# BA123 Enclosure Maintenance

Order Number EK–188AA–MG–001

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maynard, massachusetts

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| DELNI | Q-bus | VAXcluster |
| DEQNA | Rainbow | VAXstation |
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# Contents

## Chapter 3 FRU Removal and Replacement



## Appendix A Related Documentation

## Index

## Figures

## Tables

# Preface

This guide provides reference, installation, and maintenance information for the BA123 enclosure. This enclosure is intended for MicroPDP–11 and MicroVAX systems.

## Intended Audience

This document is intended only for DIGITAL Field Service personnel and qualified self-maintenance customers.

## Organization

This guide has three chapters and one appendix.

Chapter 1 provides an overview of the system enclosure, describing controls, mass storage area and capacity, backplane, signal distribution, power distribution, I/O connections, and configuration guidelines.

Chapter 2 lists site preparation considerations and shows how to install the BA123 system.

Chapter 3 describes how to remove and replace field replaceable units (FRUs). The beginning of the chapter contains a list of these FRUs.

Appendix A provides a list of related documentation.

## Warnings, Cautions, and Notes

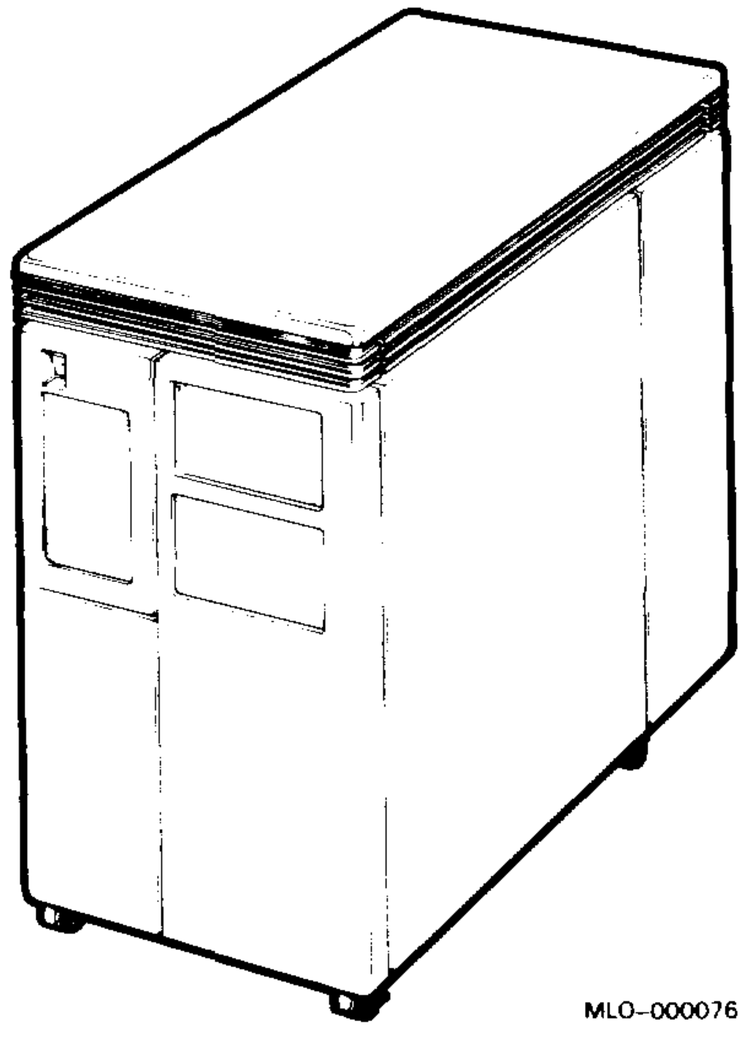
Warnings, cautions, and notes appear throughout this guide. They have the following meanings:

| | |
|---|---|
| WARNING | Provides information to prevent personal injury. |
| CAUTION | Provides information to prevent damage to equipment or software. |
| NOTE | Provides general information about the current topic. |

# Chapter 1
# BA123 Enclosure Description

This chapter describes the BA123, which is a caster-mounted office enclosure (Figure 1–1).

**Figure 1–1: BA123 Enclosure**




## 1.1 Mass Storage Device Areas

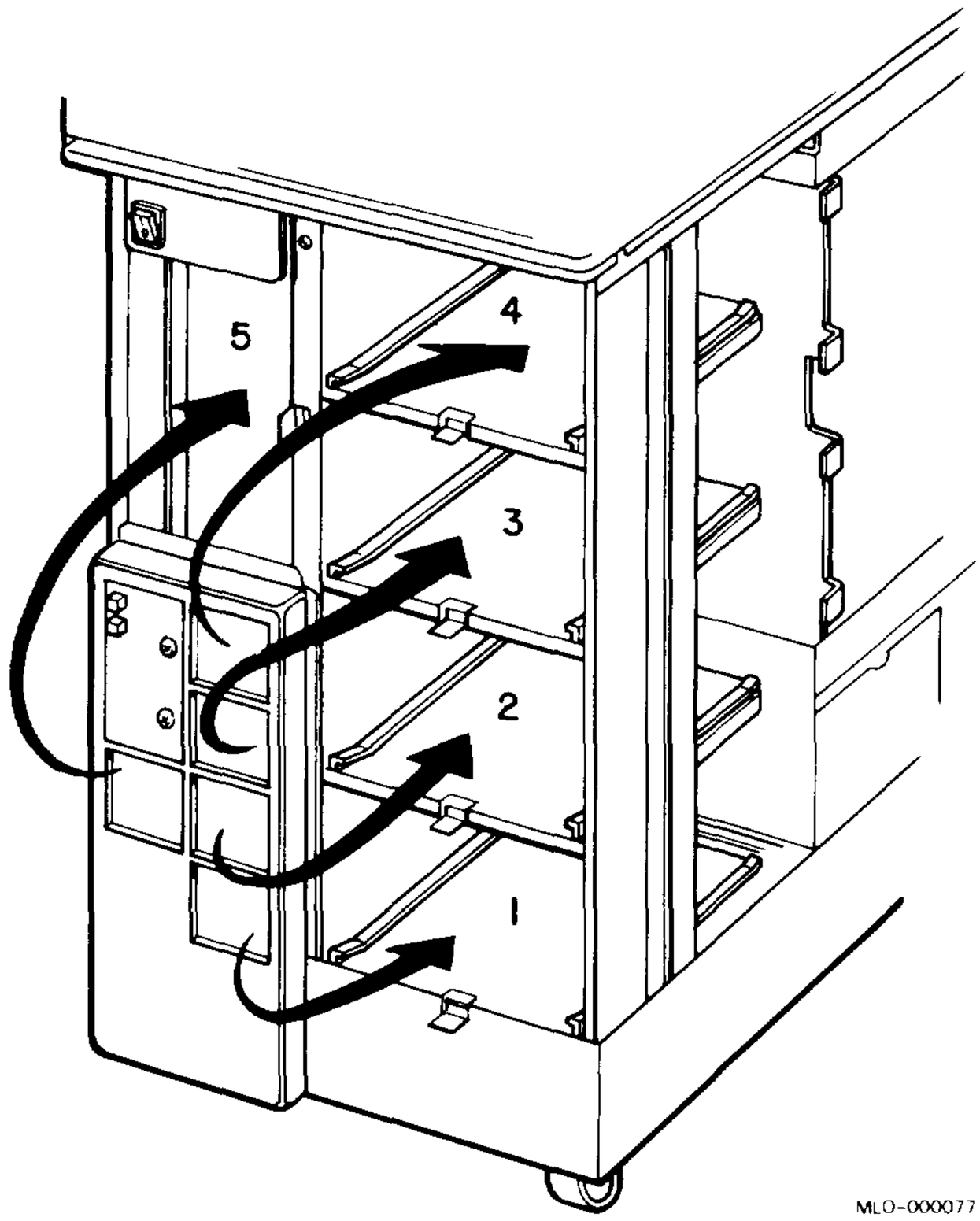
The BA123 has five 13.3-cm (5.25-in) mass storage slots (Figure 1–2). However, power considerations usually limit the enclosure to a total of four mass storage devices.

Here is a typical configuration:

| | |
|---|---|
| Slots 1, 2 | RD50-series fixed-disk drives or other devices |
| Slot 4 | TK50 tape drive |
| Slot 5 | RX50 diskette drive |

You can also connect external mass storage devices to the BA123, if their enclosures meet requirements for electromagnetic interference (EMI). (All DIGITAL enclosures meet requirements for EMI.)

**Figure 1–2: BA123 Mass Storage Slots**

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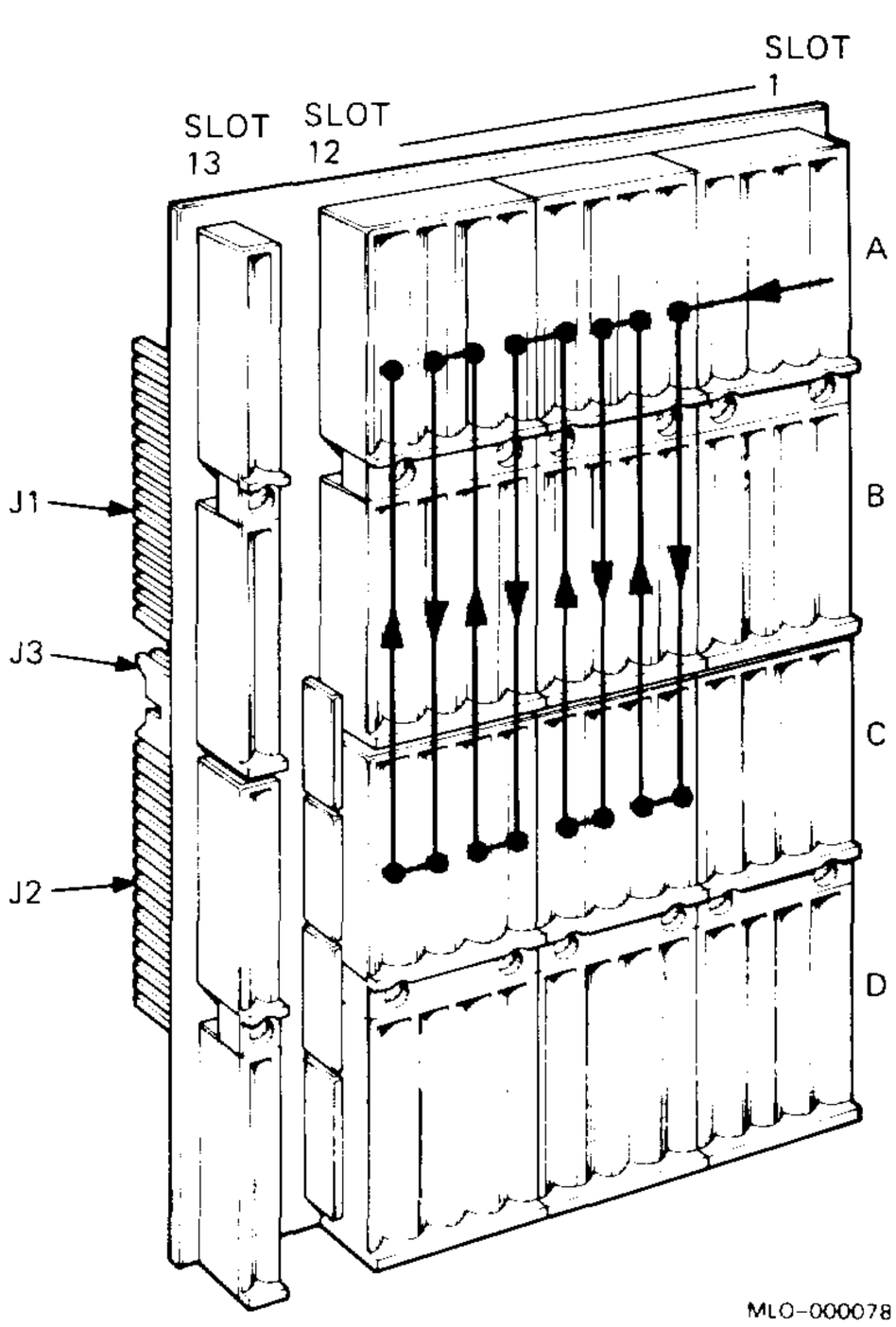
## 1.2 Backplane

The BA123 has a 13-slot backplane that measures 27.9 cm x 19.9 cm (11 in x 7.85 in). The backplane implements the extended LSI–11 bus, which uses 22-bit addressing. The common name for the LSI–11 bus is the Q22-bus.

The first 12 slots of the backplane are for dual- or quad-height modules compatible with the Q22-bus. Each backplane slot has four rows: A, B, C, and D (Figure 1–3).

**Figure 1–3: BA123 Backplane Grant Continuity and Jumpers**




A *dual-height* module has connectors that fit into two rows of a backplane slot. Two dual-height modules can occupy one backplane slot.

A *quad-height* module has connectors that fit into all four rows of a backplane slot. One quad-height module occupies one backplane slot.

As a rule, if you use dual-height modules in the AB or CD rows of slots 5 through 8, you must install another dual-height module, or an M9047 grant card, in the other two rows of each slot. The exception is the last dual-height module installed on the grant continuity chain. For example, if the last dual-height module is in the AB rows of slot 9, you do not need a grant card in the CD rows. Figure 1–3 shows the grant continuity chain.

The CD rows of slots 1 through 4 are interconnected. This feature is called the private memory interconnect (PMI). You should only use memory modules in the CD rows.

The backplane has four 120-ohm resistor packs between slots 12 and 13. These resistor packs terminate the Q22-bus. You cannot connect another backplane to the BA123.

Slot 13 of the backplane does not implement the Q22-bus. The CD rows are for the signal distribution board. The AB rows are for future use. Slot 13 provides +5 Vdc, +12 Vdc ground and the DCOK signal, which indicates that the dc voltage from the power supply is stable.

The backplane supports a maximum of 38 ac loads and 20 dc loads for MicroVAX, and 45 ac loads and 20 dc loads for MicroPDP–11 systems. An *ac load* is the amount of capacitance a module presents to a bus signal line. One ac load equals 9.35 picofarads (pf). A *dc load* is the amount of dc leakage a module presents to a bus signal line. One dc load is about 105 microamperes (μA).

Figure 1–3 shows three J connectors on the backplane. J1 and J2 are 18-pin connectors that receive dc power and signals from two independent regulators in the power supply. The backplane balances the load on each of the two regulators, A and B.

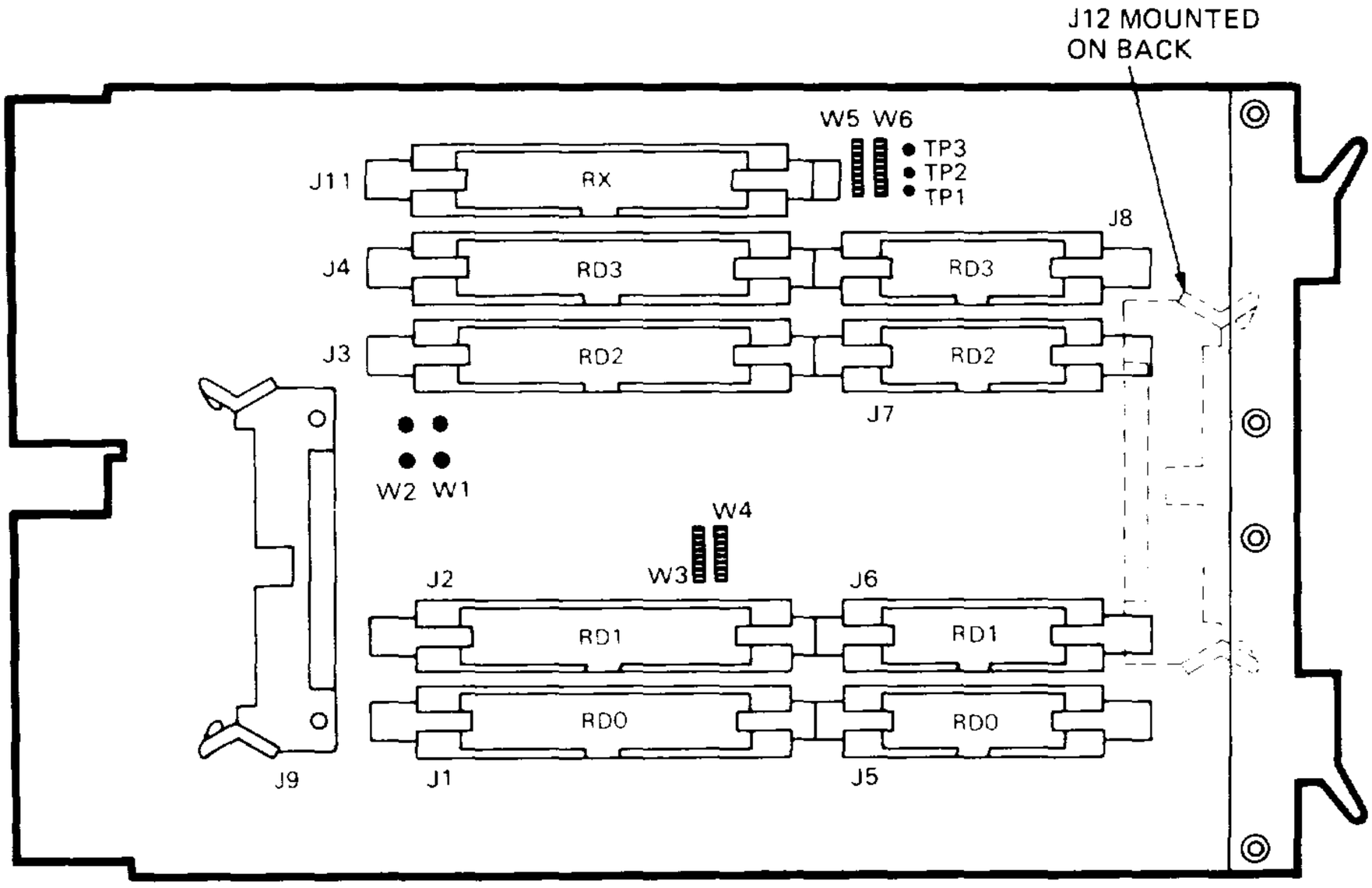
- Regulator A connects to J1, supplying the odd-numbered slots and the resistor packs.
- Regulator B connects to J2, supplying the even-numbered slots.

J3 is a 10-pin connector for a cable to the CPU console board.

## 1.3 Signal Distribution Board

The signal distribution board (Figure 1–4) *must* be installed in the bottom two rows (CD) of the last slot (13) of the backplane. If needed, a second signal distribution board can be installed in the AB rows of slot 13. Table 1–1 lists the jumper settings for the module.

**Figure 1–4: BA123 Signal Distribution Board (M9058)**



## Table 1–1: BA123 Signal Distribution Board Jumpers

| Jumper | Setting[1] | Meaning |
|---|---|---|
| W1, W2 | Out | Grant continuity not maintained. |
| W1, W2 | In | Grant continuity maintained. |
| W3 | In | DRV SEL 3 connected to DS1–DS4 of J1. |
| | Out | DRV SEL 3 connected to DS3 of J1. |
| W4 | In | DRV SEL 4 connected to DS1–DS4 of J2. |
| | Out | DRV SEL 4 connected to DS4 of J2. |
| W5 | In | DRV SEL 1 connected to DS1–DS4 of J3. |
| | Out | DRV SEL 1 connected to DS1 of J3. |
| W6 | In | DRV SEL 2 connected to DS1–DS4 of J4. |
| | Out | DRV SEL 2 connected to DS2 of J4. |
| TP1 to TP2 | | DRV SEL 1 and 2 connected to DS1 and DS2 of J11. |
| TP1 to TP3 | | DRV SEL 2 connected to DS1 and DS2 of J11. |

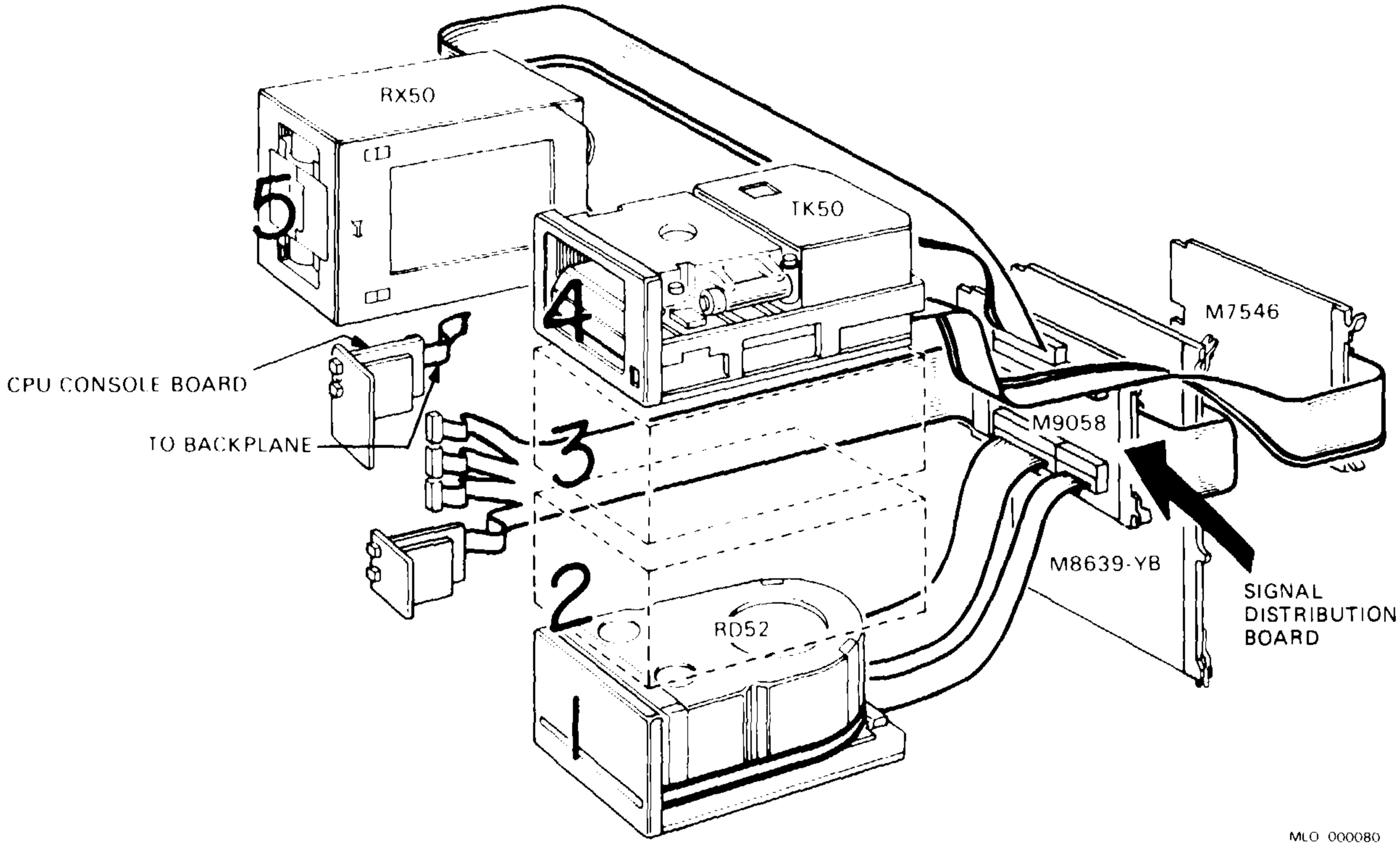
[1]The factory position appears first.

