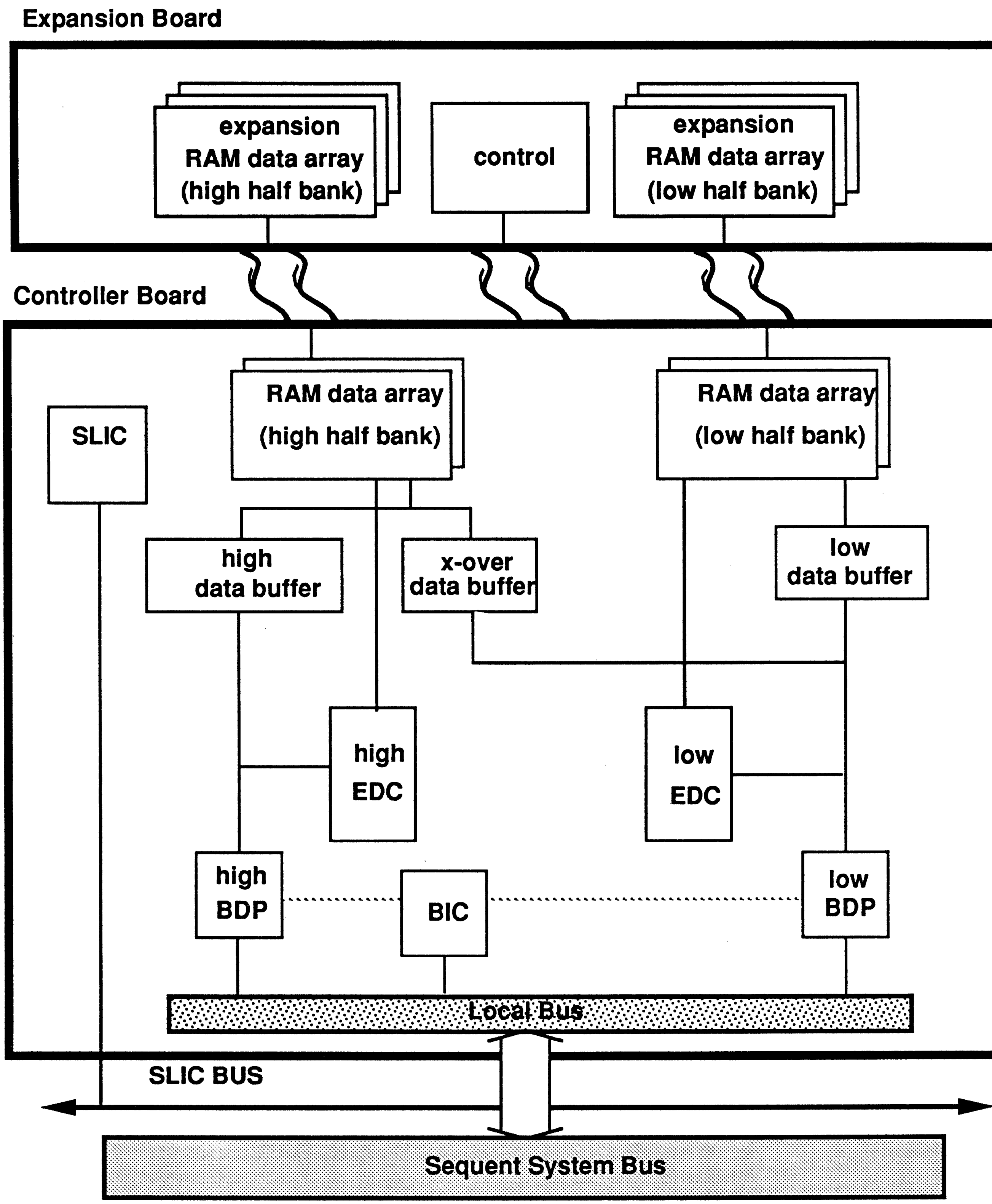
Processor Board Block Diagram



Memory Boards

- 8MB or 16MB of RAM on Controller Board
- 24MB or 48MB Expansion Board 128 MB
  SINGLE BIT ERROR CHECK
  SYNDROME WORD / PARITY
- 64-bit Data Bus
- Single-bit error detect and correct
- Double-bit error detect (no correct)
- Error scrubbing during refresh

Memory Set Block Diagram



MBAD/MBIF

- **Resides only in the S2000/400 & S2000/700**

- **Two-board set**

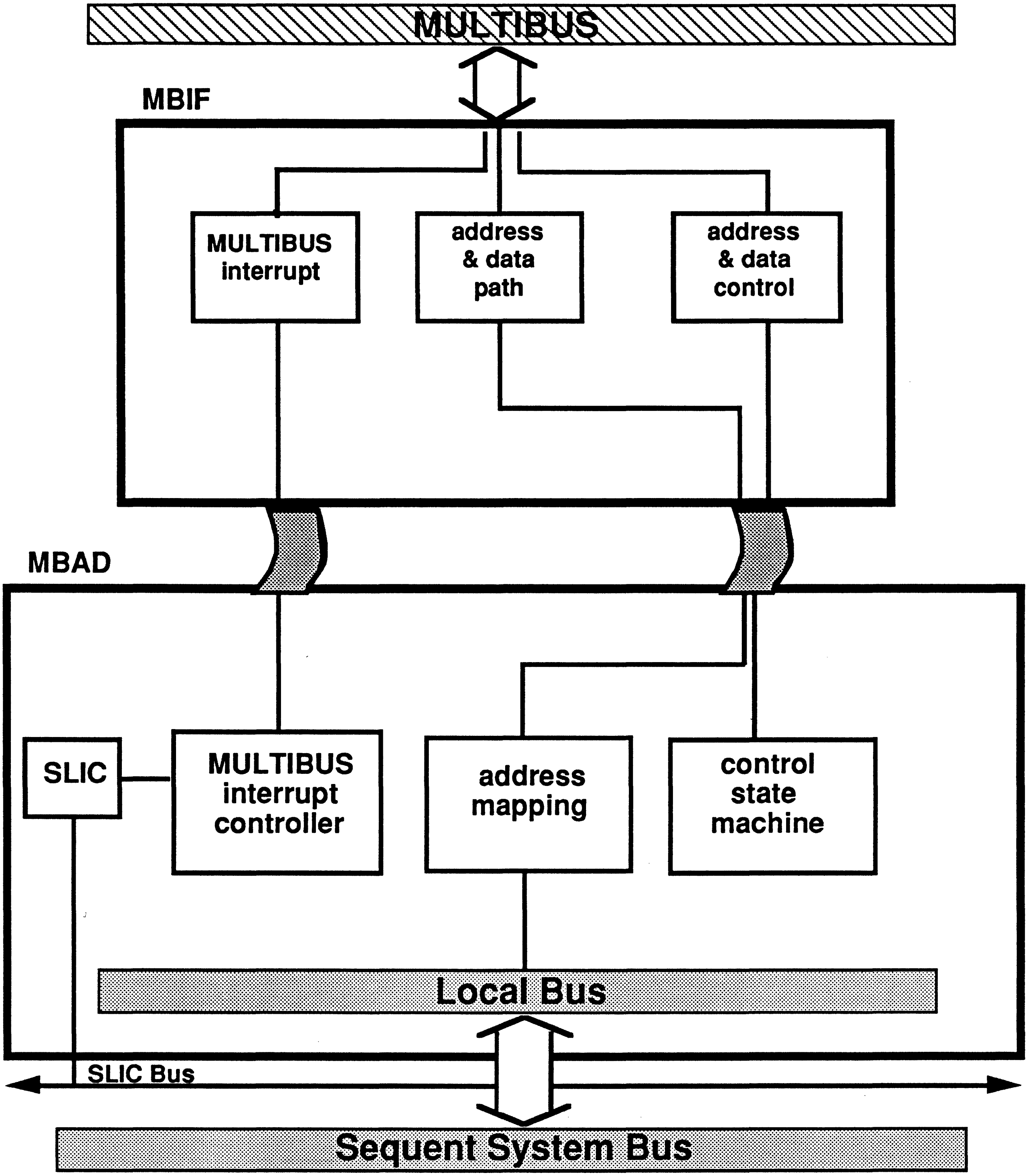
  MBAD in Sequent card cage
  - interfaces with Sequent system bus

  MBIF in MULTIBUS cage
  - resides in the MULTIBUS expansion cabinet
  - Euro-card format

- **Interfaces Sequent system bus to MULTIBUS**

- **Boards are connected by external cabling**

MBAD/MBIF Block Diagram

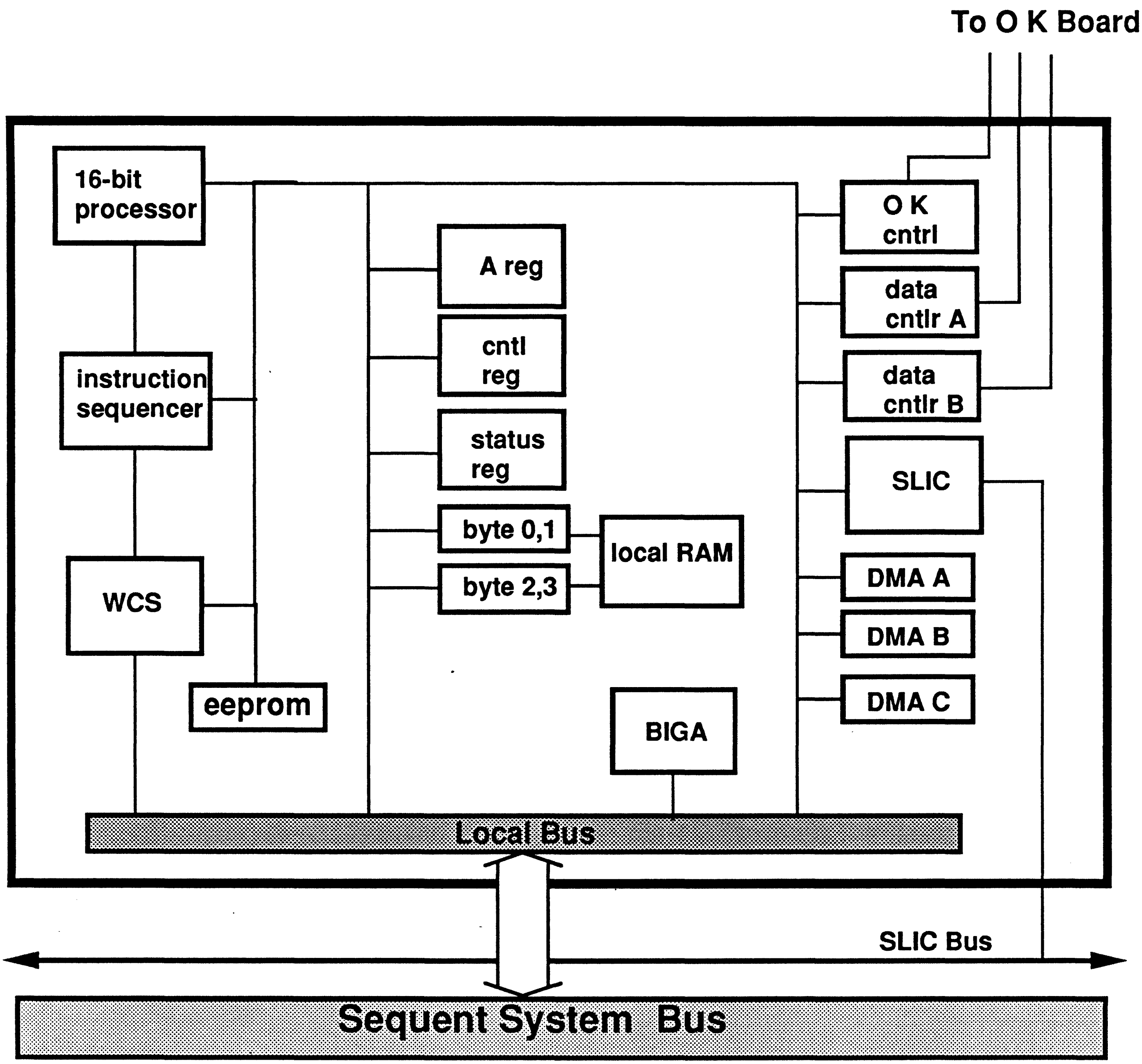


DCC/OK Boards

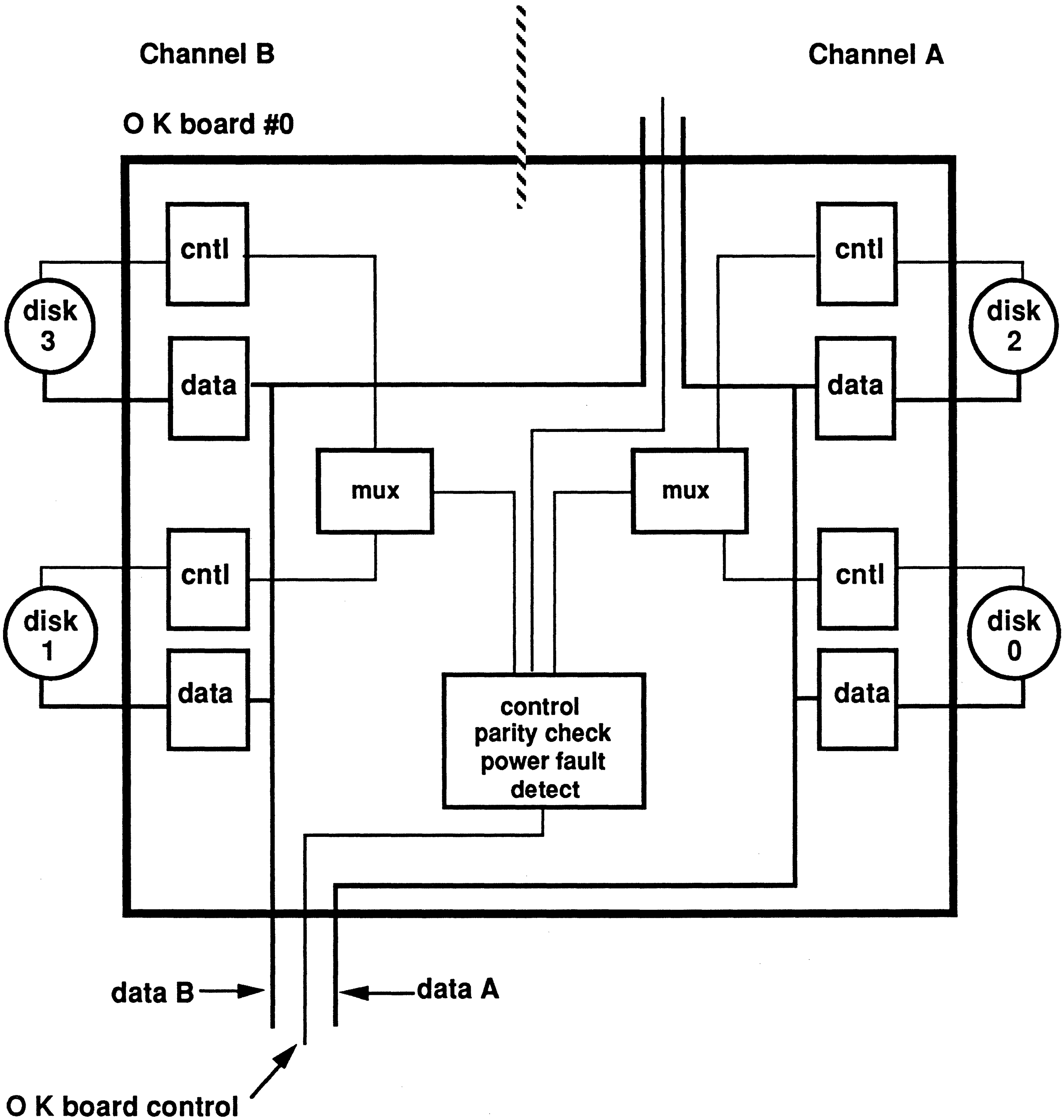
- **S2000/400 & S2000/700 only**
- **Provides the interface to SMD disk subsystem**
- **DCC board provides the interface to the system bus**
- **OK board provides the interface to the SMD disks**
- **Up to 2 OK (multiplexor boards) per DCC**
  - 4 disks per OK
  - 8 disks per DCC

TRANSFER RATE 2.5 MEG/CHNL

DCC Block Diagram



OK Block Diagram



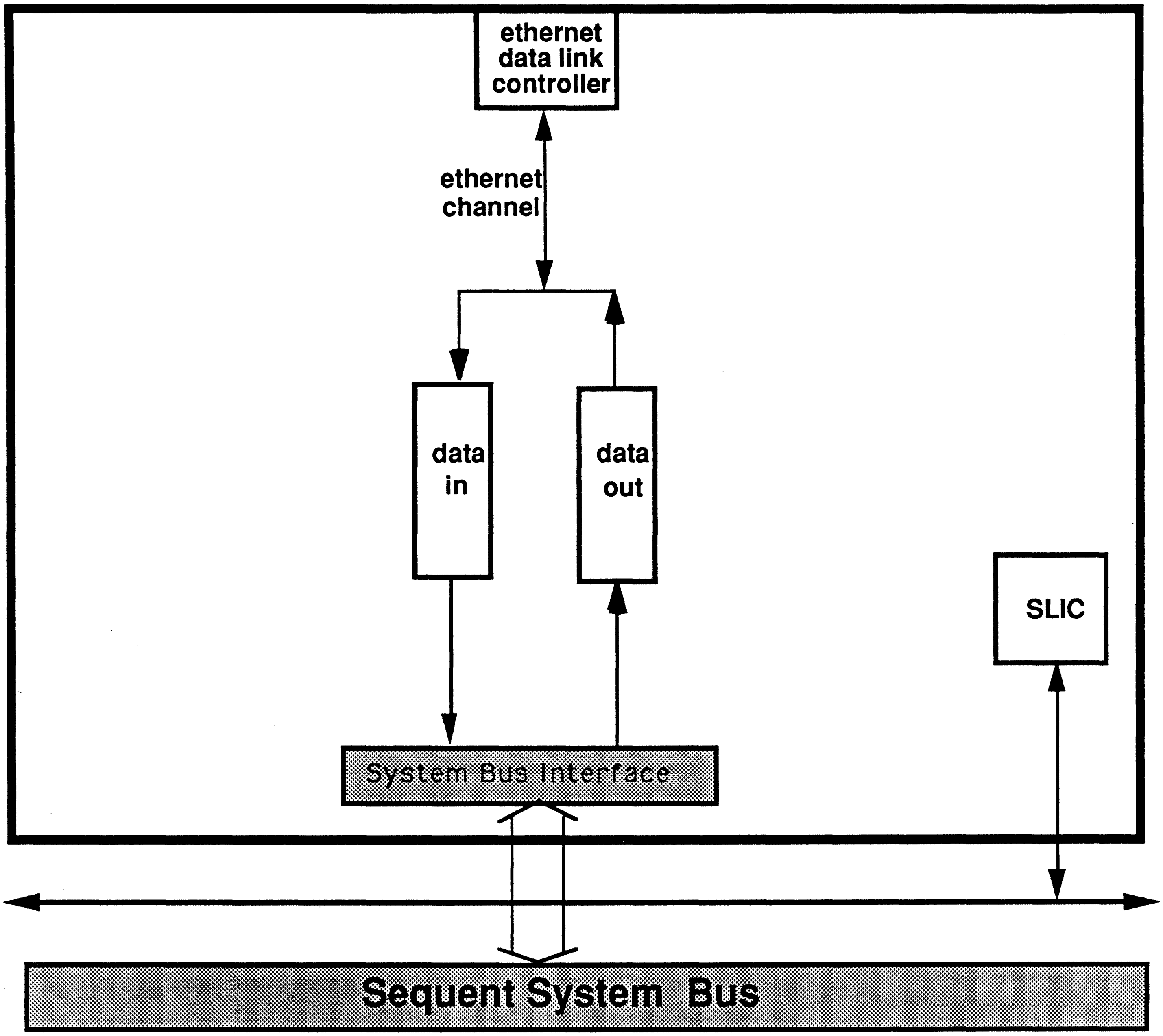
SCED

- S2000/400 & S2000/700 only

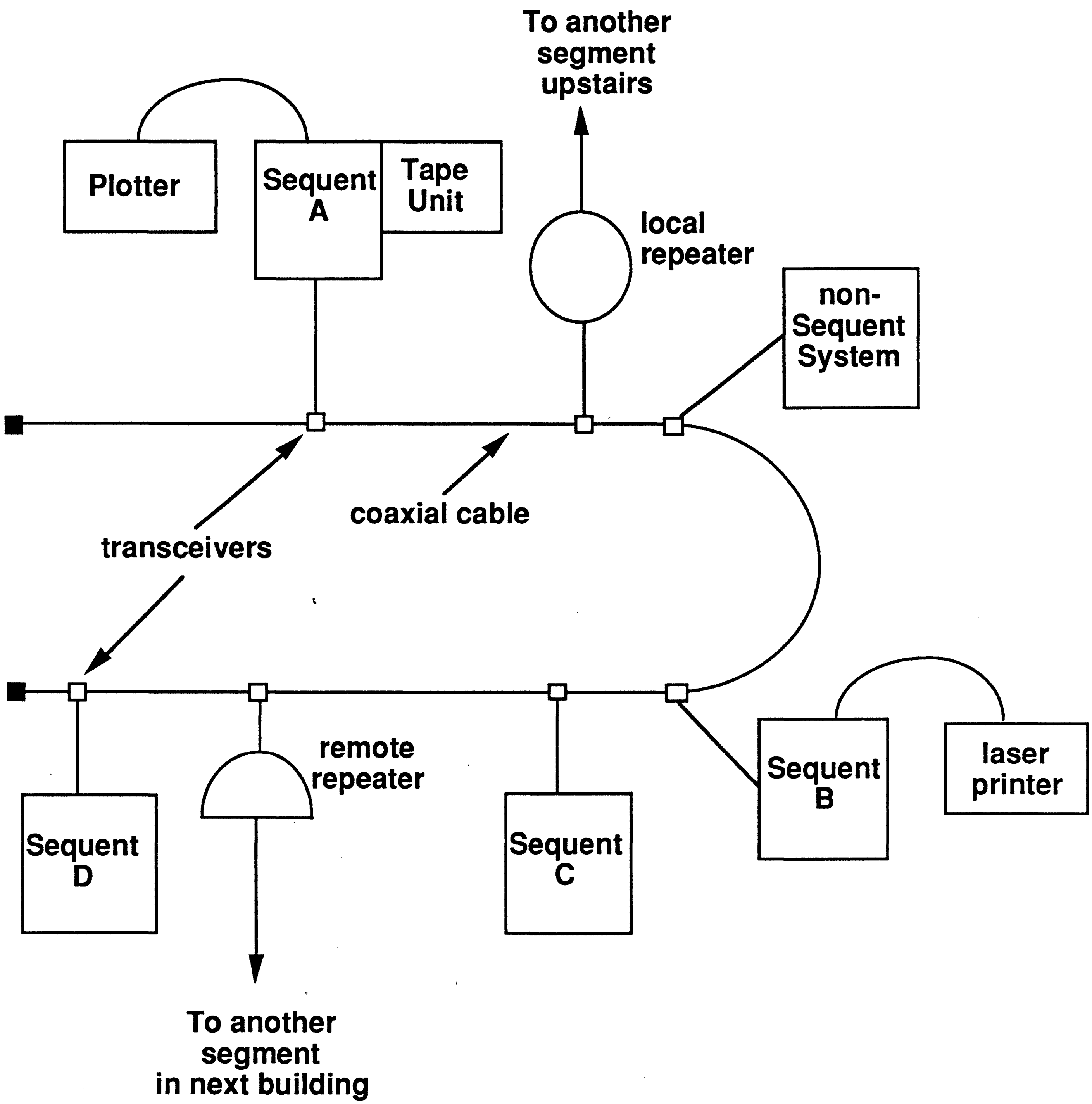
- Provides the ethernet interface

- Resides in the system card cage

SCED Block Diagram



Ethernet LAN



CADM
Clk/Arb

S2000/400
Clk/Arb Board

- Small board mounted on rear of backplane
- Provides system clocks to system boards
- Provides arbitration for Sequent system bus

S2000/700
CADM Board

- Large board located in rear of system bus in a special slot
- Provides system clocks to system boards
- Provides arbitration for Sequent system bus
- Drives processor activity lights on front panel
- Monitors +5 and -5V DC on backplane

Self Check

1. How many processors are there on each processor board? 2

2. List all system boards for the S2000/200 and give one function of each.

   CPU BOARD

   DCC / OK

   MEMORY

   SCED

3. List four functions of the SSM board

   1. SELF TEST
   2. SYSTEM CONF
   3. VME BUS INTERFACE
   4. BOOTING

4. What are the two sizes of the memory expansion board?

   24 M , 48 M   128 M

5. What is the difference between the Memory Controller board (MEMC) and the Memory Expansion board (MEMX)? EXPANSION BOARD ONLY HAS POWER RUN TO IT

6. Which board set provides the interface to the MULTIBUS? MBAD

   Which one resides in the system card cage? ______

Self Check

7. Which board on the S2000/400 and S2000/700 provides the ethernet interface? SCED

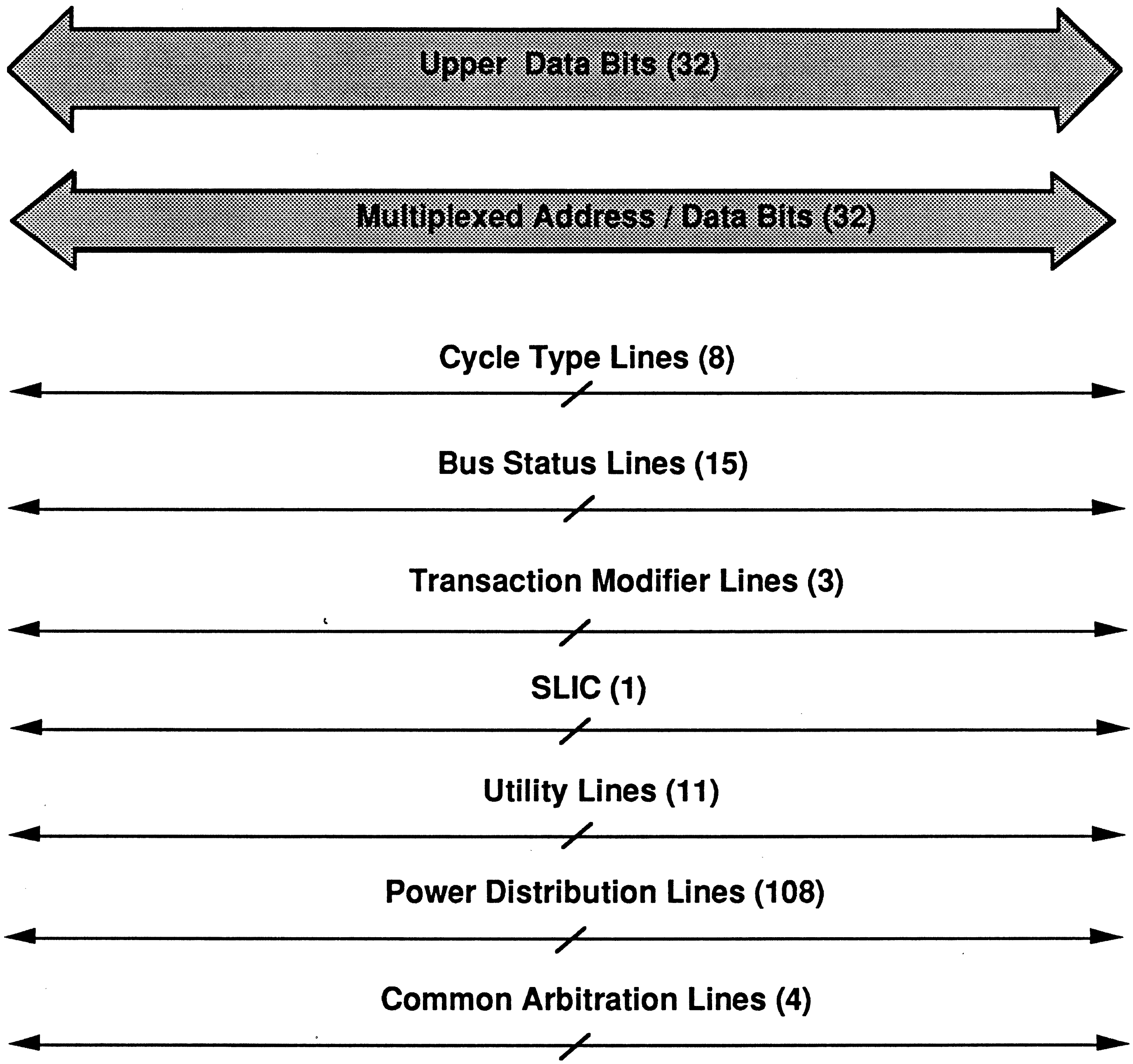
8. Which board(s) provide the interface to the SMD disk sub system?
   OK BOARD ZDC