Jumpers W3 through W6 determine the connections between the drive select lines from a fixed-disk drive controller (DRV SEL 1 through DRV SEL 4) and a fixed-disk drive (DS1 through DS4). As long as these jumpers are inserted, you can configure the drives to respond to any drive select line.

TP1 and TP2 determine the connections between the drive select lines from a diskette drive controller (DRV1 through DRV4) and a diskette drive (DS1 through DS4). For an RX50, connect TP1 to TP2 for both drives.

You can connect up to four fixed-disk drives (or an RX50 diskette drive and two fixed-disk drives) to the signal distribution board. A 50-conductor ribbon cable connects the board to an RQDX mass storage controller module in the card cage. Another ribbon cable connects the board to the RD console boards behind the control panel. Figure 1–5 shows the cabling between the signal distribution board and the rest of the system.

**Figure 1–5: BA123 Signal Distribution Board Cabling**



## 1.4 Power Supply

The power supply (Figure 1–6) is a 460-watt unit with two regulators. Each regulator supplies power to one-half of the slots in the backplane and to mass storage devices inside the system.

The power supply provides protection against excess voltage and current. The power supply regulators maintain proper output voltages against temporary fluctuations in the ac input to the power supply. Table 1–2 lists the minimum and maximum currents supplied by each regulator.

**Figure 1–6: BA123 Power Supply**

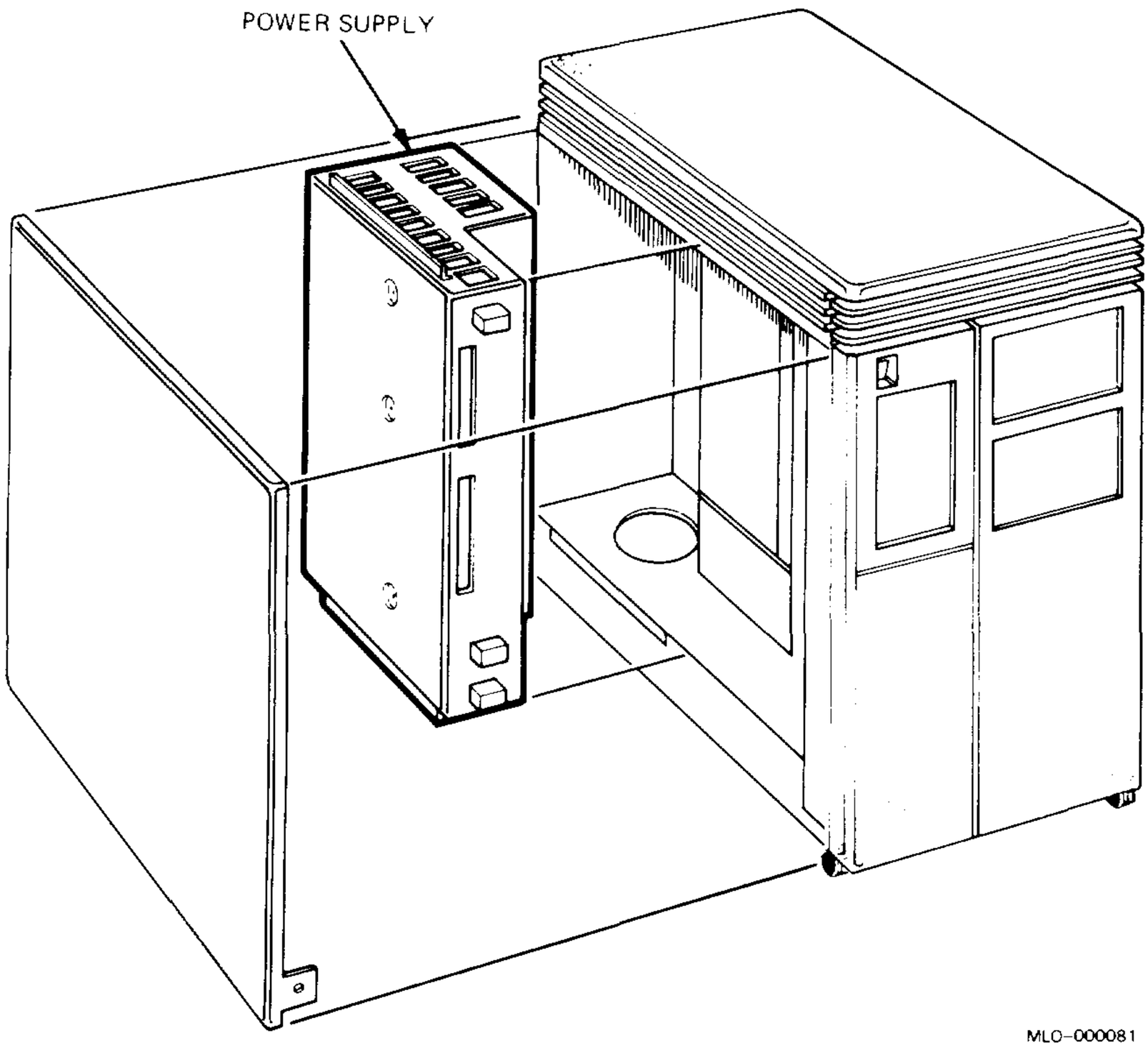


**Table 1–2: Regulators A and B Power and Current**

| | Power | +5 Vdc | | +12 Vdc | |
|---|---|---|---|---|---|
| **Regulator** | **Max[1]** | **Min** | **Max** | **Min** | **Max** |
| A | 230 W | 4.5 A | 36.0 A | 0 A | 7.0 A |
| B | 230 W | 4.5 A | 36.0 A | 0 A | 7.0 A |

[1]Total power used from each regulator must not exceed 230 W. This means the system cannot draw the maximum current at +5 Vdc and +12 Vdc for both regulators at the same time.

The power supply has two other +12 Vdc outputs that are independent of the main 460-watt output. These outputs drive the two fans that are external to the power supply. The outputs also provide power to the temperature sensors above the card cage.

The power supply also has the following controls and connectors at the rear (Figure 1–7):

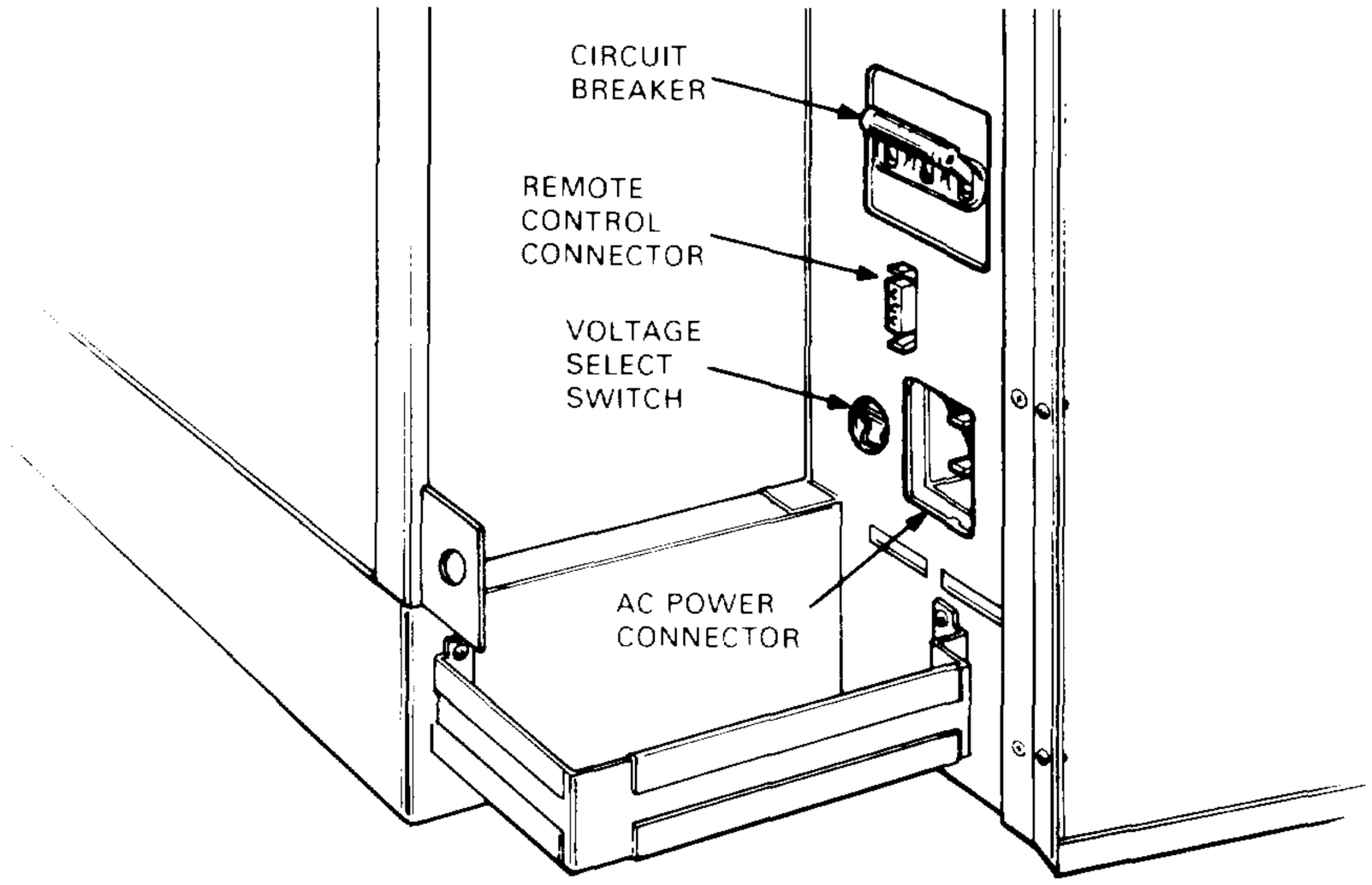
- Circuit breaker to protect the power cable
- Connector for remote control of power
- Voltage select switch

  120 V = 88 to 128 Vac
  240 V = 176 to 256 Vac

- International Electrical Commission (IEC) ac input connector, compatible with international power cables

**NOTE:** *A minimum of 90 Vac (88 to 128 Vac setting) should be present at the outlet for low-line operation, to compensate for line cord voltage drop.*

## Figure 1–7: BA123 Power Supply Controls and Connectors (Rear View)

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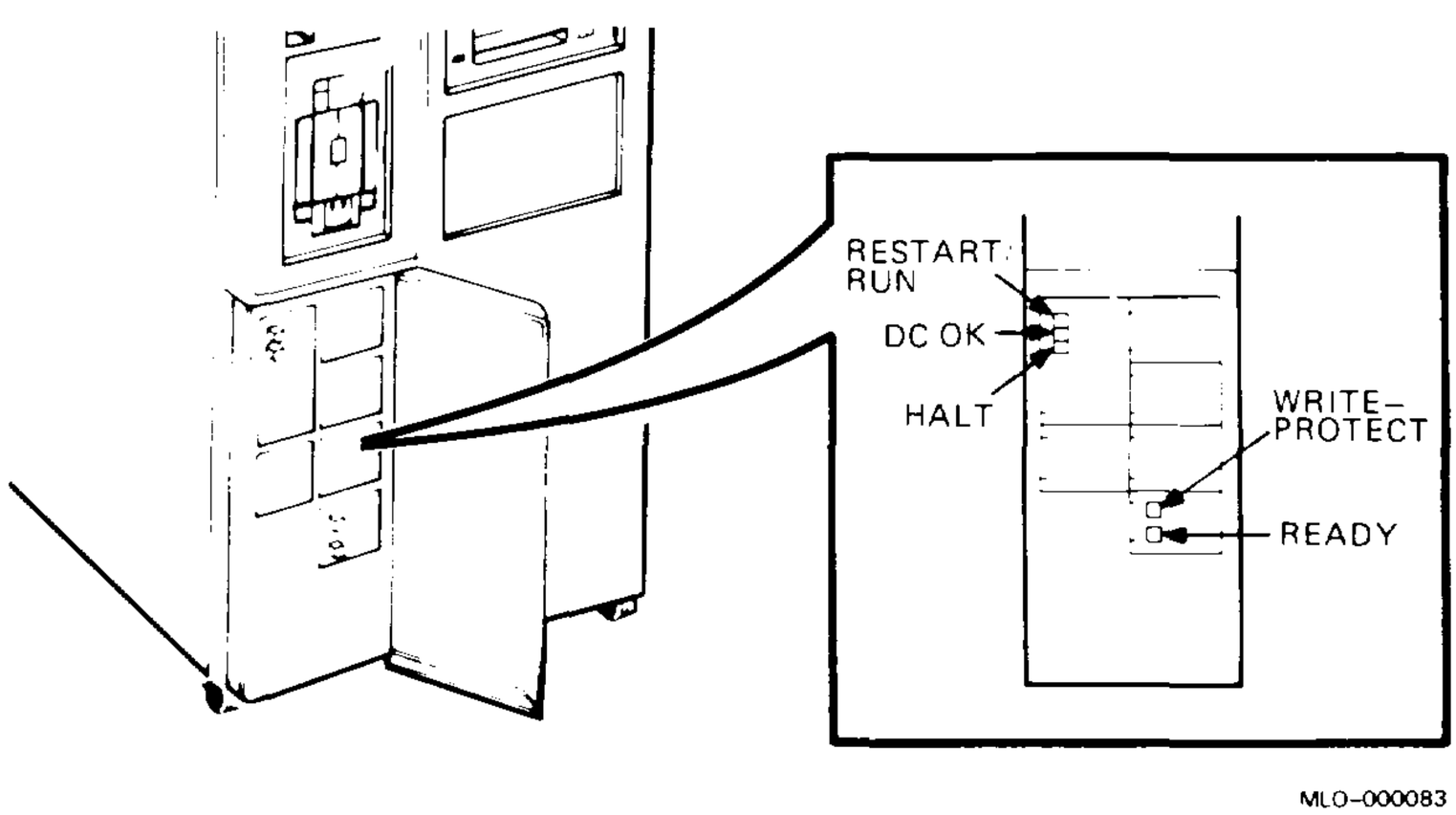
## 1.5 Control Panel

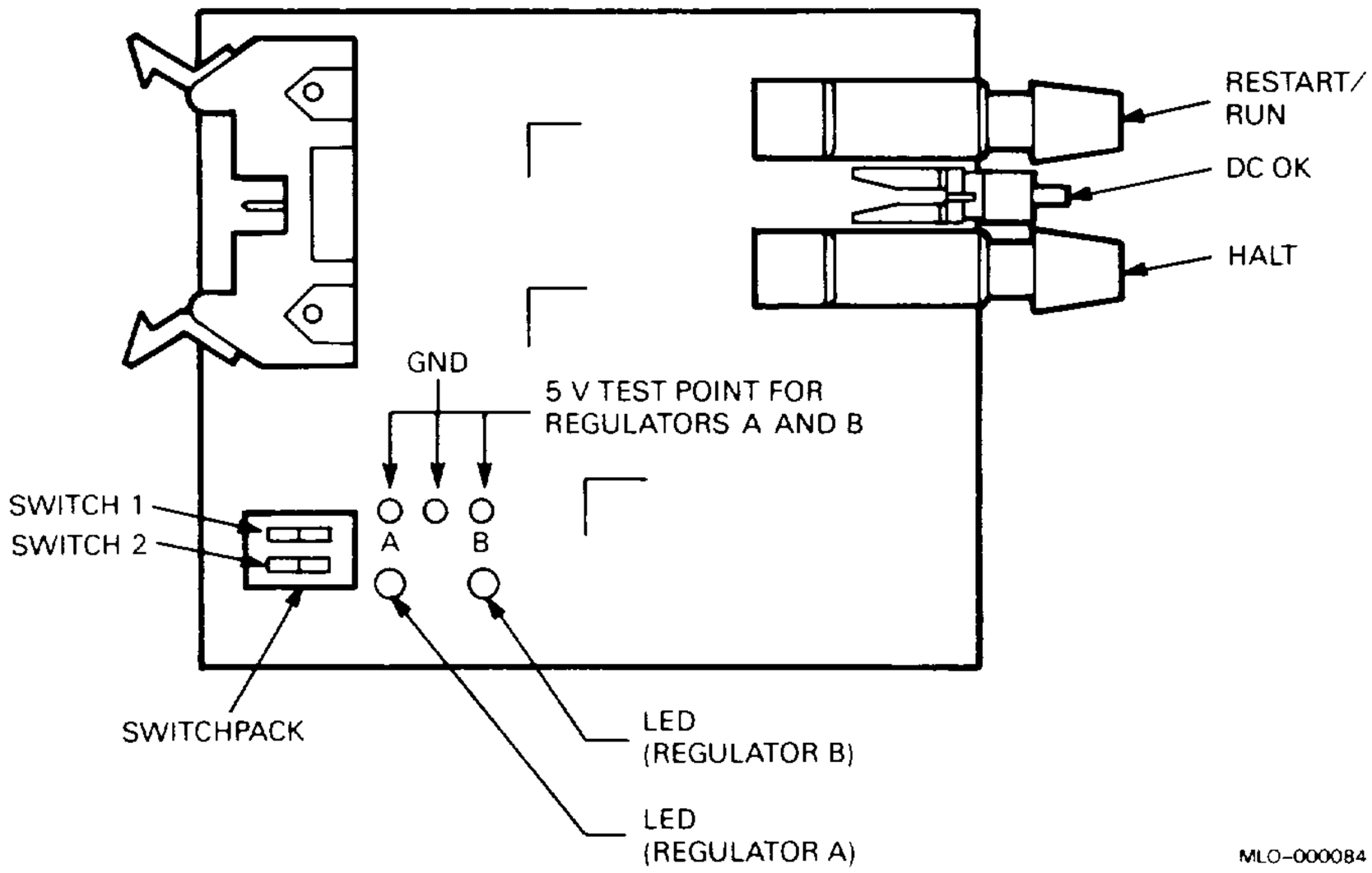
The control panel has six cutouts to provide space for control circuits (Figure 1–8):

- One cutout is for a CPU console board. This cutout contains the Restart button, the DC OK LED, and the Halt button (Figure 1–8). To see the CPU console board (Figure 1–9), you must remove the enclosure's left side panel.
- The other five cutouts are for mass storage console boards. Unused cutouts are covered with removable plates.

**Figure 1–8: BA123 Control Panel**



## Figure 1–9: BA123 CPU Console Board




The CPU console board has two regulator LEDs that indicate failures in the regulator supply to the backplane. If the DC OK indicator turns off, these two LEDs indicate which regulator supply failed:

Left LED off = regulator A failed
Right LED off = regulator B failed

If a regulator LED is on, that regulator is providing +5 Vdc within tolerance to the backplane.

**NOTE:** *There should be at least one module in both even- and odd-numbered backplane slots to draw enough current to start each regulator.*

A ribbon cable connects the CPU console board to the backplane. This cable provides the connection between the CPU and the CPU console board.

Table 1–3 lists the controls and indicators on the CPU console board.

## Table 1–3: CPU Console Board Controls and Indicators

| Control/Indicator | Setting | Description |
|---|---|---|
| Restart | | Momentary-contact pushbutton. When you press Restart, the system simulates a power-down/power-up sequence to restart CPU operation. You can enable or disable the Restart switch by using switch 2. |
| DC OK | | Green LED indicator. |
| | On | All dc voltages are present and within tolerance. |
| | Off | The Q22-bus BDCOK (dc bus power OK) signal is negated. |
| Halt[1] | | Pushbutton switch with red LED indicator. |
| | Out (LED off) | Puts the CPU in program I/O mode (normal position for running user software). |
| | In (LED on) | Stops normal software operation. Puts the CPU in console mode, where the system accepts only console commands. |
| +5 V and +12 V test points | | Used to test the system. |
| Switch 1 | | Enables the Q22-bus BEVENT timing signal and allows the line time clock to function under software control. |
| Switch 2 | | To enable Restart, set switch 2 to on. To disable Restart, set switch 2 to off. |

[1]MicroVAX: You can disable the Halt switch by setting the halt enable switch on the CPU I/O insert to the disable position (dot outside of circle). In this case, pressing Halt turns on the red indicator but does not halt the system.

## 1.6 I/O Panel

The I/O panel (Figure 1–10) connects external devices to the BA123. Each device connects to a module in the system through a filtered connector. You mount the connector on an insert, then install the insert in a cutout on the I/O panel. Filtered connectors and inserts are included with the option's cabinet kit.

The I/O panel has ten cutouts in two sizes, types A and B. You mount inserts in the order shown (by letter) in Figure 1–10. Usually, the CPU I/O insert is in cutout A. Unused cutouts are covered by removable plates. Table 1–4 lists the size of the cutouts and their corresponding inserts.