Sequent System Bus (SSB)

SB 8000

- Connects the CPU's, memory, and I/O subsystem
- 64-bit data path multiplexed with 32 bits of address
- Data packets of 1, 2, 4, 8, 16 bytes
- Pipelined operation
- 53MB-per-second transfer rate
- Parity checking for address and data

Sequent System Bus Signals



SLIC Bus

- 1-bit wide serial bus that connects all SLIC's
- Exchanges interrupts between system boards
- Passes low level non-time critical messages
- Configures system boards
- Monitors individual subsystems
- Controlled by the SLIC chip on the SSM or SSM2

SCSI Bus

- Attaches mass storage devices to the system
- Supports high-speed high-volume data transfers
- Supports synchronous SCSI devices
- 4.8 megabyte-per-second transfer rate
- Controlled by the SSM or SSM2

VMEbus

- I/O bus for the S2000/200 system
- Asynchronous parallel I/O data transfer bus
- Supports high-speed communications between the system bus and I/O subsystem
- Supports various types of I/O controllers
- Supports Euro-card format
- SSM provides interface mapping between VMEbus and Sequent system bus

VMEbus Boards
S2000/200

- **Ethernet LAN controller (ELAN-V)**
  - provides connection to local area network (LAN)
  - supports IEEE 802.3 version
  - up to 3 ELAN-Vs per VMEbus

- **Terminal Line Controller (TLC-V)**
  - provides 16 RS232-C serial ports
  - each port supports 38K baud
  - up to 5 TLC-Vs per VMEbus

- **Synchronous Communications Controller (SCC-V)**
  - high performance data communication
  - provides 4 serial communication channels
    - SDLC
    - HDLC
    - X.25
    - SNA
  - up to 4 SCC-Vs per VMEbus

MULTIBUS

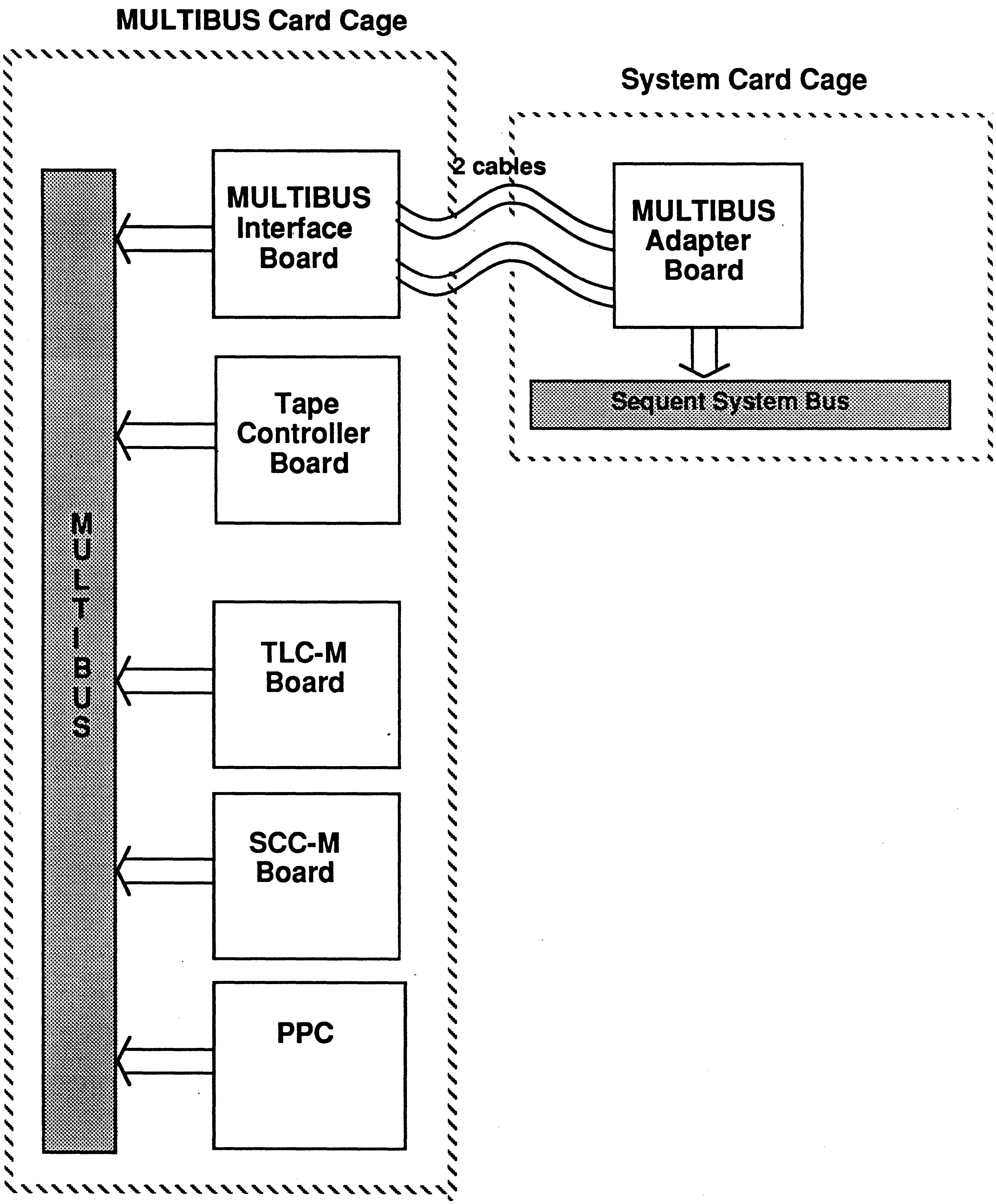
- General-purpose I/O bus

- Supports wide variety of peripheral controllers

- Provides communications between Sequent system bus and I/O

- Allows I/O devices to access system memory

MULTIBUS Block Diagram



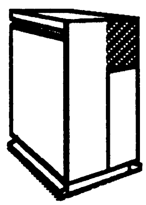
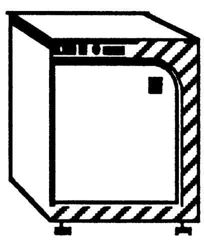
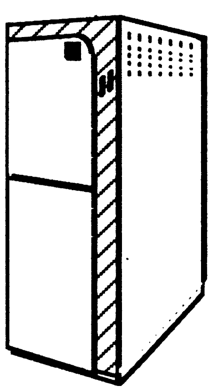
MULTIBUS Boards

- **Terminal Line Controller (TLC-M)**
  - two-board set
  - provides 16 asynchronous RS232-C serial ports
  - up to 4 per MULTIBUS

- **Synchronous Communications Controller (SCC-M)**
  - supports HDLC protocol for X.25 networks
  - provides 4 full duplex RS232-C
  - up to 1 per MULTIBUS

- **Parallel Printer Controller (PPC)**
  - provides an interface to parallel line printers
  - supports two simultaneous printers
  - up to 1 per MULTIBUS

Peripherals

Systems	Type	Max #	Size
S2000/200 	5 1/4" SCSI disk	4	1.2GB 300MB/600MB
	1/4" tape	1	60MB
	GCR 1/2"	1	N/A
			8mm TAPE
S2000/400 	5 1/4" SCSI disk	3	300MB/600MB
	1/4" tape	1	60MB
	GCR 1/2"	2	N/A
	Swallow3	8	264MB
	Swallow4		540MB
	Swallow5		792MB
	Swallow6		1.55GB
S2000/700 	5 1/4" SCSI disk	1	300MB/600MB
	1/4" tape	1	60MB
	GCR 1/2"	2	N/A
	Swallow3	56	264MB
	Swallow4		540MB
	Swallow5		792MB
	Swallow6		1.55GB

System Components

Board/Device	S2000/200	S2000/400	S2000/700
SSM	Yes	No	No
SSM-I/O	Yes	No	No
SSM2	No	Yes	Yes
PROC	Yes	Yes	Yes
MEMC	Yes	Yes	Yes
MEMX	Yes	Yes	Yes
DCC/OK	No	Yes	Yes
MBAD/MBIF	No	Yes	Yes
SCED	No	Yes	Yes
CADM	No	No	Yes
Clk/Arb	No	Yes	No
MULTIBUS	No	Yes	Yes
TLC-M	No	Yes	Yes
SCC-M	No	Yes	Yes
PPC	No	Yes	Yes
VMEbus	Yes	No	No
TLC-V	Yes	No	No
ELAN-V	Yes	No	No
SCC-V	Yes	No	No
SCSI bus	Yes	Yes	Yes
1/4" SCSI tape	Yes	Yes	Yes
5 1/4" SCSI disk	Yes	Yes	Yes
SMD Swallow disk	No	Yes	Yes
1/2" GCR tape	Yes	Yes	Yes

Self Check

1. List two functions of the SLIC bus.
   1. CONFIGURATION OF BOARDS
   2. EXCHANGES INTERRUPTS BETWEEN SYSTEM BOARDS

2. List two functions of the SSB.
   1. CONNECTS CPU, MEM, I/O
   2. PARITY CHECKING

3. Which system(s) support the VMEbus? 200
   The MULTIBUS? 400 AND 700

4. What is the VMEbus used for? ETHERNET, TLC, SCC

5. List the boards that plug into the VMEbus and give one function of each.
   ETHERNET PPC PRINTER CONTROL
   TLC 16 PORTS SERIAL
   SCC 4 FULL DUPLEX SERIAL PORTS

6. The 1/4" tape drive plugs into which bus? SCSI

7. Which system board in the system does NOT connect to the SLIC bus? MEM X

8. What is the 1/4" tape drive used for? BACKUPS

Self Check

SSM SSM2

10. Which board provides the interface to the SCSI bus? SCSI BOARD

11. List all of the devices that plug in the SCSI bus and give one function of each.

SCSI TAPE DRIVE

SCSI DISK DRIVE

Chapter 3

Hardware Configuration

Hardware Configuration Objectives

You will:

a. identify and locate system card cage, MULTIBUS card cage, and VMEbus card cage for all three S2000 systems

b. identify and locate all front panel LED's

c. identify and locate the following system boards:
- SSM2
- SSM
- SSM-I/O
- PROC
- MEMC
- MEMX
- DCC/OK
- MBAD
- SCED
- CLK-ARB

d. identify and locate the following MULTIBUS boards:
- MBIF
- TLC-M
- SCC-M
- PPC

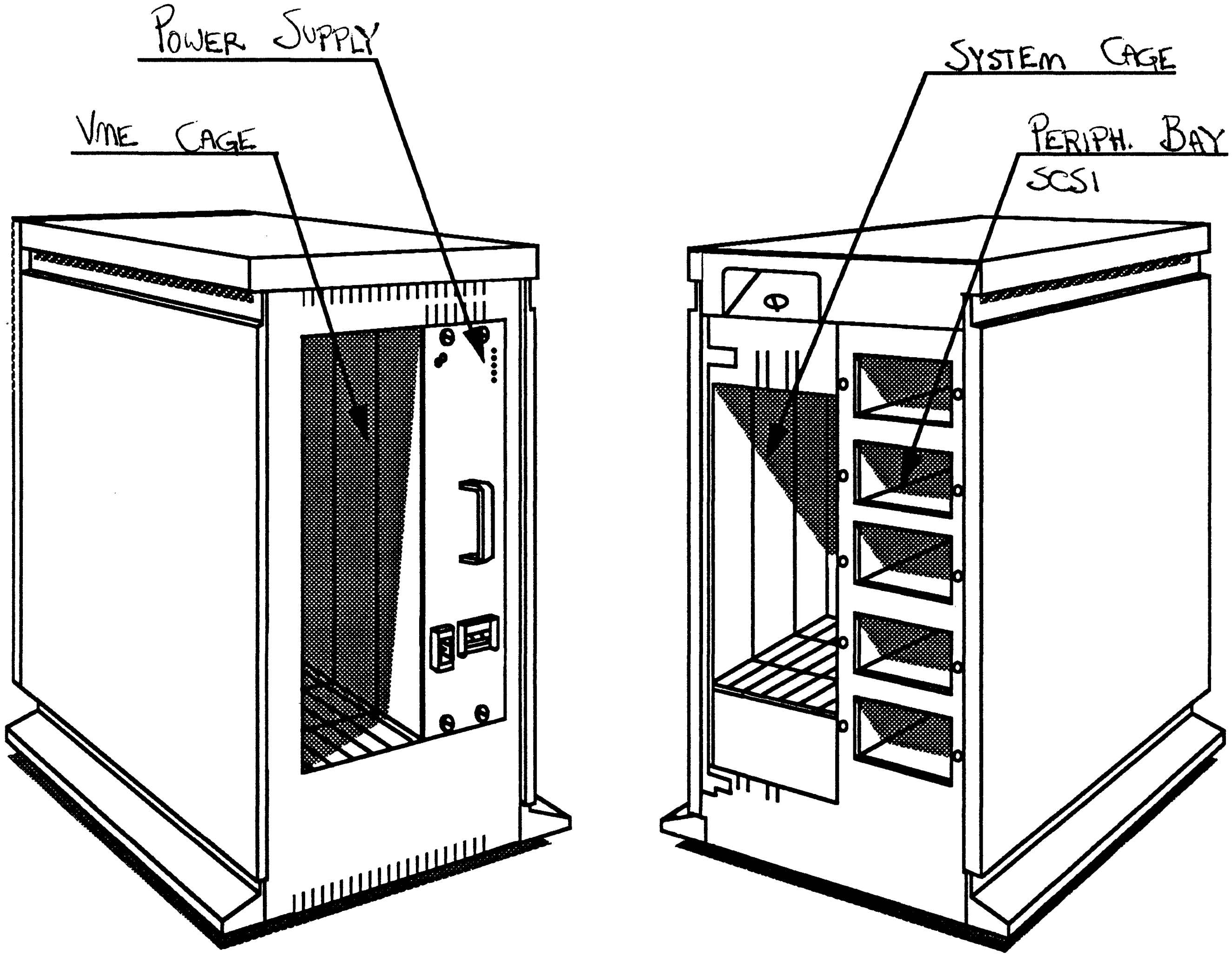
Hardware Configuration Objectives

e. identify and locate the following VMEbus boards:
   - ELAN-V
   - TLC-V
   - DCP-V

f. identify and locate the following peripherals:
   - SCSI disk
   - SCSI 1/4" cartridge tape drive
   - SCSI 1/2" tape drive
   - SMD disk drives

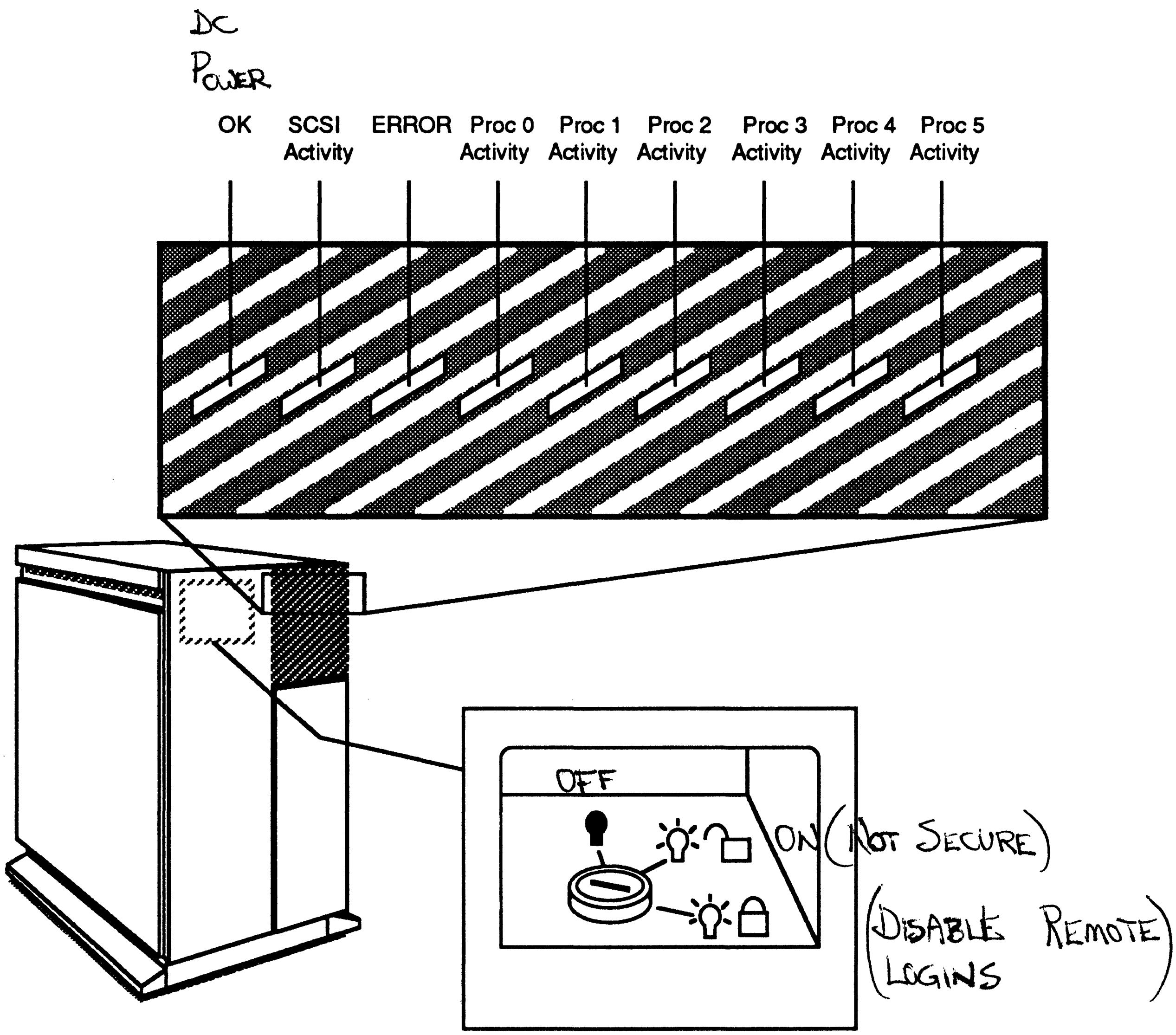
g. identify and locate all DC power supplies

S2000/200 Cages, Buses

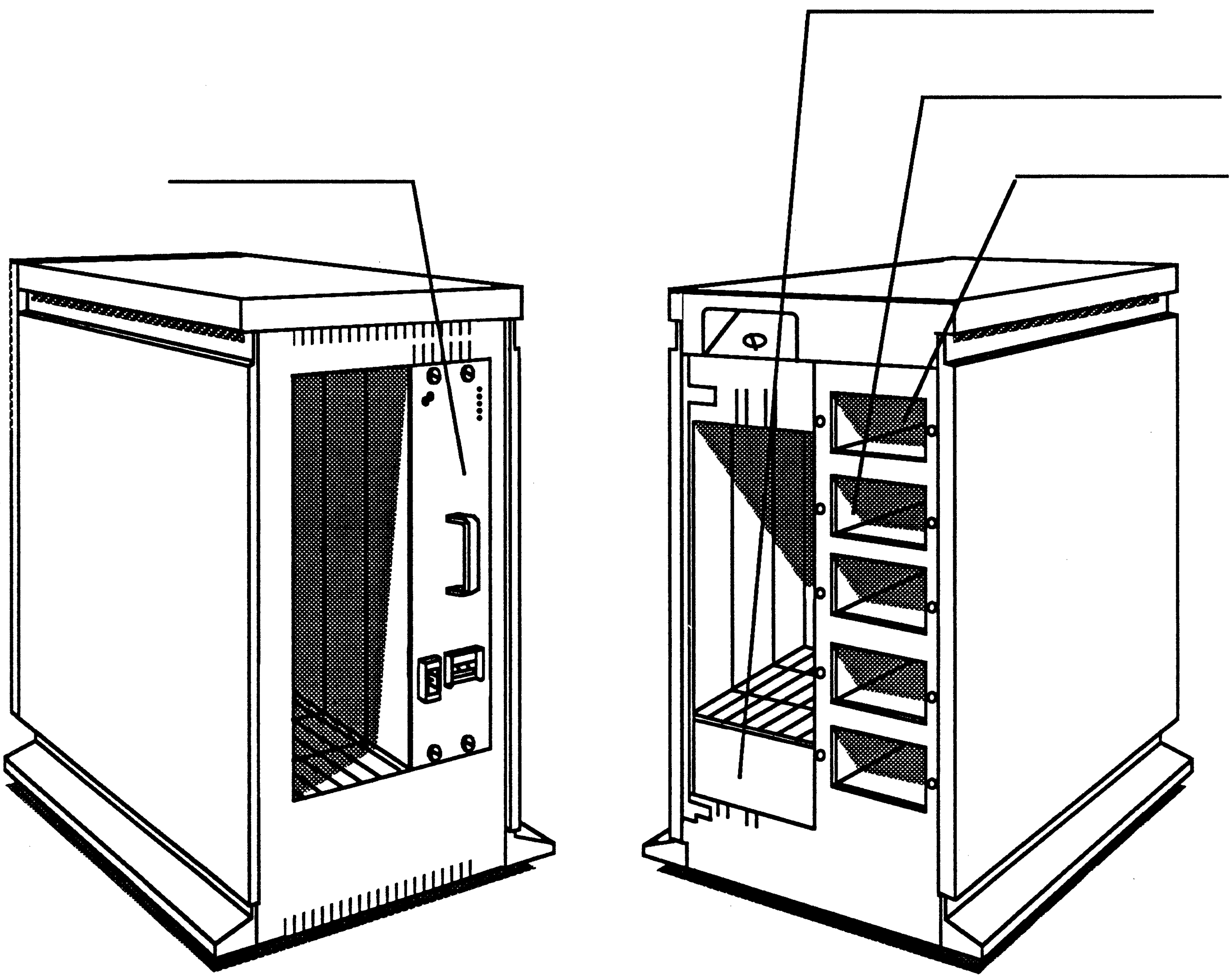


REAR FRONT

S2000/200 Operator Panel



S2000/200
Peripherals and Power Supply



REAR

FRONT

S2000/200 Power Supply

- **Located in the rear of the system**

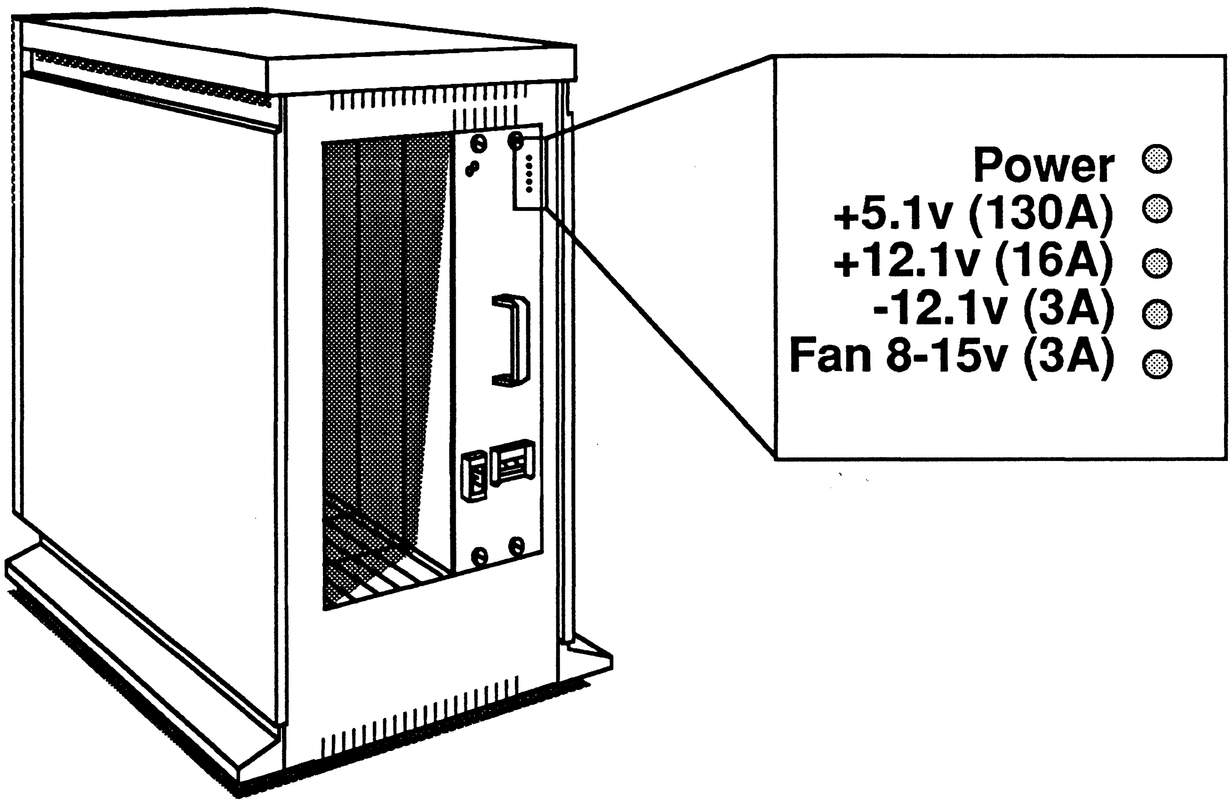
- **Provides DC voltages for all S2000/200 components**
  - system boards 5.1V 130 A
  - VMEbus boards +12.1 16A
  - system fans -12.1 3A
  - 5 SCSI disk drives 8-14 FANS
  - 1/4" SCSI tape drive

- **Operates on a range of AC input voltages**
  - 90 VAC - 250VAC

    SINGLE PHASE
    950W
    20 AMP

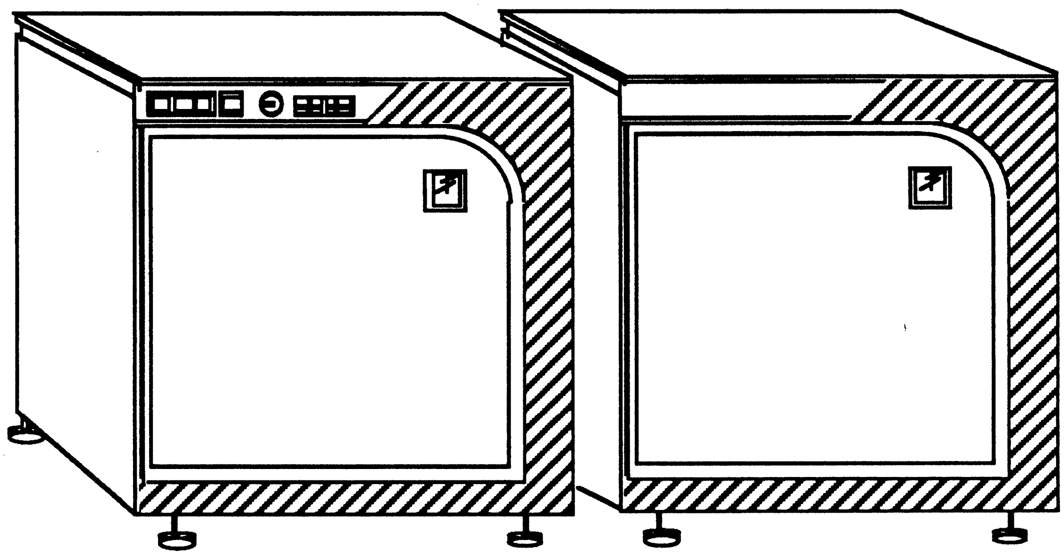
- **Easy installation and removal**

S2000/200 Power Supply Voltage Indicators



Indicator	Voltage	Tolerance
POWER	90 to 250 VAC	Only indicates breaker is ON and AC voltage is applied to power supply
+5 VDC	+5.10 VDC	±0.175 VDC
+12 VDC	+12.10 VDC	±0.60 VDC
-12 VDC	-12.10 VDC	±0.60 VDC
FAN(at low room temp)	+8.0 VDC < 20°C	±0.20 VDC
FAN(at higher room temp)	+14.5 VDC > 40°C	±0.20 VDC