**Figure 1–10: BA123 I/O Panel**

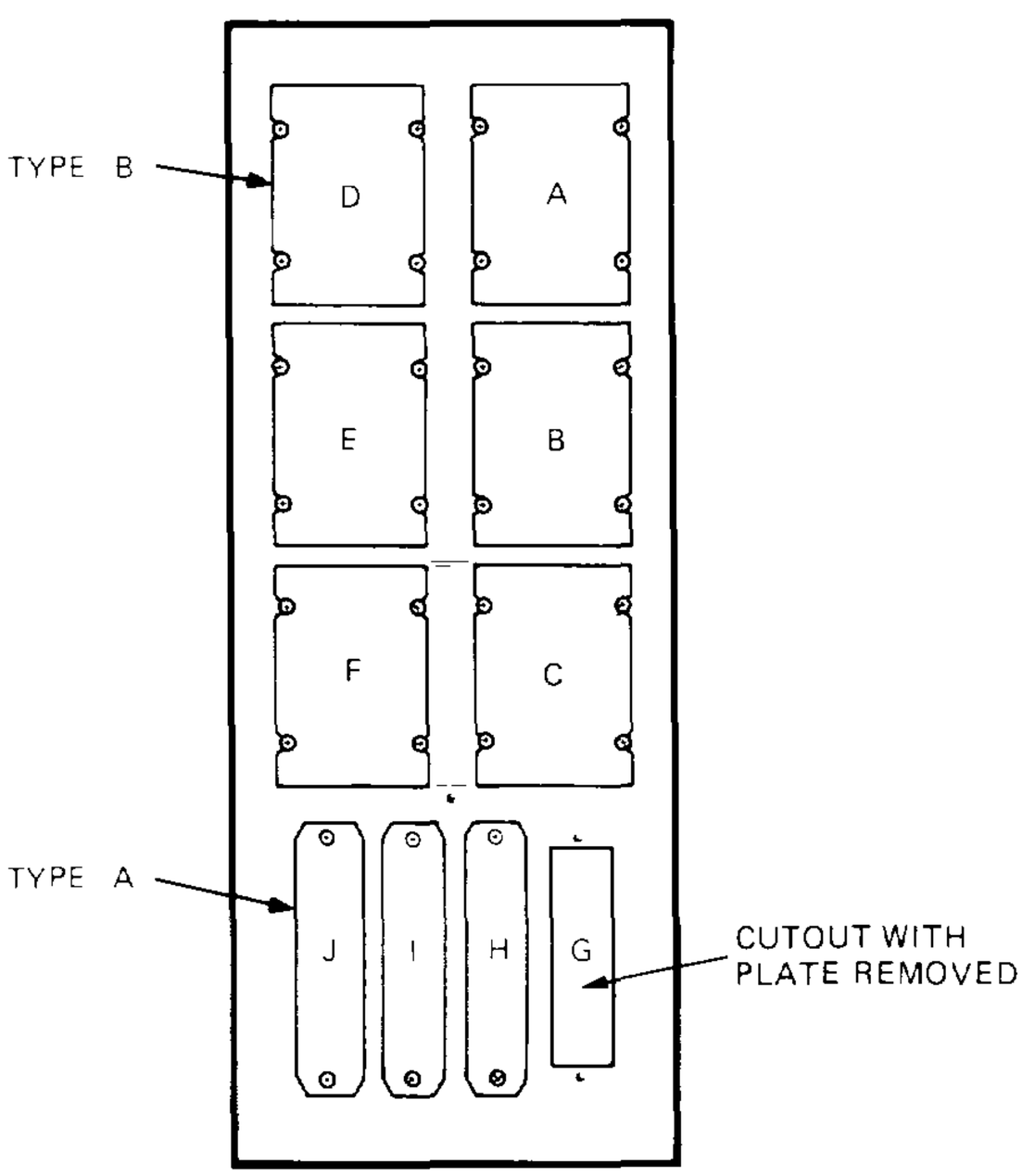



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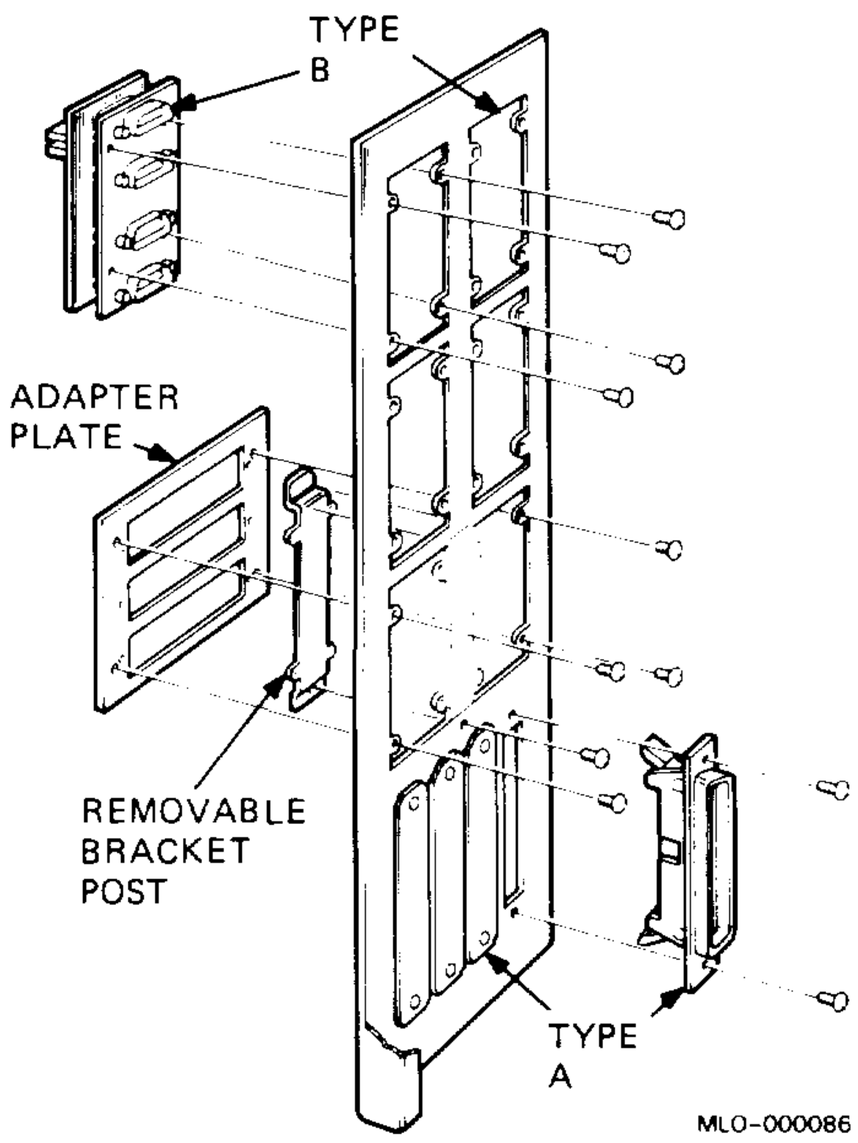
**Table 1–4: BA123 Cutout and Insert Panel Size**

| Type | Quantity | Description | Inches | Millimeters |
|---|---|---|---|---|
| A | 4 | Cutout | 0.6 x 3.2 | 15 x 81 |
| | | Insert panel | 1.0 x 4.0 | 25 x 102 |
| B | 6 | Cutout | 2.25 x 3.2 | 57 x 81 |
| | | Insert panel | 2.5 x 3.3 | 64 x 84 |

You can add three more type-A cutouts by removing the bracket post between the bottom two type-B cutouts and installing an adapter plate (part no. 74–27720–01). Figure 1–11 shows the adapter plate with typical type A and B inserts.

**Figure 1–11: BA123 Adapter Plate and Filtered Connectors**



## 1.7 Air Circulation

Three fans draw air in from the top of the enclosure:

- One below the module card cage
- One behind the control panel
- One inside the power supply

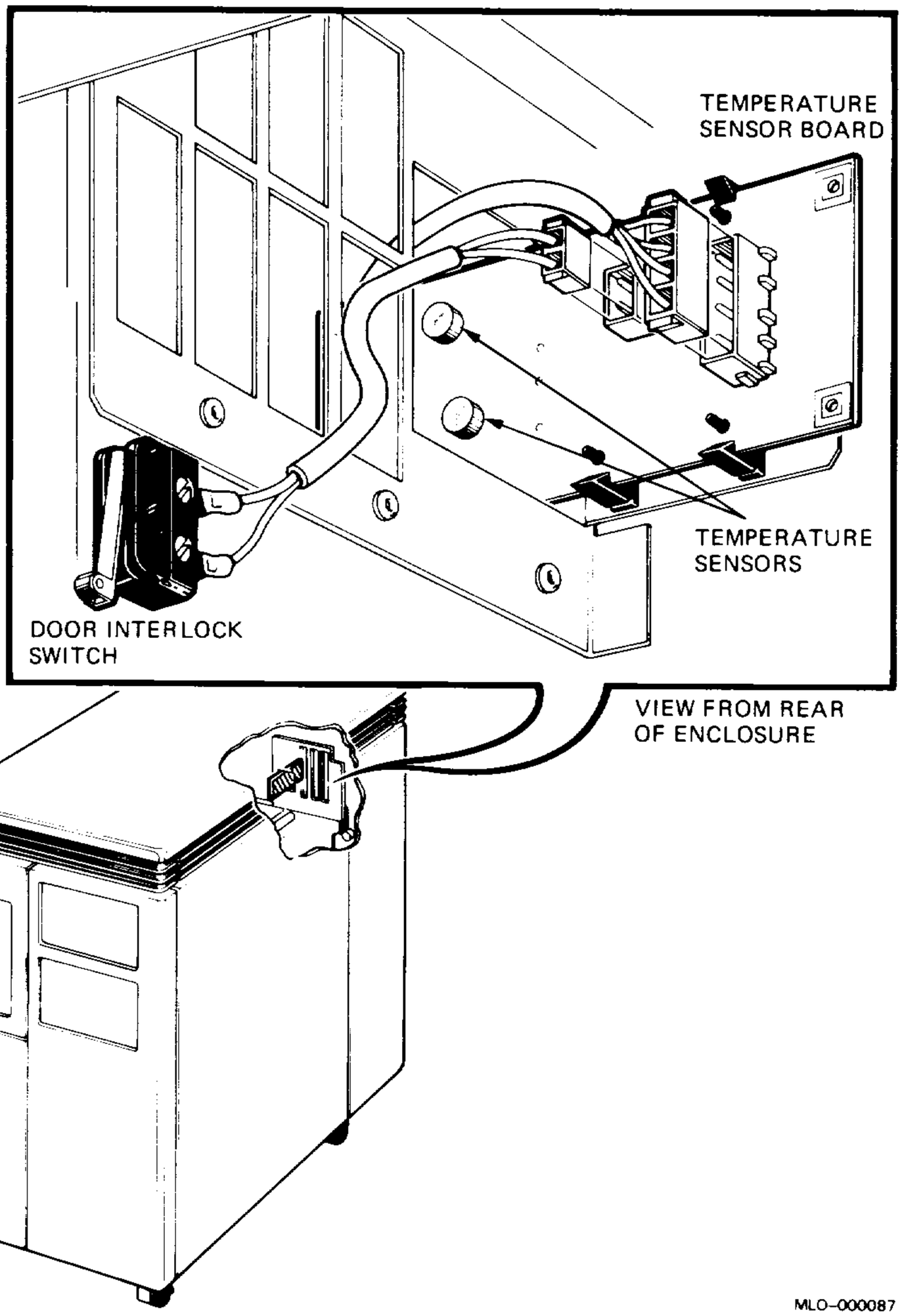
A printed circuit board above the card cage contains two temperature sensors (Figure 1–12):

- One regulates the speed of the card cage fan.
- One shuts down the system at high temperature.

The temperature sensors keep the speed of the card cage fan at the minimum level required to maintain a constant temperature within the card cage.

The card cage panel (new systems) or door (older systems) encloses the area surrounding the modules. When the panel or door is removed, an interlock switch is triggered that increases the speed of the card cage fan to maximum. If the proper temperature within the card cage cannot be maintained, even at maximum fan speed, the over-temperature sensor causes the system to shut down.

**Figure 1–12: BA123 Temperature Sensor Board**

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## 1.8 Configuration Guidelines

Before you change a system's configuration, consider the following factors:

Module order in the backplane
Module configuration
Mass storage device configuration

If you are adding a device to a system, you must know the capacity of the system enclosure in these areas:

Backplane
I/O panel
Power supply
Mass storage devices

### 1.8.1 Module Order and Configuration

The order of modules in the backplane depends on four factors:

- Relative use of devices in the system
- Expected performance of each device relative to other devices
- Ability of a device to tolerate delays between bus requests and bus grants (delay tolerance)
- Tendency of a device to prevent devices farther from the CPU from accessing the bus

The relative use and performance of devices depends on the application. This means the order of modules also depends on the application. Most applications try to balance the use of devices. For balanced applications, use the recommended module order listed in the appropriate CPU maintenance documentation. Make sure you read the rules and guidelines discussed in the CPU documentation; they affect the recommended order.

When devices do not perform as expected, you can change the recommended order of modules to meet the needs of the application. Performance problems often involve a device that is heavily used or has a low delay tolerance. Usually, there are other heavily used devices between the problem device and the CPU. In this case, move the problem device closer to the CPU.

**NOTE:** *If the option has Q/CD jumpers, check the options documentation for the correct Q/CD jumper configurations. An incorrect jumper configuration can cause damage.*

For information on how to configure modules, refer to *Microsystems Options*.

## 1.8.2 Configuration Worksheet

Use the BA123 configuration worksheet (Figure 1–13) to make sure a configuration does not exceed a system's limits for expansion space, I/O space, power, and bus loads. If you use standard DIGITAL modules, you will not exceed the limits for bus loads.

Use the worksheet as follows:

1. On the worksheet, list all the devices already installed in the system.
2. List all the devices you plan to install in the system.
3. Fill in the information for each device, using the data listed in Table 1–5.
4. Add up the columns. Make sure the totals are within the limits for the enclosure.

**NOTE:** *Check the CPU documentation to determine which options are supported for a specific system.*

### Table 1–5: Power, Bus Load, and I/O Insert Data

| | | Current (Amps) | | Power | Bus Loads | | |
|---|---|---|---|---|---|---|---|
| **Option** | **Module** | **+5 V** | **+12 V** | **Watts** | **AC** | **DC** | **Insert**[1] |
| AAV11–D[2] | A1009 | 1.8 | 0.0 | 9.0 | 1.0 | 1.0 | – |
| ADV11–D[2] | A1008 | 3.2 | 0.0 | 16.0 | 1.0 | 1.0 | – |
| CXA16–M | M3118–YA | 1.6 | 0.2 | 10.4 | 3.0 | 0.5 | – |
| CXB16–M | M3118–YB | 2.0 | 0.0 | 10.0 | 3.0 | 0.5 | – |
| CXY08–M | M3119–YA | 1.64 | 0.395 | 12.94 | 3.2 | 0.5 | – |
| DEQNA | M7504 | 3.5 | 0.5 | 23.5 | 2.8 | 0.5 | A |
| DFA01 | M3121–PA | 1.97 | 0.40 | 14.7 | 3.0 | 1.0 | – |
| DHV11 | M3104 | 4.5 | 0.55 | 29.1 | 2.9 | 0.5 | B (2) |
| DLVEI–DP | M8017 | 1.0 | 1.5 | 23.0 | 1.6 | 1.0 | A |
| DLVJ1 | M8043 | 1.0 | 0.25 | 8.0 | 1.0 | 1.0 | B |
| DMV11–M | M8053 | 3.4 | 0.4 | 21.8 | 2.0 | 1.0 | A |
| DMV11–AP | M8053–MA | 3.4 | 0.38 | 21.6 | 2.0 | 1.0 | B |
| DMV11–BP | M8053–MA | 3.4 | 0.38 | 21.6 | 2.0 | 1.0 | A |

[1]A = 2.5 cm x 10.0 cm (1 in x 4 in).
B = 5.0 cm x 7.5 cm (2 in x 3 in).

[2]Usually connected through a universal data input panel (UDIP), using a 13.3-cm (5.25-in) mass storage slot.

## Table 1–5 (Cont.): Power, Bus Load, and I/O Insert Data

| Option | Module | Current (Amps) +5 V | Current (Amps) +12 V | Power Watts | Bus Loads AC | Bus Loads DC | Insert[1] |
|---|---|---|---|---|---|---|---|
| DMV11–CP | M8064–MA | 3.35 | 0.26 | 19.9 | 2.0 | 1.0 | B |
| DMV11–FP | M8053–MA | 3.4 | 0.38 | 21.6 | 2.0 | 1.0 | A (2) |
| DMV11–N | M8064 | 3.4 | 0.4 | 21.8 | 2.0 | 1.0 | A |
| DPV11 | M8020 | 1.2 | 0.3 | 9.6 | 1.0 | 1.0 | A |
| DRV11 | M7941 | 0.9 | 0.0 | 4.5 | 2.8 | 1.0 | A (2) |
| DRV11–BP | M7950 | 1.9 | 0.0 | 9.5 | 3.3 | 1.0 | A (2) |
| DUV11–DP | M7951 | 1.2 | 0.39 | 10.7 | 3.0 | 1.0 | A (2) |
| DRV11–J | M8049 | 1.8 | 0.0 | 9.0 | 2.0 | 1.0 | A (2) |
| DZQ11 | M3106 | 1.0 | 0.36 | 9.32 | 1.5 | 1.0 | B |
| DZV11 | M7957 | 1.2 | 0.39 | 10.7 | 3.9 | 1.0 | B |
| IEQ11 | M8634 | 3.0 | 0.0 | 15.0 | 2.0 | 1.0 | B |
| KA620–AA | M7478 | 6.2 | 0.14 | 32.7 | 2.7 | 1.0 | – |
| KA630–AA | M7606 | 6.2 | 0.14 | 32.7 | 2.7 | 1.0 | – |
| KA650–AA | M7620–A | 6.0 | 0.14 | 31.7 | 2.7 | 1.0 | – |
| KDA50–Q[3] | M7164 | 6.93 | 0.0 | 34.65 | 3.0 | 0.5 | – |
| KDA50–Q | M7165[4] C or D rev | 6.57 | 0.03 | 33.21 | – | – | |
| KDA50–Q | M7165[4] E rev | 4.07 | 0.03 | 20.71 | – | – | |
| KDF11–BE | M8189 | 5.5 | 0.1 | 28.7 | 2.3 | 1.1 | B |
| KDJ11–BC | M8190 | 5.5 | 0.1 | 28.7 | 2.3 | 1.1 | B |
| KDJ11–BF | M8190 | 5.5 | 0.2 | 29.9 | 2.6 | 1.0 | – |
| KLES1 | M7740 | 3.0 | 0.0 | 15.0 | 2.3 | 1.0 | A |
| KMV11 | M7500 | 2.6 | 0.2 | 15.4 | 3.0 | 1.0 | B |
| KWV11–C[2] | M4002 | 2.2 | 0.013 | 11.2 | 1.0 | 1.0 | – |
| LPV11 | M8027 | 0.8 | 0.0 | 4.0 | 1.4 | 1.0 | A |
| MRV11–D[5] | M7942 | 1.6 | 0.0 | 8.0 | 3.0 | 0.5 | – |
| MRV11–D | M7942 | 2.8 | 0.0 | 14.0 | 1.8 | 1.0 | – |

[1]A = 2.5 cm x 10.0 cm (1 in x 4 in).
B = 5.0 cm x 7.5 cm (2 in x 3 in).

[2]Usually connected through a universal data input panel (UDIP), using a 13.3-cm (5.25-in) mass storage slot.

[3]KDA50–Q is a two-module set (M7164/M7165). AC and DC bus loads listed = total for both modules.

[4]The etch revision letter C, D, or E is part of the module part number near the handle. For example, a part number xxxxx–Ex–x is a revision E module.

[5]Unpopulated module.

## Table 1–5 (Cont.): Power, Bus Load, and I/O Insert Data

| | | Current (Amps) | | Power | Bus Loads | | |
|---|---|---|---|---|---|---|---|
| **Option** | **Module** | **+5 V** | **+12 V** | **Watts** | **AC** | **DC** | **Insert**[1] |
| M9060–YA | | 5.3 | 0.0 | 26.5 | 0.0 | 0.0 | – |
| MS630–AA | M7607 | 1.0 | 0.0 | 5.0 | 0.0 | 0.0 | – |
| MS630–BA | M7608 | 1.8 | 0.0 | 9.0 | 0.0 | 0.0 | – |
| MS630–BB | M7608 | 1.8 | 0.0 | 9.0 | 0.0 | 0.0 | – |
| MS630–CA | M7609 | 3.1 | 0.0 | 15.5 | 0.0 | 0.0 | – |
| MS650–AA | M7621–A | 2.7 | 0.0 | 13.5 | 0.0 | 0.0 | – |
| MSV11–JD | M8637–D | 3.74 | 0.0 | 18.7 | 2.7 | 0.5 | – |
| MSV11–JE | M8637–E | 4.1 | 0.0 | 20.5 | 2.7 | 0.5 | – |
| MSV11–PK | M8067–K | 3.45 | 0.0 | 17.25 | 2.0 | 1.0 | – |
| MSV11–PL | M8067–L | 3.6 | 0.0 | 17.5 | 2.0 | 1.0 | – |
| MSV11–QA | M7551–AA | 2.4 | 0.0 | 12.0 | 2.0 | 1.0 | – |
| RA70 | | 3.3 | 2.9 | 51.3 | – | – | – |
| RC25 | | 1.0 | 2.5 | 35.0 | – | – | – |
| RD51 | | 1.0 | 1.6 | 24.2 | – | – | – |
| RD52 | | 1.0 | 2.5 | 35.0 | – | – | – |
| RD53 | | 0.9 | 2.5 | 34.5 | – | – | – |
| RD54 | | 1.3 | 1.34 | 23.7 | – | – | – |
| RD54A–EA | | 1.3 | 1.34 | 22.6 | – | – | – |
| RLV12–AP | M8061 | 5.0 | 0.10 | 26.2 | 2.7 | 1.0 | A |
| RQDX1 | M8639–YA | 6.4 | 0.25 | 35.0 | 2.0 | 1.0 | – |
| RQDX2 | M8639–YB | 6.4 | 0.1 | 33.2 | 2.0 | 1.0 | – |
| RQDX3 | M7555 | 2.48 | 0.06 | 13.2 | 1.0 | 1.0 | – |
| RQDXE | M7513 | 0.5 | 0.0 | 2.5 | 1.0 | 0.0 | – |
| RX33 | | 0.5 | 0.3 | 5.6 | – | – | – |
| RX50 | | 0.85 | 1.8 | 25.9 | – | – | – |
| TK50 | | 1.35 | 2.4 | 33.55 | – | – | – |
| TK50–AA | | 1.35 | 2.4 | 34.5 | – | – | – |
| TK50E–EA | | 1.35 | 2.4 | 35.6 | – | – | – |
| TK70E–EA | | 1.5 | 2.4 | 36.3 | – | – | – |
| TQK25–KA | M7605 | 4.0 | – | 20.0 | 2.0 | 1.0 | A |
| TQK50 | M7546 | 2.9 | 0.0 | 14.5 | 2.8 | 0.5 | – |
| TSV05 | M7196 | 6.5 | 0.0 | 32.5 | 3.0 | 1.0 | A |