S2000/400 with Expansion Cabinet

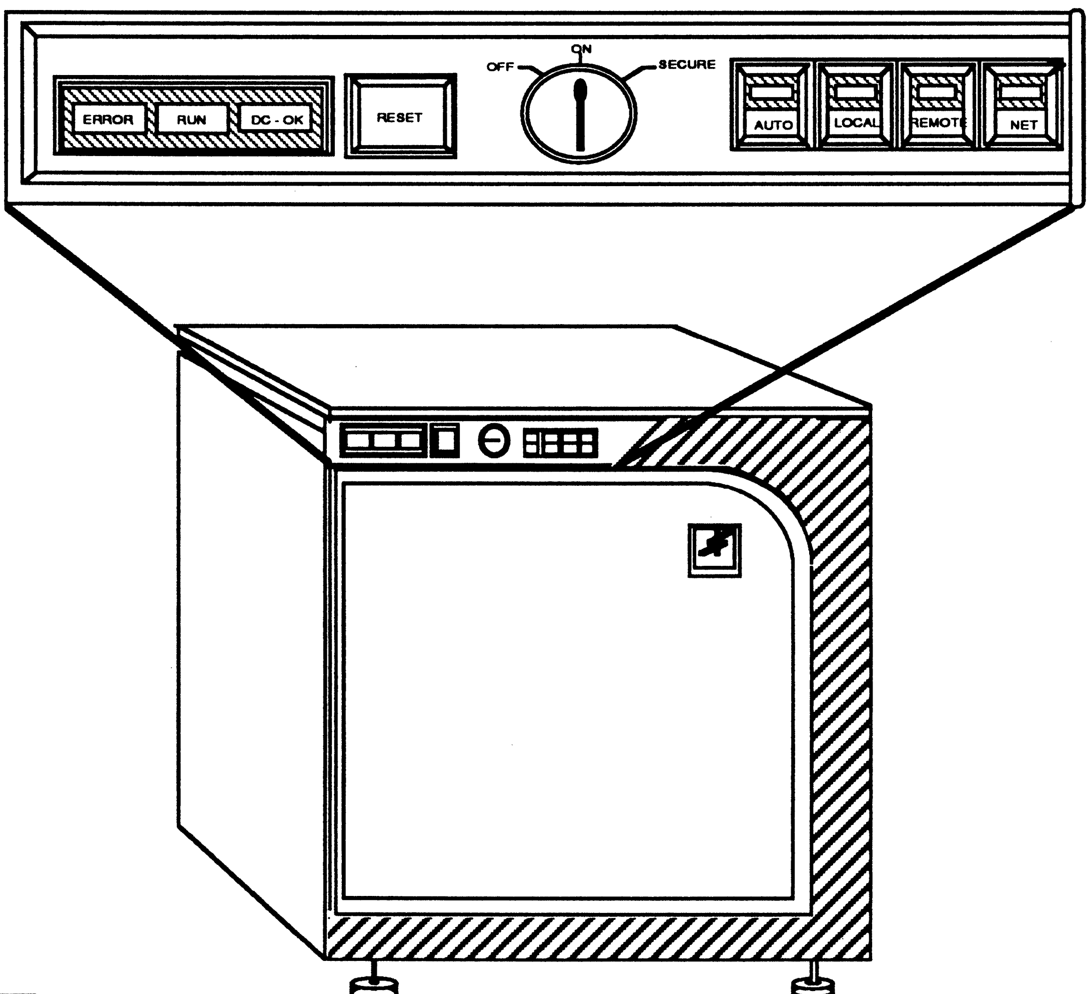


- **Main Cabinet**

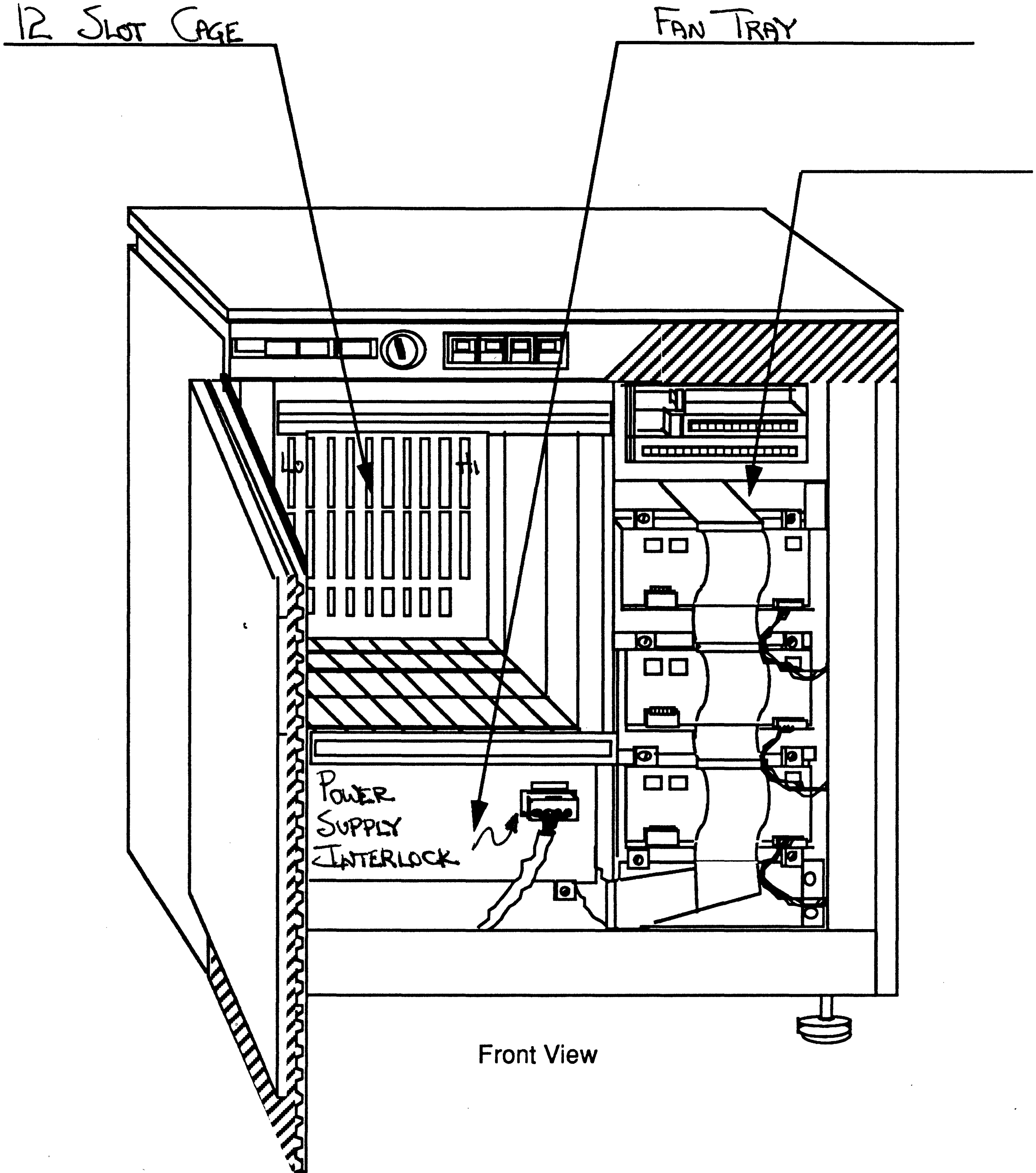
- **Expansion Cabinet (Optional)**

S2000/400
Operator Panel

- **Three-position key switch**
- **Status indicators**
- **Control switches**



S2000/400 Components



Front View

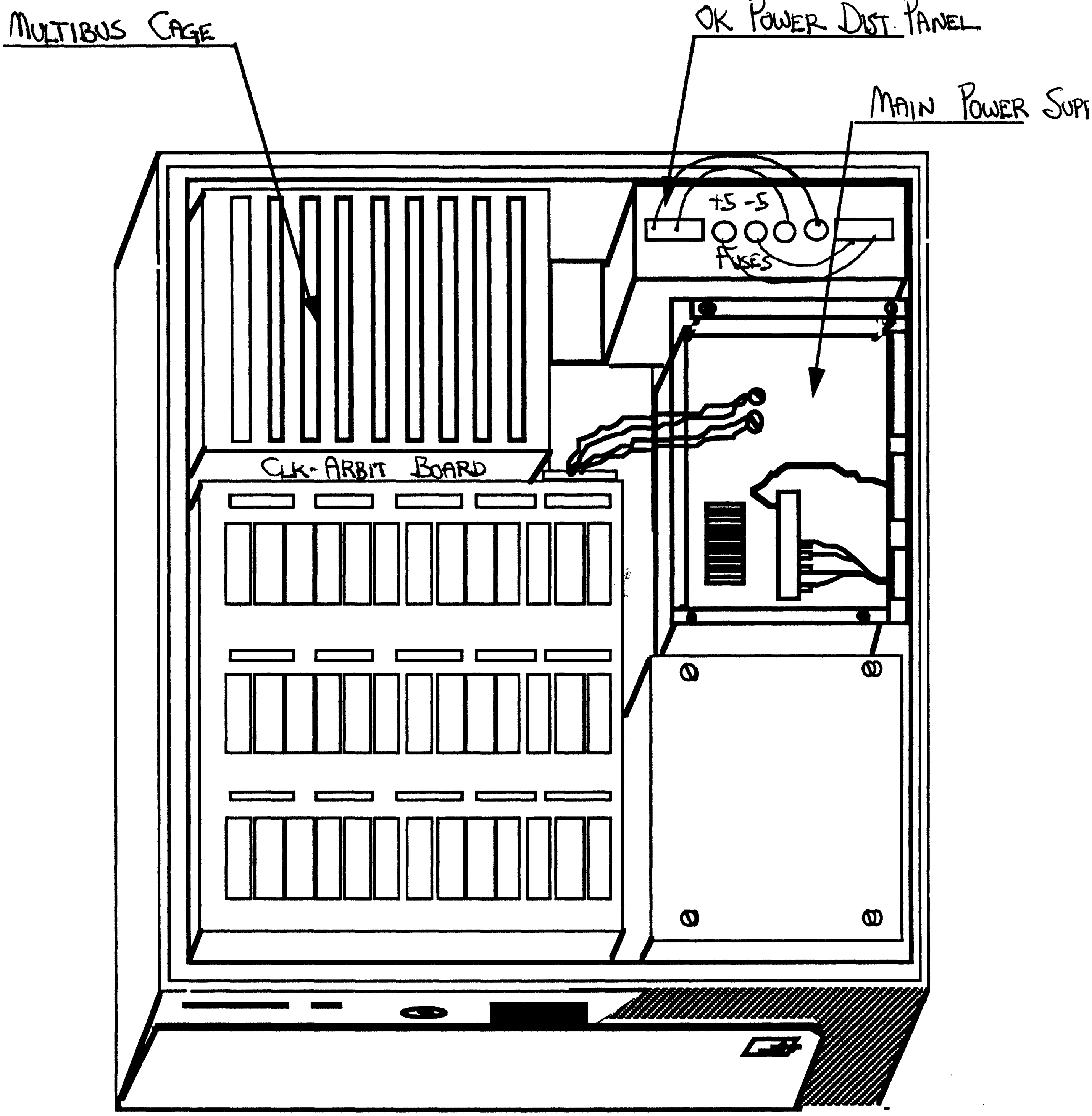
S2000/400 Peripherals

- **SCSI devices located in the peripheral tower**
  - 1/4" tape drives located at top
  - system disk located second from top WDØ
    WD1
    WD2

- **SMD disks located in the expansion cabinet**
  - 19" rack mount

- **GCR 1/2" tape drive external to cabinets (table-top)**

S2000/400 Components



Top View

S2000/400 Power Supplies

- **1000-watt power supply**
  - supplies +5vdc, -5vdc, +12vdc, -12vdc
  - accessed from the top of the system
  - supplies DC voltage for the following:
    System boards
    SCSI devices
    Fans

- **300-watt power supply**
  - supplies +5vdc, +12vdc, -12vdc
  - supplies power for the MULTIBUS boards
  - accessed from the rear of the system

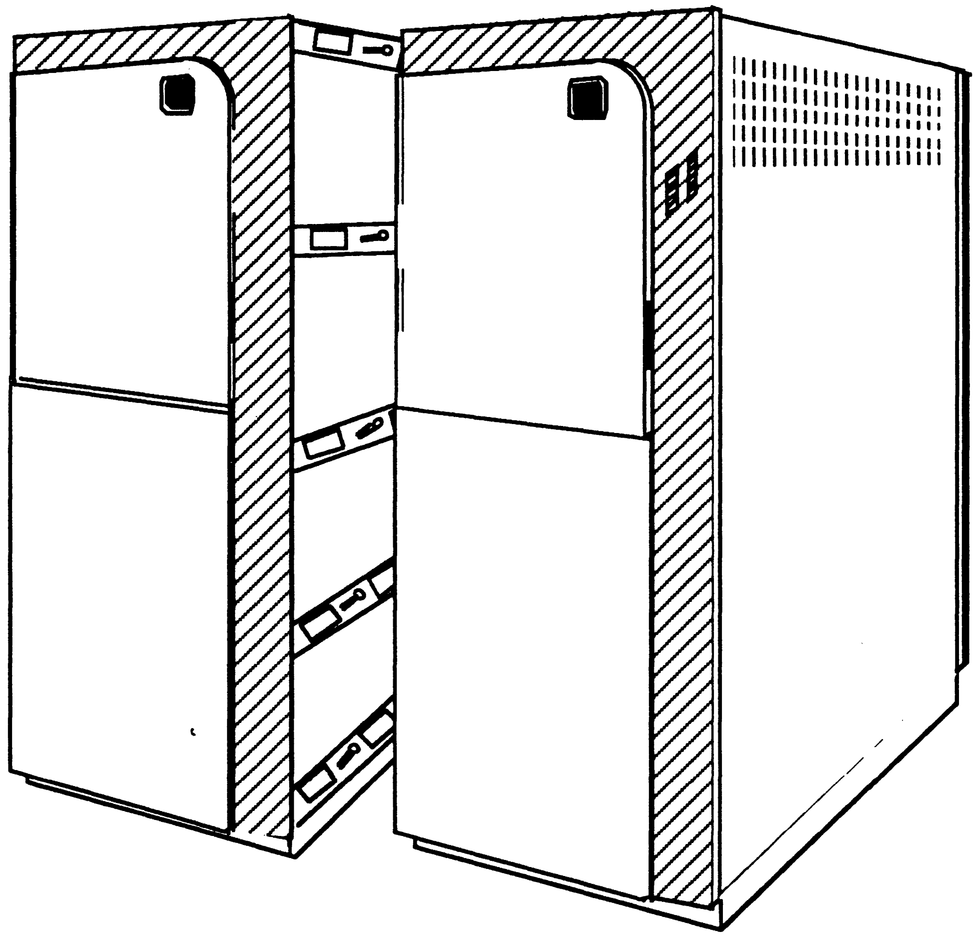
MULTIBUS Card Cage

- **Multibus card cage located in rear of main cabinet**
  - contains 6 useable slots

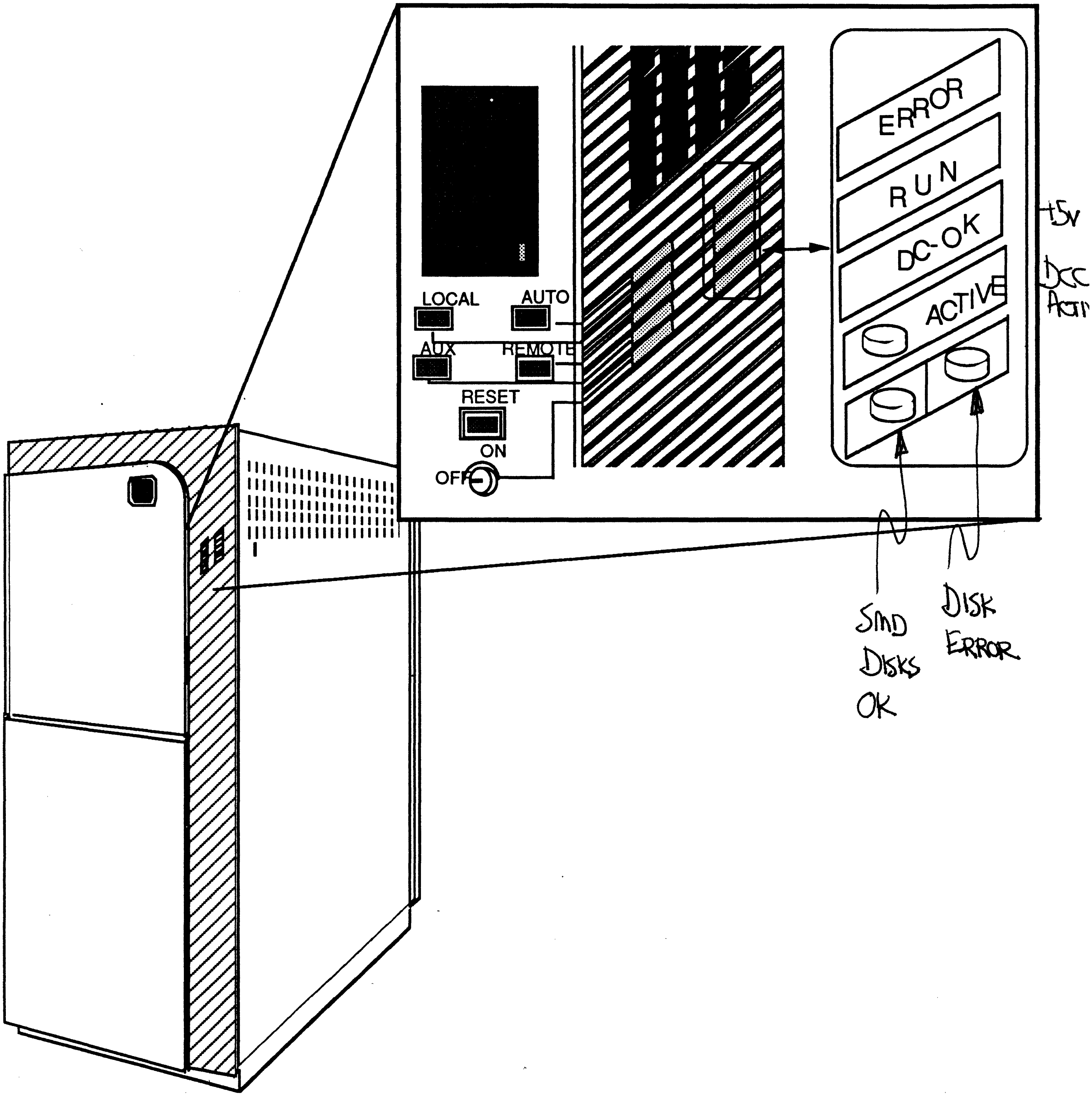
- **Multibus Expansion Units (MEU) reside in expansion cabinets**
  - contains 8 useable slots

- **Maximum configuration of 4 MEUs per S2000/400**
  - maximum of 30 useable slots

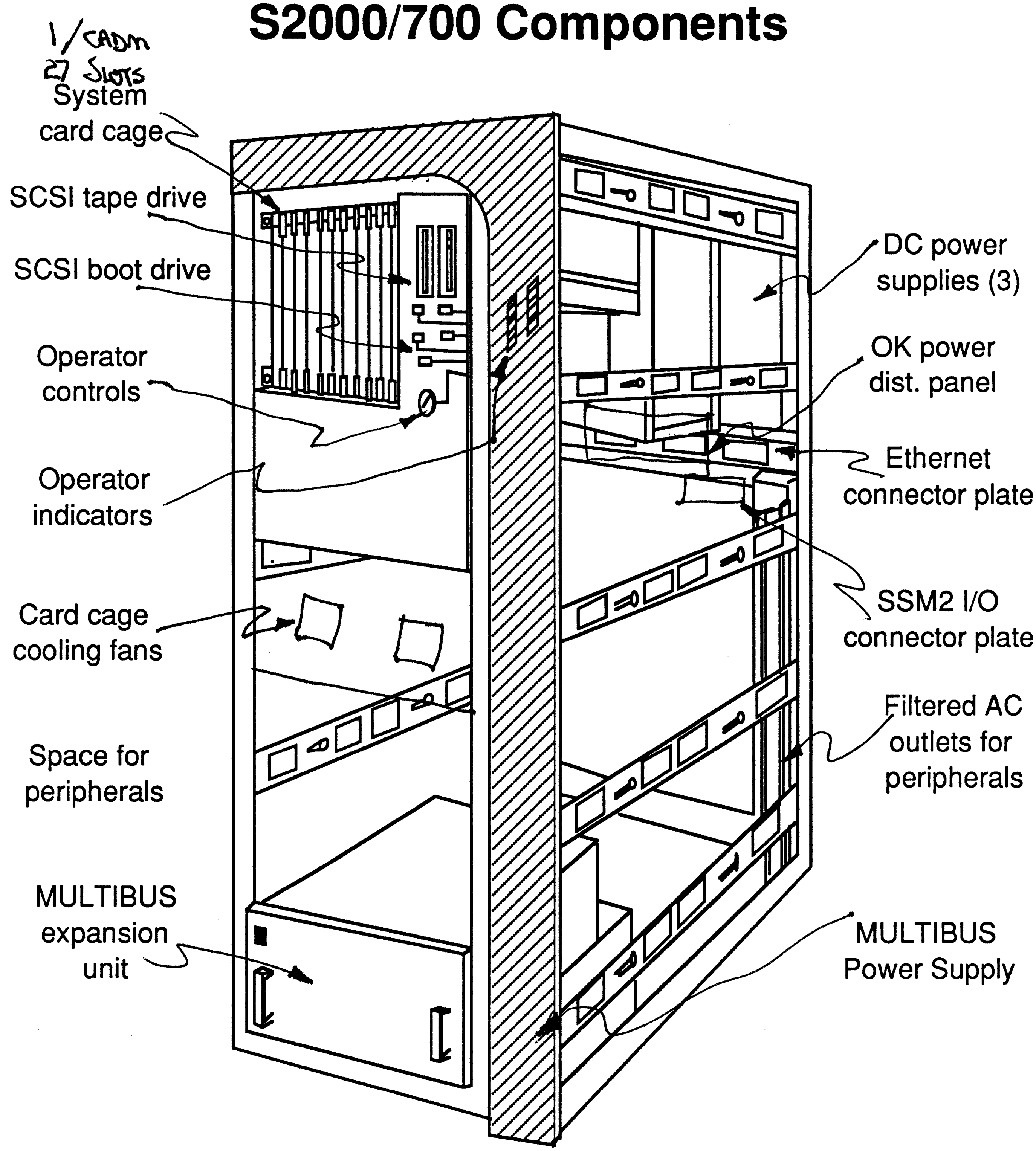
S2000/700 with Expansion Cabinet



S2000/700 Operator Panel



S2000/700 Components



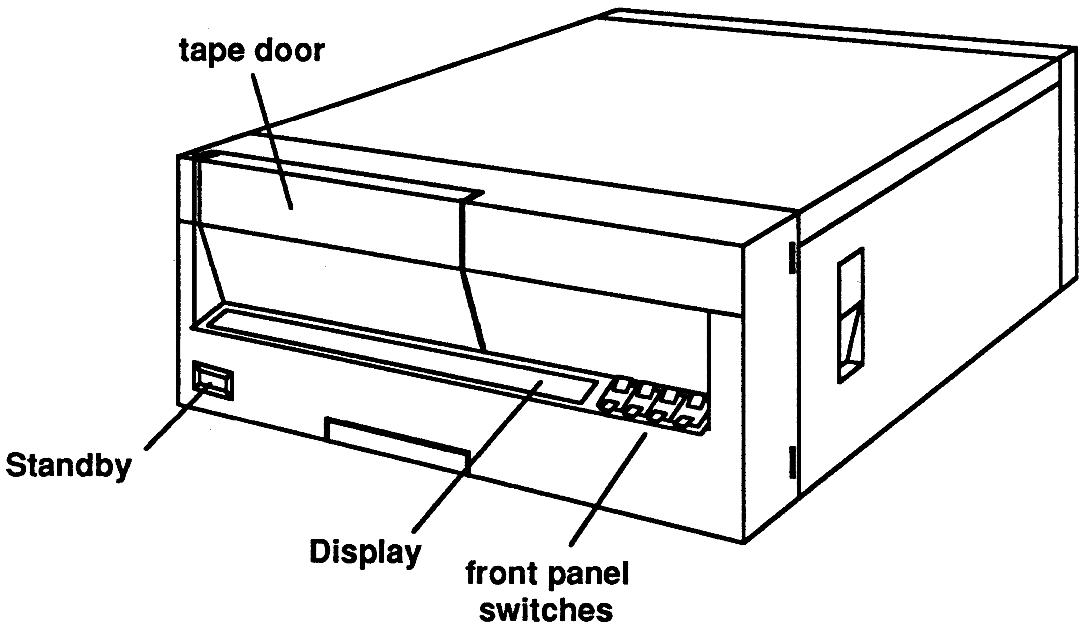
S2000/700 Peripherals

- **SCSI devices located in the front of the system**
  - 1/4" tape drives accessed from front
  - wd 0 (boot device) located behind front panel

- **SMD disks located in racks**
  - system cabinet
  - expansion cabinet

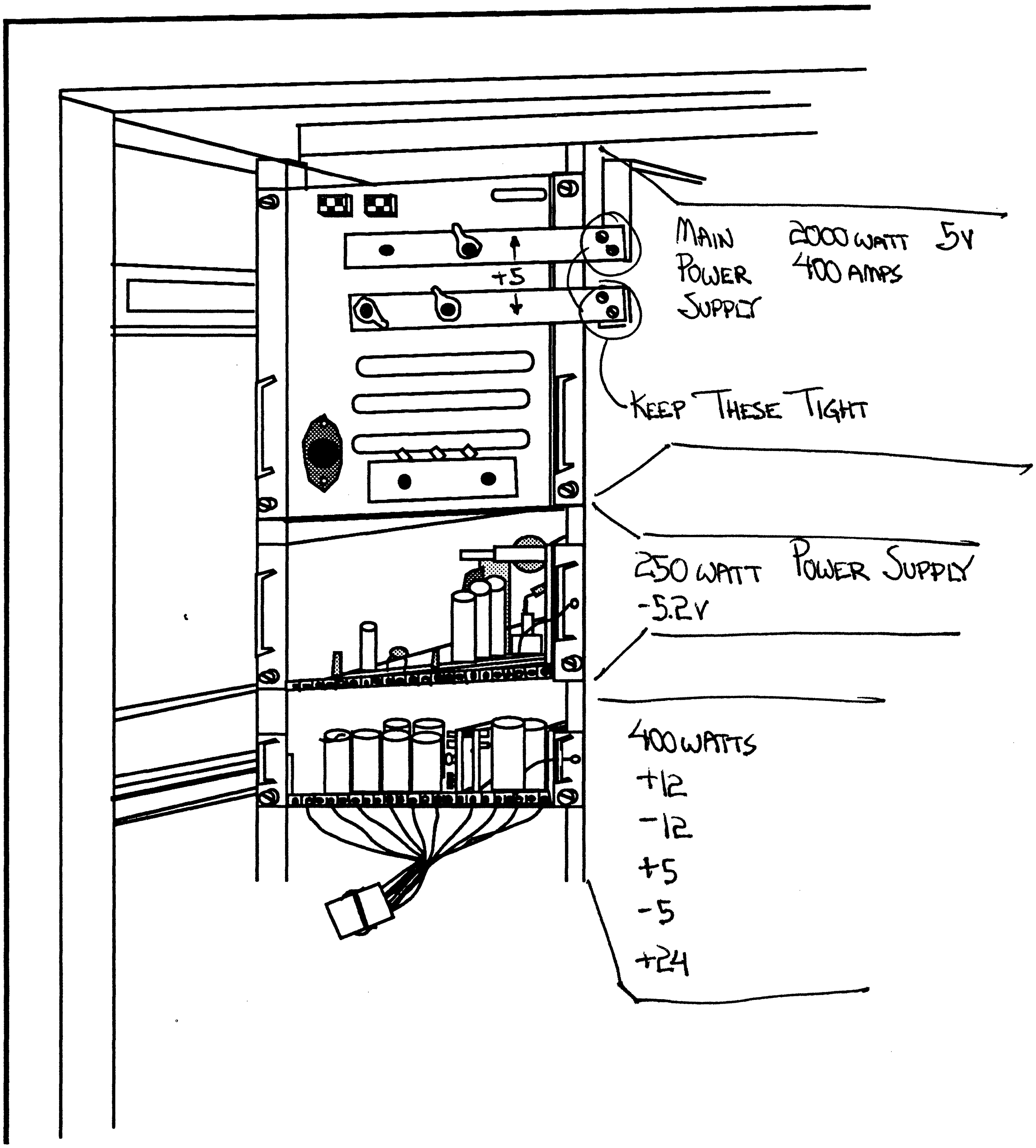
- **GCR 1/2" tape drive located in expansion cabinet**
  - supports two GCRs

GCR Tape Drive



- **Resides on the outside of the cabinet**
- **Connects to the SCSI bus on the SSM I/O panel**
- **Termination for SCSI bus at rear of GCR**

S2000/700 Power Supplies



S2000/700 Power Supplies

- **2000-watt power supply**
  - supplies +5vdc @400 amps
  - main system support

- **400-watt power supply**
  - supplies +5vdc, +12vdc, -12vdc, +24vdc
  - provides power for the following:

    system card cage

    power distribution panel

    system fans

    SCSI devices

- **250-watt power supply**
  - supplies -5.2vdc
  - provides power for the DCC boards

- **444-watt MULTIBUS supply**
  - supplies +5vdc, +12vdc, -12vdc
  - provides power for MULTIBUS boards and fans

MULTIBUS Card Cage

- **MULTIBUS card cage located in bottom of main cabinet**
  - contains 11 useable slots

- **MULTIBUS Expansion Units (MEU) reside in expansion cabinets**
  - contains 11 useable slots

- **Maximum configuration of 4 MEUs per S2000/700**
  - maximum of 44 useable slots

System Board Identification

SSM2

Bank of 5 green LEDs
15-pin - to front panel
50-pin - parallel printer
50-pin - SCSI
Bank of 4 green LEDs
15-pin - not used

SSM

2 holes (No LEDs)

SSM-I/O

2 RJ45 terminal connections

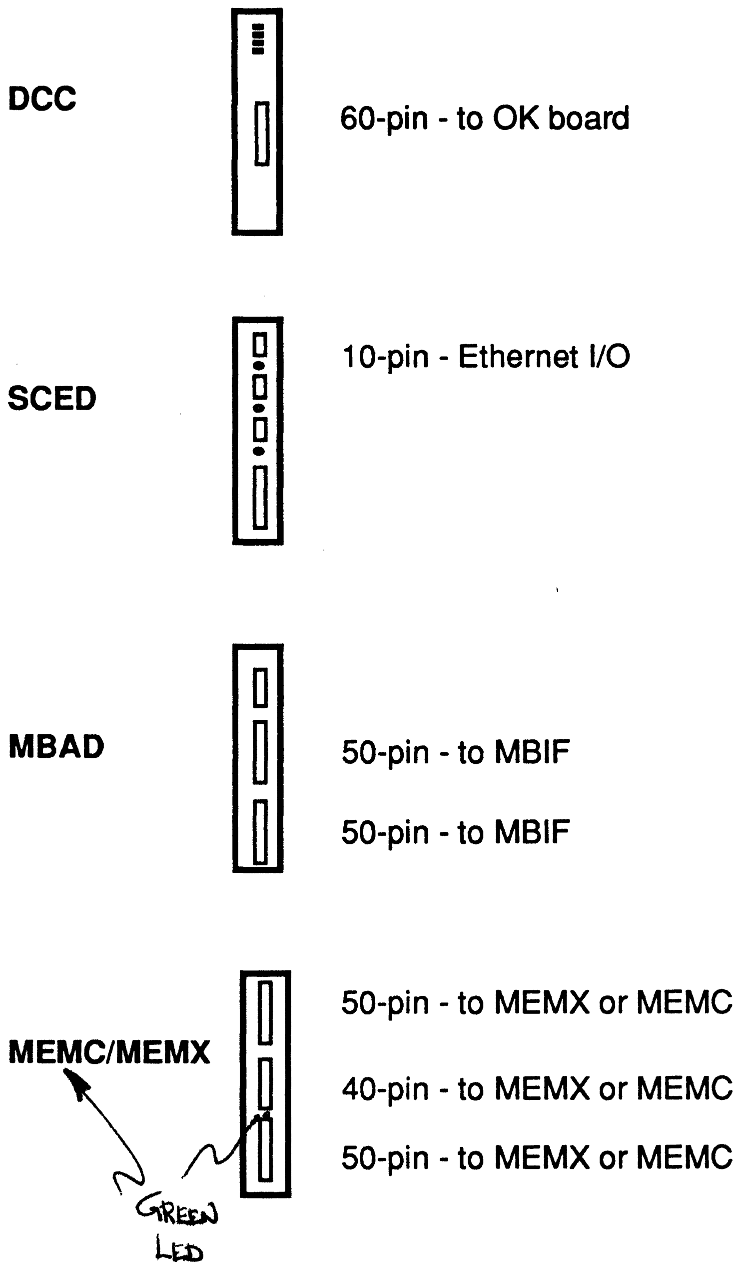
36-pin Parallel Printer Port

50-pin SCSI connector

PROC

2 yellow LEDs

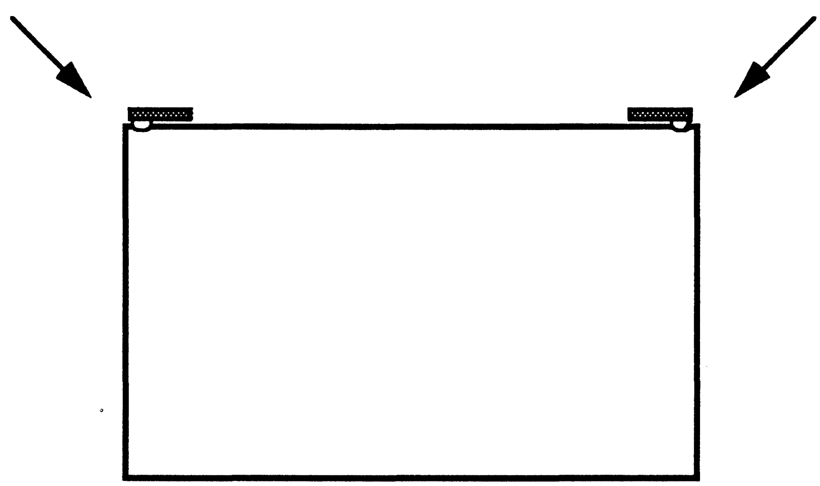
System Board Identification



MULTIBUS Board Identification

Color Coded Thumb Levers

White	**MBIF**
Orange	**TLC-M** 2 Board Set
Blue	**SCC-M**
Black	**Tape Controller**
Green	**PPC** Printer Bottom Slot
Purple	**DCP** IBM Comm. 4 Port

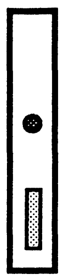


VMEbus Board Identification

TLC-V

16 RJ45 connectors

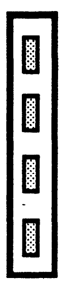
ELAN-V



1 LED

1 15-pin connector

SCC-V



4 DB style connectors

Lab
System Component Identification

1. Identify how many of each of these components you have in your system.

System Type 700

System Boards:

	Quantity	Slot
SSM		
MEMC	1	10
MEMX	1	E2
PROC	1	1
SSM-I/O		
MBAD	1	11
DCC	1	20
SSM2	1	15
CADM	1	CADM
SCED	1	14

VMEbus Boards:

SCC		
ELAN-V		
TLC-V		

MULTIBUS Boards:

TLC-M	2	
SCC-M		
PPC		

Lab
System Component Identification

Disks:	Quantity
SCSI Disks	________
1/4"Cartridge Tape	________
SMD Disks	2
GCR tape drive	________

Miscellaneous:	
System Card Cage	________
VMEbus Card Cage	________
Multibus Card Cage	________
Power Supply	________
GCR Tape	________
Printer	________
Fans	________

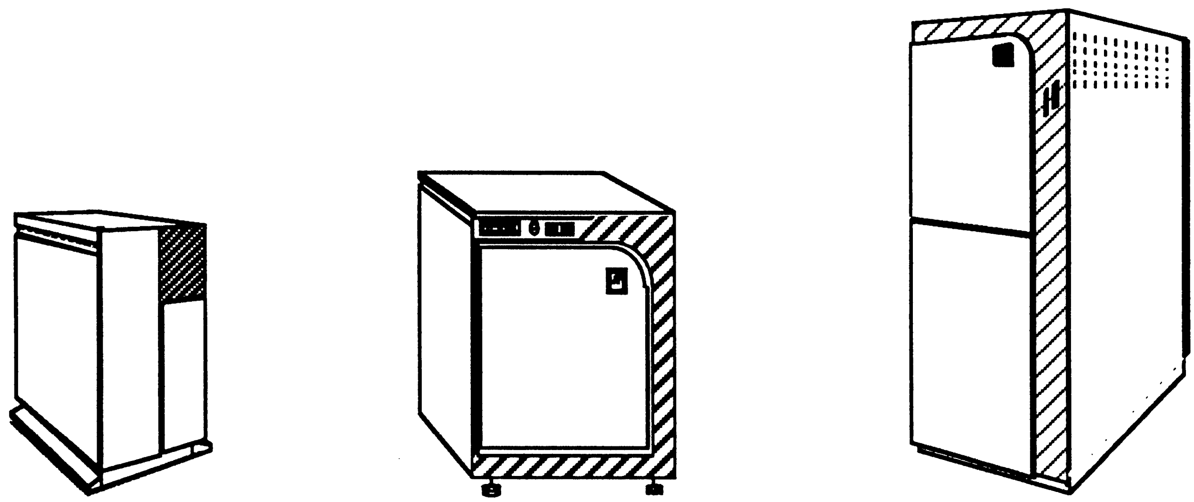
Chapter 4
SSM Monitor

SSM Monitor Objectives

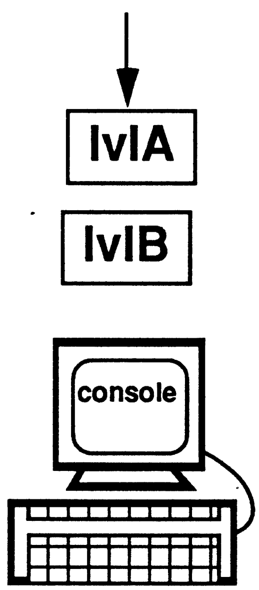
You will:

a. manually boot to each of the two SSM stages
b. get help at each stage
c. print parameters for specific commands
d. change command parameters
e. use the test command to manually test hardware components
f. display the system configuration using the config command
g. interpret the system configuration
   - slot number of each board
   - status of each board
   - amount of memory in system
   - total number of processors
h. change the system configuration
i. automatically boot to level-B
j. reboot the system using the zap command
k. boot DYNIX/ptx
l. move between system levels using init and shutdown
h. boot to level-B from tape

System Startup Overview



Power Up



Boot DYNIX/ptx

Powering Up the S2000

- **Power up the system console**
- **Turn on AC power to the system by lifting up the circuit breakers at the rear of the system**
  - expansion cabinets first
- **Turn system key switch to the "on" position**
- **Verify correct LED status**
- **Messages to the system console in about 45 seconds**

What is the Monitor?

- A program that runs from the firmware in the SSM and SSM2 boards
  2 PROMS

- Initiated at power-up
  POWER TEST / SSM BOARD } MUST BE WORKING TO GET TO LEVEL A

- Provides power-up testing of system components

- Single-user system monitor

- Supports system reconfiguration

- Loads diagnostics or the operational firmware

- Boots the operating system

Systems Services Module (SSM/SSM-2)
Self-Paced Lesson

What is the SSM/SSM-2 Monitor?

The SSM/SSM-2 monitor is the System Services Module power-up monitor. It is a single-user system monitor that runs out of firmware on the SSM/SSM-2 board. You enter commands on the console; no other ports are available.

When you power up your system, there are tests that must be run, devices that must be acknowledged and initialized, and other procedures that must be performed to bring up the operating system. The SSM/SSM-2 goes through two stages (lvlA and lvlB) during power up. Each stage handles increasingly complex tasks.

The boot information for lvlA is stored and read from an EPROM on the SSM/SSM-2 board. The boot information for lvlB resides on disk.

The SSM/SSM-2 can automatically boot from one stage to the next. You also have the option of manually booting from one stage to the next, allowing an opportunity to modify command parameters.

lvlA (level-A)

The first stage, lvlA (level-A), performs self-tests on the SSM/SSM-2 hardware and specifies the location of the boot file for lvlB.

lvlB (level-B)

The second stage, lvlB (level-B), runs power-up tests on the system boards and provides an option to run diagnostics.

lvlB is the run-time environment for the SSM/SSM-2 monitor. You boot the operating system from this level.

SSM/SSM-2 Commands

The two stages have some common commands:

Getting help

help displays a list of commands available at each stage

help *command* displays command syntax for a specific command
[ ] = optional argument
| = OR indicators

Displaying values

print *command* displays current parameter values for a specific command. If the parameter has no value, nothing displays.

Setting values

Values are set in the same way at each level. The general format to set new values for a command is:

command parameter=value

When typing commands, it is only necessary to enter as many characters as needed to distinguish the command from all the others. For example, you can enter any of the following for the print commands:

p
pr
print

If you make a mistake while typing a command line, use the backspace key to erase one character at a time on the line. To erase the entire line, press control-U. These terminal characteristics are set by default.

Specific examples of commands are provided throughout this lesson. A complete list of SSM/SSM-2 commands is included in the SSM/SSM-2 Power-Up Monitor Guide and the Diagnostic Executive Quick Reference Card.

lvlA (Level-A)

lvlA is the first stage of the SSM/SSM-2 monitor. During the power-up to lvlA, the SSM/SSM2 board performs several self tests, testing various chips on the board.

Practice 1

Power up a Symmetry system and observe the boot to lvlA. It will take about 45 seconds for the system to boot to lvlA.

DC OK } BOTH
LOCAL } GREEN

Below is the power-up listing for an S2000/200. The listing may differ for an S2000/400 or S2000/700.

```
Oct 24 08:30
...

WARNING: Jumper Register exp = 0x206 act = 0x266

SCSI test
TOD test (1)
Panic Timeout Test
SLIC test
  - Slave Registers Test
  - Bin Interrupts Test
  - NMI Interrupt Test
ARC test
VME INTR test
BIC test
CPU PIC test
IO PIC test
SIC test
      - SLIC Access
      - Local Access
      - Register Defaults
      - Packets
      - Parity
      - Comparison
      - NMI's
Printer Port test (2)
VME IF test
      VME Path Test
      S2V Map Test
      V2S Map Test
```



```
     Timeout Test
     Panic NMI Test
     PIC Interface Test
     IO PIC Parity Error Test
     VME Interrupts Test
SSM lvlA testing complete
Spinning up disks...(3)
SSM Firmware (Level A) version 4.b.1.
->
```

During the boot to lvlA, the system:

(1) tests pieces of the SSM/SSM-2 hardware
(2) tests the parallel printer port
(3) spins up the disks.

The lvlA prompt is **->**. The following commands are available at lvlA.

lvlA commands

- remote	display or change remote console port characteristics
- local	display or change local console port characteristics
- zap	simulate a power cycle on SSM/SSM-2
- bh	boot host CPUs
- bo	set the boot path for other Sequent controllers with downloadable firmware
- bs	boot SSM/SSM-2 Firmware
- test	manually test pieces of the SSM/SSM-2 hardware
- print	display parameter values for a command
- dump	display SSM/SSM-2 memory
- help	obtain on-line help for SSM/SSM-2 commands

Below are some examples of commands you'd use at lvlA.

To print the parameter values for the remote port, enter the following:

➔

```
->print remote
      baud      = 9600
      stop      = 1
      size      = 8
      parity    = none
      flow      = xoff
->
```

The command to set the baud rate for the remote port is:

➔

-> remote baud=2400

➔

Now, if you enter print remote, the baud rate reflects this change.

The command to set the baud rate for the local port is the same, but enter local instead of remote.

The local port has an additional parameter called autoBaud.

Sometimes the baud rate on the terminal and the baud rate on the SSM port are different. When this happens, your terminal doesn't respond. If the autoBaud flag is enabled, you can cycle through baud rates on the SSM port by pressing the break/pause key on your terminal. When both baud rates match, your terminal works properly again. It the autoBaud flag is not enabled, use the set-up key on your terminal to select the baud rate which matches the baud rate of the SSM port.

Practice 2

1. Display the list of commands available at lvlA. What command did you use?
   HELP

2. Get help on the <u>local</u>, <u>zap</u>, and <u>bs</u> commands. What command(s) did you use?
   Help local

3. Display the parameter values of the <u>local</u>, <u>bh</u>, and <u>bs</u> commands. What command(s) did you use?
   print local

4. Set the baud rate for the local port to 1200. Your terminal should not respond after you do this. What command did you use?
   local baud=1200

5. Cycle through the baud rates by pressing the break key until you reach the correct baud rate. Your terminal will respond with a prompt when you've reached the correct baud rate.

6. Enter the command to display the baud rate of the local port. What command did you use? (Notice the baud rate of the SSM port has been set back to 9600 to match the baud rate that was set when originally configuring the terminal.)
   print local

Verify your answers with those provided in the Appendix.

Note:

Leave the system on for the rest of this lesson.

Testing

The system automatically performs a number of tests at lvlA and lvlB. The test command allows you to manually test components of the SSM/SSM-2 hardware at lvlA.

test command

To view test's optional parameters, enter the following:

➔

->help test

Here is an explanation of some of the parameters of the test command:

53c90	- SSM & SSM2 SCSI chip test
tod	- time of day display
slic	- slic bus
frontPanel	- the front panel
bic	- bus interface
cpic	- the SSM/SSM-2 CPU peripheral interface controller
vpic	- the VMEbus peripheral interface controller
all	- tests all SSM/SSM-2 hardware components

The display may differ, depending upon which system you're using. You can stop the scrolling on a screen by entering control-s and restart screen output by entering control-q.

It is possible to hang the system if these tests are not run in order.

Practice 3

1. Test the components available at lvlA. What command did you use?

   test all

Verify your answers with those provided in the Appendix.

lvlB (Level-B)

lvlB is the second stage of the SSM/SSM-2 monitor. This level is the normal run-time environment of the SSM/SSM-2 monitor. The operating system, DYNIX/ptx, can be booted **only** from this level.

To boot from lvlA to lvlB, use the bs (boot string) command:

➔ **-> bs**

Below is the power-up listing that appears during the boot from lvlA to lvlB.

```
--->
booting SSM from 'wd(0,32)' (1)
loading 72089 bytes
Date 90/10/24 15:19:22 UTC

probe slic 0 2 3 4
Clear mem . (2)
test MEM/1w .
test PROC/486w ....
test SSM2 .

System Configuration: (3)

   type         no slic  flags      revision
   MEM/1w       0   2    00000000   00.03.02  size=16.0Mb base=0x00000000 ileave
   MEM/1w       1   4    00000000   00.03.02  size=16.0Mb base=0x00000000 ileave
   SSM          0   0    00000000   01.04.02  sysid=0x604  Bver=4.B.1  Aver=4.B.1  Console
   PROC/486w             00000000   00.08.01  25MHz 2*256K/16:no.0(slic8),1(9),2(10)
   PROC/486w             00000000   00.08.01  25MHz 2*256K/16: 3(slic 11)
SSM Firmware (Level B) version 4.b.1
```

During this boot from lvlA to lvlB, the system:

(1) identifies where on disk the SSM/SSM-2 is being booted from and the number of bytes being loaded

(2) tests system boards

(3) configures the system; displays the configuration listing

As the system boots to lvlB, boards are tested, and dots appear on the screen to indicate how many of that particular board are in the system. As processors are being tested, a dot appears for each processor, not for each processor board.

The following is an example of the SSM/SSM-2 hardware test output for four 486 processors:

PROC/486w ....

The lvlB prompt is **--->** (Notice three dashes in the prompt). The following commands are available in addition to those already introduced at lvlA.

lvlB commands

- fprog	program FLASH proms on SSM boards
- mem	allow or disallow host memory interleave
- deconfig	deconfigure a controller
- config	display a configuration; configure a controller
- log	examine or manipulate the SSM/SSM-2 console log
- reset	reset the host system; this usually forces a panic
- sysmodes	display or change system mode parameters
- rdump	display system memory

Practice 4

1. What command did you use to boot your Symmetry 2000 system from lvlA to lvlB?

   bs

2. Display the list of commands available at lvlB. What command did you use?

   help

Verify your answers with those provided in the Appendix.

Part # 1003-54362-00

System Configuration

Two other new commands at this level are config and deconfig.

You can display the system configuration by entering the following:

➔ **--->config**

Below is an example of the display:

System Configuration

type	no	slic	flags	revision	
MEM/1w	0	2	00000000	00.03.02	size=16.0Mb base=0x00000000 ileave
MEM/1w	1	4	00000000	00.03.02	size=16.0Mb base=0x00000000 ileave
SSM	0	0	00000000	01.04.02	sysid=0x604 Bver=4.B.1 Aver=4.B.1 Console
PROC/486w			00000000	00.08.01	25MHz 2*256K/16:no.0(slic8),1(9),2(10)
PROC/486w			00000000	00.08.01	25MHz 2*256K/16: 3(slic 11)

Below is a description of each field of the configuration display:

type

Indicates board type. Board type can be any of the following:

MEM/1w	Symmetry Memory Controller (In the listing above, the "/1w" indicates a 64-bit wide mode)
MBAD*	MULTIBUS Adapter board
SCED*	SCSI Console Ethernet Diagnostics board
ZDC*	Dual Channel Disk Controller board
SSM2	System Services Module 2 board
PROC/486w	Symmetry Processor Board ("w" means wide mode board)
CADM*	Clock arbitration board

*These boards are found only on the S2000/400 or S2000/700 and do not appear in the display above.

no — Indicates board number. The board number distinguishes multiple boards of a given type. Processor boards are the only exception to this rule; processors are numbered and listed individually, rather than by processor board.

slic — Indicates the board's address on the SLIC (System Link and Interrupt Controller). Dividing the slic number by 2 (integer division) will provide you the system card cage slot number of the board.

flags — Indicates the board's operating status. Flags should be all zeroes unless there is some problem.

revision — Indicates revision level of the board.

MULTIBUS Adapter Board (MBAD)

fw version — Indicates the version number of the firmware.

SCSI Console Ethernet Diagnostics board (SCED)

Enet — Represents the hexadecimal Ethernet address of a given SCED Ethernet controller. The first six digits are a Sequent-specific identifier; the last six are a unique Enet address.

Memory Board (MEM/1w)

size — Indicates the total amount of memory provided by a memory module (a controller plus its expansion board, if it has one).

base — Indicates the starting address of a given memory controller or expansion module.

ileave — Indicates whether a memory controller or expansion module's memory is interleaved with another module for increased system performance.

Systems Services Module board (SSM/SSM2)

sysid — Indicates a unique number associated with the system

Bver, Aver — Indicates the version number of the level-A and level-B firmware

console — Indicates which SSM board the console is connected to (in case there's more than one)

Processor Board (PROC/486w)

Processors having a common configuration are listed together on one or more lines. (Up to three may be listed on one line.) Common characteristics are flags, hardware/software revision numbers, clock rate, existence of floating-point accelerator (FPA) and cache configuration.

Following the common information, individual processors are listed in the format: processor number (SLIC number).

In the example below, processors 0, 1, and 2 are listed on the same line because they all have similar characteristics. (Processor 3 on the following line would be too if there was room.) Processors with different characteristics are always on different lines. Two processors (0 and 1) are on the board in slot 4 and processor 2 is on the board in slot 5. (Slot number is calculated by slic divided by 2 - integer division).

```
System Configuration
    type        no  slic   flags       revision
    MEM/1w      0   2      00000000    00.03.02     size=16.0Mb base=0x00000000 ileave
    MEM/1w      1   4      00000000    00.03.02     size=16.0Mb base=0x00000000 ileave
    SSM         0   0      00000000    01.04.02     sysid=0x604 Bver=4.B.1 Aver=4.B.1 Console
    PROC/486w              00000000    00.08.01     25MHz 2*256K/16:no.0(slic8),1(9),2(10)
    PROC/486w              00000000    00.08.01     25MHz 2*256K/16: 3(slic 11)
    --->
```

```
System Configuration
    type         no  slic    flags        revision
    MEM/1w       0   2       00000000     00.03.02     size=16.0Mb base=0x00000000 ileave
    MEM/1w       1   4       00000000     00.03.02     size=16.0Mb base=0x00000000 ileave
    SSM    0   0             00000000     01.04.02     sysid=0x604  Bver=4.B.1  Aver=4.B.1  Console
    PROC/486w                00000000     00.08.01     25MHz 2*256K/16:no.0(slic8),1(9),2(10)
    PROC/486w                00000000     00.08.01     25MHz 2*256K/16: 3(slic 11)
    --->
```

Practice 5

Answer the following questions using the system configuration listing **above**.

1. How many processors are there?

   FOUR

   How many processor boards?

   TWO

2. How much memory does this system have?

   32 MB

3. What system card cage slots are the memory boards in?

   SLOTS 1 & 2

4. How many boards are in the system card cage?

   FIVE

5. What system card cage slot is the first processor board in?

   FOUR

Verify your answers with those provided in the Appendix.

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Practice 6

1. Display your system configuration and answer the following questions:

   a. How many processors are there?
   Two
   How many processor boards?
   One

   b. How much memory does this system have?
   64 MB

   c. What system card cage slots are the memory board(s) in?
   Slot 10

   d. How many boards are ßin this system?
   Seven

   e. What system card cage slot is the first processor board in?
   Slot 1

2. Display all commands available at lvlB. What command did you use?
   help

3. Get help on these commands: config, deconfig, and bs
   What command did you use?
   help command name

4. Display the parameter values for these two commands: bs and bh
   What commands did you use?
   print command name

Answers for question 1 will vary depending on your system. If you are not sure, ask the instructor for help. Verify your answers for questions 2 through 4 with those provided in the Appendix.

config and deconfig commands

The flags field in the system configuration listing indicates the status of a board. The last digit of the flags field can be:

- 0 board passed all tests and is operational
- 2 board failed power up tests and was deconfigured by the system
- 4 board was deconfigured by the user

If a board fails, you may need to deconfigure (logically remove) the board from the system configuration. At some point, you'll need to configure (add) that board back into the system configuration. The board will remain deconfigured until you reconfigure it or replace the SSM/SSM2 board.

In the case of processors, one processor may be failing and causing the error light to go on. You can deconfigure that processor which will turn off the error light. If you allow the error light to remain on, other possible errors may go undetected.

The commands config and deconfig allow you to do this. You must know the slic address to configure or deconfigure boards.

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deconfig command

The following demonstrates how to deconfigure (remove) the first memory board and processor 0:

```
--->config
System Configuration
    type       no    slic    flags       revision
    MEM/1w     0     2       00000000    00.03.02    size=16.0Mb base=0x00000000 ileave
    MEM/1w     1     4       00000000    00.03.02    size=16.0Mb base=0x00000000 ileave
    SSM        0     0       00000000    01.04.02    sysid=0x604 Bver=4.B.1 Aver=4.B.1 Console
    PROC/486w                00000000    00.08.01    25MHz 2*256K/16:no.0(slic8),1(9),2(10)
    PROC/486w                00000000    00.08.01    25MHz 2*256K/16: 3(slic 11)

    --->deconfig slic=2
System Configuration
    type       no    slic    flags       revision
   *MEM/1w     0     2       00000004    00.03.02    size=16.0Mb base=0x00000000 ileave
    MEM/1w     1     4       00000000    00.03.02    size=16.0Mb base=0x00000000 ileave
    SSM        0     0       00000000    01.04.02    sysid=0x604 Bver=4.B.1 Aver=4.B.1 Console
    PROC/486w                00000000    00.08.01    25MHz 2*256K/16:no.0(slic8),1(9),2(10)
    PROC/486w                00000000    00.08.01    25MHz 2*256K/16: 3(slic 11)

    --->deconfig slic=8
System Configuration
    type       no    slic    flags       revision
   *MEM/1w     0     2       00000004    00.03.02    size=16.0Mb base=0x00000000 ileave
    MEM/1w     1     4       00000000    00.03.02    size=16.0Mb base=0x00000000 ileave
    SSM        0     0       00000000    01.04.02    sysid=0x604 Bver=4.B.1 Aver=4.B.1 Console
   *PROC/486w                00000004    00.08.01    25MHz 2*256K/16:no.0(slic8)
    PROC/486w                00000000    00.08.01    25MHz 2*256K/16: ,1(9),2(10),3(slic 11)
--->
```

Note the asterisk (*) in front of the memory board and processor that were deconfigured. The last digit in the flag field is now a 4, which indicates the board was deconfigured by the user. Also, notice the deconfigured processor appears on a line by itself.

config command

The following demonstrates how to configure (add) the memory board and processor back into the system:

```
--->config slic=2
System Configuration
    type        no    slic   flags      revision
    MEM/1w      0     2      00000000   00.03.02    size=16.0Mb base=0x00000000 ileave
    MEM/1w      1     4      00000000   00.03.02    size=16.0Mb base=0x00000000 ileave
    SSM         0     0      00000000   01.04.02    sysid=0x604 Bver=4.B.1 Aver=4.B.1 Console
   *PROC/486w                00000000   00.08.01    25MHz 2*256K/16:no.0(slic8)
    PROC/486w                00000000   00.08.01    25MHz 2*256K/16: ,1(9),2(10),3(slic 11)
--->config slic=8

System Configuration
    type        no    slic   flags      revision
    MEM/1w      0     2      00000000   00.03.02    size=16.0Mb base=0x00000000 ileave
    MEM/1w      1     4      00000000   00.03.02    size=16.0Mb base=0x00000000 ileave
    SSM         0     0      00000000   01.04.02    sysid=0x604 Bver=4.B.1 Aver=4.B.1 Console
    PROC/486w                00000000   00.08.01    25MHz 2*256K/16:no.0(slic8),1(9),2(10)
    PROC/486w                00000000   00.08.01    25MHz 2*256K/16: 3(slic 11)
--->
```

Practice 7

1. Display your system configuration.

   config

2. Deconfigure a memory board and a processor from the system configuration. What command(s) did you use?

   deconfig slic=20
   deconfig slic=3

3. Configure the board and processor back into the system configuration. What command did you use?

   config slic=20
   config slic=3

Verify your answers with those provided in the Appendix.