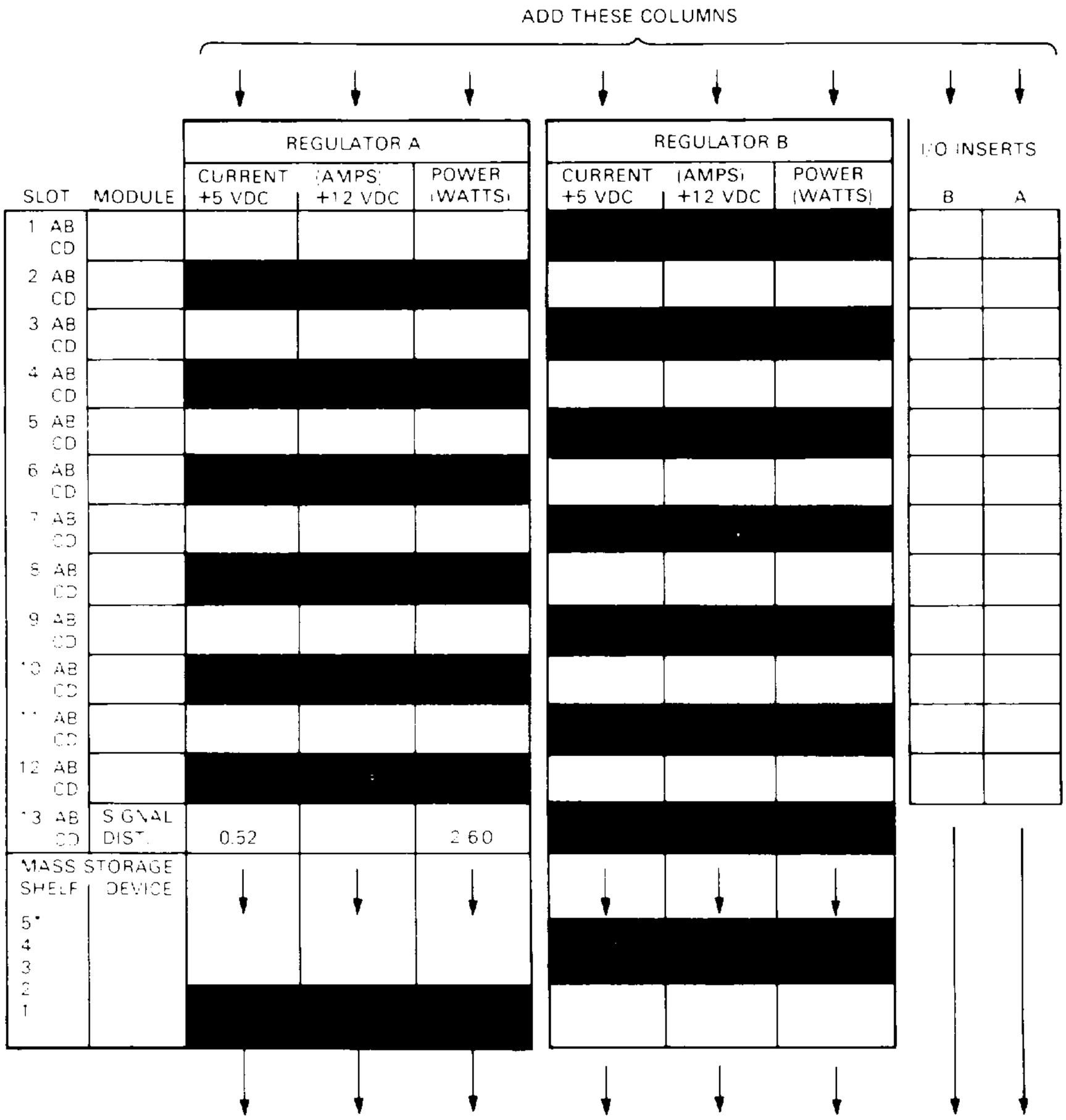
[1]A = 2.5 cm x 10.0 cm (1 in x 4 in).
B = 5.0 cm x 7.5 cm (2 in x 3 in).

## Table 1–5 (Cont.): Power, Bus Load, and I/O Insert Data

| | | Current (Amps) | | Power | Bus Loads | | |
|---|---|---|---|---|---|---|---|
| **Option** | **Module** | **+5 V** | **+12 V** | **Watts** | **AC** | **DC** | **Insert**[1] |
| VCB01 | M7602 | 4.6 | 1.5 | 42.0 | 3.0 | 1.0 | B |
| VCB02 | M7169 | 5.8 | 0.75 | 38.0 | 3.5 | 1.0 | B |
| VCB02 | M7168 | 3.4 | 0.0 | 17.0 | 0.0 | 0.0 | – |

[1]A = 2.5 cm x 10.0 cm (1 in x 4 in).
B = 5.0 cm x 7.5 cm (2 in x 3 in).

## Figure 1–13: BA123 Configuration Worksheet




*RECOMMENDED FOUR DRIVES MAXIMUM – TWO IN SHELVES 1 AND 2, TWO IN 3, 4, OR 5
**IF MORE THAN FOUR 1 X 4 I/O PANELS ARE REQUIRED, AN ADAPTER TEMPLATE MAY BE USED

MLO-000088

# Chapter 2
# Installation

This chapter provides site preparation and installation guidelines for the BA123 enclosure.

## 2.1 Preparing the Site

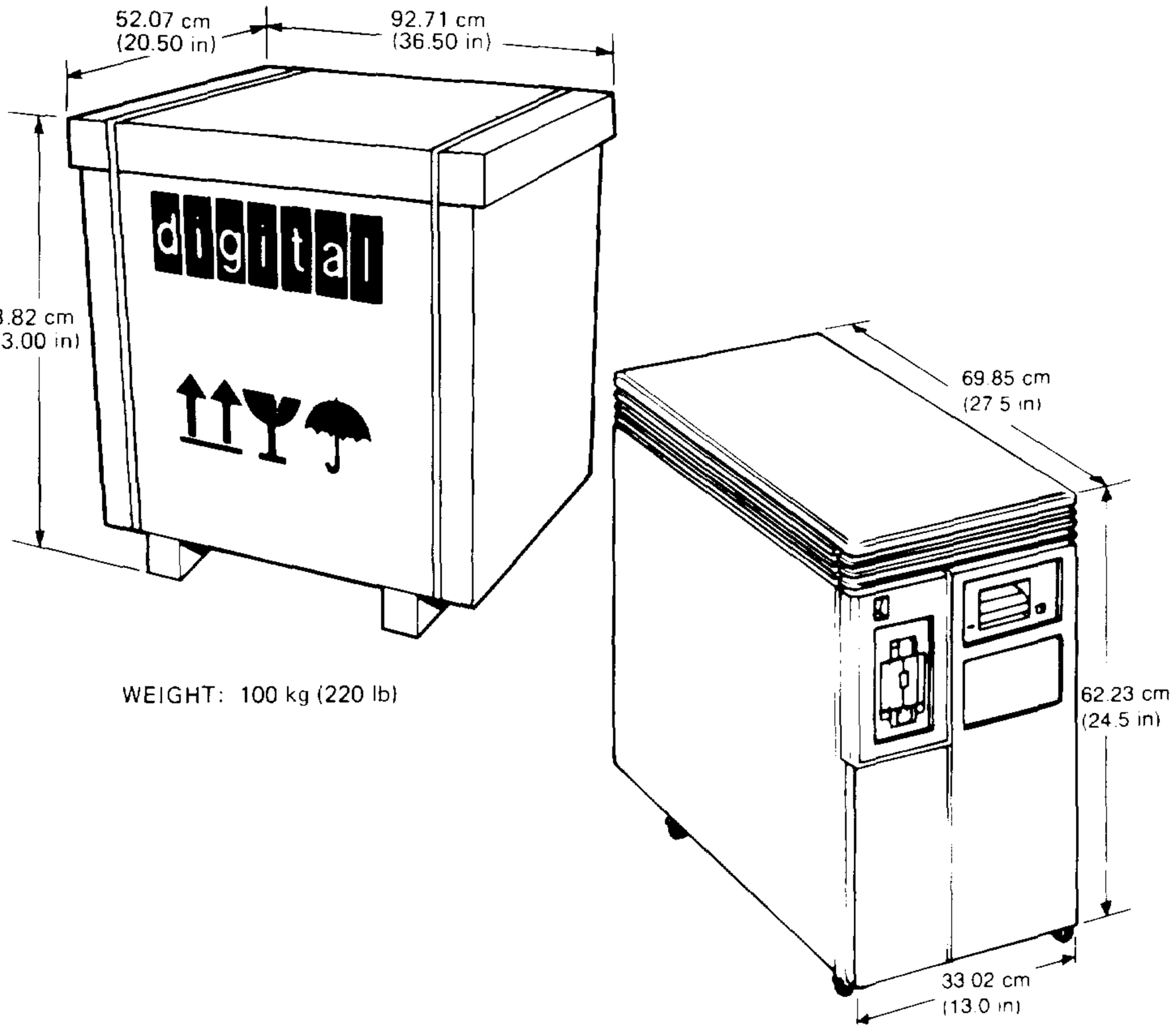
Before you unpack the BA123 enclosure shipment, verify the physical, environmental, and electrical site requirements.

### 2.1.1 Dimensions

Figure 2–1 shows the dimensions of a BA123 enclosure. The figure also shows the dimensions of the shipping container.

**WARNING:** *Use two people to handle the shipping container and enclosure. The shipping container and the enclosure together weigh 100 kg (220 lb); the enclosure weighs 59 kg (130 lb).*

**Figure 2–1: BA123 Enclosure Dimensions**




## 2.1.2 Additional Equipment

Make sure there is sufficient space for terminals and other peripheral equipment. The temperature and humidity at which mass storage media are kept should be the same as that of the computer area.

When you plan the cable routing for multiple-terminal systems, consider factors such as safety, convenience, future expansion, and cost. You should have cabling in place and labeled before you install the system.

## 2.1.3 Acoustics

The BA123 pedestal enclosure is designed for use in offices and other general working areas. The following are acoustic emission and heat dissipation levels for the BA123. Levels may be lower, depending on the kind and number of mass storage devices in the system. Data is measured in accordance with ANSI S12.10–1985 (American National Standards Institute) and ISO/DIS 7779 (International Standards Organization).

- LNPE (B) is the noise power emission level (A-weighted sound power level) measured in bels re 1 pw (reference 1 picowatt). LNPE for the BA123 enclosure is 6.0.
- LPA is the sound pressure measured in decibels at 1.0 m (3.3 ft) from the front edge of the unit and 1.5 m (5.0 ft) above the floor. LPA for the BA123 enclosure is 46.

## 2.1.4 Operating Environment

Computer systems located in office areas are subject to discharge of static electricity, temperature changes, and humidity.

You should install the system in a well-ventilated area where the temperature and humidity ranges listed in Section 2.1.7 are maintained throughout the year. Rapid temperature changes may affect system performance. Therefore, systems should not be operated near heating or cooling devices, large windows, or doors that open to the outside. Air should contain a minimum of dust and other abrasive contaminants.

## 2.1.5 Static Electricity

Static electricity can cause system failure and loss of data. To minimize static buildup, follow these guidelines:

- Maintain relative humidity of at least 40%.
- Place the system away from busy office corridors.
- Avoid using carpeting in the computer area, if possible. If carpeting is to be installed, antistatic carpeting is recommended. If carpeting is already in place, place an antistatic mat under the system.

## 2.1.6 Heat Dissipation

Heat dissipates in the BA123 enclosure system at the rate of 2355 Btu per hour.

## 2.1.7 Environmental Specifications

Table 2–1 shows the temperature ranges, humidity ranges, and altitude limits for systems in the BA123 enclosure.

**Table 2–1: BA123 Environmental Specifications**

| Parameter | Range | |
|---|---|---|
| Temperature | Operating:[1] | 10°C to 40°C<br>50°F to 104°F |
| | Nonoperating: | –40°C to 60°C<br>–40°F to 140°F |
| Temperature rate of change | Operating: | 11°C per hour maximum<br>19.8°F per hour maximum |
| Relative humidity | Operating: | 20% to 80% (noncondensing) |
| | Nonoperating: | 10% to 95% |
| Maximum altitude | Operating: | 2440 m (8000 ft) |
| | Nonoperating: | 4900 m (16,000 ft) |

[1]For operation above sea level, decrease the operating temperature by 1.8°C per 1000 m (or 1°F per 1000 ft).

## 2.1.8 Electrical Requirements

The power source should be adequate to handle the original system and allow for system expansion. DIGITAL recommends a dedicated circuit from the power source to each micro system. Additional power equipment may be required to avoid power disturbances.

Table 2–2 lists power cord information for 240 V operation of systems in the BA123 enclosure. Table 2–3 lists electrical requirements for systems in the BA123 enclosure.

**Table 2–2: 240 V Power Cords**

| Power Cord Number | Countries |
|---|---|
| BN02A–2E | United Kingdom and Ireland |
| BN03A–2E | Austria, Belgium, Czechoslovakia, Finland, France, Germany, Hungary, Netherlands, Norway, Poland, Portugal, Spain, and Sweden |
| BN04A–2E | Switzerland |
| BN05A–2E | Australia and New Zealand |
| BN06A–2E | Denmark |
| BN07A–2E | Italy |

**Table 2–3: BA123 Electrical Requirements**

| Nominal ac Voltage ⟹ | 100 Vac | 120 Vac | 220–240 Vac |
|---|---|---|---|
| Voltage range | 90–110 Vac | 104–128 Vac | 191–256 Vac |
| Power source phase | Single | Single | Single |
| Nominal frequency | 50–60 Hz | 50–60 Hz | 50–60 Hz |
| Frequency range | 47–63 Hz | 47–63 Hz | 47–63 Hz |
| Maximum steady state current at nominal voltage | 10.5 A | 8.8 A | 4.4 A |
| Maximum steady state current at minimum voltage | 12 A | 11.0 A | 5.5 A |
| Maximum inrush current | 100 A | 100 A | 100 A |
| Maximum power consumption | 690 W | 690 W | 690 W |

## 2.2 Unpacking the Shipment

Unpack all boxes and check the contents listed in Table 2–4. Instructions for unpacking the system box are on the shipping carton.

**Table 2–4: BA123 Shipment Contents**

| Description | Qty. | Part No. |
|---|---|---|
| Basic BA123 enclosure | 1 | BA123 |
| Signal distribution board | 1 | M9058 |
| RQDX-to-M9058 cable | 1 | 17–01520–01 |
| Cable for M9058 to 5 disk control panels | 1 | 17–00862–01 |
| RX cable | 1 | 17–00867–01 |
| TK cable | 1 | 17–01047–01 |
| Disk control panel | 4 | 70–22393–01 |
| Disk data cable | 4 | 17–00282–01 |
| Disk control cable | 4 | 17–00286–01 |
| Half-height filler panel | 3 | 74–31478–01 |
| BA123 accessory kit | 1 | 70–22382–03 |
| Console panel assembly (MicroPDP–11 only) | 1 | 70–21150–02 |
| Console backplane cable | 1 | 17–00624–01 |
| Cable 20-pin console | 1 | 17–00712–02 |
| Function Sel/SLU console connect (MicroVAX only) | 1 | 54–16744–01 |

In addition to the above parts, the shipment may include some of the following equipment:

Additional terminal(s)
Printer(s)
Modem(s)
Cables for connecting additional devices

## 2.3 Installing the BA123 System

To install the BA123-based system, perform the following steps:

1. After unpacking the system enclosure, move it to where it will be used. Carefully roll the enclosure into position. Be sure to:
   a. Allow enough space around the unit for air circulation and servicing. The system requires 5.08 cm (2 in) for ventilation on each side. You should leave about 61 cm (2 ft) at the rear of the system to connect cables and access controls behind the rear cover.
   b. Keep food and liquid away from the enclosure.
   c. Place the enclosure away from heaters, photocopiers, and direct sunlight.

d. Minimize static by placing the enclosure away from busy office corridors.

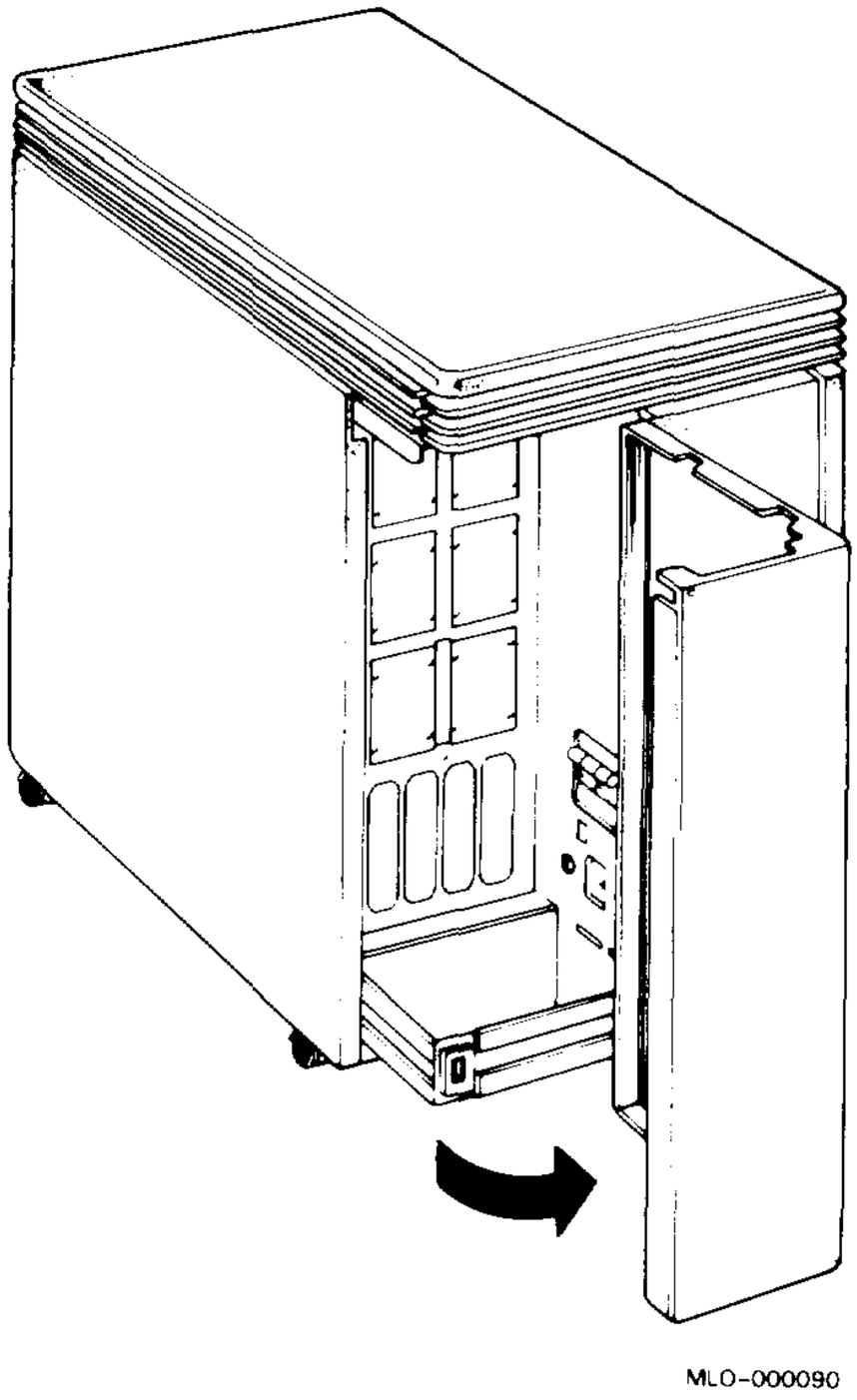
e. Keep the area free from dust and other abrasive materials.

2. Unpack the installation and user guides for the console terminal, which is the first terminal you connect to the system.

3. Follow the installation guide to unpack and install the console terminal.

4. Open the rear door of the enclosure. The door is held in place by a pop fastener (Figure 2–2).

**Figure 2–2: Opening the Rear Door**



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5. Set the controls on the CPU I/O insert found at the rear of the enclosure to the following positions:

**MicroVAX** (Figure 2–3)

a. Set the baud rate for the console terminal serial line to 9600 on the 8-position rotary. Also set the baud rate on the console terminal to 9600; the baud rates must match.

b. Set the mode to the middle position (language inquiry) on the 3-position rotary.

**Arrow**—Run (factory position). If the console terminal supports the Multinational Character Set (MCS), you are prompted for language only if the battery backup has failed. Full start-up diagnostics are run.

**Face**—Language inquiry. If the console terminal supports the MCS, you are prompted for language on every power-up and restart. Full start-up diagnostics are run.

**T in a circle**—Test. ROM programs run wraparound serial line unit (SLU) tests.

c. Set the halt enable/disable switch to the disable position (down) on this 2-position rotary.

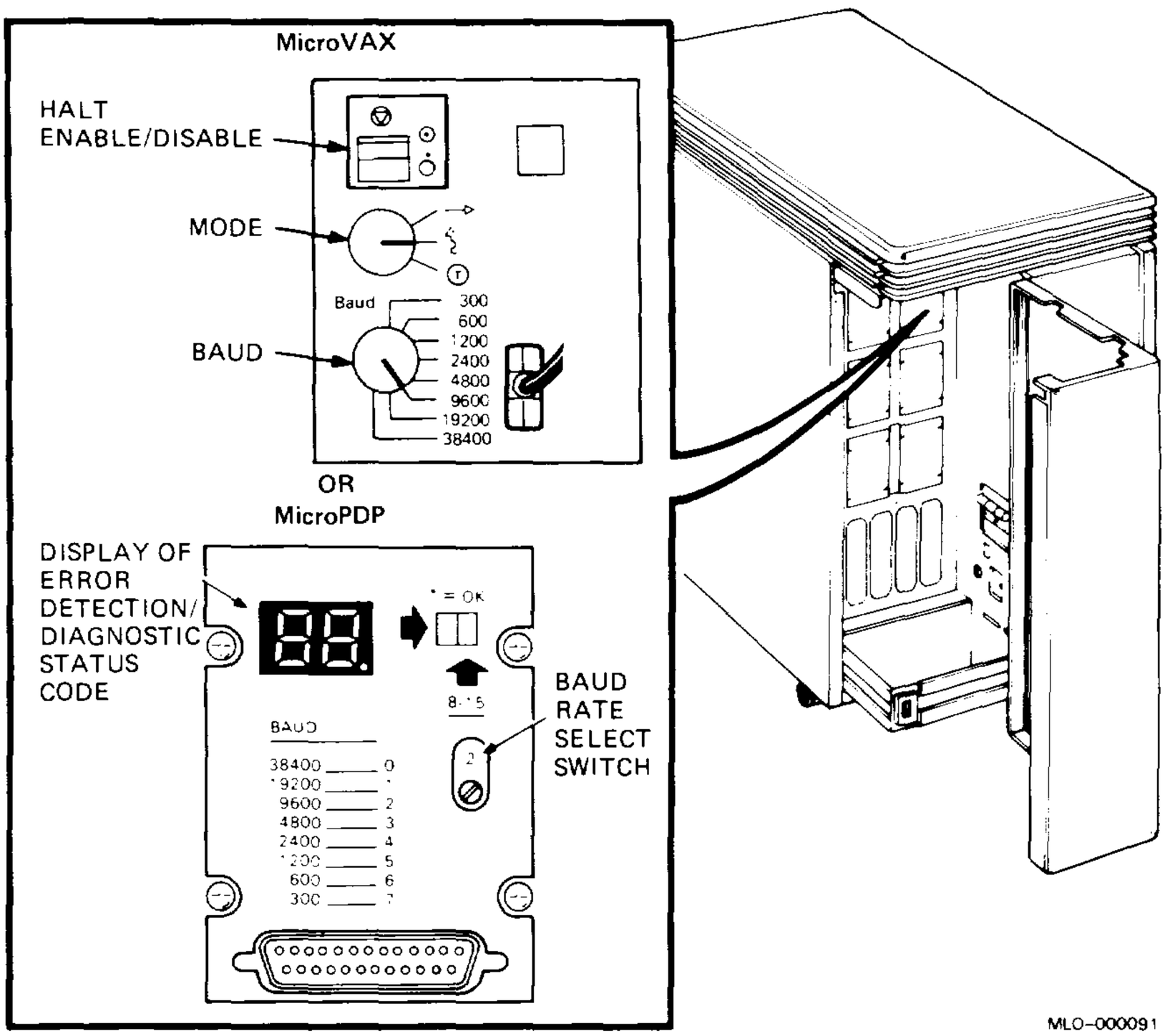
**Dot outside circle**—Halts are disabled (factory position). On power-up or restart, the system attempts to load software from one of the devices at the completion of start-up diagnostics.

**Dot inside circle**—Halts are enabled. On power-up or restart, the system enters console I/O mode at the completion of start-up diagnostics.

**MicroPDP–11** (Figure 2–3)

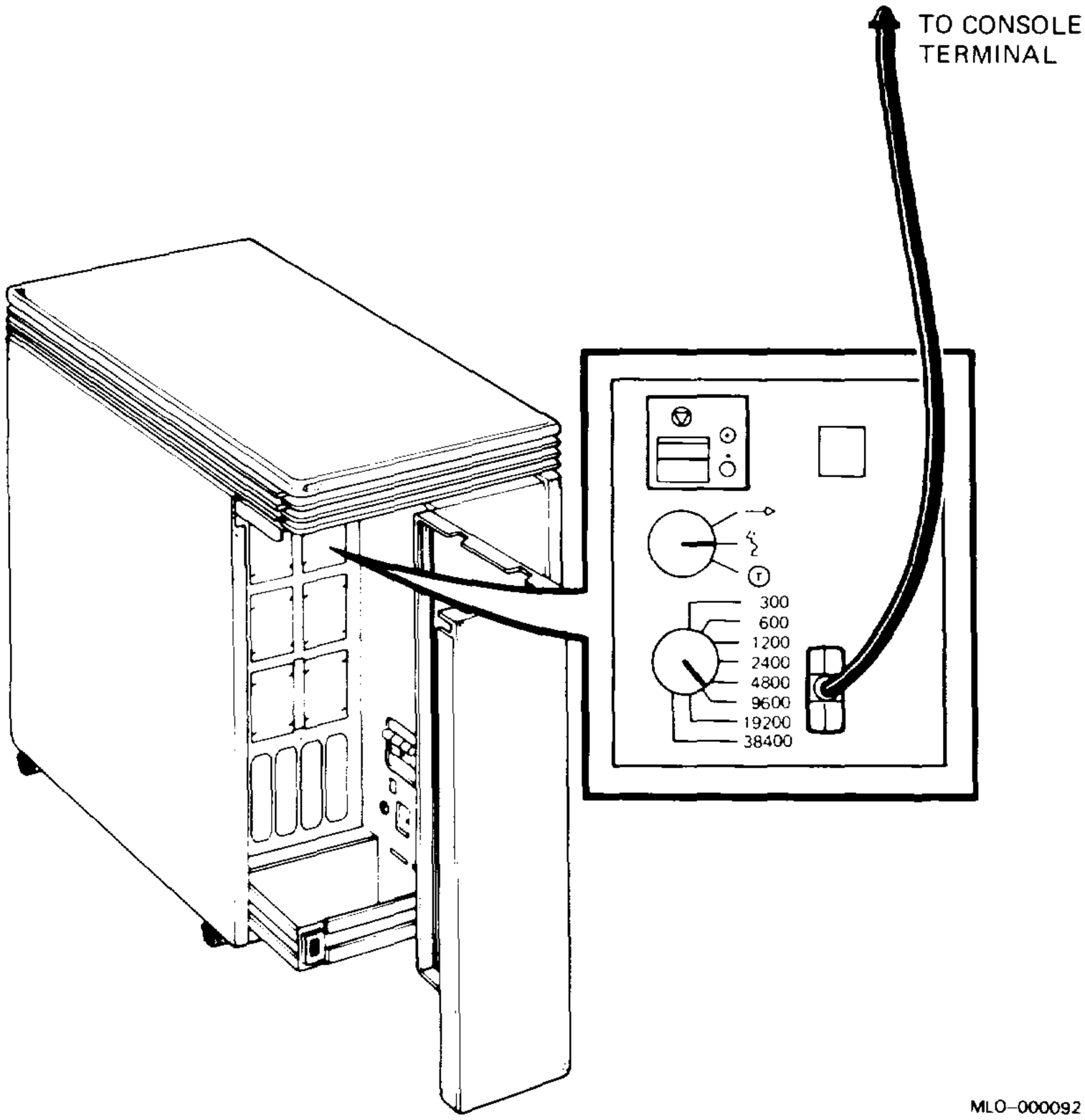
a. Set the baud rate for the console terminal serial line to 9600. Also set the baud rate on the console terminal to 9600; the baud rates must match.

## Figure 2–3: BA123 CPU I/O Inserts



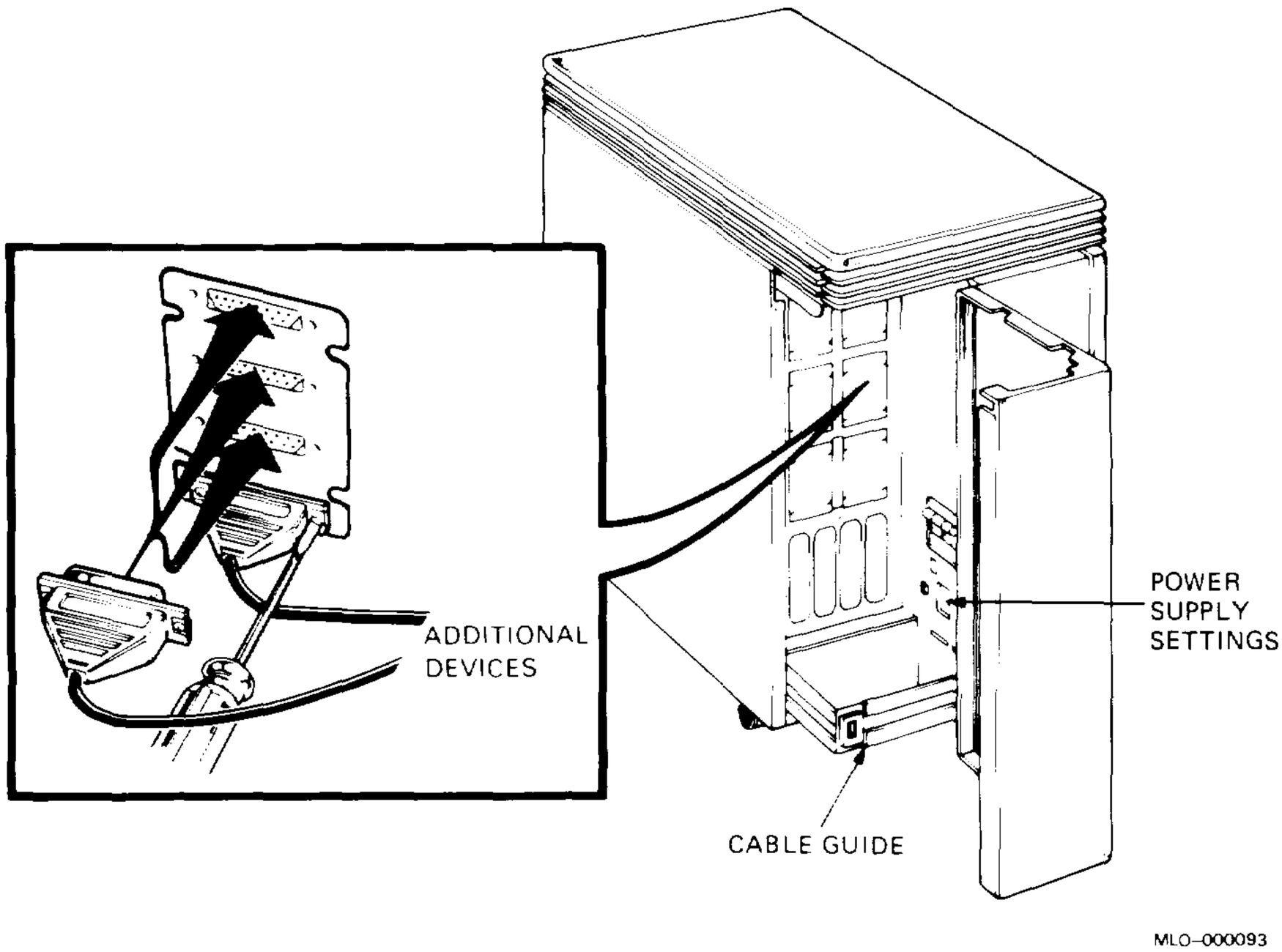

6. Connect the console terminal cable to the console terminal and the enclosure (Figure 2–4).

**Figure 2–4: Connecting the Console Terminal to the CPU I/O Insert (Example)**




7. Install and connect any external devices. Refer to Figure 2–5. External devices may include terminals, printers, modems, and storage devices. The devices may be connected in any order. Refer to the installation guide included with each device.

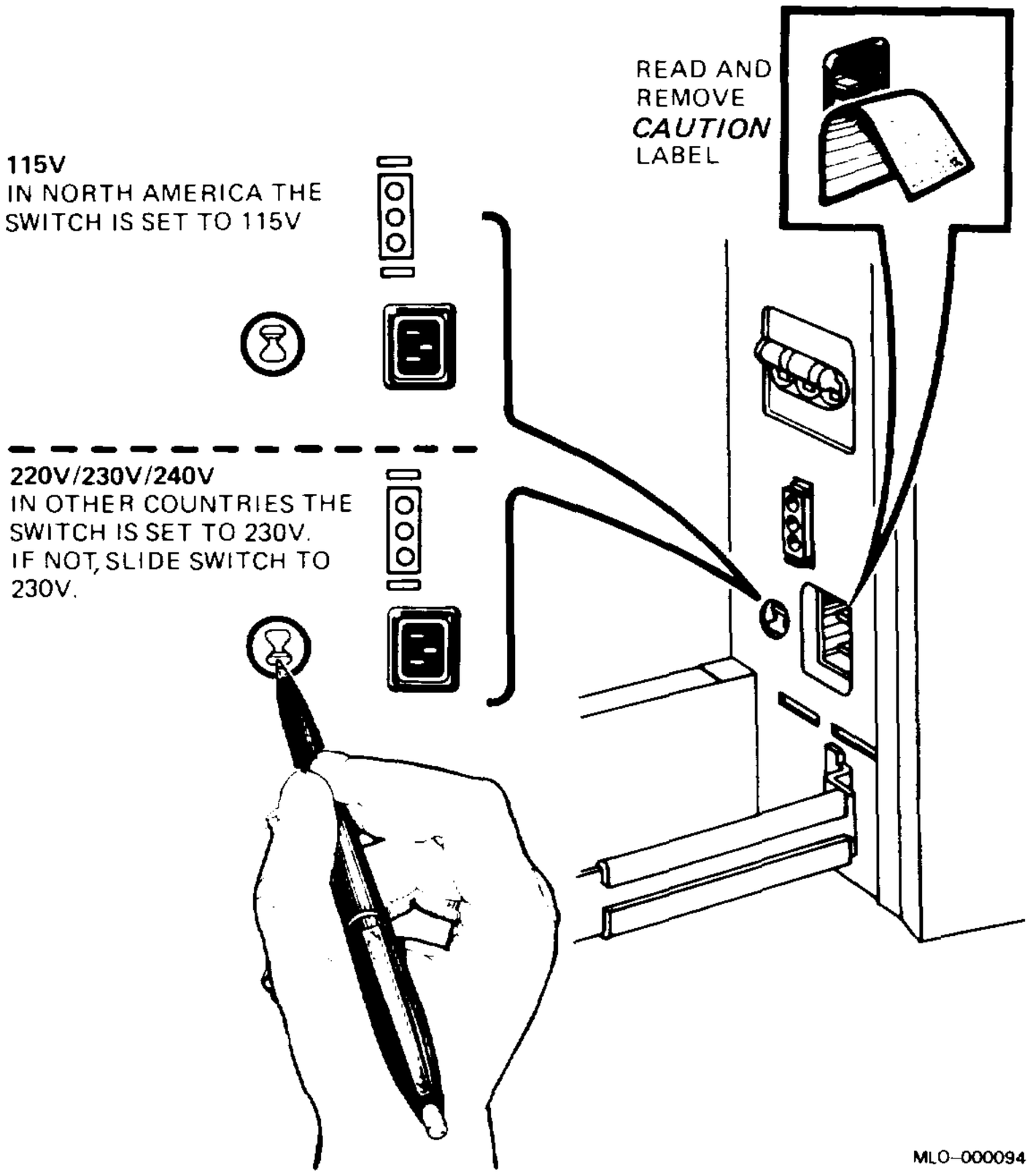
**Figure 2–5: Connecting External Devices**




8. Check the voltage switch setting on the rear of the power supply (Figure 2–5). Peel back the label covering the switch to see the voltage setting. If necessary, change the switch setting to match the voltage source you are using (Figure 2–6).

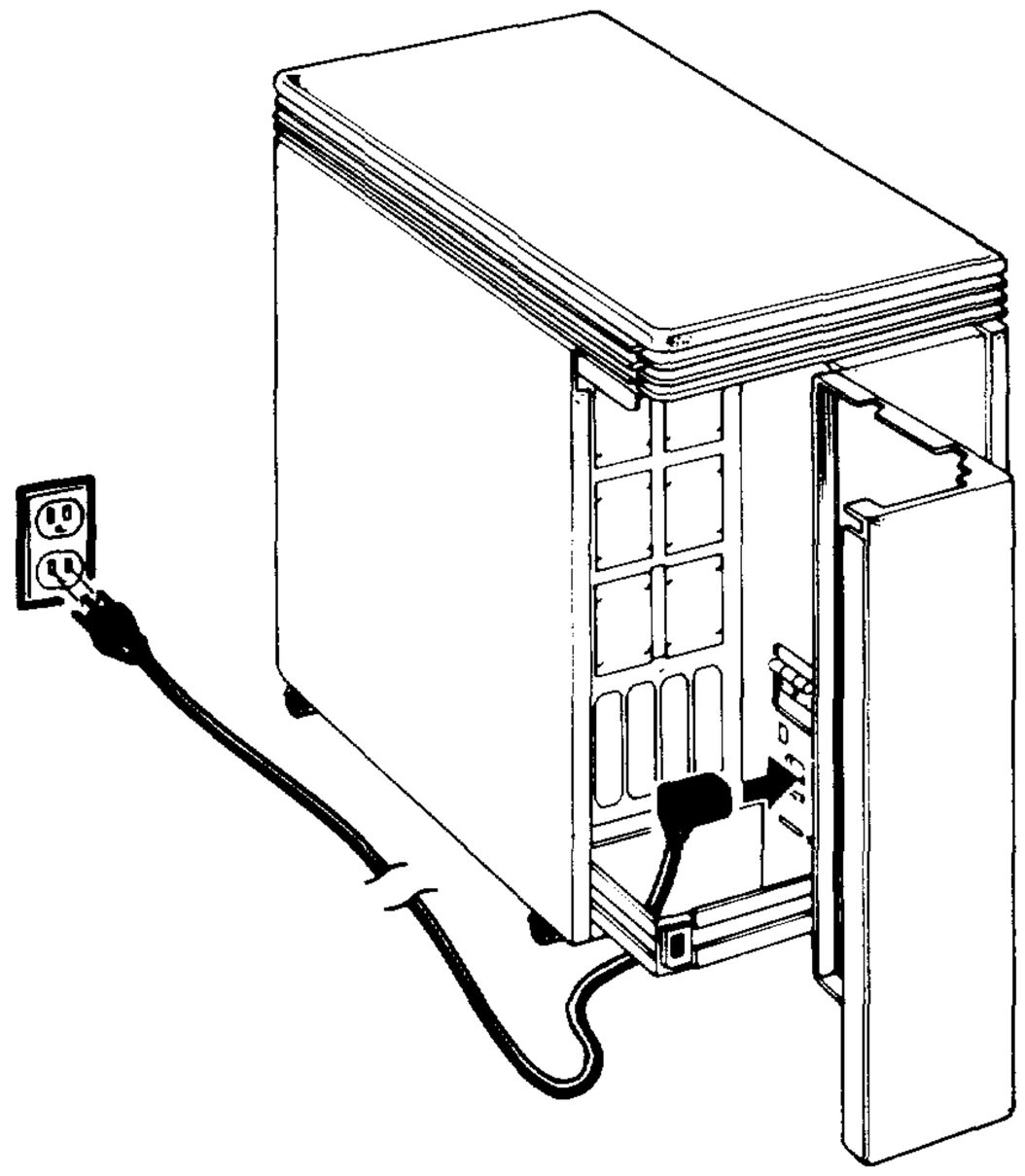
   **CAUTION:** *Be careful to set the voltage correctly. An incorrect voltage switch setting can damage your system.*

**Figure 2–6: Checking the Voltage Setting**




9. Set the power switch on the front of the enclosure to 0 (off).
10. Plug the power cord into the power supply and the wall outlet (Figure 2–7). Thread all the cables through the lower cable guide.

**Figure 2–7: Attaching the Power Cord**



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11. The installation of the BA123 enclosure is now complete. Refer to the CPU maintenance documentation for procedures on running power-up self-tests and diagnostics.

# Chapter 3
# FRU Removal and Replacement

This chapter describes how to remove and replace the field replaceable units (FRUs) in the BA123 enclosure.

Each section describes the removal procedure for that FRU. Unless otherwise specified, you can install an FRU by reversing the steps in the removal procedure.

**CAUTION:**

- *Only qualified service personnel should remove or install FRUs.*
- *Before you remove any FRU, always power down the system and remove the ac power cord.*
- *Static electricity can damage integrated circuits. Use the wrist strap and antistatic mat found in the Antistatic Kit when you work with the internal parts of a computer system.*

## 3.1 FRUs

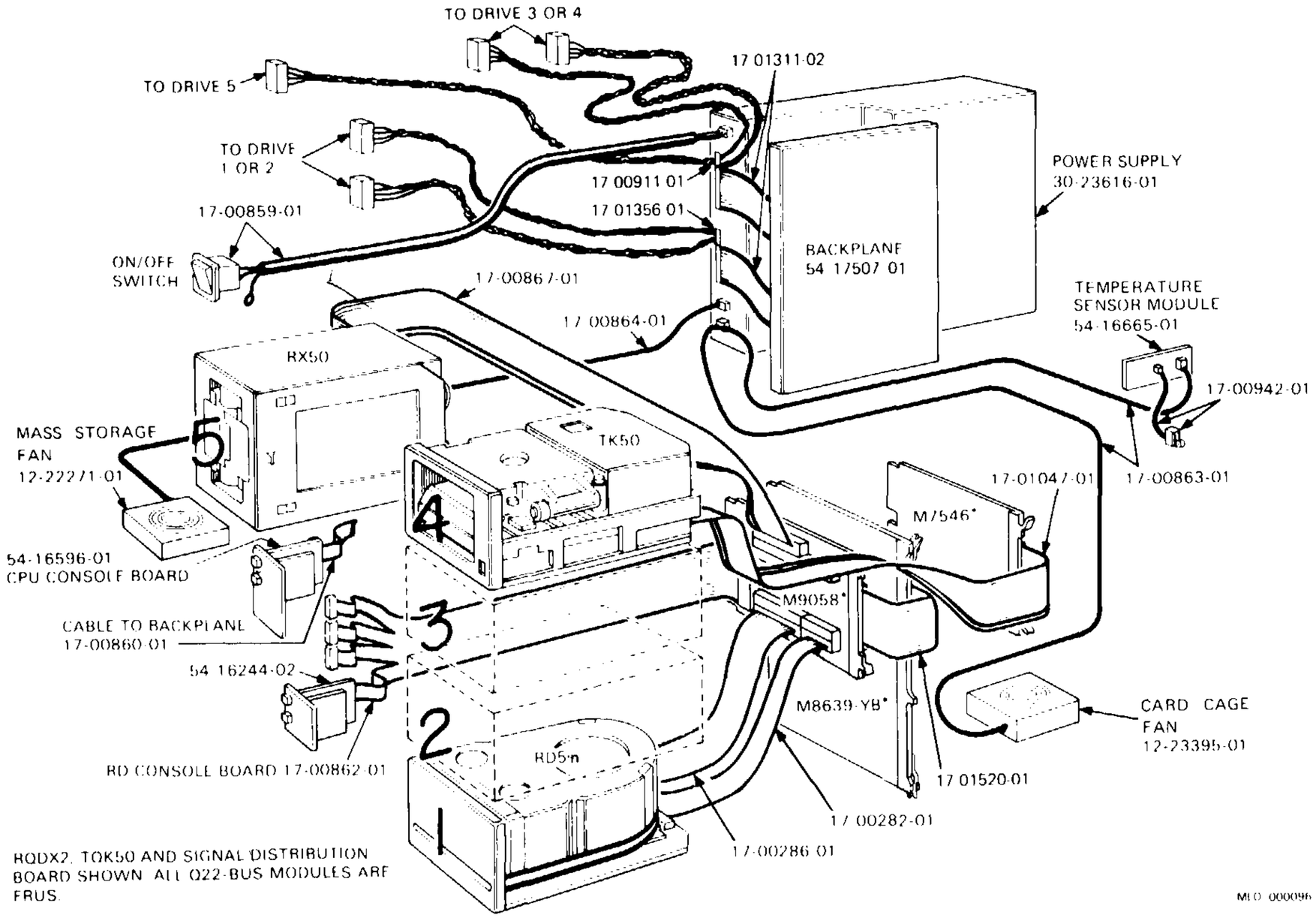
Table 3–1 lists the BA123 FRUs and their part numbers. Refer to the applicable CPU documentation for CPU-specific part numbers and supported options. All options are also FRUs. Refer to *Microsystems Options* for option kit numbers.