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SSM/SSM-2 Boot Flags

In this lesson, you have manually booted from lvlA to lvlB using the bs command.

bs command

The SSM/SSM-2 monitor can proceed through the two stages automatically if the appropriate flag is set in the boot commands. The bootflag that controls this process is called monAuto. This bootflag is a parameter of the bs command. To view the value of the monAuto flag, enter the following:

➔

0 DISK #
SCSI ADDRESS

```
--->print bs
        lvlBPath    = wd(0,32)
        monAuto     = 0
        diagPath    = wd(0,2)ssw/diag/exec
        diagAuto    = 0
--->
```

In this display, the monAuto flag is set to 0, which causes the system to be manually booted from one stage to the next.

If monAuto were set to 1, the system would automatically boot through lvlA and stop at lvlB. As the system proceeds through each stage, it pauses for five seconds and gives you a chance to abort the automatic boot. You'll have a chance to observe this in the next practice.

Here is an explanation of the other parameters of the bs command:

lvlBPath - the disk type, unit and block on the SCSI disk where the lvlB boot file is located

diagPath - the disk type, unit, partition, and pathname on the SCSI disk where the diagnostics are located

diagAuto - flag which indicates if diagnostics can be booted manually (0) or automatically (1) from lvlB

The system will not allow both the diagAuto flag and the monAuto flag to be set to 1 at the same time. If one flag is set to 1 and you attempt to set the second flag to 1, the system resets the first flag back to 0.

You can change any of the bs parameters by entering the following:

--->bs parameter=*value*

To change the monAuto flag you enter the following:

--->bs monAuto=1

If you change any bs parameters, reboot the system by using the zap command. The zap command causes the system to start from lvlA and boot either manually or automatically, depending on the monAuto bootflag. Rebooting the system using zap takes about 60 seconds.

Practice 8

1. Display the bs parameter values. What command did you use?
   print bs
2. Change the bootflag so the next time the system is rebooted, it will boot to lvlB automatically. What command did you use?
   bs monAuto=1
3. Reboot the system. Abort the boot at lvlA when prompted. How did you do this?
   ZAP
   PRESS ANY KEY
4. Reboot the system. Don't interfere with the boot process.
   ZAP

Verify your answers with those provided in the Appendix.

Booting DYNIX/ptx

bh command

The operating system, DYNIX/ptx, is booted only from lvlB. The bh (boot host) command boots the operating system. (**Do not** boot the system until instructed to do so in Practice 10).

To view the parameter values of the bh command, enter the following:

➔

```
--->print bh
        osPath       = 0 wd(0,0)unix -r wd0s0 -s wd0s1
        autoBoot     = 0
        tmpPath      = 0 wd(0,0)unix -r wd0s0 -s wd0s1
        auxPath      = 88 wd(0,0)stand/dump wd(0,1) 8000
                           /dev/rdsk/wd0s1
        autoDump     = 1
        loaderPath   = wd(0,2)ssw/boot
        errPath      = wd(0,2)ssw/boot
--->
```

Here is an explanation of the parameters of the bh command:

osPath - the disk type, unit, partition, and pathname on the disk where the OS boot file is located. The first digit after the equal sign (=) in this string indicates whether to boot the system to single-user (2) or to multiuser (0). (More on single-user and multiuser later).

autoBoot - flag which indicates if the operating system is booted from lvlB manually (0) or automatically (1)

tmpPath - the disk type, unit, partition, and pathname on the disk where an alternate boot file is located.

auxPath - the disk type, unit, partition, and pathname on the disk of a boot file that is used if there is a system panic.

autoDump - flag which indicates if sytem memory is dumped automatically (1) or not (0) when a system panic occurs

loaderPath - specifies the path to the boot program which is actually used to load the operating system.

errPath - specifies the path where scan error information is written; currently used by Sequent engineering only.

Setting monAuto to 1 and autoBoot to 1 causes the system to automatically go from power-up to DYNIX/ptx

The DYNIX/ptx operating system consists of two levels: single-user mode and multiuser mode. The first digit after the equal sign in osPath is set to a default of 0 (multiuser) at the factory, but you can change it to 2 (single-user).

Practice 9

1. Display the parameter values of the bh command. What command did you use?

   print bh

2. What parameter of the bh command determines if the operating system is to be booted manually or automatically?

   autoboot

3. How would it be set to manually boot?

   bh autoBoot=0

4. Boot the operating system to DYNIX/ptx multiuser mode. What command did you use? Login as **root**. (There is no password; just press <return>)

   bh

Verify your answers with those provided in the Appendix.

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System Levels

There are four system levels: lvlA, lvlB, DYNIX/ptx single-user mode and DYNIX/ptx multiuser mode.

You are already familiar with the power-up monitor levels.

You work on the DYNIX/ptx operating system in single-user mode or multiuser mode. The prompt for single-user mode is a **#.** The prompt when you login as root (as you do in this lesson) in multiuser mode is also a **#**.

Single-user mode

Single-user mode is the level where only the system console is active. Only one user is allowed on the system. Some system administration duties like backups and restores are performed at single-user mode.

Multiuser mode

Multiuser mode is the level where several users are allowed on the system. People doing their day-to-day work on a system are in multiuser mode. System administrators are able to perform some of their duties at multiuser mode when others are using the system.

Moving Between System Levels

There are times when you'll need to move between these system levels. For instance, if you need to power down a system, you need to move from multiuser mode to power-up monitor and then turn off the system. If you need to perform some system administration functions, you'll need to move from multiuser mode to single-user mode.

You already know how to power up from the power-up monitor to DYNIX/ptx. There are two other commands that allow you to move between system levels: init and shutdown. These two commands can only be used in single-user or multiuser mode; they are not valid commands in the power-up monitor.

init command

The init command allows you to move between system levels without giving warning to any users who might be logged into the system. This is a good command to use when you're on the system by yourself; it's not a command to use when there are others on the system.

The init command has the following syntax:

init [state]

state can be: 0= power-up monitor
1=single-user mode
2=multiuser mode

Here are some examples:

# **init 2**	move from single-user to multiuser
# **init 0**	move from multiuser to power-up monitor
# **init 1**	move from multiuser to single-user

shutdown command

The shutdown command performs the same function as the init command but allows you to give a warning message to any users who might be logged onto the system.

The shutdown command has the following syntax:

shutdown [-y] [-g*secs*] [-i*state*]

-y When you enter shutdown, the system asks if you want to shut down the system. This option automatically answers 'yes' to this question.

-g*secs* specifies a grace period between the time you send a message and system shutdown. Enter the grace period in seconds; the default is 60 seconds.

-i*state* runs init command; states are the same as described above, except that state 2 to move to multiuser mode is not available.

Here are some examples:

 # shutdown -y -g300 -i0
moves from single-user to the monitor; gives users 5 minutes grace period

 # shutdown -y -g120 -i1
move from multiuser to single-user mode; gives users 2 minutes grace period

 # shutdown -y -g120 -i0
move from multiuser to power-up monitor; gives users 2 minutes grace period

Here is a table summarizing commands to move from one system level to another.

This table assumes these flag settings:

monAuto=0
autoBoot=0

(Flag settings of monAuto=1 and autoBoot=1 cause the system to automatically boot to DYNIX/ptx on power up.)

TO

FROM	Power Off	Level A	Level B	Single-user	Multiuser
Power Off	——	turn key on	N/A	N/A	N/A
Level A	turn key off	N/A	bs	N/A	N/A
Level B	turn key off	zap	N/A	bh 2wd(0,0)unix	bh or bh 0wd(0,0)unix
Single-user	N/A	N/A	init 0	N/A	init 2
Multiuser	N/A	N/A	init 0 or shutdown -y -g60 -i0	init 1 or shutdown -y -g60 -i1	N/A

*N/A means there is no direct route between the two system levels. Move between these system levels by combining several routes.

Practice 10

1. Shutdown the system to DYNIX/ptx single-user mode. Do not notify anyone else. What command did you use?

   init 1

2. Bring the system back to multiuser mode. What command did you use?

   init 2

3. Shutdown the system to the monitor level and notify others that the system will shut down in 10 seconds. Choose the option to bypass questions. What command did you use?

   shutdown -y -g10 -i0

4. Change all boot flags so that the system will boot automatically to DYNIX/ptx multiuser mode. How did you set the flags?

   bs monAuto=1

   bh autoBoot=1

5. Reboot the system. What command did you use?

   zap

6. Shut down the system to lvlB and power off your system.

   init 0

Verify your answers with those provided in the Appendix.

Booting to lvlB From Tape

When data on the system disk is corrupted or if SSM/SSM-2 software has not yet been installed, the SSM/SSM-2 monitor will not automatically boot from lvlA to lvlB. Then you use the ssm Diagnostics FW tape to boot the system to lvlB.

To boot to lvlB from 1/4 inch tape:

1. Boot the system to lvlA.

2. Insert the ssm Diagnostics FW tape.

3. Boot the system to level-B (lvlB) by typing:

   ->bs tm(56,1) on S2000/200 systems
   or
   ->bs tm(56,3) on S2000/400 and S2000/700 systems

Practice 11

1. Boot to lvlB from the ssm Diagnostics FW tape. What steps did you follow?

   bs tm(56,3)

2. Turn the system off.

Verify your answers with those provided in the Appendix.

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Self Check

Following is a list of tasks you should be able to do at the completion of this self-paced lesson. Check off those that you feel you can do. If there are any you do not feel you can do, review this lesson or ask the instructor for assistance.

I can:

_____ Manually boot to each of the two SSM/SSM-2 levels

_____ Get help at each level

_____ Print parameters for a specific command

_____ Use the test command to test hardware components

_____ Change command parameter values

_____ Display the system configuration

_____ Interpret the system configuration
- list the slot number of all boards
- tell if a board is operational or not
- determine the total amount of memory in a system
- determine the number of processors in a system

_____ Change the system configuration

_____ Automatically boot to lvlB

_____ Reboot the system using the zap command

_____ Boot DYNIX/ptx

_____ Move between system levels using init and shutdown

_____ Boot to lvlB using the ssm Diagnostics FW tape.

Additional information about the SSM/SSM-2 Monitor is included in the SSM/SSM-2 Power-Up Monitor Guide.

Appendix
Answers to Practice Exercises

Practice 2

Answer		Exercise
help	1.	Display the list of commands available at lvlA. What command did you use?
help local **help zap** **help bs**	2.	Get help on the local, zap and bs commands. What command did you use?
print local **print bh** **print bs**	3.	Display the parameter values of the local, bh, and bs commands. What command(s) did you use?
local baud=1200	4.	Set the baud rate for the local port to 1200. Your terminal should not respond after you do this. What command did you use?
	5.	Cycle through the baud rates by pressing the break key until you reach the correct baud rate. Your terminal will respond when you've reached the correct baud rate.
print local	6.	Enter the command to display the baud rate of the local terminal.

Practice 3

test all

Test the components available at lvlA.

What command did you use?

Practice 4

bs	1. What command did you use to boot your Symmetry system from lvlA to lvlB?
help	2. Display the list of commands available at lvlB. What command did you use?

Practice 5

4 processors	1. How many processors are there?
2 boards	How many processor boards?
32Mb	2. How much memory does this system have?
Slots 1 & 2	3. What system card cage slots are the memory boards in?
5 boards (including SSM/ SSM-2)	4. How many boards are in the system card cage?
Slot 4 (slic/2)	5. What system card cage slot is the first processor board in?

	Practice 6	
help	2.	Display all commands available at lvlB. What command did you use?
help config **help deconfig** **help bs**	3.	Get help on these commands: config, deconfig, and bs What commands did you use?
print bs **print bh**	4.	Display the parameter values for these two commands: bs and bh What commands did you use?
	Practice 7	
config	1.	Display your system configuration.
deconfig slic=x **(x=slic number)**	2.	Deconfigure a memory board and a processor from the system configuration. What command(s) did you use?
config slic=x	3.	Configure the board and processor back into the system configuration. What command did you use?
	Practice 8	
print bs	1.	Display the bs parameter values. What command did you use?

bs monAuto=1

2. Change the bootflag that controls automatic or manual boot so the next time the system is rebooted, it will boot to lvlB automatically.

   What command did you use?

zap
Press any key to abort when prompted.

3. Reboot the system. Abort the boot at lvlA when prompted.

   How did you do this?

zap

4. Reboot the system. Don't interfere with the boot process.

   What command did you use?

Practice 9

print bh

1. Display the parameter values of the bh command. What command did you use?

autoBoot

2. What parameter of the bh command determines if the operating system is to be booted manually or automatically?

bh autoBoot=0

3. How would it be set to manually boot?

bh

4. Boot the operating system to DYNIX/ptx multiuser mode. What command did you use? Login as **root**. (There is no password; just press <return>)

Chapter 5
Diagnostic Executive

Diagnostic Executive Objectives

You will:

a. boot the Diagnostic Executive from disk

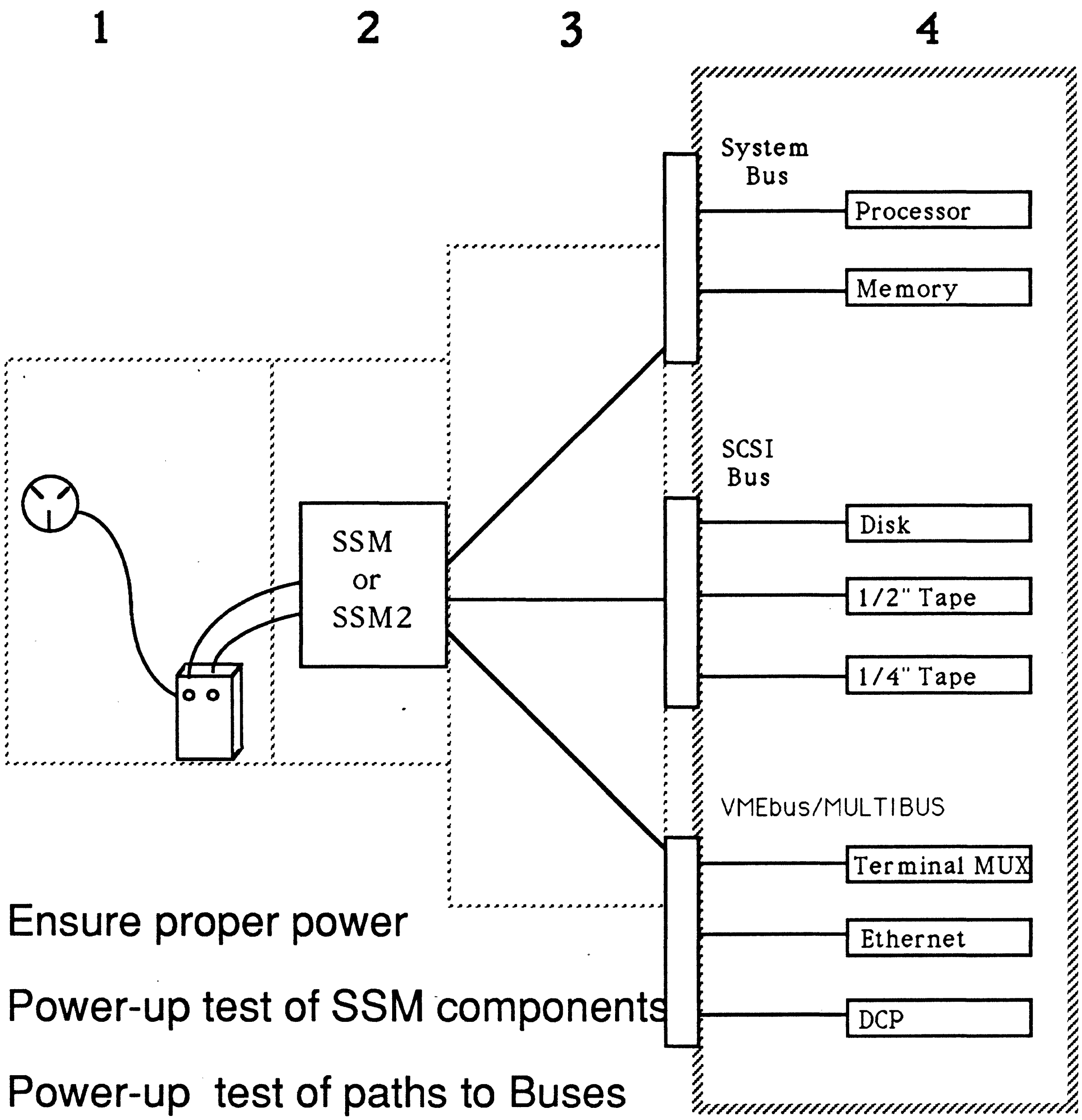
b. load the Diagnostic Executive from tape

c. from the Diagnostic Executive menu:
   - get help on all commands
   - print current parameters of all commands
   - set parameters on the local and remote ports
   - select test execution parameters
   - configure hardware to test
   - select and execute tests and subtests
   - display the error log
   - execute the system quick tests
   - re-boot the system

Diagnostic Executive

- Diagnostic software that allows component level testing
- Interactive
- Menu driven format
- Executed from the SSM/SSM2 processor
- Booted from cartridge tape or disk
- Board level reconfiguration

Diagnostic Diagram



1. Ensure proper power
2. Power-up test of SSM components
3. Power-up test of paths to Buses
4. Executive test of all system components and peripherals

Using the Diagnostic Executive

Taking this lesson

This is a self-paced lesson on the Diagnostic Executive. You can work on it at your own pace; if you have questions ask the instructor for help. This lesson takes about an hour to complete.

This lesson is organized with information about a topic presented first, followed by a practice session. Read the information carefully and then enter commands when you see ➔ in the left margin or during a practice exercise. Examples of user input are in bold.

A checklist outlining the steps to run diagnostics is included on page 5.36 of this lesson. The Diagnostic Executive Reference Card contains a list of all Executive commands.

Prerequisites

You should already know how to power up and power down a Symmetry 2000 system.

Objectives

During this lesson you will:

- boot the Diagnostic Executive from disk
- load the Diagnostic Executive from tape
- from the Diagnostic Executive menu:
  - get help on all commands
  - print current parameters of all commands
  - set parameters on the local and remote ports
  - select test execution parameters
  - configure hardware to test
  - select and execute tests and subtests
  - display the error log
  - execute the system quick tests
  - re-boot the system

The following commands invoke the Diagnostic Executive and this menu is displayed:

--->bs doDiags

or

--->bs wd(0,2)ssw/diag/exec

```
        +------------------------------------------------------------------+
        |              Diagnostic Executive Version 4.b.1                  |
        |       Copyright (c) 1990 Sequent Computer Systems, Inc.          |
        +------------------------------------------------------------------+
==>           #
==>           #   Information about running scripts
==>           #

b - boot                      i - information level      r - run a test
c - configure hardware        k - kill a test            s - read a script
e - error control             l - loop control           t - test select
f - foreground                m - menu control           u - UART control
h (or ?) - help               o - operator functions     v - test variables
                              x - execute a subtest
              #
              #
              #
==>
```

Practice 1

1. Power up a Symmetry system to level-B and invoke the Diagnostic Executive.

2. Determine the version number of the Diagnostic Executive.

Using the Diagnostic Executive

Commands

Diagnostic Executive commands consist of top-level commands, subcommands, and second-level commands. Commands are **not** case sensitive.

The prompt changes to reflect the level of the menu you're in. Here is an example. Notice how the prompt changes.

```
          +-----------------------------------------------------------------+
          |              Diagnostic Executive Version 2.0.0                 |
          |       Copyright (c) 1990 Sequent Computer Systems, Inc.         |
          +-----------------------------------------------------------------+
==>             #
==>             #   Information about running scripts
==>             #

b - boot                            i - information level             r - run a test
c - configure hardware              k - kill a test                   s - read a script
e - error control                   l - loop control                  t - test select
f - foreground                      m - menu control                  u - UART control
h (or ?) - help                     o - operator functions            v - test variables
                                    x - execute a subtest

==>i
==(i)>        b - box               h - help             p - print
              f - flow              m - menu
==(i)>m
==(im)>       f- full menus   h - help             p - prompt only

                                    r - reference menus
==(im)>
```

In the example above, the prompt changes from ==> to ==(i)> to ==(im)> depending on the level in the menu. At the ==(i)> prompt, valid commands are b, f, h, m, and p. Entering any of these moves you down to the next level and the prompt changes to reflect the move.

To return to the main menu, press the Escape (ESC) key (located in the upper left-hand corner of your keyboard).

Practice 2

1. Explore all levels of the i and e commands.

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Getting Help

The Diagnostic Executive has on-line help available at all levels. Help is not available in all cases; if no useful information is available, the message `"no help message for this level"` is displayed.

h or ?	displays a list of all commands available from the main menu and an explanation of how to obtain help on these commands
***command*h**	displays help on specific menu command

Here are some command examples that are entered at the main menu:

eh	help for error control commands
ih	help for information level commands
imh	help for information menu commands

Displaying parameters

You can also display current parameters (settings) of any menu command.

***command*p**	displays current parameters for a specific command. If the command has no parameters, nothing displays.

Here are some command examples that are entered at the main menu:

ip	print current parameters for information level commands
ep	print current parameters for error control commands
tp	print a list of all available tests

The h and p commands can be entered at any level.

You can stop the scrolling on a screen by entering control-s and restart screen output by entering control-q. This is useful if screen displays take more than one screen.

Practice 3

1. Explore at least five commands on the Diagnostic Executive menu by:

    a. getting help on each of these commands

    b. printing the current parameters for each of these commands

Verify your answers with those provided in the Appendix.

LOOP lh
lp

MENU mh
mp

CONFIG ch
cp

OPERATOR oh
op

VARIABLES vh
vp

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Setting Remote and Local Port Parameters

Parameters for the local and remote port have default values. These parameters can be changed using the UART control menu option. The u commands set the baud rate for the console and remote ports and specify whether a CRT terminal or printer is connected to a given port. The u commands also allow you to set characters for erase, kill, interrupt, repeat and suspend.

To see what parameters are currently set, enter the following:

➔ **==>up**

Here is an explanation of commands to set baud rate and terminal type:

Setting the Baud Rate

==>ubc <baudrate> Sets the console baud rate; valid baud rates are 300, 1200, 2400, 4800, 9600, 19200, and 38400

Example: **ubc 9600**

==>ubr <baudrate> Sets the remote port baud rate

Setting the Terminal Type

==>utc <type> Sets the console terminal type; valid types are crt and printer

Example: **utc crt**

==>utr [enable | disable]
Enables/disables the remote console terminal (S2000/200 only; use front panel button on S2000/400 and S2000/700)

Practice 4

1. Enable the remote port and set its baud rate to 1200 and its terminal type to be crt. What commands did you use? ubr 1200
utr crt

2. Verify these changes. What command did you use?
up

3. Restore the baud rate of the remote port to 9600. ubr 9600

4. Verify these changes.
up

Verify your answers with those provided in the Appendix.

Setting Terminal Characters

You may want to change the erase, kill, interrupt, repeat, or suspend character. The u commands allow you to do this.

==>ue <character> Sets the erase character; by default backspace. Be careful when setting this character. DON'T set it to"u" or "e" because this command will no longer work.

Example: **ue ^b** (control-b)

==>uk <character> Sets the kill character; by default ^X or ^U.

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==>ui <character>	Sets the interrupt character; by default ^C or ^[. This is the character you'd enter to terminate a test
==>ur <character>	Sets the repeat character; by default ^J. This is the character you'd enter to repeat a command.
==>ud	restore default settings for the erase, kill and interrupt characters.
==>uh	get help on u commands
==>us <character>	Sets the suspend character; by default ^Z. This is the character you'd enter to suspend a test. (Covered in more detail later in this lesson.)

Practice 5

1. Set the interrupt, erase, and kill characters for the console to characters of your choice. Be careful not to use any characters that are part of the command! What commands did you use?

   ue w

2. Restore the system to its default settings. What command did you use?

   ue cntrl H

Verify your answers with those provided in the Appendix.

Isolating Problems

When problems occur with a system, you need to follow an orderly procedure to isolate the cause of the problem.

Here are some general rules to follow:

1. Perform a visual inspection and check for the simple, obvious things first; make sure the power is correct, all boards are seated properly, and all cable connections are secure.

2. Resolve low level problems first; make sure the SSM power-up tests run successfully.

3. Make sure all status indicators are in the normal state; these include the front panel display, the power supply status indicators, and board indicators.

4. Use a building block approach when running diagnostics. Start with the SSM power-up tests. Then boot the Diagnostic Executive. Test one module at a time. Start with simple tests and build up to more complicated ones.

5. Keep variables at a minimum. Change only one item at a time and then re-run diagnostics.

6. Run tests for a period of time to ensure problem has been solved.

Running Diagnostic Tests

When running diagnostics, here are the steps to follow:

1. Set up parameters for information control, error control, and loop control.
2. Select the hardware to be tested.
3. Select the tests to be executed.
4. Run the tests.
5. Examine the test results.
6. Take corrective action.

Setting Parameters

Information Control

The i commands allow you to control the amount of information given in messages and menu displays.

Here is an explanation of information control subcommands:

i subcommands

ib select whether text is enclosed in a box
if select the level of information displayed for a given test
im select the level of command menu displayed
ip displays current parameters
ih get help on i commands

Practice 6

1. Get help on the i commands.
   What command did you use? ih

2. Display the current information control parameters. What command did you use? ip

3. Set information control parameters to the following:
   a. flow level - display test and subtest start and stop messages only iff
   b. display full menus imf

   What commands did you use?

Verify your answers with those provided in the Appendix.

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Error Control

The e commands allow you to specify how the Diagnostic Executive behaves when it encounters an error. You can select how the Executive responds to an error and how the Executive logs and reports errors.

Here is an explanation of error control subcommands:

e subcommands

ea	determines what action is taken when a test encounters errors
el	determines how error message logging is handled
ep	displays the current status of all error control flags
er	determines how the Executive reports test errors
eh	get help on the e commands

Practice 7

1. Get help on the e commands. What command did you use?
   eh

2. Display the current error control parameters. What command did you use?
   ep

3. Set the error control parameters to the following:
   a. abort test on error — eqa
   b. write full error messages in the error log — elf
   c. report all errors — era

Verify your answers with those provided in the Appendix.

Loop Control

The l command allows you to select the kind of looping to be performed when tests are run. This is useful when errors are intermittant. The l command has only subcommands; there are no second-level commands.

Here is an explanation of loop control subcommands:

l subcommands

ld	causes a loop on the failing data pattern
le	loop on the first subtest which gets an error
lt	causes a loop on all selected tests
lc	clears looping options (default)
lp	displays current state of loop flags
lh	displays help messages about the loop control commands

Practice 8

1. Get help on the l commands. What command did you use?

   lh

2. Display the current loop control parameters. What command did you use?

   lp

3. Set the loop parameters to the following:
   a. loop on first subtest that gets an error

      le

Verify your answers with those provided in the Appendix.

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Configuring Hardware to be Tested

You must configure (select) the hardware to be tested before running diagnostic tests. The c commands allow you to configure components of the system hardware to test.

Here is an explanation of configuration control subcommands:

c subcommands

ca automatically scans the system to determine what hardware is installed and then selects all hardware components to test

Note: some types of hardware failures prevent "ca" from finding everything

cf set diagnostic flags for specified Sequent controller

cm set system mode values

ch displays help messages about the configuration control commands; also displays a list of all possible hardware components (devices)

Note: ch <device name> displays help for specific devices

cp displays the currently configured system boards

Note: cp <device name> displays currently configured <device name>

cs allows you to manually select and deselect controllers and devices

Practice 9

1. Display a list of all system boards that are currently configured. What command did you use?

   cp

2. Get help on the c commands. What commands did you use?

   ch

3. Get help on these devices: wd (SCSI disk drive) and tm (SCSI tape drive). What command did you use?

   ch wd ch tm

Verify your answers with those provided in the Appendix.

Select and Deselect

The cs command is used to select and deselect controllers and devices to test. System boards are selected by default; this means that system board tests will run on all boards unless you specifically deselect them.

The minus (-) deselects hardware components. Deselect processor 0 by entering the following:

==>cs -proc/486w 0

This command deselects processor 0 so it will not be tested the next time processor tests are run.

The plus (+) adds hardware components back into the system configuration. To add processor 0 back into the configuration enter the following:

==>cs +proc/486w 0

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Controllers and devices are deselected by default; therefore, if you want to run a test on any of these components, you must select or configure them first.

The command for selecting a controller or device is more complicated than for system boards.

Here is an example of selecting a tape drive to test:

==>cs +ssm2 0 ssm_scsi 0 tm 56

Here is an explanation of that command:

ssm2 0	SSM board type and number (Can be either ssm or ssm2; in this example, the first ssm2 board is referenced)
ssm_scsi 0	SCSI bus number (in this example, the first SCSI bus)
tm 56	device name and unit number (in this example, tape drive with unit number 56; default is 56)

The command to deselect this tape drive is:

==>cs -ssm2 0 ssm_scsi 0 tm 56

Practice 10

1. Configure the SCSI tape drive.
   What command did you use?
   cs +ssm2 ssm_scsi 0 tm 56
2. Verify the tape drive was configured.
   What command did you use?
   cp tm

Verify your answers with those provided in the Appendix.

Preferential treatment

When testing like components, the first component of its kind is tested first, the second component of its kind is tested next, and so on. For example, processor 0 is tested first, processor 1 is tested next, and so on. The same holds true for controllers and devices.

If you want testing to occur in a different order you need to use the css command. For instance, you may want processor 1 tested before processor 0. The css command allows you to do this.

==>css proc/486w 1

The css command also allows you to give preferential treatment to a component. For example, if you had two disk drives, wd0 and wd8, and you wanted to test wd8 before wd0, the command is:

==>css +ssm2 0 ssm_scsi 0 wd 8

To remove preferential treatment from a system board, you can enter either of the following commands:

==>cs proc/486w 0 (board remains selected)

or

==>css -proc/486w 0 (board is deselected)

Removing preferential treatment from any system component is the same as for system boards.

You can enter any of the following commands:

==>cs ssm2 0 ssm_scsi 0 wd 8 (wd8 remains selected)

or

==>css -ssm2 0 ssm_scsi 0 wd 8 (wd8 is deselected)

or

==>cs -ssm2 0 ssm_scsi 0 wd 8) (wd8 is deselected)

Practice 11

1. Give preferential treatment to processor 1. What command did you use?

   css -proc/486w 0

2. Verify this change. What command did you use?

   cp

Verify your answers with those provided in the Appendix.

Selecting Tests to be Executed

The t commands allows you to select which diagnostic tests to run.

Here is an explanation of the test control subcommands:

t subcommands

ta searches the configuration table and selects all tests and subtests not flagged as *out* that apply to the currently configured hardware

th displays help messages about the test control commands

ts allows you to manually select and deselect tests and subtests

tq automatically selects a "quick-look" version of all tests that apply to the currently configured hardware

tp displays a list of tests and their current status (selected/deselected)

Enter the following command to display a list of all tests:

→

==>tp

Display a list of tests

To display a list of all tests in the "symmem" module, enter the following:

→

==>tp symmem

```
+-----------------------------------------------+
|     *-Symmetry Memory Unit Test               |
|     *-1   VLSI Verification                   |
|     *-2   Symmetry Memory EDC                 |
|     *-3   Symmetry Memory Support             |
|     *-4   Symmetry Memory DRAM                |
|     *-5   Symmetry Memory Modes               |
|     *-6   System Bus Interface                |
+-----------------------------------------------+
```

A numbered list of tests appears. The "*" next to the number indicates there are subtests within that particular test. To display a list of subtests within Test 1 enter the following:

➔ **==>tp symmem 1**

```
+--------------------------------------------------+
|      *-VLSI Verification                         |
|      *-1.1 SLIC and Configuration PROM           |
|      *-1.2 BDP and BIC                           |
|                                                  |
|--------------------------------------------------+
```

Practice 12

1. Get help on the ts command. What command did you use?

   tsh

2. Display all tests for the symproc module. What command did you use?

   tp symproc

3. What number test in the dcc test module tests the OK board logic?

   4.1

4. What number test in the csd test module will write/read the entire disk?

   4.4

Verify your answers with those provided in the Appendix.

Select tests

The ts command allows you to select specific diagnostic tests to run. Using ts selects the test specified and deselects any other tests that may have been selected. Use the plus (+) and minus (-) to add or remove tests.

Here are some examples:

==>ts symproc	Clears the current test list and selects the Symmetry processor test
==>ts +symmem	Adds the Symmetry memory test to the list of selected tests
==>ts -symproc	Removes the Symmetry processor test from the list of selected tests
==>ts symmem; ts +symproc	Selects Symmetry memory test and Symmetry processor test

These same commands are used to select and deselect subtests. Here are some examples:

Select multiple tests

==>ts +tm 2.1 2.2	Adds tm subtests 2.1 and 2.2 to list of selected tests
==>ts +tm 2:4	Adds tm subtests 2, 3, and 4 to the list of selected tests. Select a range of tests using a colon (:)
==>ts -tm 3.2	Removes tm subtest 3.2 from the list of selected tests
==>ts csd	Clears the current test list and selects SCSI disk drive tests

Display selected tests

Use the rp command to display all tests selected to run.

Practice 13

1. Select diagnostic tests to test the SCSI tape drive you have already configured. What command did you use?

   ts tm

2. Display all selected tests. What command did you use?

   rp

Verify your answers with those provided in the Appendix.

Running the Tests

There are two ways to run diagnostic tests.

The r command runs all selected tests and follows whatever loop, error control, and information control parameters you have set.

You can also run an individual test that has not been previously selected using the x command. You can only run one test at a time using x.

Here are some examples:

==>r	runs all selected tests
==>x symmem	runs the Symmetry memory test
==>x symmem 1.2	runs subtest 1.2 of the the Symmetry memory test

When running tests on the tape drives, put scratch tapes in the drives to avoid errors.

Practice 14

1. Run the test you have selected. Make sure there's a tape in the tape drive. What command did you use?

Verify your answers with those provided in the Appendix.

Suspending a Test

You can temporarily halt or suspend a test while it is running by pressing control-z. When you enter control-z, the word SUSPEND appears on the screen and then the Diagnostic Executive screen menu appears. The amount of time it takes the menu to appear varies , depending upon the test being run.

You may change information control, error control, or loop control parameters while a test is suspended. The changes take place when you resume execution of the test.

You may not print a list of selected tests or select or deselect tests while a test is suspended.

Resuming a Test

Enter fg or f to resume a suspended test. When a test is suspended it is held in the background. The fg or f command stands for foreground, meaning bring the test to the foreground and resume executing it.

Killing a Test

You can terminate a suspended test by using the k (kill) command.

Interrupting a Test

You can interrupt a test before completion by pressing control-c or the Escape (ESC) key. This command terminates the test.

Practice 15

1. Run the tests you have selected again.

2. Suspend these tests and then restart them. What commands did you use?

3. Suspend these tests again and then kill them. What commands did you use?

Verify your answers with those provided in the Appendix.

Test Quick (tq)

The tq command automatically selects a "quick-look" version of all tests that apply to the currently configured hardware. This command doesn't select all tests but it does provide good test coverage. If the Executive encounters an error while running tests under the tq command, it automatically reruns the full set of tests for that piece of hardware before going on. These tests take about forty minutes to complete.

The tq command isolates a particular fault to the field-replaceable unit (FRU) level. Appendix A of the Diagnostic Executive User's Guide lists all tests and subtests and identifies those that are run during this quick test.

This quick test is run automatically when diagnostics are booted and the diagAuto flag is set to 1.

The command to select these quick tests is:

==>tq

You would need to then enter the r command to actually run these tests. **DO NOT** start these tests now.

Test Autoschedule (ta)

The ta command searches the configuration tables and selects all tests and subtests not flagged as out that apply to the currently configured hardware. (Tests flagged as out do not run unless specifically selected). Tests selected by the "ta" command are more extensive than those run with the tq command. The command to select these tests is:

==>ta

You would then need to enter the r command to actually run these tests. **DO NOT** start these tests now.

Practice 16

1. Configure all available hardware in your system. (Remember, there is a simple command to do this). What command did you use?

   ca

2. Select and run the quick tests on the selected hardware. What commands did you use?

   tq

3. Interrupt these quick tests. What command did you use?

   esc cntrl - C

Verify your answers with those provided in the Appendix.

Examining the Results

Error messages are displayed by a test to indicate a hardware failure. When tests have completed, check the results in an error log.

Prior to running the tests, you set error control parameters. You have choices about how much or how little error information you want displayed. This information is written to an error log.

There are three types of diagnostic messages and they have the following format:

<I>	information	non-error information; start/stop time of test
<E>	error	error information; includes the following: - time of error - test name and subtest number - error number - SLIC number associated with failure - slot number of the subsystem under test - name and number of the subsystem
<W>	warning	indicates conditions that could interfere with the execution of the test

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Reading the Error Log

Use the elp command to print the error log.

Here is an example error message:

```
==> elp
-<E>- 21:23:47 UTC: tg, error number 78, pass 0
->E<- Failing Unit:  TG 0 on SSM_SCSI 0 on SSM 0 (slot 0, SLIC 0)
->E<- Unknown SCSI device at target 0
->E<- Expected = HP
->E<- Actual = CDC
->E<- SUSPECT COMPONENTS (in order of decreasing probability):

            1.   SCSI 1/2 inch Tape Drive [logical unit 0]
            2.   System Services Module(SSM) [0]

==>
```

Clearing the Error Log

Use the elc command to clear the error log. Error messages are written to a memory buffer during the run of each test. By default, logging stops when the log buffer is full, so it is important to periodically clear the error log.

Practice 17

1. Select and run the test on the SCSI tape drive without putting a scratch tape in the drive. (This will cause errors.) What command did you use?

2. Display the error log. What command did you use?

   elp

3. Clear the error log. What command did you use?

   elc

Verify your answers with those provided in the Appendix.

Returning to the Monitor

When you have finished running diagnostics, you must return to the SSM monitor before booting to DYNIX/ptx or shutting the system down.

The boot control command b allows you to do this.

Here is an explanation of boot control subcommands:

bt causes a boot of the system; if autoBoot is set to 1, will boot DYNIX; if monAuto is set to 1, will stop at level-B; otherwise stops at level-A

bp displays current boot strings and flags
Note: In this display, there are three references to auto flags; in order, they are monAuto, autoDiag, and autoBoot flags.

bh displays help messages for the boot control commands

Practice 18

1. Re-boot the system from the Diagnostic Executive. What command did you use?

Verify your answers with those provided in the Appendix.

Loading the Diagnostic Executive from Tape

If your disk is not accessible, you may have to load and run the diagnostics from tape. You can do this from level-B by inserting the ssm Diagnostics FW tape in the 1/4-inch SCSI tape drive and entering the following:

```
--->bs tm(56,6)
```

Practice 19

1. Boot the Diagnostic Executive from tape. What command did you use?

2. Re-boot the system to level-A and turn the key off. What command did you use?

Verify your answers with those provided in the Appendix.

CHECKLIST

When running diagnostics, here are the steps to follow:

- _____ Set up information control parameters - i commands
- _____ Set up error control parameters - e commands
- _____ Set up loop control parameters - l commands
- _____ Select (configure) hardware to test - c commands
- _____ Select the tests to run - t commands
- _____ Run the tests - r or x command
- _____ Examine the results in the error log - e commands
- _____ Take corrective action

Sample diagnostics run:

```
==>imf; ife     #  set information control to
                   full menus and extended
                       information about tests
==>eac          #  continue on error
==>elf          #  log full error messages
==>cs +ssm 0 ssm_scsi 0 tm 56
                #  configure the SCSI tape
                       drive to test
==>ts tm        #  select test to test SCSI tape
                       drive
==>r            #  run the tests
==>elp          #  view the error log
==>elc          #  clear the error log
```


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Self Check

Following is a list of tasks you should be able to do at the completion of this self-paced lesson. Check off those that you feel you can do. If there are any you do not feel you can do, review this lesson or ask the instructor for assistance.

I can:

_____ Boot the Diagnostic Executive from disk

_____ Load the Diagnostic Executive from tape

_____ From the Diagnostic Executive menu:

- _____ get help on all commands
- _____ print current parameters of all commands
- _____ set parameters on the local and remote ports
- _____ set test execution parameters
- _____ configure hardware to test
- _____ select and execute tests and subtests
- _____ display the error log
- _____ execute the system quick tests
- _____ re-boot the system

Additional information about the Diagnostic Executive is included in the Diagnostic Executive User's Guide.

Appendix
Answers to Practice Exercises

Practice 3

Answer	Exercise
	1. Explore at least five commands on the Diagnostic Executive menu by:
command h (ch or ih, etc.)	a. getting help on each of these commands
commandp (cp or ip, etc.)	b. printing the current parameters for each of these commands

Practice 4

Answer	Exercise
utr enable or front panel **ubr 1200** **utr crt**	1. Enable the remote port and set its baud rate to 1200 and its terminal type to be crt. What commands did you use?
up	2. Verify these changes. What command did you use?
ubr 9600	3. Restore the baud rate of the remote port to 9600.
up	4. Verify these changes.

Practice 5

ui any character
ue any character
uk any character

1. Set the interrupt, erase, and kill characters for the local port to characters of your choice. Be careful not to use any characters that are part of the command! What commands did you use?

ud

2. Restore the system to its default settings. What command did you use?

Practice 6

ih

1. Get help on the i commands. What commands did you use?

ip

2. Display the current information control parameters. What command did you use?

iff
imf

3. Set information control parameters to the following:
   a. flow level - display start and subtest start and stop messages only
   b. display full menus

   What commands did you use?

Practice 7

eh

1. Get help on the e commands. What commands did you use?

ep

2. Display the current error control parameters. What command did you use?

	3. Set the error control parameters to the following:
eaa	a. abort test on error
elf	b. write full error messages in the error log
era	c. report all errors

Practice 8

lh	1. Get help on the l commands. What commands did you use?
lp	2. Display the current loop control parameters. What command did you use?
	3. Set the loop parameters to the following:
le	a. loop on first subtest that gets an error

Practice 9

cp	1. Display a lists of all system boards that are currently configured. What command did you use?
ch	2. Get help on the c commands. What commands did you use?
ch wd **ch tm**	3. Get help on these devices: wd (SCSI disk drive) and tm (SCSI) tape drive). What commands did you use?

Practice 10

cs +ssm2 0 **ssm_scsi 0 tm 56**	1. Configure the SCSI tape drive. What command did you use?
cp tm	2. Verify the tape drive was configured. What command did you use?

Practice 11

css +proc/486w 1	1. Give preferential treatment to processor 1. What command did you use?
cp	2. Verify this change. What command did you use?

Practice 12

tsh	1. Get help on the ts command? What commands did you use?
tp symproc	2. Display all tests for the symproc module. What command did you use?
4.1	3. What number test in the dcc test module tests the OK board logic?
4.4	4. What number test in the csd test module will read/write the entire disk?

Practice 13

ts tm	1. Select diagnostic tests to test the SCSI tape drive you have already configured. What command did you use?
rp	2. Display all selected tests. What command did you use?

Practice 14

r	1. Run the test you have selected. What command did you use?

Practice 15

r	1. Run the tests you have selected again.
control-z **f** or **fg**	2. Suspend these tests and then restart them. What commands did you use?
control-z **k**	3. Suspend these tests again and then kill them. What commands did you use?

Practice 16

ca	1. Configure all available hardware in your system. (Remember, there is a simple command to do this). What command did you use?

Chapter 6
Hardware Replacement

Hardware Replacement Objectives

You will:

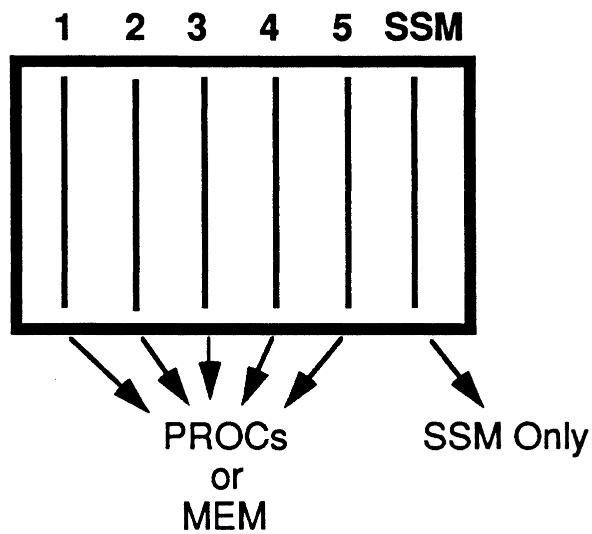
a. remove, install, configure and run diagnostics to verify the following:
   - system boards
   - VMEbus boards
   - MULTIBUS boards
   - system console
   - modem
   - disks
   - tape drives
   - power supplies
   - fans

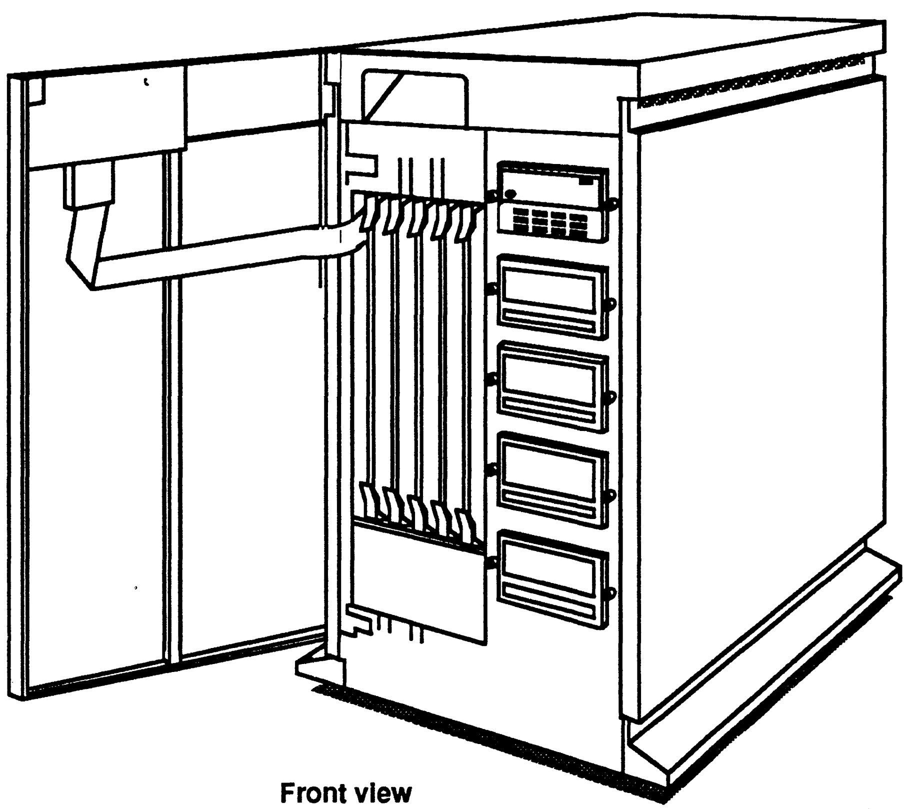
b. locate and describe the function of the on/off module

System Boards

- **SSM board** ONLY ON 200
- **SSM-I/O board** 200
- **SSM2 board** 400 700
- **Processor board** "D" 200 400 700
- **Memory and Memory Controller** " "
- **DCC board** 400 700
- **MULTIBUS Adapter board** 400 700
- **SCED board** 400 700

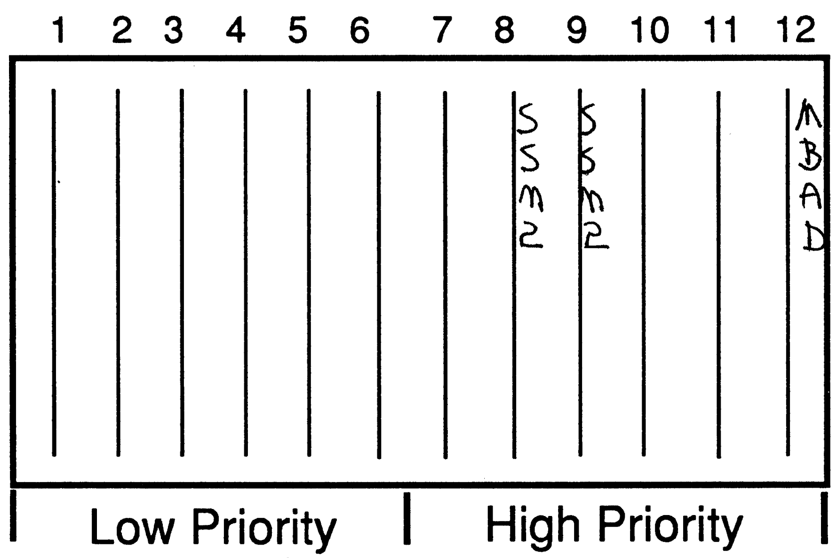
S2000/200 System Slot Usage





Front view

S2000/400 System
Slot Priorities

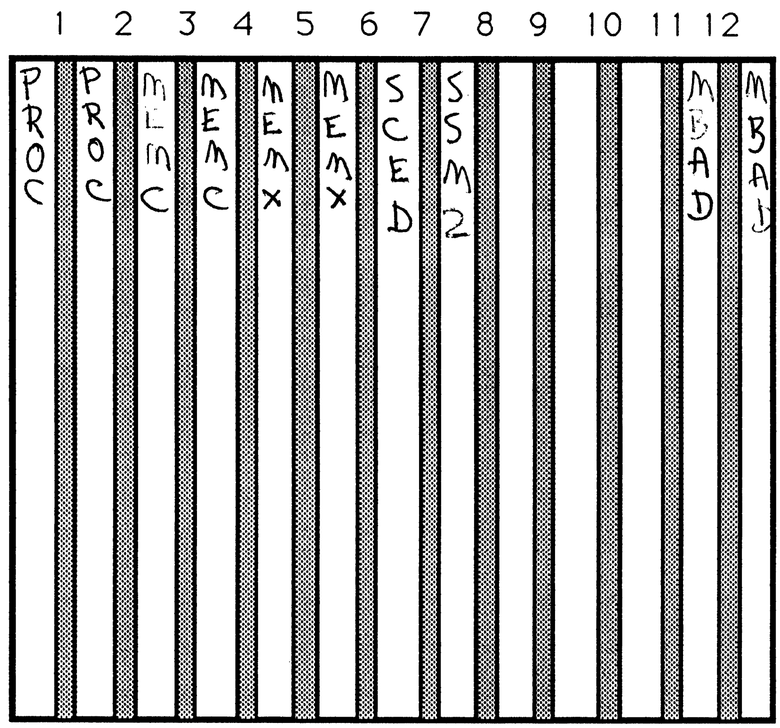


Processors or Memory	I/O Controllers or Memory
PROCS	SSM2
MEM C	SCED
MEM X	DCC
	MBAD

S2000/400
System Boards Configuration

Board type	Maximum # of Boards	Slot Priority
SSM2	1	High
PROC	5	Low
SCED	2	High
MEMC/MEMX	2 sets	H/L
MBAD	4	High
DCC	2	High

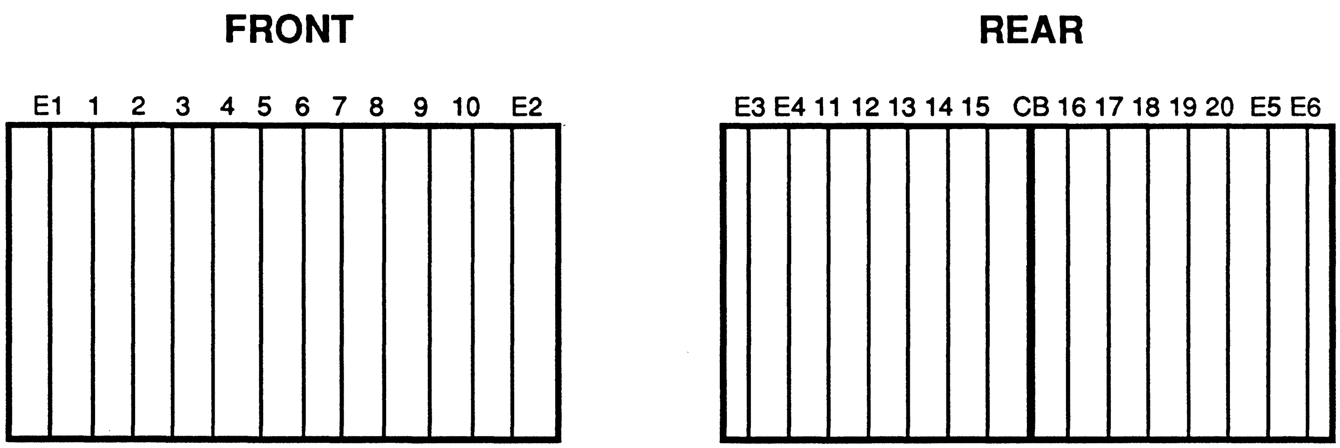
S2000/400 System Boards Configuration Exercise



1 SCED	10	
2 MBAD	12	
1 DCC	11	
2 PROCS	1	2
2 MEMC	3	4
2 MEMX	5	6
1 SSM2	8	

1st SCED ALWAYS IN SLOT 7

S2000/700
Slot Priorities

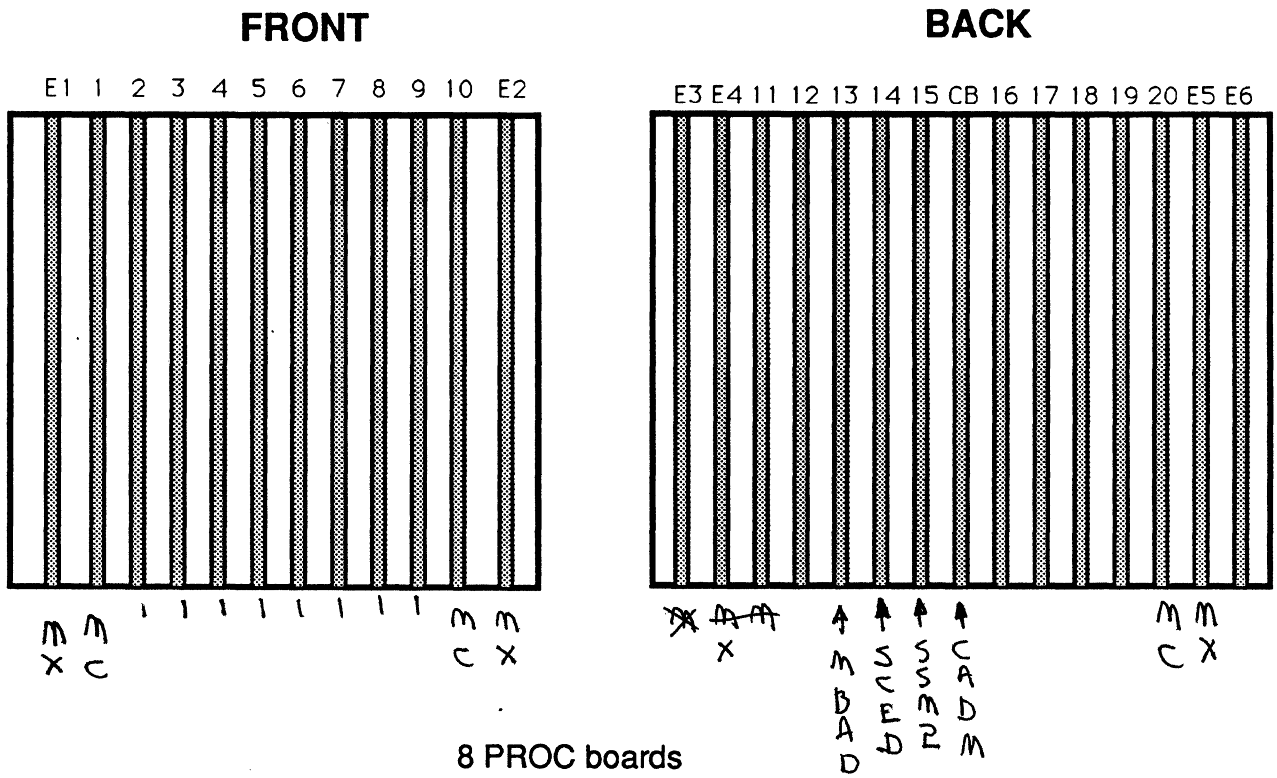


1-10 - LOW priority
11-15 - HIGH priority
16-20 - HIGH/LOW priority
E1-E6 - Memory Expansion
CB - CADM Board Only

S2000/700
System Boards Configuration

Board type	Max # of Boards	Slot Priority
SSM2 [2ND SSM2 ADDITIONAL SCSI PRINTERS]	1 (2)	High
PROC	10	Low
SCED	4	High
MEMC/MEMX	6 sets	H/L
MBAD	4	High
DCC	7	High

S2000/700
Board Configuration Exercise



8 PROC boards
3 MEMC/MEMX pairs
3 DCCs
1 SSM2
-1 MBAD
-1 CADM
-1 SCED

Lab
Configuring System Boards

1. Remove all system boards from the system card cage. Place boards in anti-static bags. Switch systems with another group and configure the system boards in that system to the recommended procedure.