Figure 3–1 shows the major FRUs.

## Table 3–1: BA123 FRUs

| FRU | Part Number |
|---|---|
| 20-conductor RD drive cable | 17–00282–01 |
| 40-conductor RD drive cable | 17–00286–01 |
| 50-conductor cable, RQDX to signal distribution board | 17–01520–01 |
| AC power switch and cable from switch to power supply | 17–00859–01 |
| Battery backup unit, CPU insert panel (MicroVAX) | 12–19245–01 |
| Cable, backplane to CPU console board | 17–00860–01 |
| Cable, MicroVAX memory interconnect | 17–00716–01 |
| Cable, power supply to card cage fan and temperature sensor | 17–00863–01 |
| Cable, power supply to mass storage fan | 17–00864–01 |
| Cable, regulator A to backplane | 17–01311–02 |
| Cable, regulator B to backplane | 17–01311–02 |
| Cable, regulator A to 2 drives via 2 plugs | 17–01356–01 |
| Cable, regulator B to 3 drives via 3 plugs | 17–00911–01 |
| Cable, signal distribution board to 4 RD consoles | 17–00862–01 |
| Cable, signal distribution board to RX50 | 17–00867–01 |
| Cable, TK50-to-M7546 interconnect | 17–01047–01 |
| Card cage fan, 12.7 cm (5 in) | 12–23395–01 |
| Door interlock switch and cable from switch to temperature sensor board | 17–00942–01 |
| Mass storage fan, 11.4 cm (4.5 in) | 12–22271–01 |
| Power supply | 30–23616–01/ 30–28231–01 |
| Q22-bus quad-height backplane (13 slots) | 54–17507–01 |
| RD5n console read/write protect panel | 54–16244–02 |
| Signal distribution board | M9058 |
| Shock-isolating caster, fixed (2) | 12–23985–01 |
| Shock-isolating caster, swivel (2) | 12–23985–02 |
| Temperature sensor board | 54–16665–01 |

## Figure 3–1: BA123 FRUs



## 3.2 Accessing FRUs

Before you can remove most FRUs in the BA123 enclosure, you must remove one or more side panels. Removing a side panel is the first step in many of the FRU procedures.

### 3.2.1 Right Side Panel

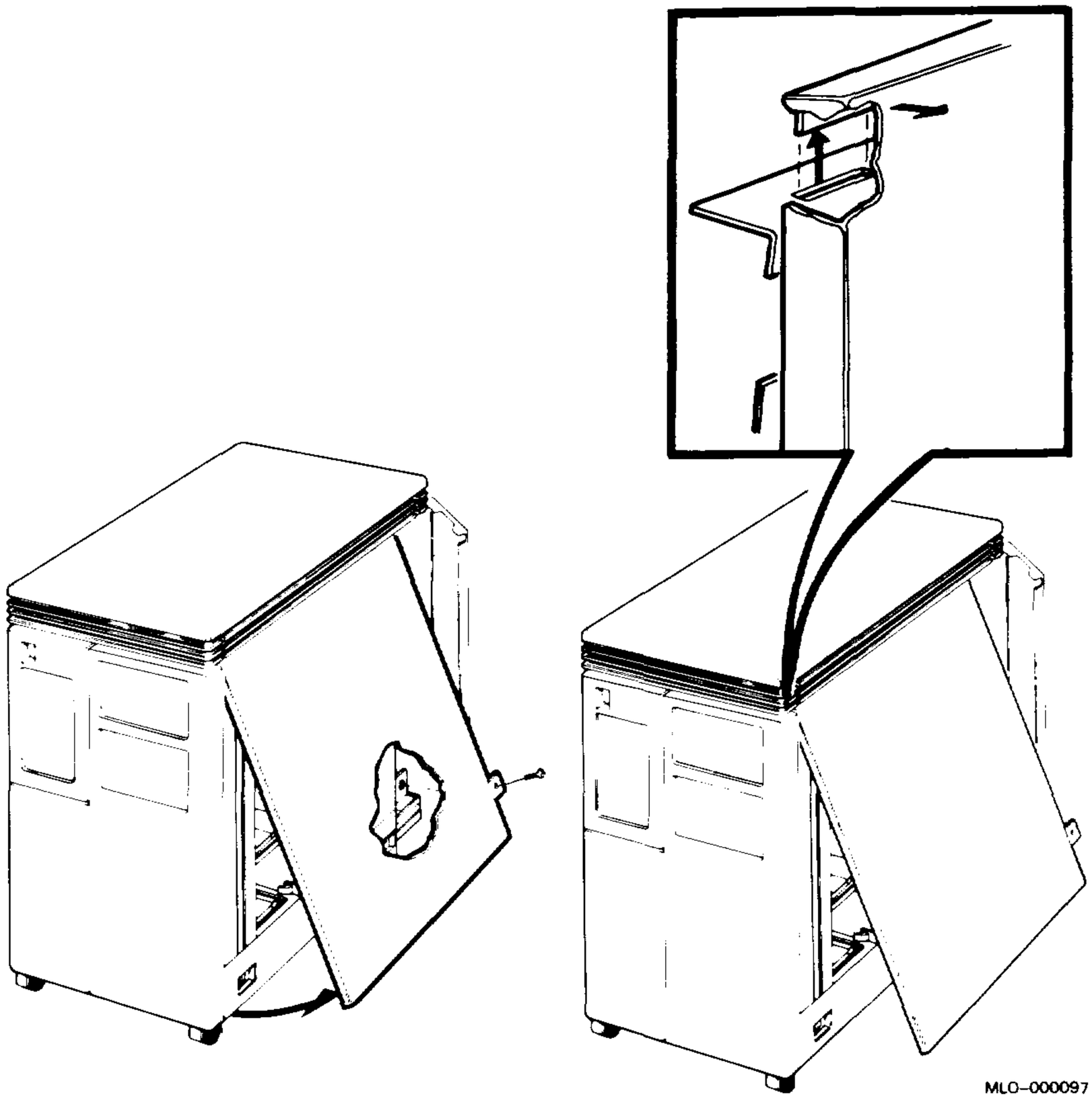
Remove the right side panel as follows:

1. Turn off the system and unplug the ac power cord from the wall socket.
2. Open the rear door.

Refer to Figure 3–2 for steps 3 through 5.

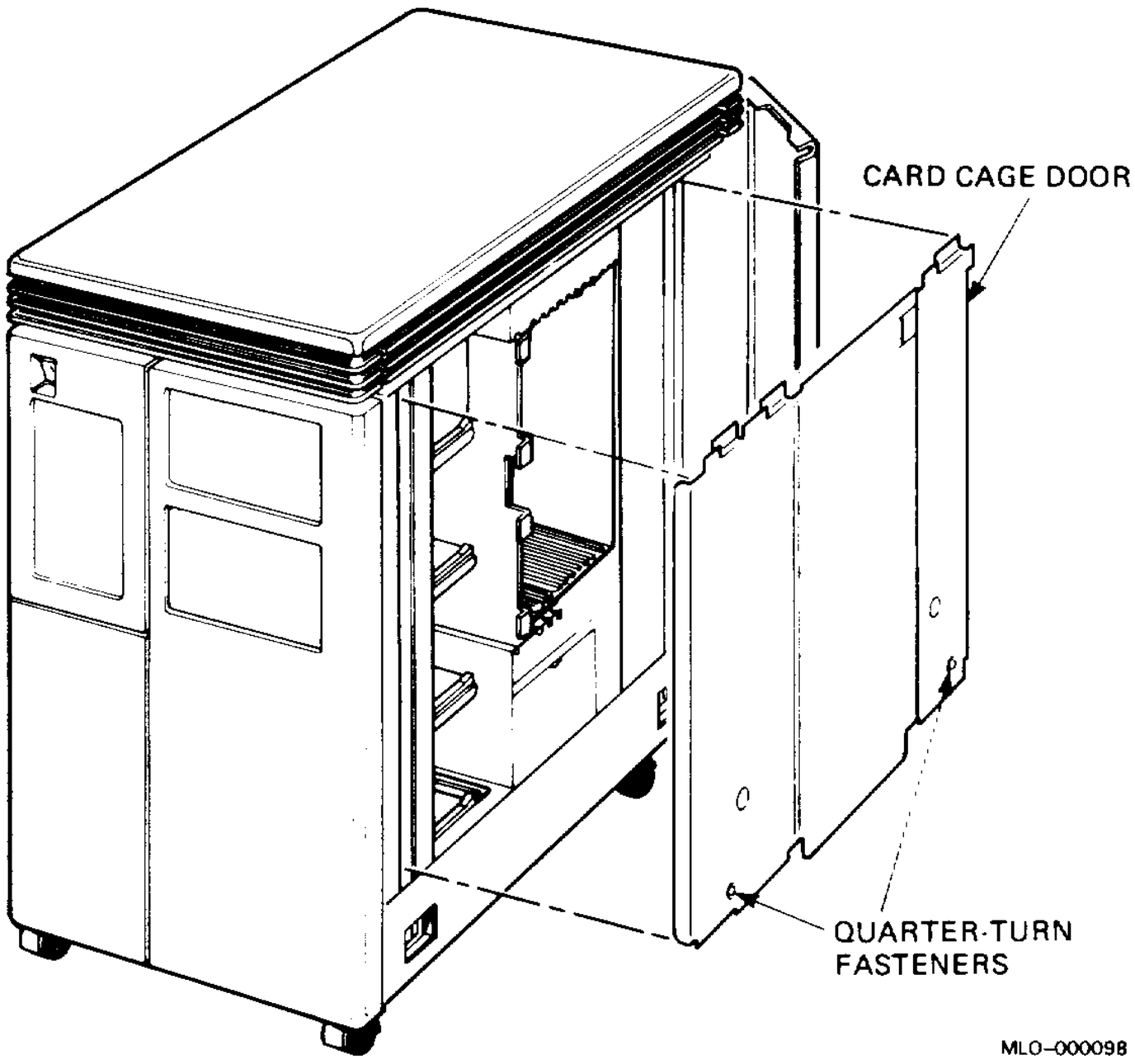
3. Loosen the captive screw that connects the right side panel to the rear of the enclosure frame.
4. Two snap fasteners hold the bottom of the panel to the frame. Pull out the bottom of the panel until you release the fasteners.
5. Lift the panel slightly to release it from the lip at the top of the frame. Remove the panel.

**Figure 3–2: Removing the Right Side Panel**




6. Newer systems also have an inner panel. To remove, unscrew the two quarter-turn fasteners at the base of the panel (Figure 3–3).

**Figure 3–3: Removing the Right Inner Panel**




### 3.2.2 Left Side Panel

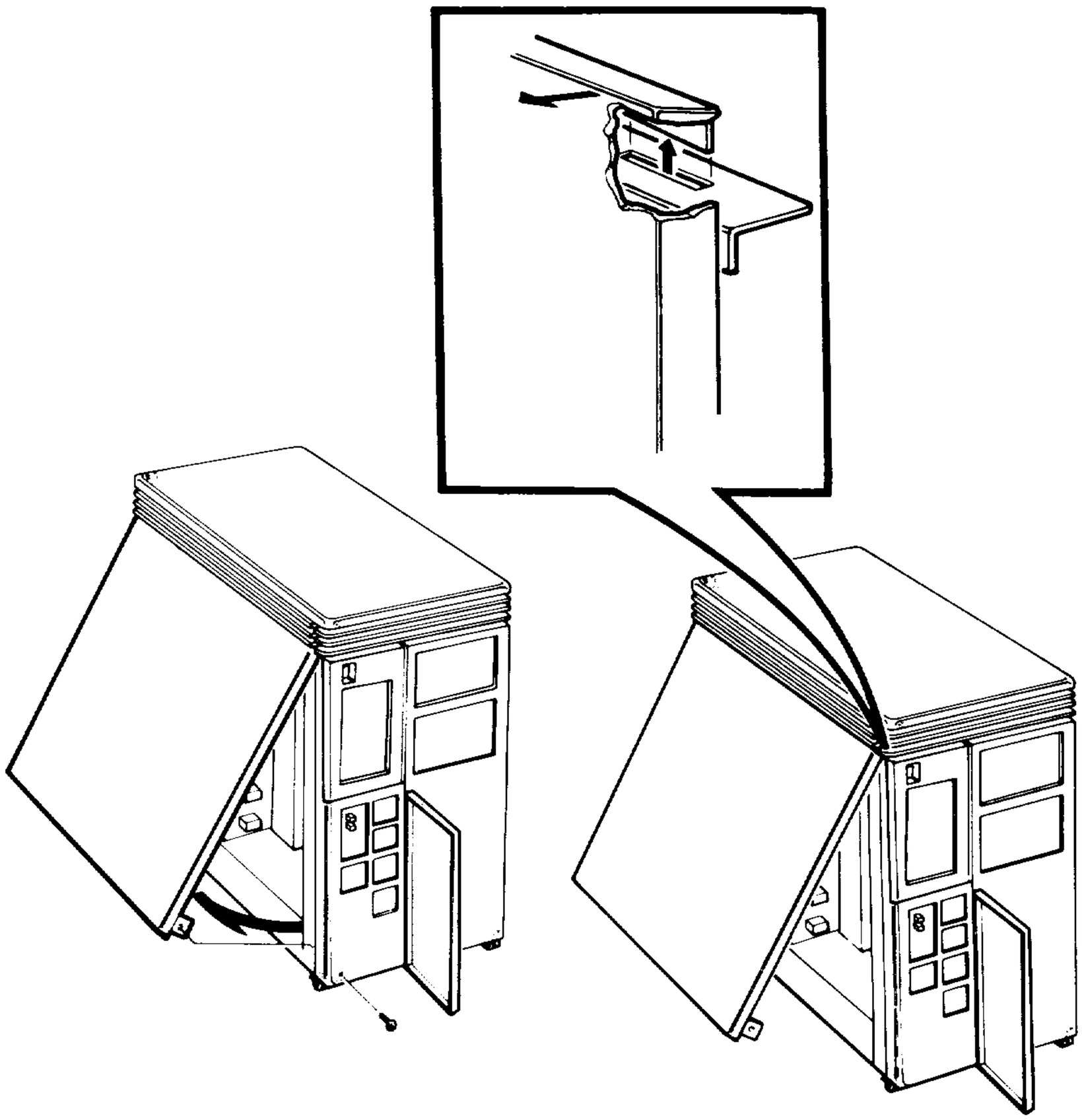
Remove the left side panel as follows:

1. Turn off the system and unplug the ac power cord from the wall outlet.
2. Open the control panel door.

Refer to Figure 3–4 for steps 3 through 5.

3. Loosen the screw that holds the left side panel to the front of the enclosure frame.
4. Two snap fasteners hold the bottom of the panel to the frame. Pull out the bottom of the panel until you release the fasteners.
5. Lift the panel slightly to release it from the lip at the top of the frame. Remove the panel.

**Figure 3–4: Removing the Left Side Panel**



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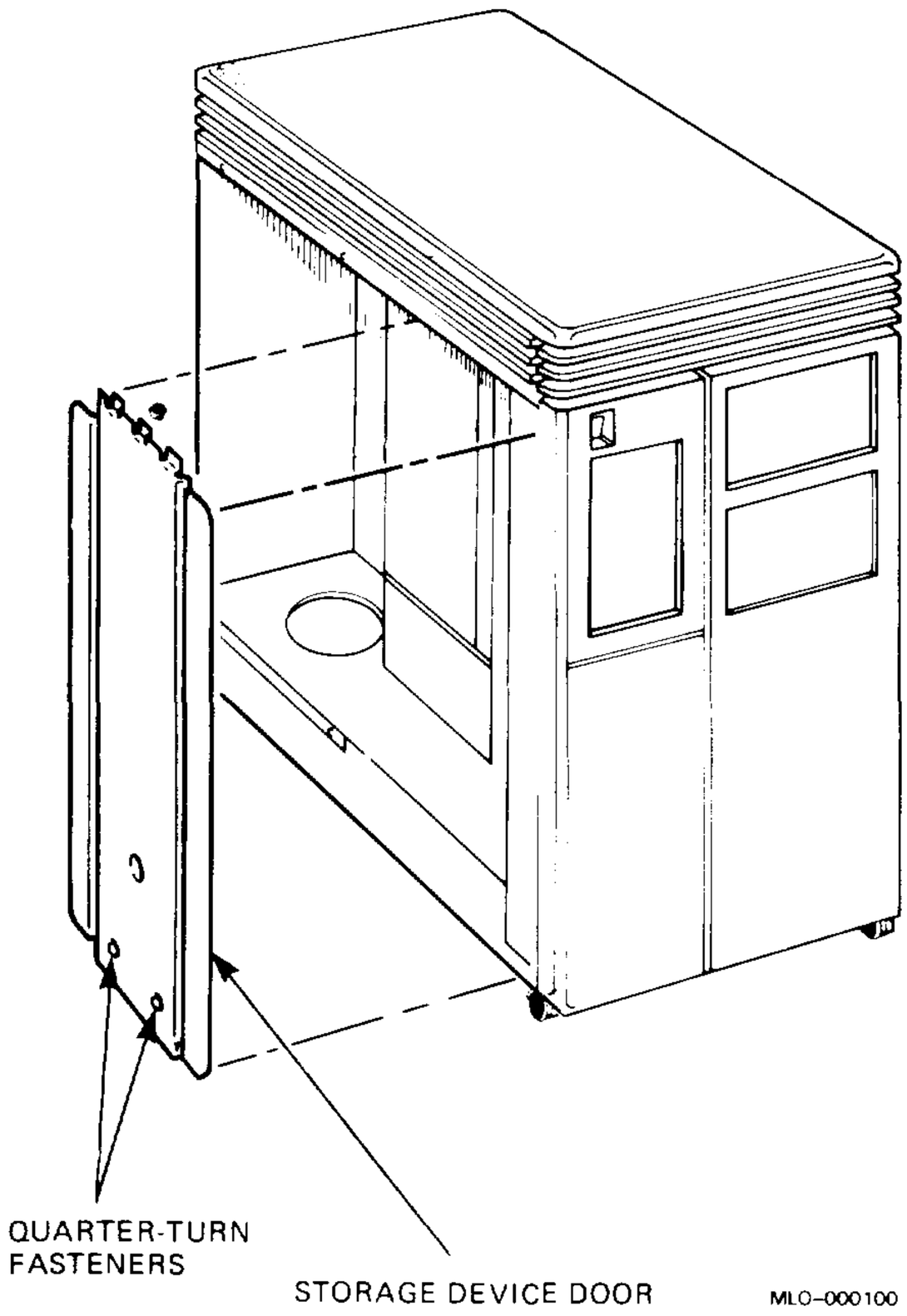
6. Newer systems also have an inner panel. To remove, unscrew the two quarter-turn fasteners at the base of the panel (Figure 3–5).

**Figure 3–5: Removing the Inner Left Panel**




## 3.2.3 Top Cover

Remove the top cover as follows:

1. Open the rear door.
2. Remove the screw at the top of the frame, above the I/O panel. This screw holds a bracket connected to the top cover.
3. Four tabs hold the top cover in place. To release the cover, push it back as far as it will go (about 2.5 cm; 1 in).
4. Lift the top cover off the frame.

## 3.3 Modules

Remove modules as follows:

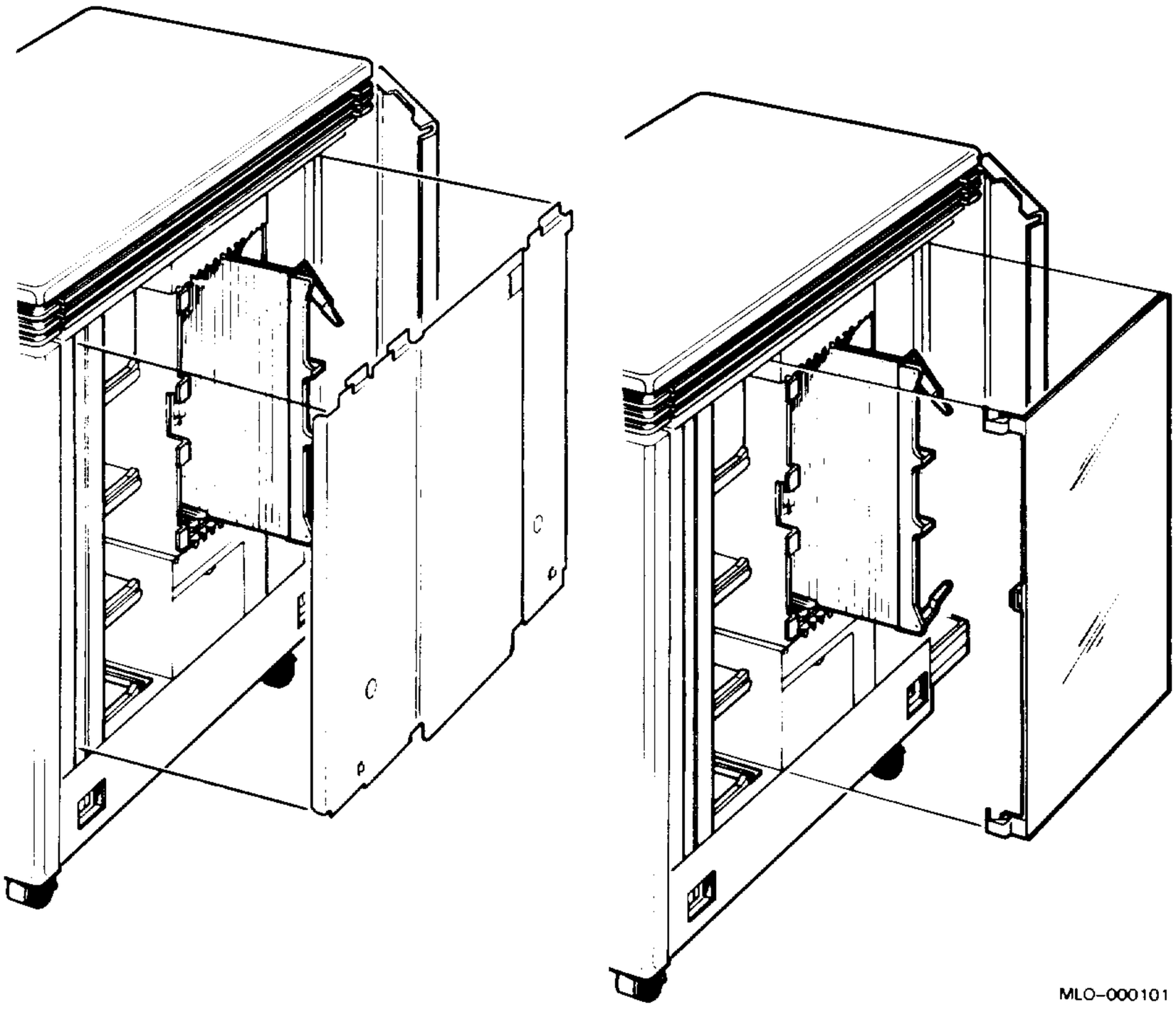
**CAUTION:**

- *Static electricity can damage integrated circuits. Use the wrist strap and antistatic mat found in the Antistatic Kit when you work with modules.*
- *Remove and install modules carefully, to avoid damaging the modules or changing switch settings.*
- *New modules come wrapped in special antistatic packaging material, with a silica gel packet to prevent damage from moisture. Use both materials to protect any modules you store, transport, or return.*

1. Remove the outer and inner right side panels (Section 3.2.1).
2. Older systems have a card cage door instead of an inner panel. Release the two clasps at the front end of the door and swing the door open. Remove the door from its hinges. Figure 3–6 shows the removed card cage door.
3. Quad-height modules have levers (Figure 3–6) to lock the module in the backplane. When you remove a quad-height module, use the levers to slide the module partially out of the backplane. Pull the levers firmly toward you. Apply pressure evenly to both levers.