* Follow the system board installation guides in Volume I of the manual set.

2. Run enough of the diagnostics to verify system board functionality.

VMEbus Boards

- All VMEbus boards go in the rear of the S2000/200

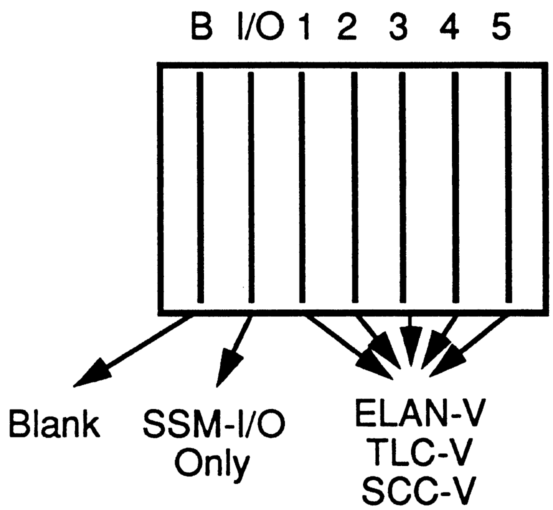
- Boards and VMEbus need to be configured

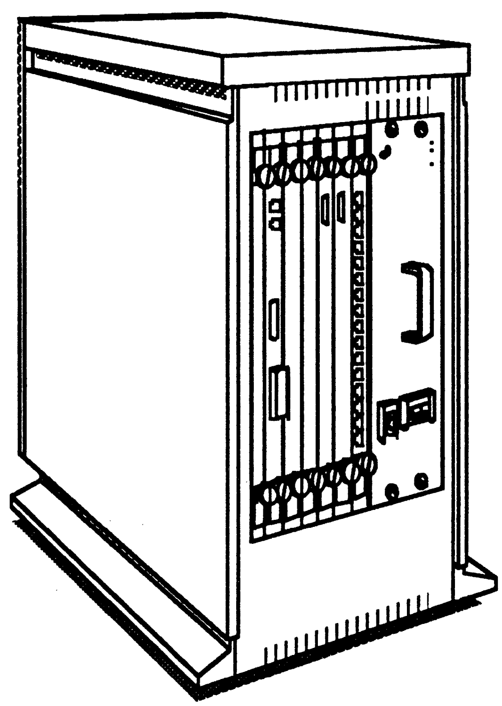
- Boards must be loaded from right to left

- Left-most slot is not used

- No empty slots between boards

S2000/200 VMEbus Slot Usage

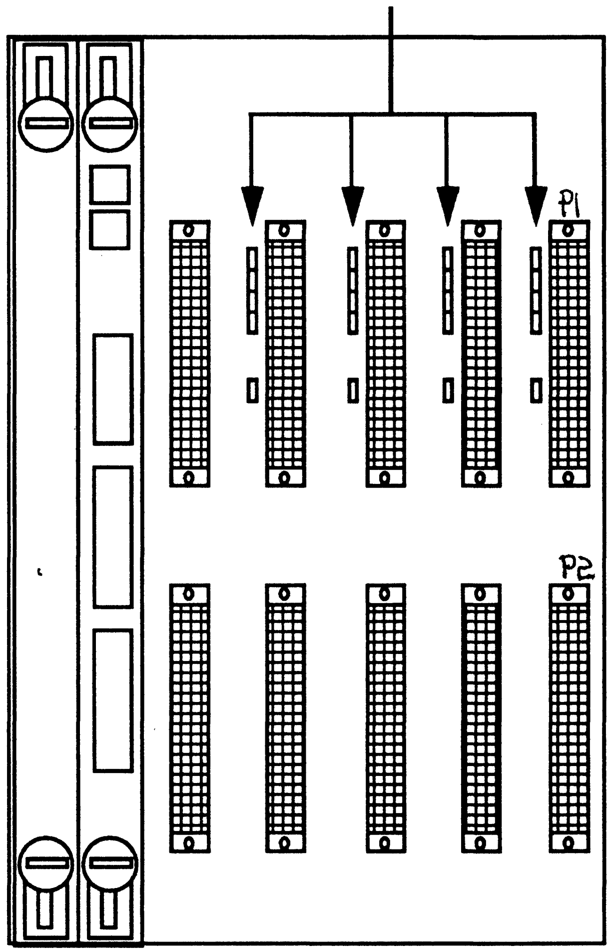




Rear view

VMEbus Jumpers

- **Bus grant jumpers need to be removed or added depending on the particular configuration**



Configuring VMEbus Boards

- **S2000/200 supports three different VMEbus boards:**
  - ELAN-V Max 3
  - TLC-V 5
  - SCC-V 4

- **Boards must be hardware configured by use of switches and jumpers**

- **Verify functionality by running the appropriate diagnostic test(s)**

MULTIBUS Boards

- All MULTIBUS boards reside in the MULTIBUS card cage

- Boards should be placed in correct priority slots

- ALL boards need to be hardware configured via jumpers and switches

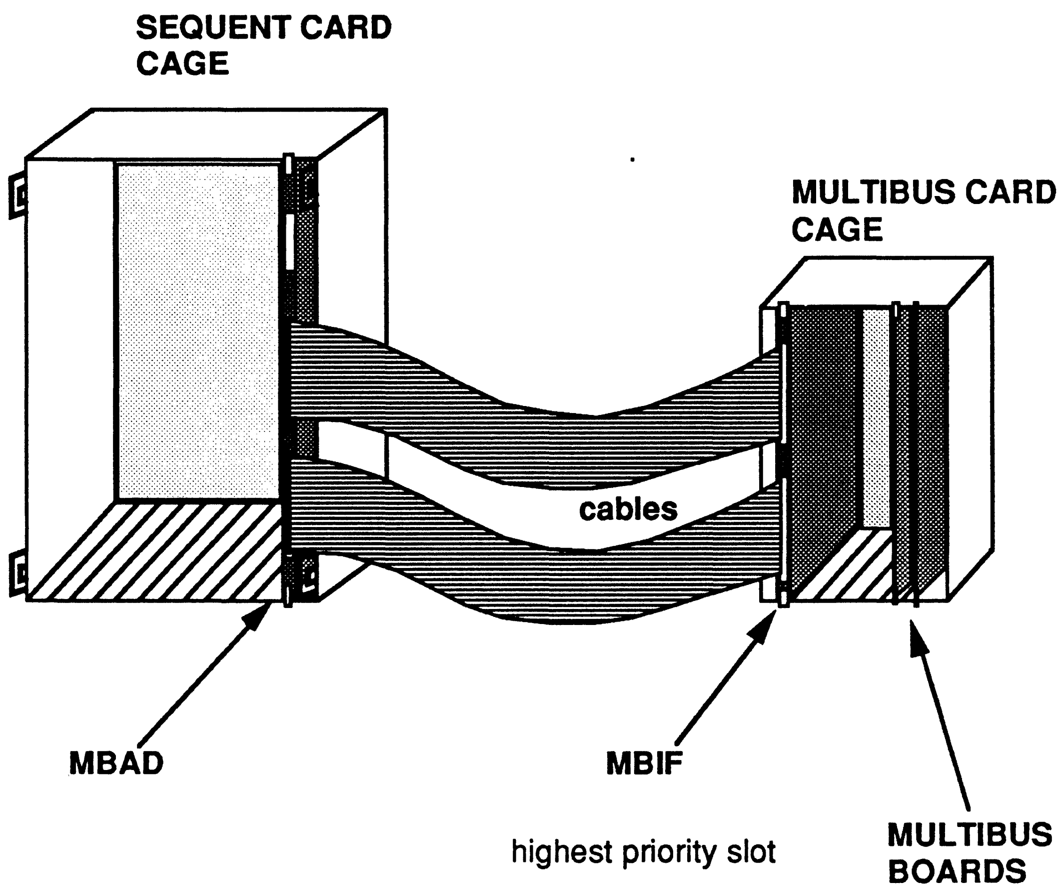
- Boards must be cabled correctly

- Diagnostics must be used to verify functionality

MULTIBUS Board Priority

1. MBIF board
2. Tape controller board (Xylogics 472)
3. TLC-M
4. DCP
5. PPC board

MULTIBUS Card Cage



Lab
MULTIBUS & VMEbus boards

1. Remove all VMEbus and MULTIBUS boards from the systems. Place the boards in anti-static bags.

2. Switch systems with another group and install and configure the VMEbus and MULTIBUS boards per the chart below.

3. Verify functionality of all boards by running the appropriate diagnostics.

**Refer to the board installation manuals for switch settings and cabling issues.

Board	Controller/Board Number
ELAN-V	1
TLC-V	2
SCC-V	2
TLC-M	4
PPC	0
DCP	4

System Console

- **Connect the system console to the connector labeled *cons1* on the I/O panel**
  - RJ45 type connector

- **Power up system console**

- **Set up the terminal characteristics by using the setup menu on the terminal**
  - use the arrow keys to move around
  - save your settings

- **Power up the system**

- **Verify correct local and remote settings**

Configuring a Modem

- **S2000s use a USRobotics Courier 1200 baud modem**
  - used as a remote console

- **Configure the modem using DIP switches**
  - follow switch setting on bottom of modem (Dial-in)

- **Connect the RJ45 cable to the *cons2* port on the I/O panel**

- **Configure the remote port using the SSM monitor or the front panel switch**

- **Power up modem**

- **Power up the System**

Lab
System Console and Modem

1. Deinstall the system console from one of the systems. Change the system console set up (setup menu) and the local settings in the monitor so that its a challenge for the next group to install the console. Switch systems with another group and install that system console. Set up the local port to enable the autoBaud function. Follow the procedure in the System Installation Guide.

2. Install and configure a modem. Verify setup by dialing into the modem. Set the remote port to echo everything being typed to the terminal (system console) screen.

SCSI Devices

- **Configure the drives using jumpers to determine logical device number**
  - tape drive = logical device 7
  - boot disk drive = logical device 0

- **Install disk drives in the system**
  - slide in rack mount for S2000/200 systems
  - peripheral tower for S2000/400 system
  - located in fan tray for S2000/700 systems

- **Verify devices using diagnostics**
  - disk test (csd)
  - tape drive test (tm)
  - GCR tape drive (tg)

SCSI IDs

SCSI Device	ID#	Device#
1/4" tape drive	7	tm56
Boot disk	0	wd0
1st SCSI disk	1	wd8
2nd SCSI disk	2	wd16
3rd SCSI disk	3	wd24
1st GCR tape	5	tg40
2nd GCR tape	4	tg32
SSM board	6	N/A

GCR Tape Drive

- **Verify correct power**
  - check voltage select switch
  - check the fuse on the GCR for proper voltage
  - check the wall outlet for proper voltage

- **Connect the device to the I/O panel**
  - connects via 10 foot SCSI cable
  - move terminator from I/O panel
  - install terminator onto vacant connector on GCR

- **Power-up GCR and set logical device number**
  - GCR = logical device 5; S2000/200 & /400
  - S2000/700; top GCR=5; bottom GCR=4
  - use the front panel display on the GCR

- **Verify functionality using diagnostics**
  - GCR tape diags (tg)

SMD Devices

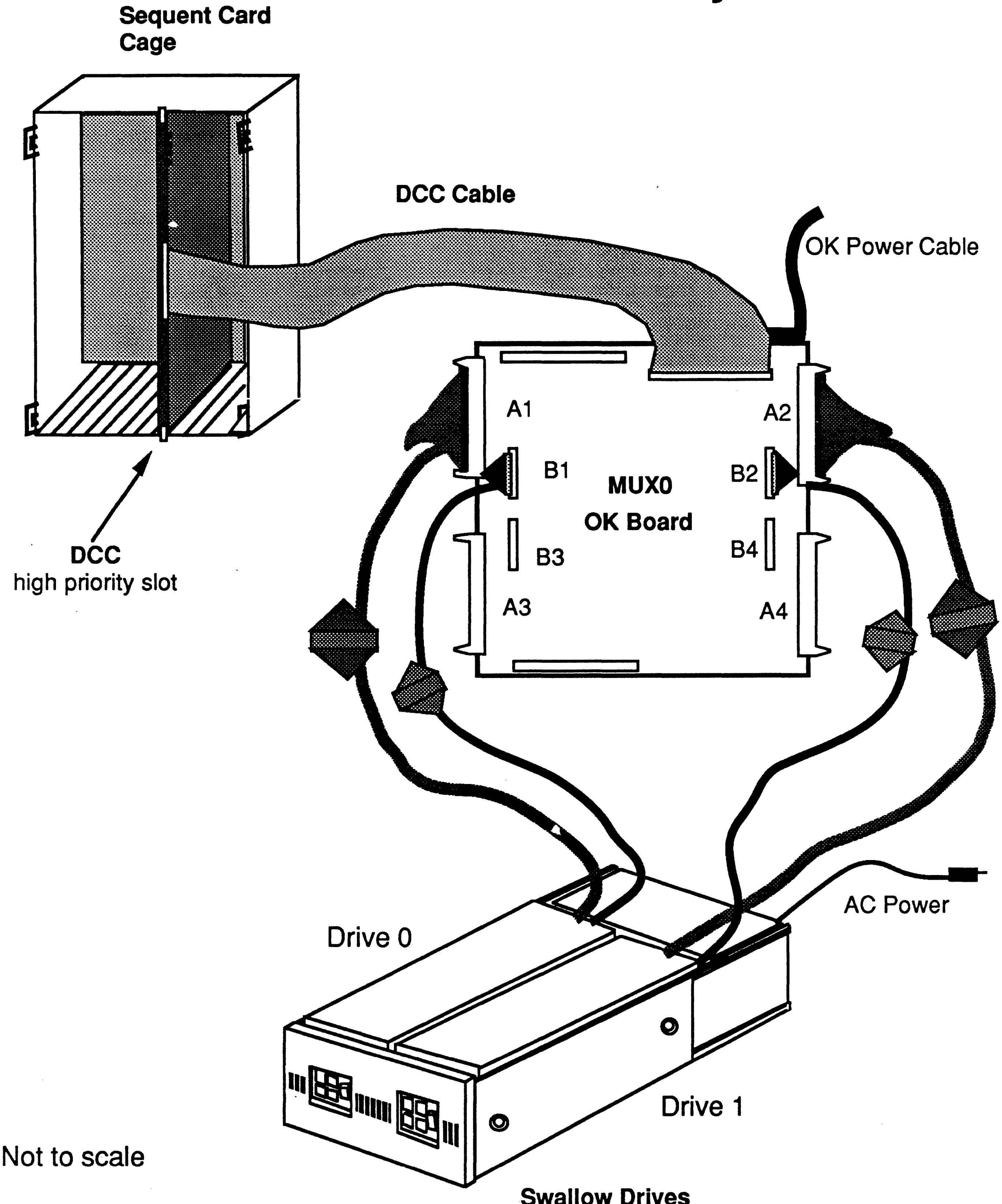
- **Configure the drives using DIP switches to determine drive select number**
  - switches accessed from the top of the drive
  - different swallows require different settings

- **Install drives into 19" rack mounts**
  - expansion cabinet only for S2000/400s
  - main or expansion cabinet for S2000/700s

- **Verify correct cabling**
  - DCC cables to OK board
  - OK board to drives
  - correct power and power connections
  - verify correct voltage selection on drive power supply

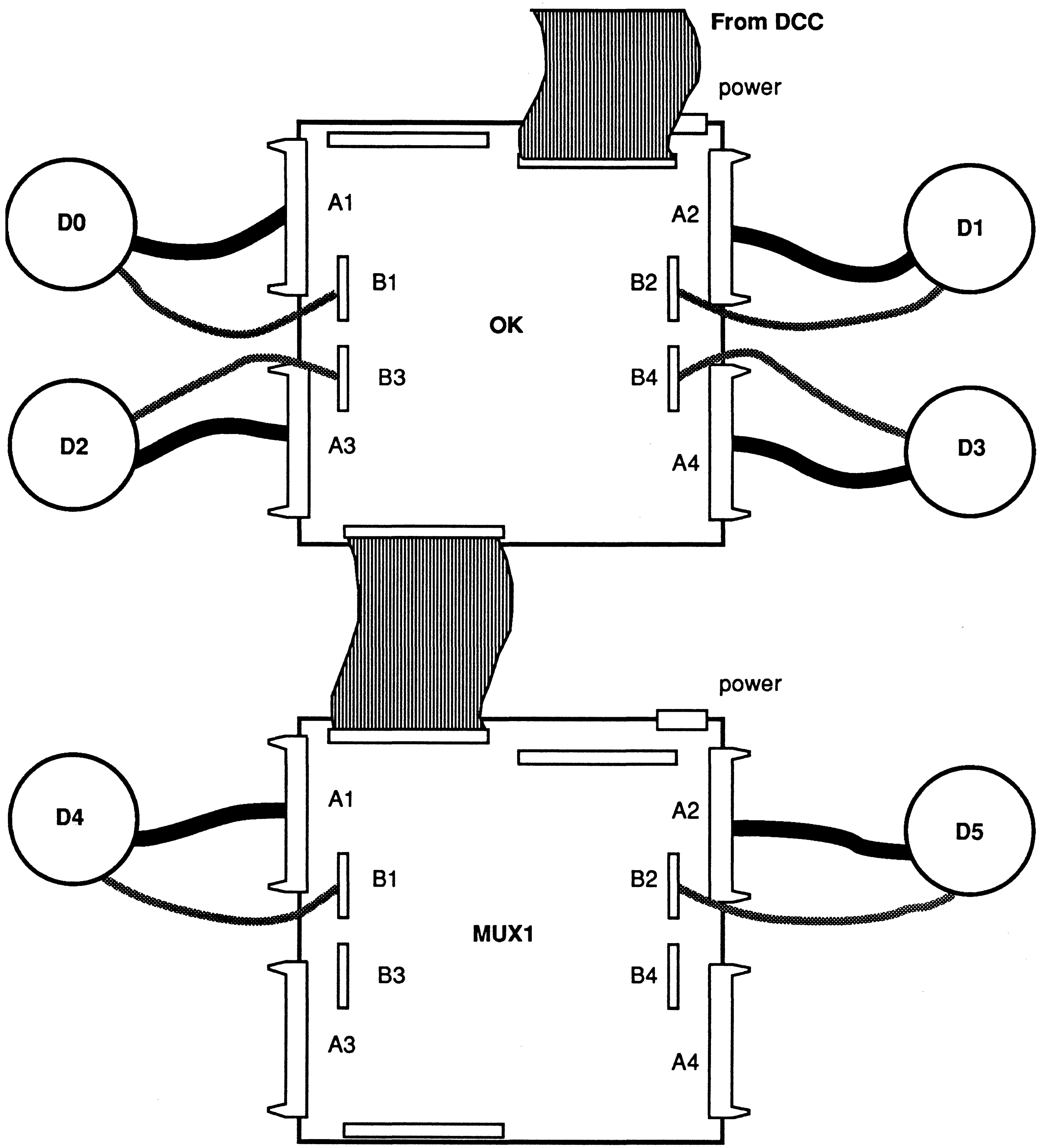
- **Verify devices using the zd diagnostics**

Swallow Drive Subsystem



Not to scale

Sample Drive Configuration



Lab
SCSI, GCR, SMD

SCSI disks

1. Remove the SCSI 5 1/4" disk drives (label drive 0) and the SCSI 1/4" tape drive from the system. Remove the address jumpers from the drives and place the drives in an anti-static bag.

2. Switch systems with another group and reconfigure all of the devices back into the system.

3. Verify functionality by running the appropriate diagnostics.

SMD disk

1. Remove the 19" SMD disk rack from the system. Then remove at least one of the SMD drives from the disk rack. Verify that the drives are set for disk 0 and disk 1. Reinstall the disks back into the rack and the rack back into the system.

2. Verify functionality by running the appropriate diagnostics.

GCR tape drive

1. Install the GCR tape drive onto the S2000/200 or S2000/400 system.

2. Verify functionality by running the appropriate diagnostics.

Power Supply
S2000/200

- **One 950-watt power supply**

- **Supports a range of single phase voltages**
  - 90VAC - 250VAC
  - verify correct AC line cord

- **Power supply is rack mounted**
  - slides in and out of system on rails
  - no cables or connectors to manually connect
  - held by four captive fasteners on the front of the supply

- **Verify supply is functioning correctly**
  - check supply under load
  - check power supply status indicators
  - no voltage adjustments necessary

Power Supply
S2000/400

- **2 power supplies**
  - 1000w system supply
  - 300w MULTIBUS supply

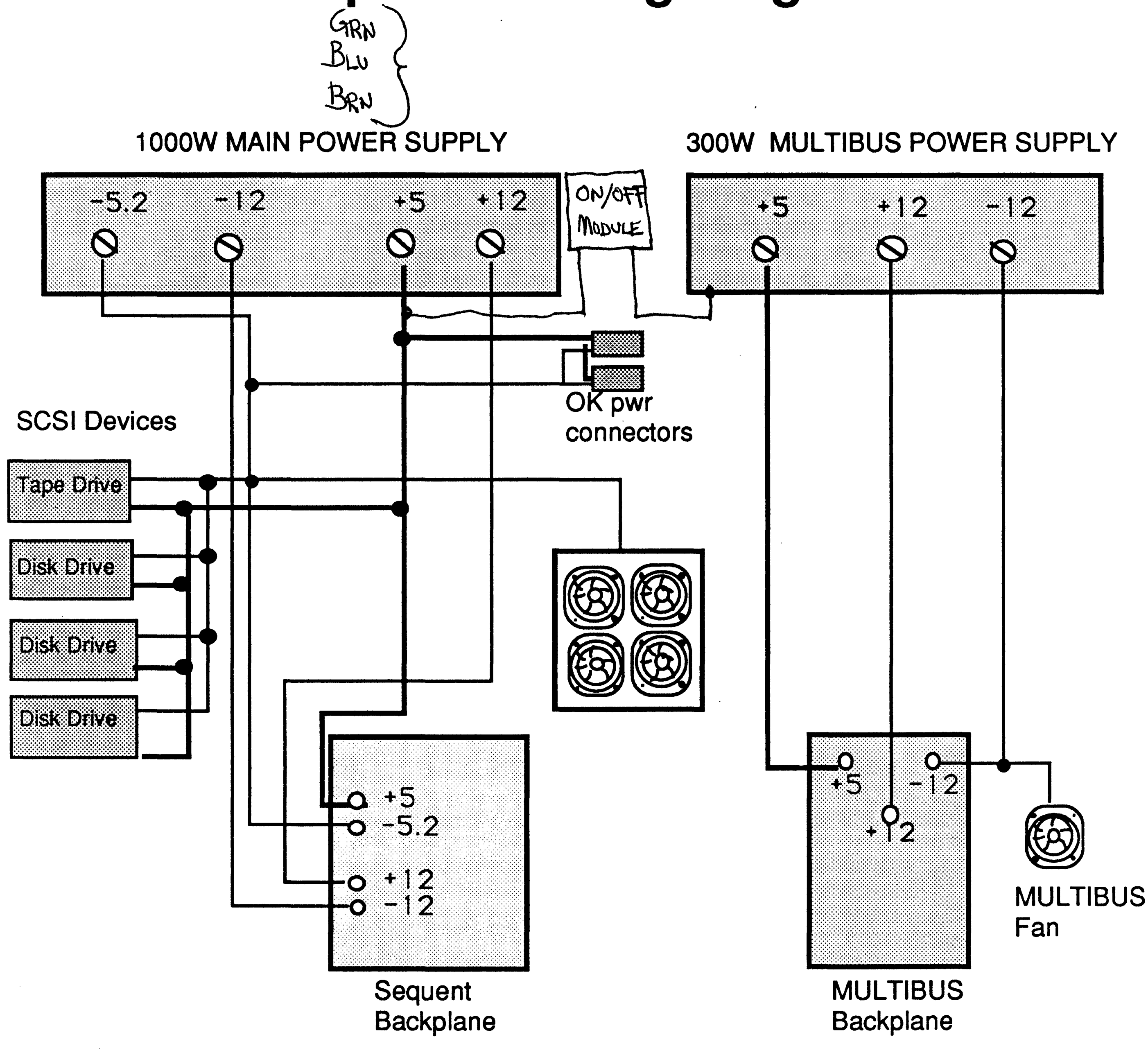
- **Turn off circuit breaker and unplug system**

- **1000w supply accessed from the top of the system**

- **300w supply accessed from the rear of the system**

- **Label wires and connectors**
  - verify pin1 connection on molex plugs

S2000/400
Simplified Wiring Diagram



Power Supply
S2000/700

- **4 power supplies**
  - 2000w system supply located at top 400 AMP @ 5 VOLTS
  - 250w supply is second from top
  - 400w supply is third from top
  - 444w supply located in MULTIBUS

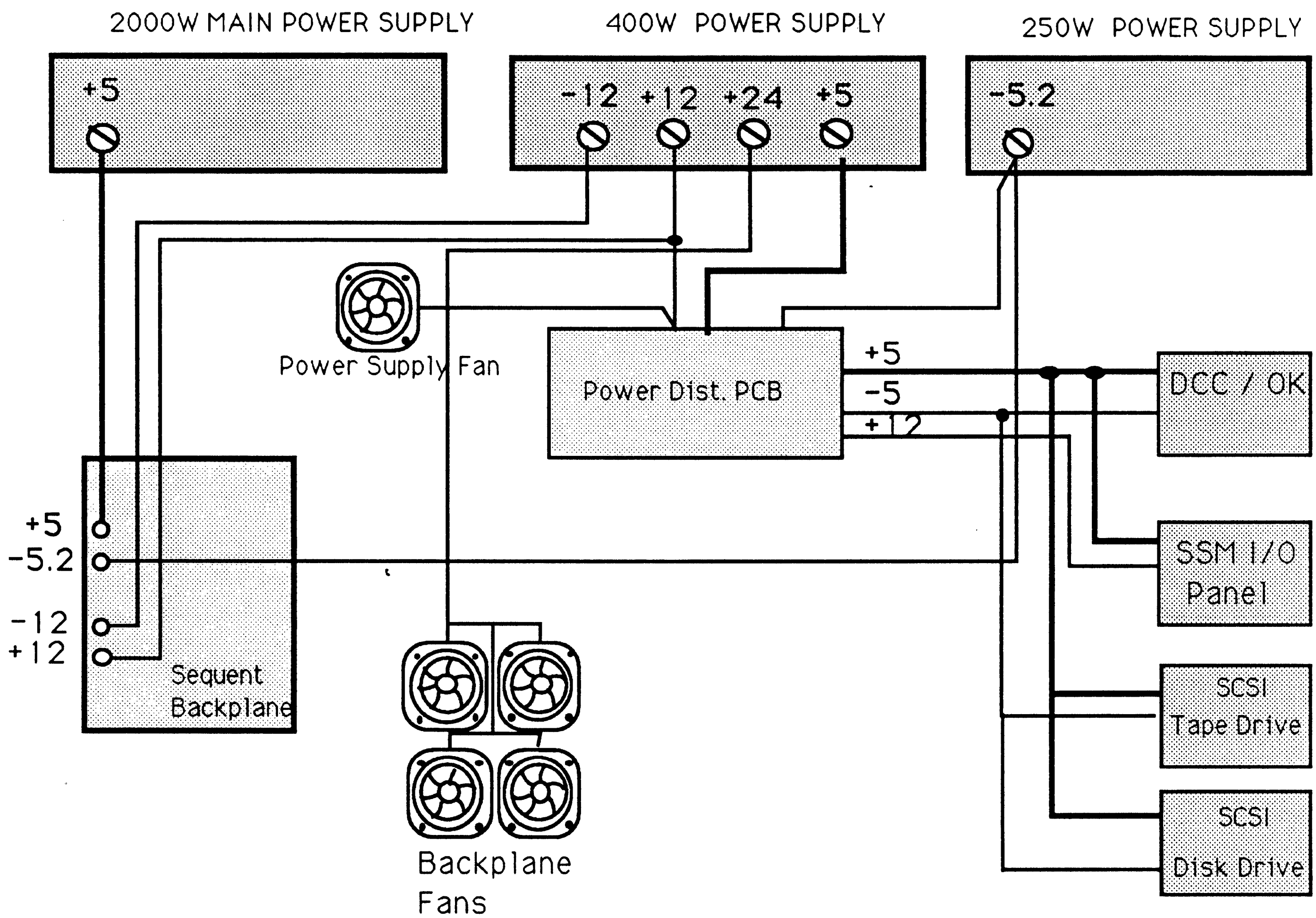
- **Turn off circuit breaker and unplug system**

- **System supplies accessed from the rear of the system**

- **MULTIBUS supply accessed from the MULTIBUS cabinet**

- **Label wires and connectors**
  - verify pin1 connection on molex plugs

S2000/700
Simplified Wiring Diagram



Power Distribution Panel

- **Supplies +5vdc and -5vdc to the OK boards**
  - +5vdc supplied by the 400watt supply
  - -5vdc supplied by the 250watt supply
- **Support for 7 DCC boards (S2000/700)**
- **Located in the rear of the S2000/700 system**
- **Pop-up fuses**
  - check to make sure all fuses are down
  - pop up and push down during install to insure contact
- **S2000/400 distribution panel supports 2 OK boards**
- **Screw in fast blow fuses**

ON/OFF Module

S2000/700

- **Monitors main power supply +5V**
- **Shuts down 200W and 300W supplies if +5 fails**

S2000/400

- **Monitors main power supply +5V**
- **Disables the MULTIBUS power supply if +5V fails**

Fans

S2000/200

- Two DC fans mounted under the system card cage
- One DC fan mounted under the peripheral bay
- Clip mounted for easy removal

S2000/400

- Four 12V fans mounted under the system card cage
- One DC fan located under the peripheral bay

S2000/700

- Four 220V AC fans mounted on rear door
- Four 24V fans mounted under system card cage
- Two 12V fans mounted beside MULTIBUS card cage
- One 12V fan for the 200W and 300W supplies
- MULTIBUS power supply has its own fan

Lab
Power Supplies, Fans

1. Remove and install at least one power supply from the systems. Label all wires and follow instructions in the installation guides. Have the instructor verify the wiring before powering on your system.

2. Locate, remove, and replace at least two fans in the system.

CAUTION - Remove AC power before removing supplies

Chapter 7

Site Prep and Installation

Site Prep and Installation Objectives

You will:

a. identify the appropriate site prep parameters

b. install S2000/200, S2000/400, S2000/700 systems according to the installation procedures

c. install the SSM software and diagnostics according to the installation procedure

d. verify system functionality using the quick check diagnostics

e. boot the systems into single-user and multiuser modes

f. examine the system error message logs

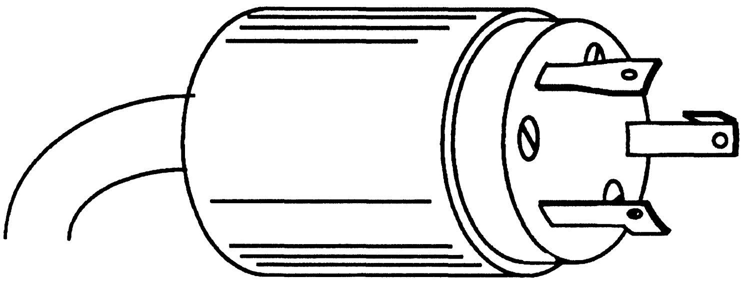
Site Prep

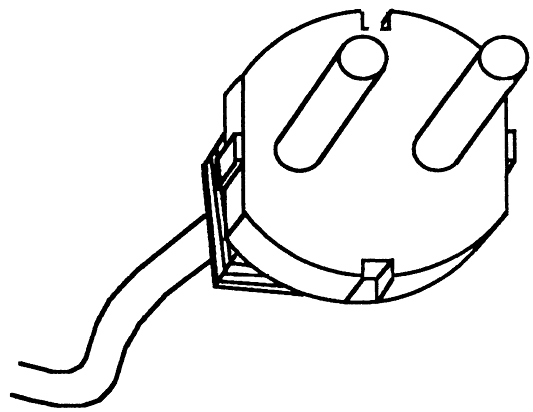
- **Space**
  - adequate spacing for air flow
  - serviceability

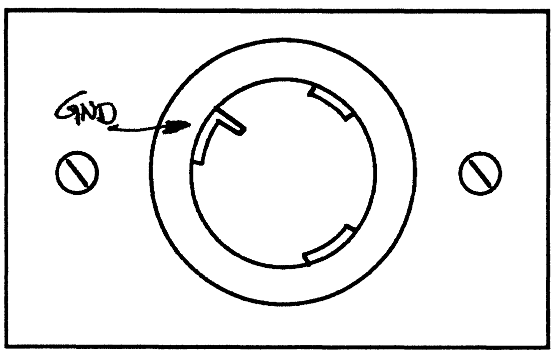
- **Environmental**
  - 68 to 72 degrees preferred HARD DISKS SHOULD BE COOL
  - 50% humidity preferred

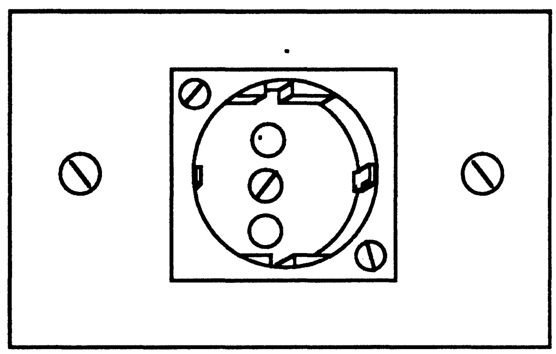
- **Power**
  - proper power and phasing
  - proper plug and receptacle

S2000/400
Plugs and Sockets









110V Single Phase

North America

NEMA L5-20P - plug
NEMA L5-20R - receptacle
20 Amp Dedicated Circuit

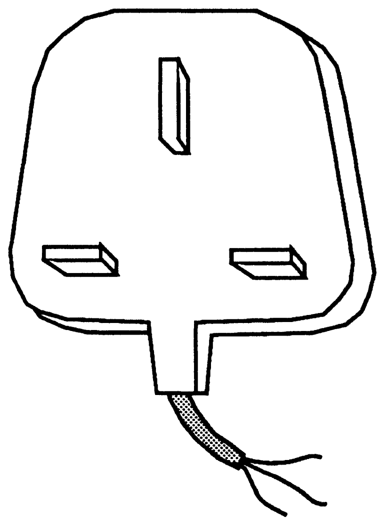
220V Single Phase

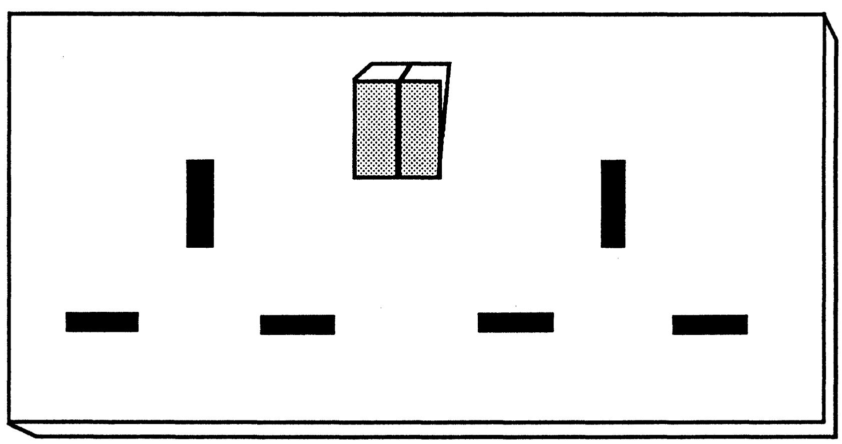
European Continent,
Australia, and Japan

CEE 7-7 compatible

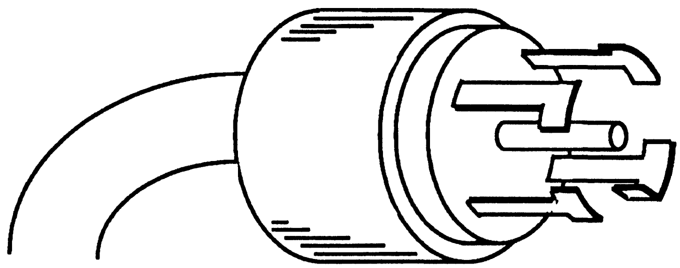
S2000/400
British Plug and Socket

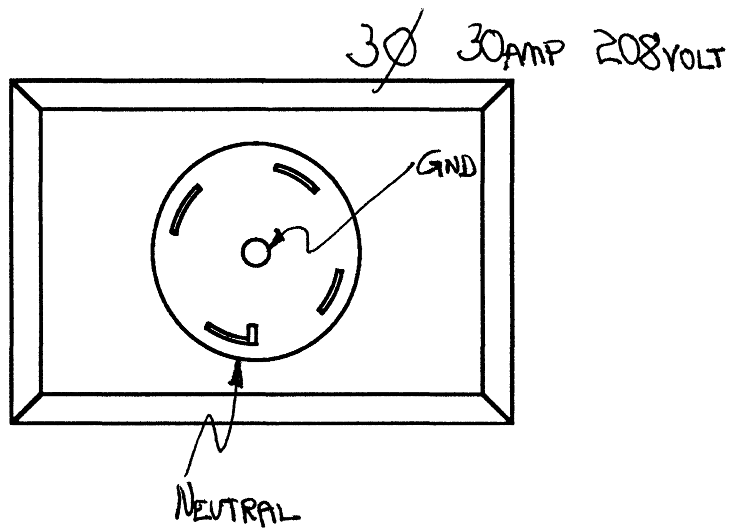
Britain
B.S. 1363



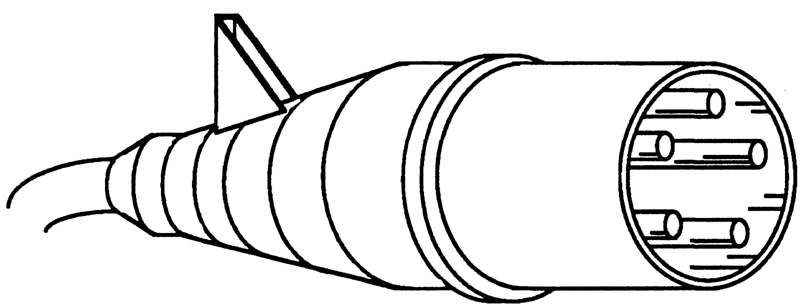


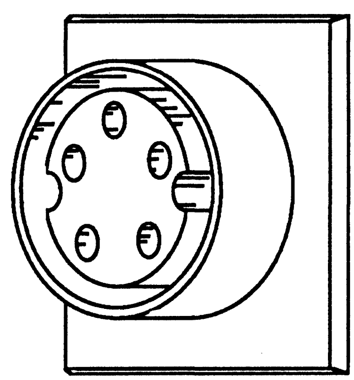
S2000/700
Plugs and Sockets





North America and Japan
NEMA L21-30P - plug
NEMA L21-30R - receptacle





Europe and Australia
IEC 309 - plug
CEE 17 - receptacle

System Installation Steps

- **Unpack system cabinet**

- **Install the system cabinet**

- **Install and connect expansion cabinets**

- **Connect I/O devices**
  - system console
  - terminals
  - printer
  - tape drive
  - user terminals
  - ethernet

System Installation Steps

- Install additional boards and disks
- Power up the system
- Run quick check diagnostics
- Boot operating system
- Check error logs
- Configure system software

Lab
Hardware Installation

1. Deinstall one of the S2000 systems. Remove the SMD disk racks, terminals, modems, and GCR tape drive. Disconnect the main cabinet from the expansion cabinet. When completed, switch system with another group.

2. Perform a hardware installation. Install all available peripherals; GCR tape drive parallel printer, SMD disk drives, modem, user terminals.

3. Verify system function by running the quick check diagnostics. Correct any errors that may exists

   * Refer to the hardware installation manuals

Installing SSM and Diagnostics

1. **Boot system to level-A** PROM LEVEL

2. **Boot to level-B from tape** DISK LEVEL
   - bs tm(56,3) 400 700 ONLY

3. **Boot to operating system**
   - bh

4. **Install SSM/Diagnostic software according to the installation instructions**

TERM = sqn + 220

export (sp) TERM

CONSOLE

HPC-TERM

Lab
Software Installation

1. Install SSM software and diagnostics. Refer to the Installation Instructions with the tape.

2. Boot the monitor and diagnostics to verify that the installation was done correctly.

Periodic Maintenance Schedule

Frequency	Performer	Device	Procedure
WEEKLY	Customer	Tape Drives	Clean drive heads with electronic grade isopropyl alcohol
MONTHLY	Customer	Tape Drives	Clean entire tape path
QUARTERLY	Service	Cabinets	Clean air filters
	Service	Systems	Check power at receptacle if problems have been reported
	Service	Systems	Visually check cabling, fans, EMI shields, cabinet parts Monitor environment Review system logs for errors: /usr/adm/shutdownlog /usr/adm/messages Check DC voltages

Chapter 8

Troubleshooting

Troubleshooting Objectives

You will:

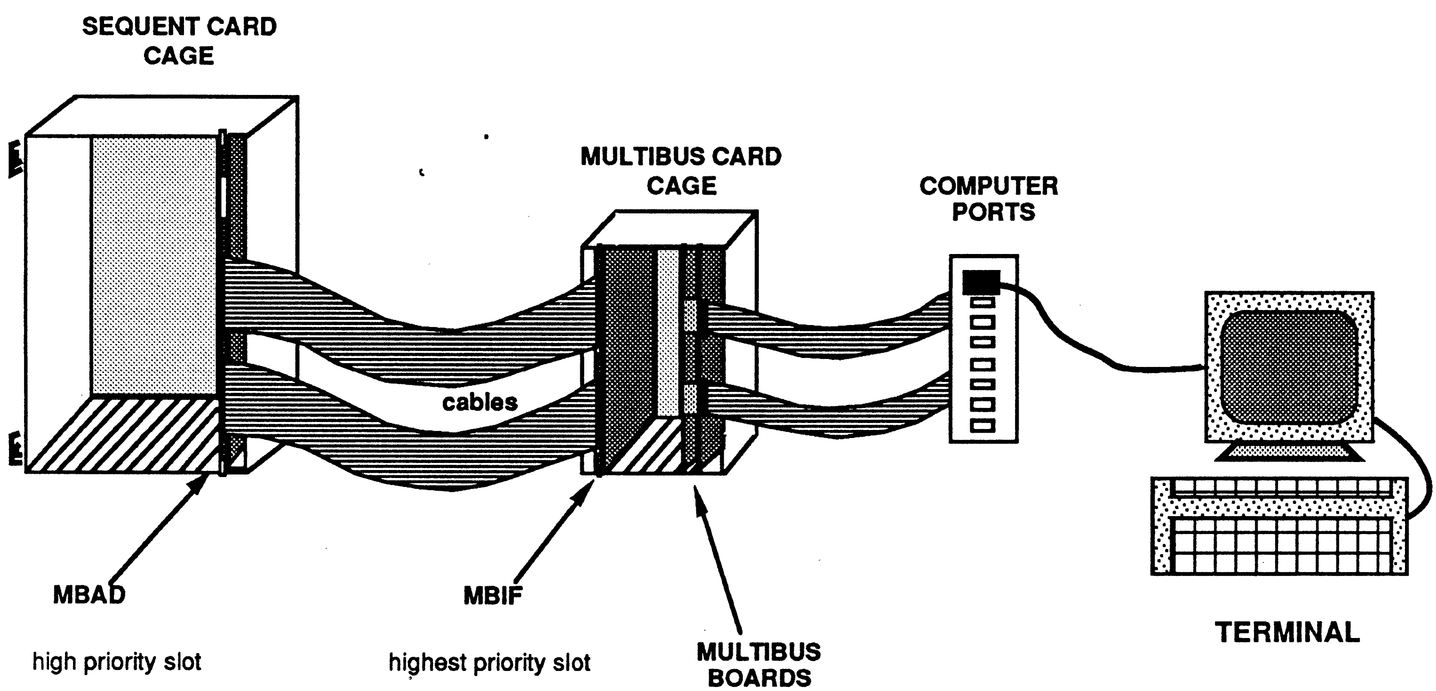
a. identify various system problems using the SSM power-up monitor and the Diagnostic Executive.

Diagnosing a Problem

- Ask questions
- Perform visual inspections
- Check for cable and board seating
- Boot to SSM monitor to perform low level hardware testing
- Verify correct system configuration with SSM monitor
- Boot diagnostics and execute test(s)
- Change only one variable at a time, reverify

Checking Connections

- **Board seating**
- **Cables**
- **Connectors**



Normal Boot Operation

- **SSM Monitor runs power up tests**

```
Date 90/11/17 17:07:05 UTC
Power-up
Invalidate caches
Clear mem . . .
test MBAD .
test MEM/1w .
test DCC .
test PROC/486w . . . .
test SCED .
.
.
```

- **SSM Monitor shows system config.**

CHECK THESE

```
System Configuration:
type       no slic   flags      revision
MEM/1w     0  2   00000000  00.03.02  size=40.0Mb ......
SCED       0  22  00000000  02.12.00  ver=44 host=.......
SSM2       0  30  00000000  00.00.00  sysid=0x6
ZDC        0  6   00000000  00.02.01  f/w version=17
PROC/486w         00000000  00.07.01  25MHz 2*256K .....
PROC/486w         00000000  00.07.01  25MHz 2*256K .....
.
.
```

CHECK FOR ASTERISKS

- **Boards are initialized and the boot process is begun**

```
Date 09/03/07 23:41:24 UTC
test SCED .
Clear mem .
Mem 16.0 Mb
init MBAD .
init SCED .
init ZDC .
init PROC/486w . .
test
loading zd(0,0)boot
Boot
```

Failure Mode Power-up

- **SSM Monitor runs power up tests**

```
Date 90/03/07 23:04:39 UTC
Power-up
Invalidate caches
Clear mem . . .
test MBAD .
test MEM/1w .
test DCC .
test PROC/486w . Error: PROC/486w 1 : test timeout
Error: PROC/486w 1: test(s) failed.
Warning: PROC/486w 1: hold ack timeout
Warning: PROC/486w 1: hold ack timeout

test SCED .
```

- **SSM Monitor shows system config.**

```
System Configuration:
type       no slic   flags      revision
MEM/1w     0   2   00000000  00.03.02  size=40.0Mb ......
SCED       0  22   00000000  02.12.00  ver=42 host=.......
ZDC        0   6   00000000  00.02.01  f/w version=17
PROC/486w          00000000  00.00.00  25MHz 2*256K .(slic 4)
* PROC/486w        04000002  00.00.00  25MHz 2*256K .(slic 5)
.
.
```

DECONFIGURED

TOP PROC

- **SSM Monitor initializes boards and the boot process is begun**

```
Date 09/03/07 23:41:24 UTC
test SCED .
Clear mem .
Mem 16.0 Mb
init MBAD .
init SCED .
init ZDC .
PROC/486w 1: flag = 0x 04000002, not initialized
init PROC/486w .x
test
loading zd(0,0)boot
Boot
```

System Log

- *dmesg* **provides a system log of errors and warnings**
  - viewed from multiuser mode
  - logs single bit correct memory errors
  - logs hard and soft disk errors
  - logs boot up information and configuration listings

```
07: MEM/1w 2: Correctable EDC HI error, local (refresh/scrub) cycle.
07: bank=4 addr=0xe87a89c0 error status=0xc synd=0x1a
07: MEM/1w 2: single bit error on data bit 22
07: MEM/1w 2: Correctable EDC HI error, local (refresh/scrub) cycle.
07: bank=4 addr=0xe87ae9c8 error status=0x8 synd=0x1a
07: MEM/1w 2: single bit error on data bit 22
07: zd1e: Error (Header ECC error); cmd 0x1 at (637, 1, 74).
07: zd1e: Filesystem blkno = 579710.
07: zd1e: cb_status: 0xa3 0x1 0x0 0x0 0x10 0x0 0x3c
07: zd1e: Error (Header ECC error); cmd 0x1 at (637, 1, 74).
07: zd1e: Filesystem blkno = 579710.
07: zd1e: cb_status: 0xa3 0x1 0x0 0x0 0x10 0x0 0x3c
06: NFS server crg6 not responding, still trying
07: NFS server crg6 not responding, still trying
07: NFS server crg6 ok
02: NFS server crg6 ok
07: NFS write error: on host eng3 remote file system full
07: zd1e: Error (Header ECC error); cmd 0x1 at (741, 1, 58).
07: zd1e: Filesystem blkno = 807142.
07: zd1e: cb_status: 0xa3 0x1 0x0 0x0 0x10 0x0 0x34
```

Panics

```
SSM F/W: nmiClass:: nmiPanic -  -  NMI status: 8
diagnose_bus...
SSM F/W: Error: Bus Pause!


PROC/486w 0 (slic 18):
        int=00(00)  int_en=23  ext1=DC  ext0=B0
        bdpd_low.ses_chain: 0 0000
        bdpd_low.des_chain: 0 1002 6000
        cic0.err_chain: 0 300F F238
        bicd0.bicses_chain: 0000 1400 0000
                IFRPAUSE: detected RPAUSE
                IFPAUSE: detected IPAUSE
        bdpd_high.ses_chain: 0 0001
        bdpd_high.des_chain: 0 0003 A000

PROC/486w 1 (slic 19):
        int=00(00)  int_en=23  ext1=DC  ext0=B0
        bdpd_low.ses_chain: 0 0000
        bdpd_low.des_chain: 0 1002 6000
        cic0.err_chain: 0 300F F238
        bicd0.bicses_chain: 0000 1400 0000
                IFRPAUSE: detected RPAUSE
                IFPAUSE: detected IPAUSE
        bdpd_high.ses_chain: 0 0001
        bdpd_high.des_chain: 0 0003 A000

PROC/486w 2 (slic 20):
        int=F0(20)  int_en=23  ext1=DC  ext0=B0
                INT1: SCLK hardware error
        bdpd_low.ses_chain: 0 0000
        bdpd_low.des_chain: 0 1002 8000
        cic0.err_chain: 0 300F F238
        bicd0.bicses_chain: 0000 1E00 0100
                IFRPAUSE: detected RPAUSE
                RPAUSED: driving RPAUSE
                IFPAUSE: detected IPAUSE
                IPAUSED: driving IPAUSE
                ERRSRC8: RA/RAi hit on valid block
        bdpd_high.ses_chain: 0 0001
        bdpd_high.des_chain: 0 0002 8000
```

SHOULD BE ZEROES

BOTTOM CPU SLOT 10

Panics

```
panic: SLIC NMI
09: Cpu registers:
09:  eax=ff ebx=97f0000 ecx=f edx=3c5600
09:  esi=1b4090 edi=0 ebp=7fffff58 esp=7fffff54
09: Hex dump of panic stack:
09: 7fffff00:    31ec3 7fffff48    31ecb        0
09: 7fffff10:   1b4090 7fffff48 7fffff2c  97f0000
09: 7fffff20:   3c5600        f       ff  97f0000
09: 7fffff30:   1b4090        0        0        0
09: 7fffff40:        0    94140 7fffff58    47019
09: 7fffff50:    75641  f7f556b 7fffff80    45278
09: 7fffff60:        0    e2f22    e00fe 7fffff90
09: 7fffff70:    11af8    e2d80        0  97f0000
09: 7fffff80: 7fffffb8    44a5f        2        0
09: 7fffff90:   1b4090 7fffffb8 7fffffac  97f0000
09: 7fffffa0:   3c5601    89c94    94120    14351
09: 7fffffb0:        8      246 80000000    142fb
09: 7fffffc0:       19        0 3fff0010        0
09: 7fffffd0:   1be310        0 7fffff8c    4472b
09: 7fffffe0:   1b40b8    562ff       8a    5628f
09: 7ffffff0:       ff    44f4d   1b40b8    94120
09: Stack @ 0x33ff0c
09: @ 0x47019 call(0x75641)
09: @ 0x45278 call(0x0, 0xe2f22, 0xe00fe, 0x7fffff90, 0x11af8)
09: @ 0x44a5f call(0x2)
09: @ 0x142fb call(0x19, 0x0, 0x3fff0010, 0x0, 0x1be310)
09: processor 0 stat 0xfd flt 0x7f
09: processor 1 stat 0xfd flt 0x7f
09: processor 2 stat 0xfd flt 0x7f
09: processor 3 stat 0x8f flt 0x7f
09: processor 4 stat 0xfd flt 0x7f
09: processor 5 stat 0xfd flt 0x7f
09: processor 6 stat 0xfd flt 0x7f
09: processor 7 stat 0xfd flt 0x7f
09: processor 8 stat 0xfd flt 0x7f
09: processor 9 stat 0xbf flt 0x7f09:
```

PROC 3 IS BAD

ODD BALL NUMBER

CPU #9

CPU REPORTING ERROR

Lab
System Debug

1. Boot the S2000 system and verify system functionality using the SSM power-up monitor and Diagnostic Executive.

2. Select and run tests for all PROC's, MBAD's, and system memory.

3. Correct any problems that you may encounter and reverify.

4. Use the remaining time to insert simple bugs into your system. Only insert bugs such as removing cables, reversing cables, unseating boards, disconnecting disk drives ect. DO NOT insert any bugs into the power subsystem or individual boards. Here are some suggestions:

    1. reverse the MBAD cables
    2. remove the SCSI terminator
    3. disconnect SCSI cable or power cable at a SCSI disk
    4. remove one of the cables from the MEMC/MEMX pair
    5. unseat the MBIF board
    6. reverse the DCC cable
    7. remove the SSM2 front panel cable
    8. unseat the SSM/SSM2 board
    9. disconnect the CADM cable
    10. power off the MULTIBUS
    11. skip a slot in the VMEbus

Standard Procedure
Maintenance Contract

- Customer calls Sequent Hotline with a problem
- Hotline determines the nature of the problem
- Field Engineer (FE) arrives at site with part
- FE contacts Sequent Hotline
- FE replaces part
- FE calls Hotline for RMA information

Replacement Procedure

- **Detect failure with diagnostics**
- **Follow RMA procedure to get new FRU**
- **Use proper ESD procedure**
  - remove bad FRU
  - remove new FRU from static protection
  - install new FRU
- **Run system diagnostics to verify operation**
- **Return bad FRU with RMA information**

RMA Faulty Hardware

- **Information needed to return hardware:**
  - item being returned
  - reason for return
  - serial number of item/system
  - part number
  - contact person and phone
  - PO number if applicable
  - billing and shipping address

- **Call Sequent Hotline with information**

- **Label package with RMA number obtained from Sequent**

- **Return faulty item to Sequent:**

  Sequent Computer Systems, Inc.
  ATTN: Service Dept. RMA #xxx
  15450 SW Koll Parkway
  Beaverton, OR 97006-6063

Sequent Technical Support

- Check release notes
- Call Sequent Hotline with information
  - USA 1-800-854-9969
  - Overseas 01-503-627-9875
- Hotline manned from 6:00am - 5:00pm ~~EST~~ 5:00am - 6:00pm PST
- Pager contact 24 hours/day
- UUCP e-mail a mailbug

Getting Help

- Have the system serial number ready when you call

- Leave a number where you can be reached if a hotline person is not immediately available

• U.S.A.	1-800-854-9969	24 hours
U.S.A. local	578-4164	24 hours
• Canada	1-800-338-7852	24 hours
• U.K.	0932-850879	8am to 6pm
	0932-859833	off hours

Serial Numbers

- **The serial number is: on the system data sheet**
  on the label at the rear

System 400 88xxx
System 700 89xxx

```
SEQUENT   COMPUTER   SYSTEMS   INC.
   BEAVERTON  OR  USA  97006-6063

MODEL   NO.  -  S27-1571-21B
SERIAL  NO.  -  88429
```