   Dual-height modules do not have levers; they simply slide in and out of their slots.
4. Label and disconnect any cables connected to the module.
5. Note the module's location in the backplane, then remove the module.

**Figure 3–6: Removing Modules**




## Installation Notes

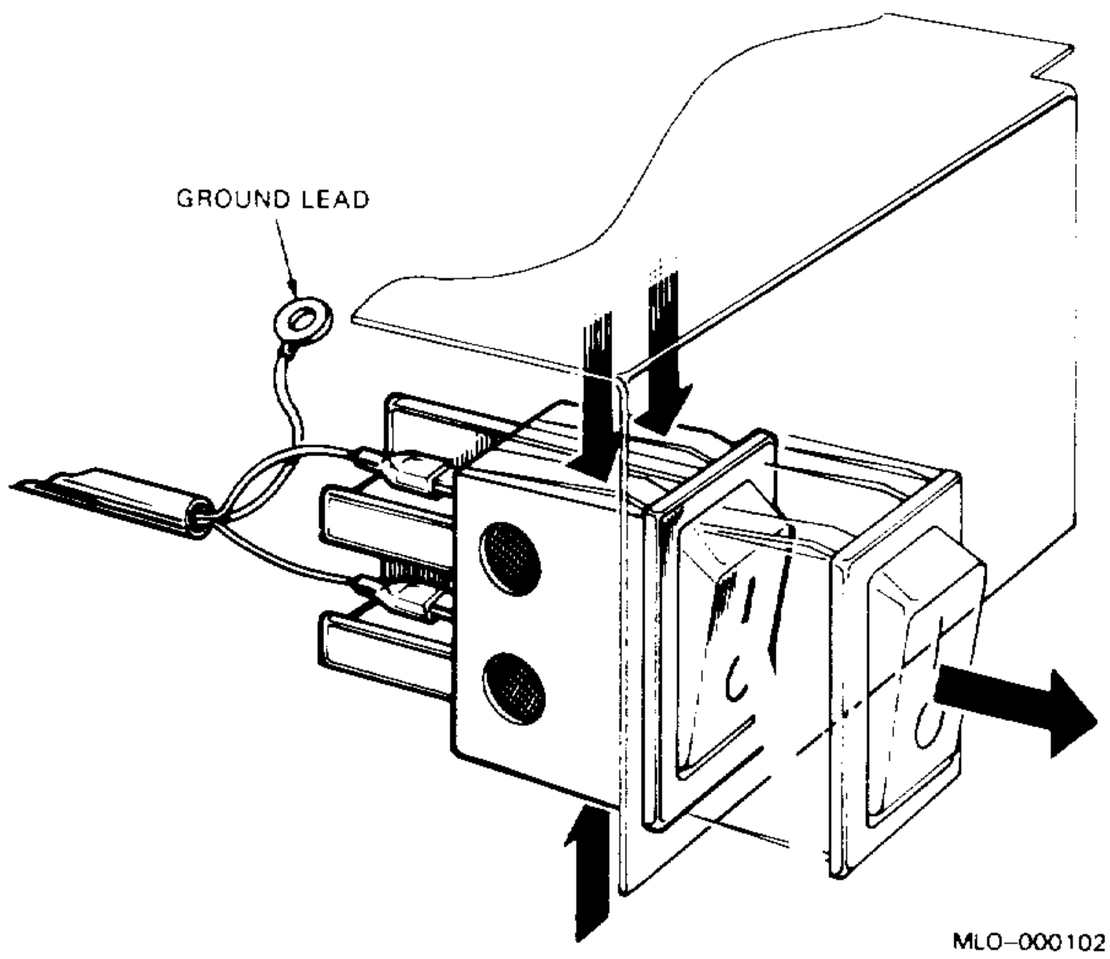
- Make sure the jumper and switch settings on the new module are the same as those on the removed module.
- If you install a dual-height module in slots 1 through 4 of the backplane, you must install it in the AB rows. If no modules are installed in the AB rows, you must install a grant continuity card (M9407).
- You can install dual-height modules in either the AB or CD rows of slots 5 through 12. The other two rows of the slot must contain either another dual-height module or a grant continuity card.

## 3.4 On/Off Switch

Remove the on/off switch as follows:

1. Remove the outer and inner left side panels (Section 3.2.2).
2. Unplug the on/off switch cable from the rear of the power supply (see Figure 3–1 for cable connection).
3. Remove the nut that holds the cable's ground lead (Figure 3–7) to the BA123. Disconnect the ground lead.
4. Press the top and bottom of the on/off switch, then push out the switch and its cable from the inside of the front panel (Figure 3–7).

**Figure 3–7: Removing the On/Off Switch**




## 3.5 CPU Console Board

Remove the CPU console board from the control panel as follows:

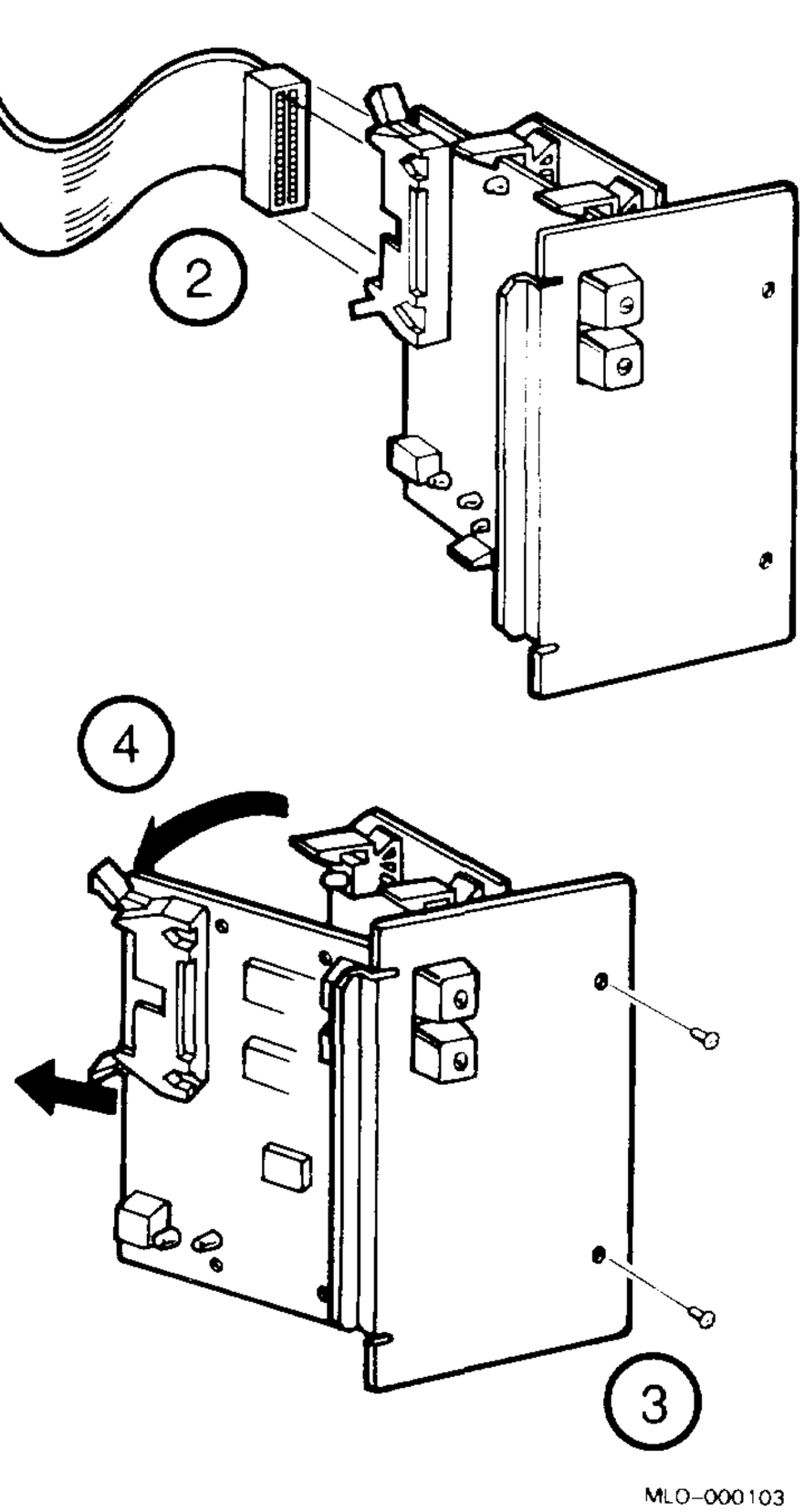
1. Remove the outer and inner left side panels (Section 3.2.2).

Refer to Figure 3–8 for steps 2 through 4.

2. Disconnect the ribbon cable from the CPU console board.

3. Remove the two screws that hold the CPU console board assembly to the control panel.
4. Remove the board from the plastic brackets.

**Figure 3–8: Removing the CPU Console Board**



## 3.6 Mass Storage Devices

Remove 13-cm (5.25-in) drives as follows:

**CAUTION:**

- *Static electricity can damage integrated circuits. Use the wrist strap and antistatic mat found in the Antistatic Kit when you work with mass storage devices.*
- *Do not turn off the system, or a TK-series tape drive if you have a TK cartridge in place. Never put your hands or other objects in the cartridge opening.*
- *Handle any fixed-disk drive with care; dropping or bumping the drive can damage the disk surface.*

1. Remove the outer and inner side panels (Sections 3.2.1 and 3.2.2).
2. The front panel has four snap fasteners that hold the panel to the BA123. Remove the front panel by pulling it from the frame until you release the fasteners.
3. Disconnect all signal cables and dc power cords from the device.
4. Push down on the release tab under the front of the drive, then slide the device out of the shelf.

See *Microsystems Options* for procedures on removing mass storage device FRUs.

## 3.7 Fans

You can remove the mass storage fan and the card cage fan. The fan in the power supply is not an FRU.

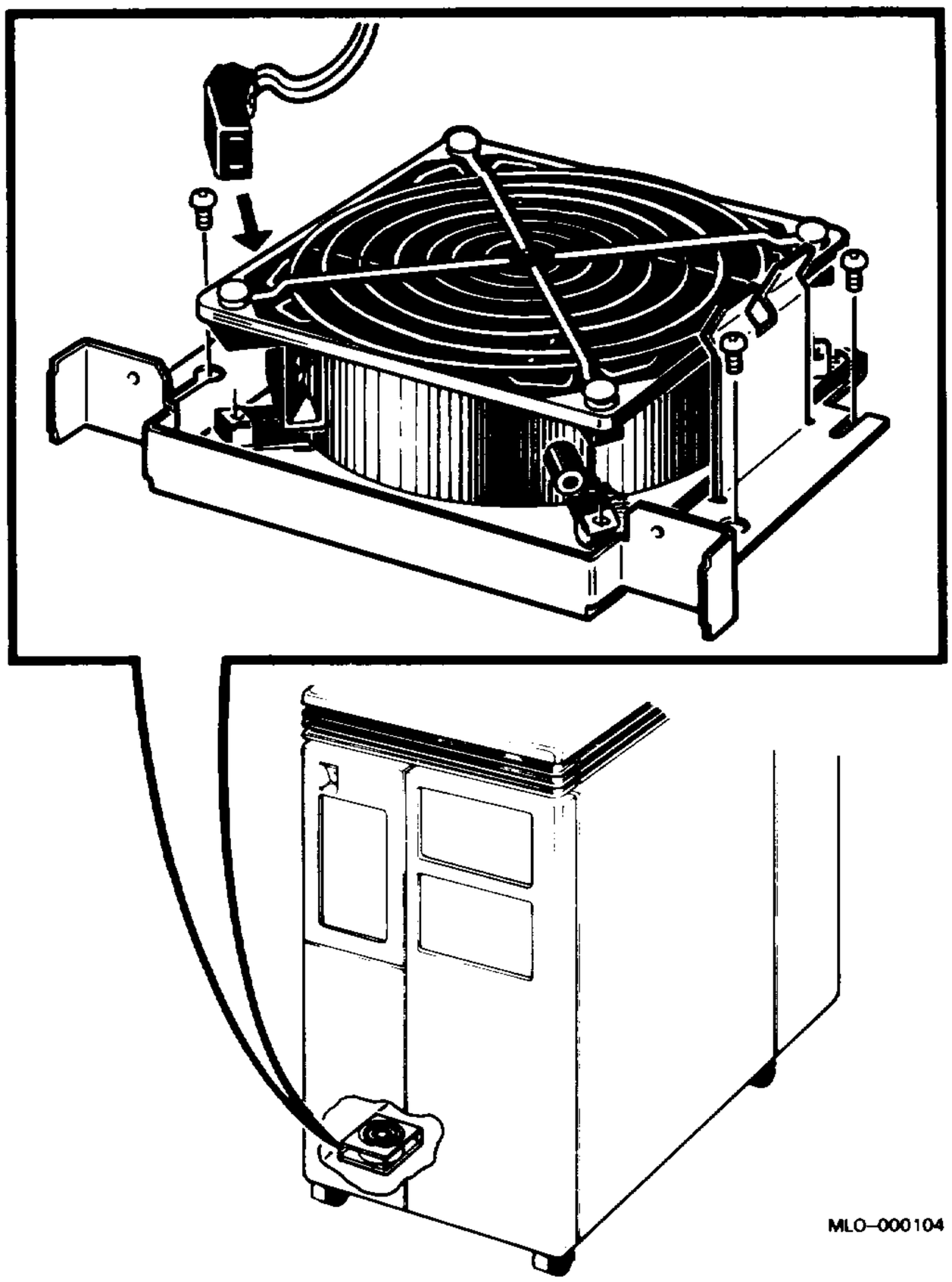
### 3.7.1 Mass Storage Fan

Remove the mass storage fan as follows:

1. Remove the outer and inner left side panels (Section 3.2.2).
2. Unplug the dc power cord from the fan (Figure 3–9). The plug is curved to fit the fan. When you replace the fan, make sure to align the plug the same way.
3. Remove the three screws that hold the fan's metal base plate to the BA123 (Figure 3–9). Note the fan's alignment. Make sure to align the new fan in the same direction.

4. On older systems, remove the four screws that hold the fan to the metal base plate. On newer systems, snap out the fan from the metal base plate.

**Figure 3–9: Removing the Mass Storage Fan**



### 3.7.2 Card Cage Fan

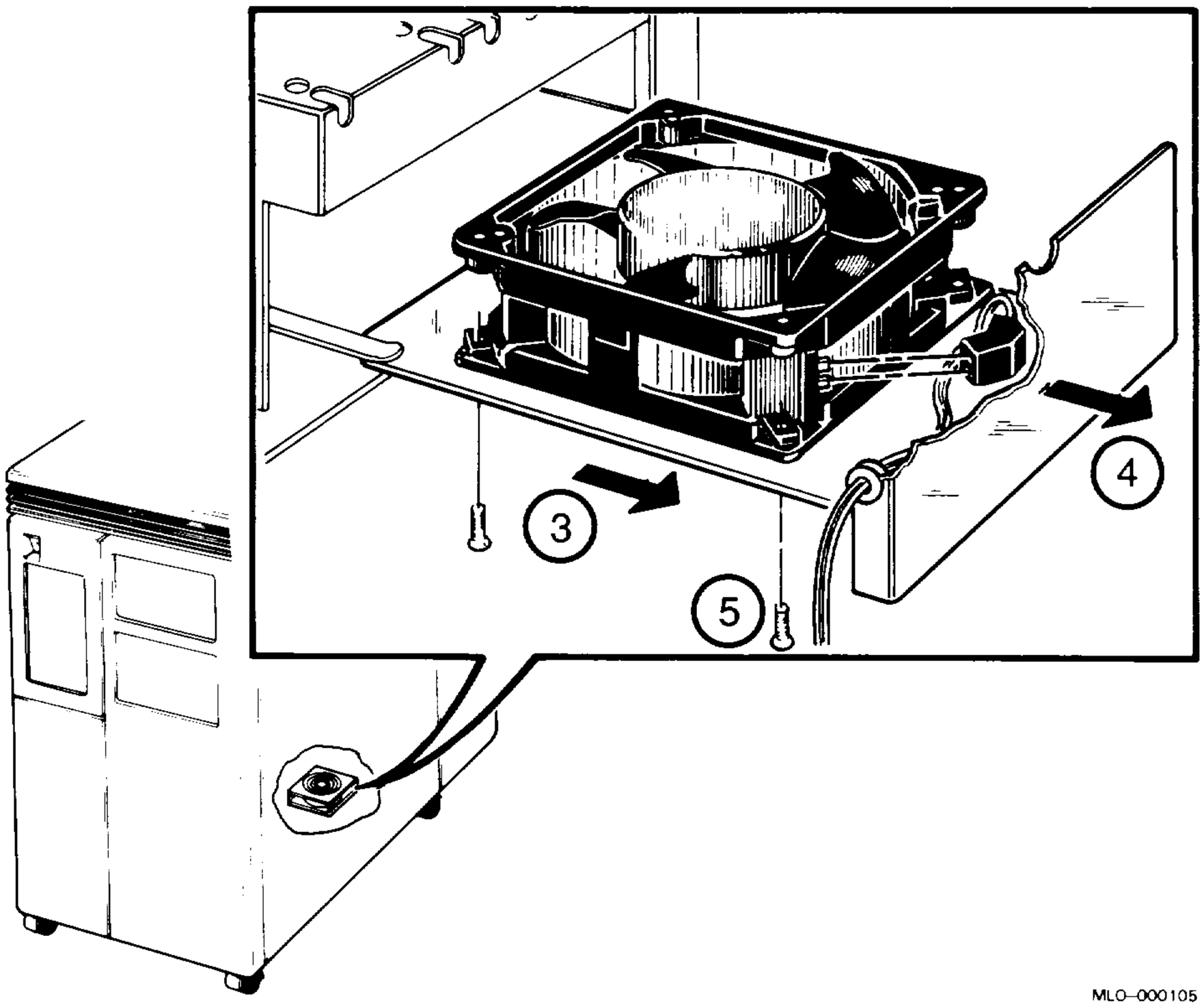
Remove the card cage fan as follows:

1. Remove the outer and inner right side panels (Section 3.2.1).
2. Older systems have a card cage door instead of an inner panel. Remove the door by releasing the two clasps at the front end of the door and swinging the door open.

Refer to Figure 3–10 for steps 3 through 5.

3. Slide the tray below the card cage partially out.
4. Unplug the dc power cord from the fan. The plug is curved to fit the fan. When you replace the fan, make sure to align the plug the same way.
5. On older systems, remove the four screws that hold the fan to the tray. On newer systems, snap out the fan from the tray.

**Figure 3–10: Removing the Card Cage Fan (Older Systems)**




MLO–000105

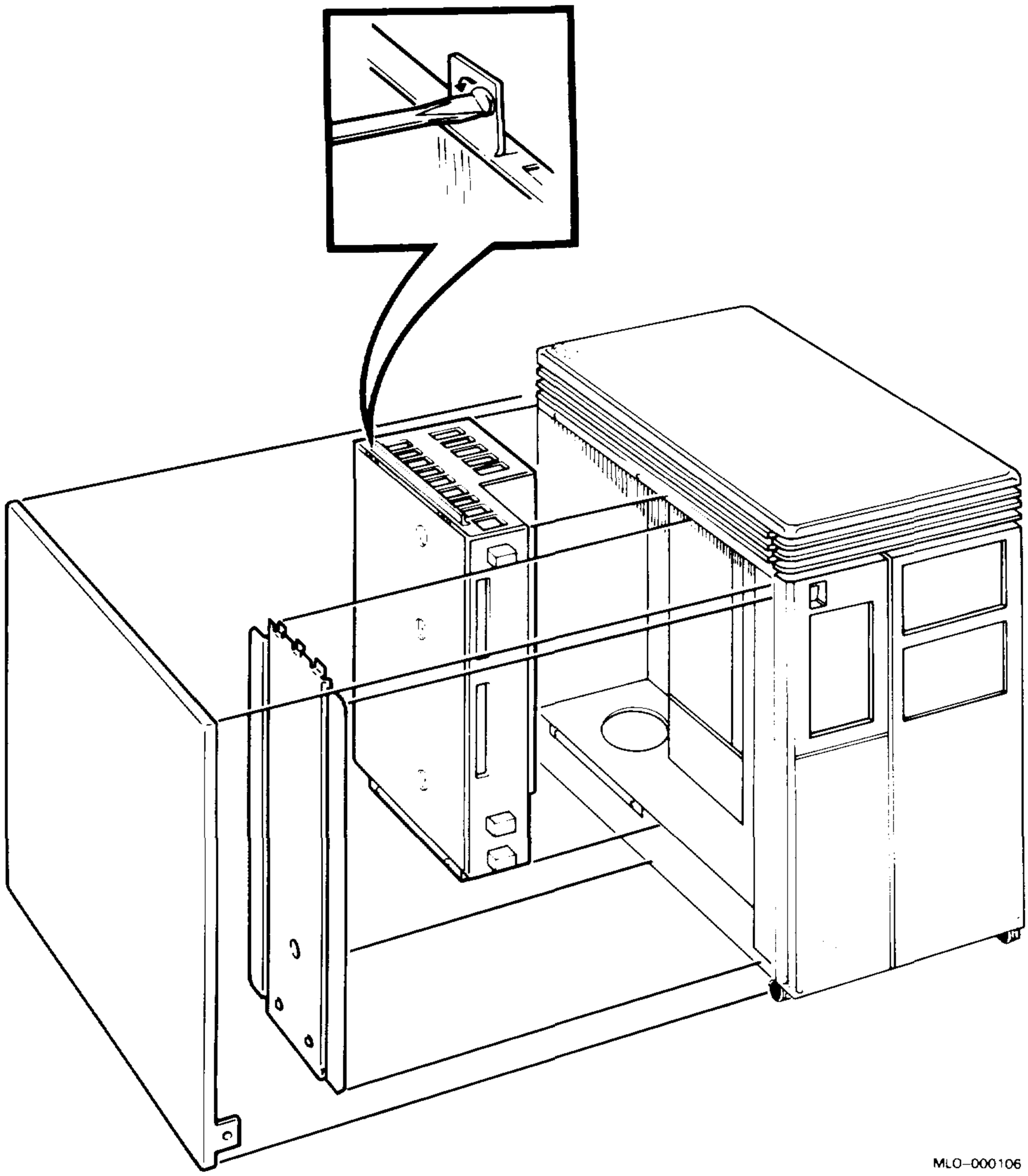
## 3.8 Power Supply

Remove the power supply as follows:

1. Remove the outer and inner left side panels (Section 3.2.2).
2. Note the location and alignment of all cables connected to the power supply. Disconnect all cables, including the ac power cord at the rear of the system.
3. Unfasten the four quarter-turn fasteners holding the power supply to the enclosure (Figure 3–11). Remove the power supply.

**CAUTION:** *Before you install a new power supply, make sure the setting of the voltage select switch at the rear of the power supply is correct. An incorrect setting can cause damage to the system.*

**Figure 3–11: Removing the Power Supply**



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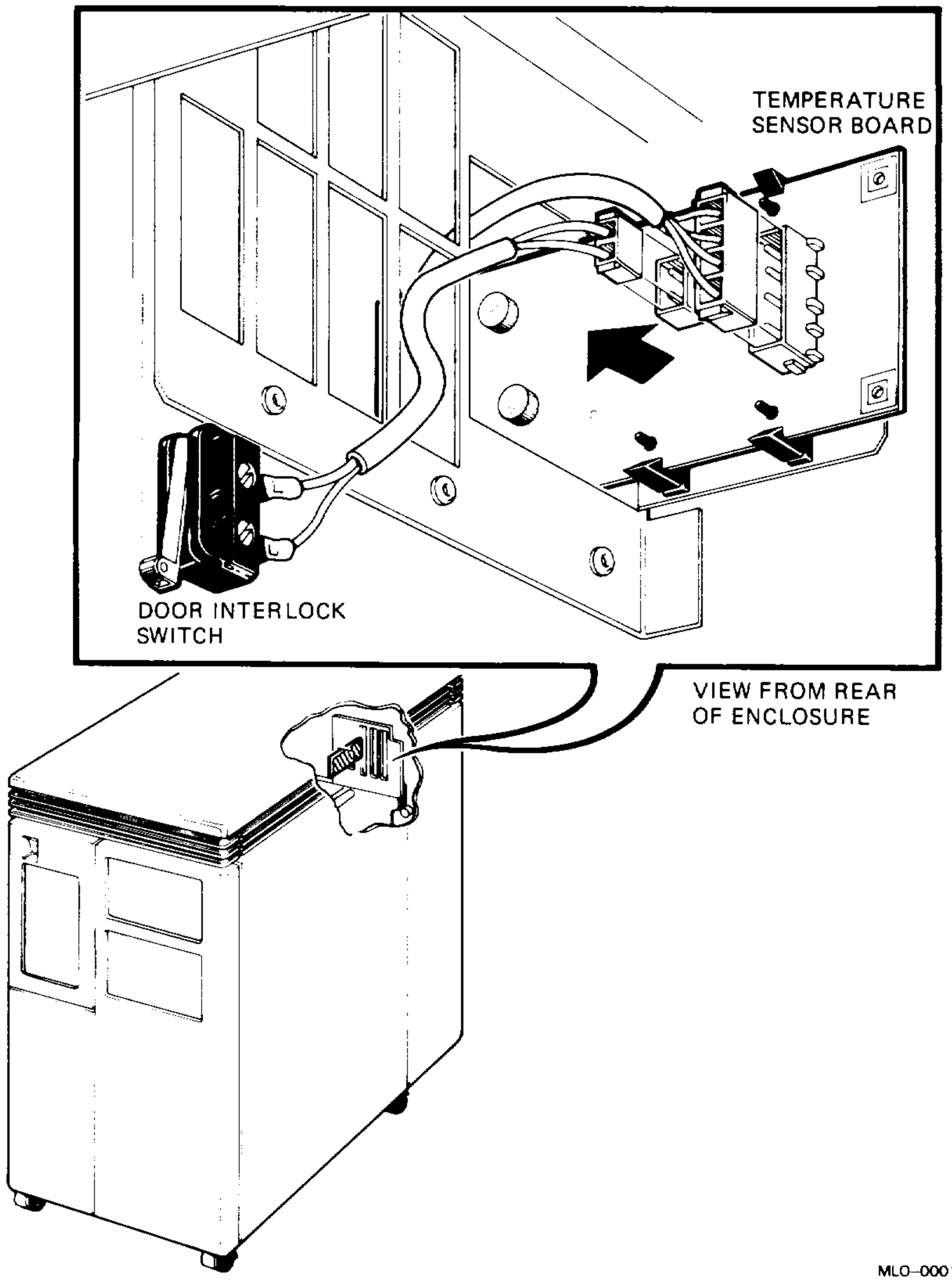
## 3.9 Door Interlock Switch

Remove the door interlock switch as follows:

1. Remove the outer and inner right side panels (Section 3.2.1).
2. Older systems have a card cage door instead of an inner panel. Remove the door by releasing the two clasps at the front end of the door and swinging the door open.
3. Figure 3–12 shows the cable connecting the interlock switch to the temperature sensor board. Disconnect the cable from the temperature sensor board.
4. Remove the two screws that hold the switch to the side of the card cage.
5. Remove the switch and the cable.

**Figure 3–12: Door Interlock Switch and Temperature Sensor Connection**




MLO–000107

## 3.10 Temperature Sensor Board

Remove the temperature sensor board as follows:

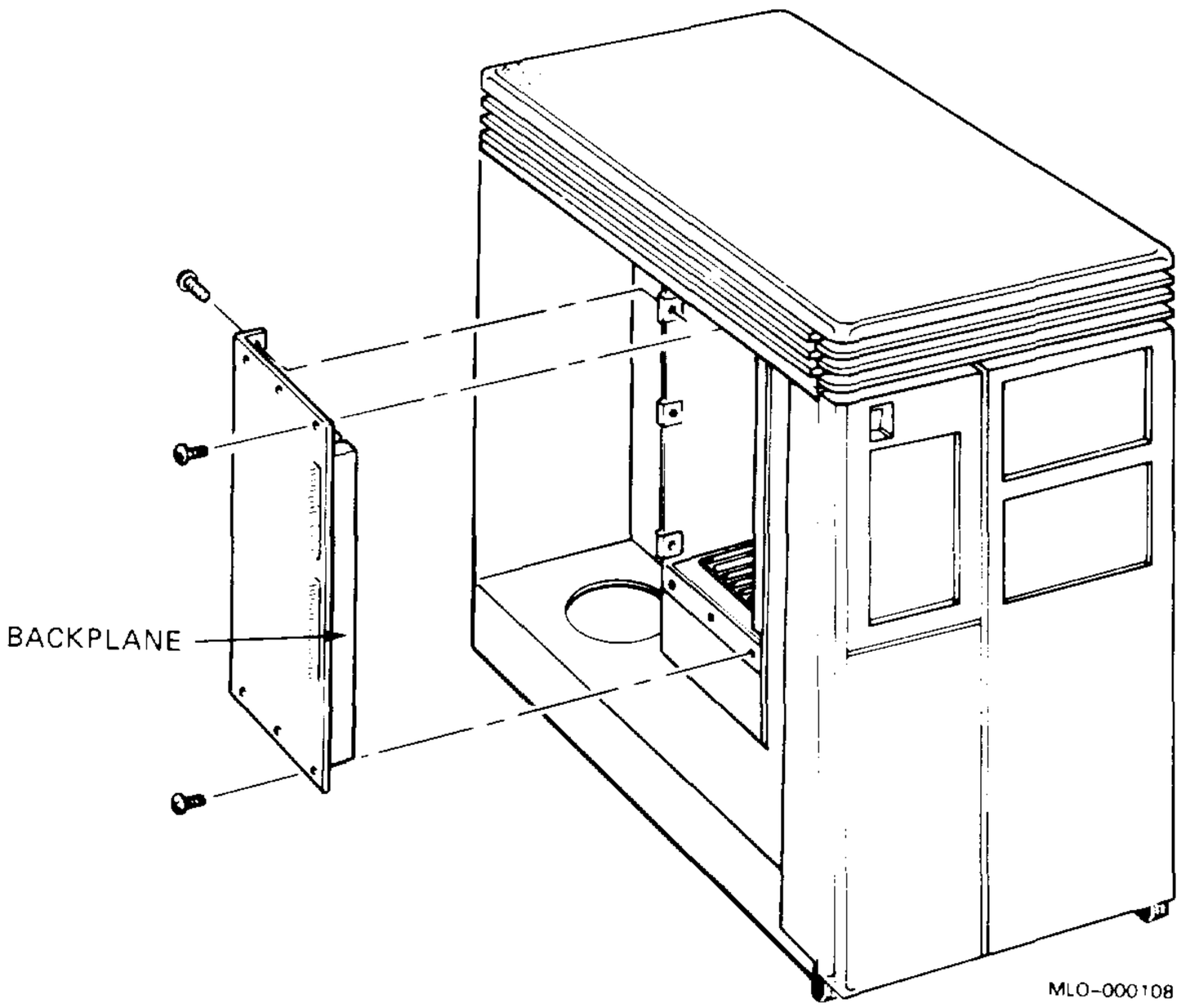
1. Remove the outer and inner right side panels (Section 3.2.1).
2. Older systems have a card cage door instead of an inner panel. Remove the door by releasing the two clasps at the front end of the door and swinging the door open.
3. Figure 3–12 shows the cable connecting the interlock switch to the temperature sensor board. Disconnect this cable from the temperature sensor board.
4. Find the cable connecting the temperature sensor board to the power supply. Disconnect this cable from the temperature sensor board.
5. Remove the temperature sensor board from the four plastic brackets that hold it to the frame.

## 3.11 Backplane

Remove the backplane as follows:

1. Remove the outer and inner side panels (Sections 3.2.1 and 3.2.2).
2. Slide all modules partially out of the backplane, including the signal distribution board.
3. Remove the power supply (Section 3.8).
4. Find the metal plate between the backplane and the power supply. Remove the nine screws that hold the plate to the BA123: six on the front and three on the side (Figure 3–13).
5. Lift the metal plate and the backplane out of the rear of the card cage.
6. Remove the screws that hold the metal plate to the backplane.

**Figure 3–13: Removing the Backplane**




### Installation

1. Install the screws that hold the metal plate to the backplane.
2. Place the backplane and the metal plate at the back of the card cage.
3. Insert the nine screws that hold the metal plate to the card cage, but do not tighten.
4. Insert modules in the first and last card guides of the card cage. This step aligns the backplane with the card cage guides.
5. Tighten the screws on the metal plate.
6. Check the alignment of the backplane by inserting all the modules in their original slots.
7. Replace the power supply by reversing the steps in Section 3.8.

## 3.12 CPU I/O Insert

Remove the CPU I/O insert as follows:

1. Turn off the system and unplug the ac power cord from the wall outlet.
2. Open the rear door.
3. Disconnect the console terminal cable from the CPU I/O insert.
4. Remove the outer and inner right side panels (Section 3.2.1).
5. Older systems have a card cage door instead of an inner panel. Release the two clasps at the front end of the door and swing the door open. Remove the door by disengaging its hinges.

**NOTE:** *Some internal cables connected to the back of I/O inserts may not be keyed. Note the alignment of internal cables and make sure you reconnect them the same way.*

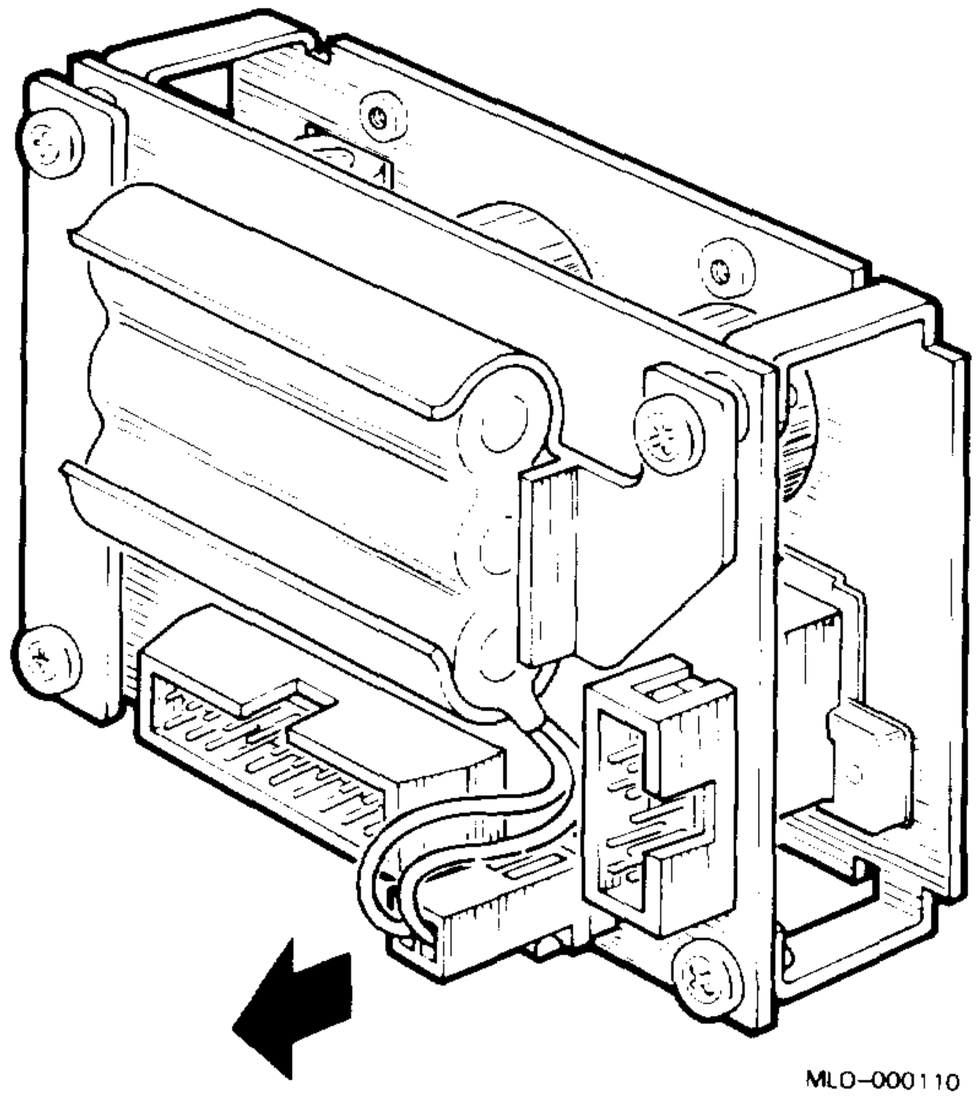
6. Label and disconnect cables that connect the CPU I/O insert to modules inside the enclosure.
7. Remove the screws that hold the CPU I/O insert to the I/O panel. Figure 1–11 shows the orientation of the inserts on the I/O panel.
8. Remove the CPU I/O insert.

## 3.13 MicroVAX Battery Backup Unit (BBU)

Remove the battery backup unit for the time-of-year clock as follows:

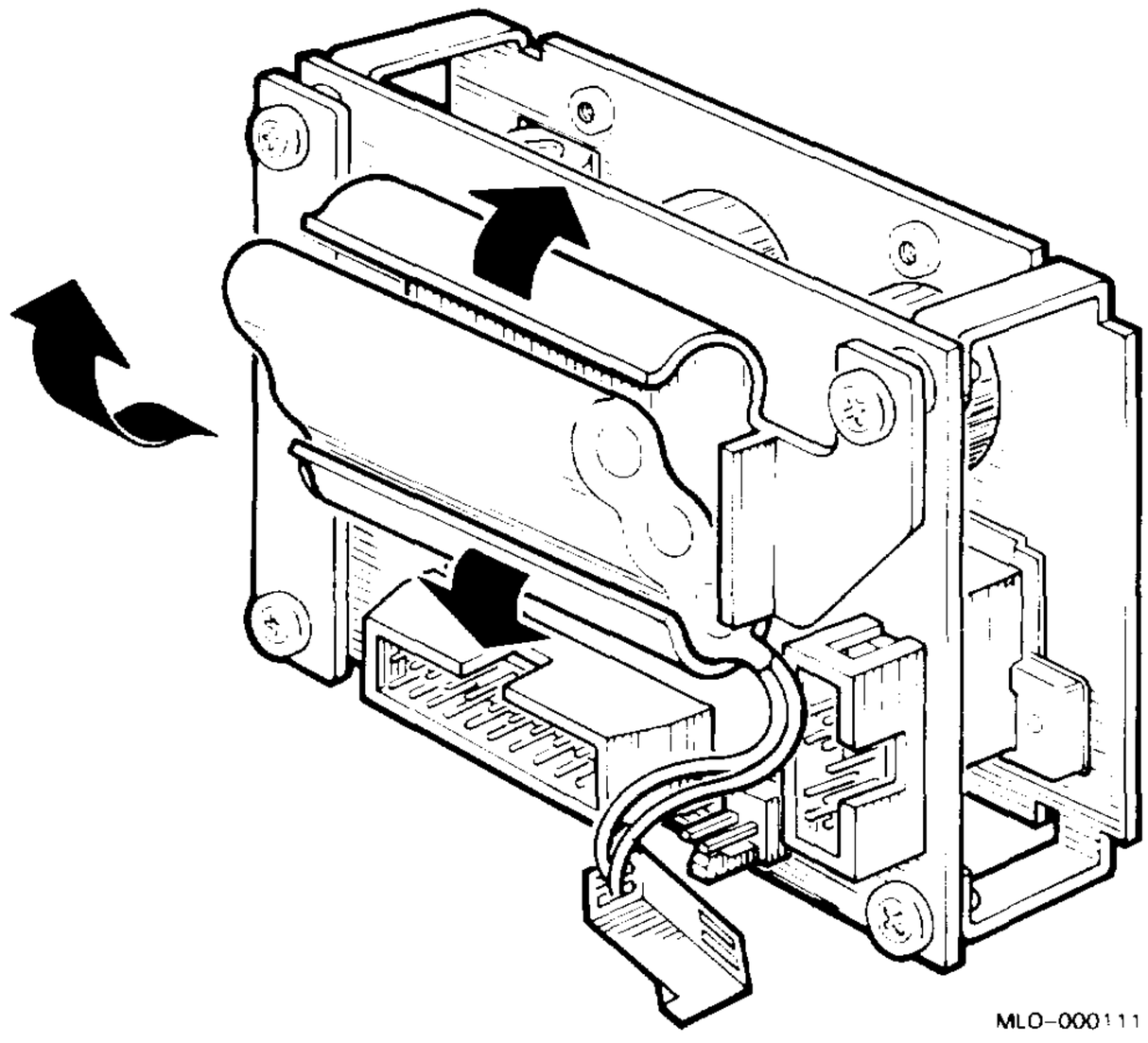
1. Remove the CPU I/O insert, using the procedure in Section 3.12.
2. Remove the batteries from the CPU I/O insert:
   a. Disconnect the battery backup unit cable from the CPU I/O insert (Figure 3–14).

**Figure 3–14: Disconnecting the Battery Backup Unit Cable**




b. Carefully spread the plastic holder and pop out the battery backup unit (Figure 3–15).

**Figure 3–15: Removing the Battery Backup Unit**



MLO-000111

# Appendix A
# Related Documentation

The following documents contain information relating to MicroVAX or MicroPDP–11 systems.

| Document Title | Order Number |
|---|---|
| **Modules** | |
| CXA16 Technical Manual | EK–CAB16–TM |
| CXY08 Technical Manual | EK–CXY08–TM |
| DEQNA Ethernet User's Guide | EK–DEQNA–UG |
| DHV11 Technical Manual | EK–DHV11–TM |
| DLV11–J User's Guide | EK–DLV1J–UG |
| DMV11 Synchronous Controller Technical Manual | EK–DMV11–TM |
| DMV11 Synchronous Controller User's Guide | EK–DMV11–UG |
| DPV11 Synchronous Controller Technical Manual | EK–DPV11–TM |
| DPV11 Synchronous Controller User's Guide | EK–DPV11–UG |
| DRV11–J Interface User's Manual | EK–DRV1J–UG |
| DRV11–WA General Purpose DMA User's Guide | EK–DRVWA–UG |
| DZQ11 Asynchronous Multiplexer Technical Manual | EK–DZQ11–TM |
| DZQ11 Asynchronous Multiplexer User's Guide | EK–DZQ11–UG |
| DZV11 Asynchronous Multiplexer Technical Manual | EK–DZV11–TM |
| DZV11 Asynchronous Multiplexer User's Guide | EK–DZV11–UG |
| IEU11–A/IEQ11–A User's Guide | EK–IEUQ1–UG |
| KA630–AA CPU Module User's Guide | EK–KA630–UG |
| KA640–AA CPU Module User's Guide | EK–KA640–UG |
| KA650–AA CPU Module User's Guide | EK–KA650–UG |
| KDA50–Q CPU Module User's Guide | EK–KDA5Q–UG |
| KDJ11–B CPU Module User's Guide | EK–KDJ1B–UG |
| KDJ11–D/S CPU Module User's Guide | EK–KDJ1D–UG |
| KDF11–BA CPU Module User's Guide | EK–KDFEB–UG |
| KMV11 Programmable Communications Controller User's Guide | EK–KMV11–UG |
| KMV11 Programmable Communications Controller Technical Manual | EK–KMV11–TM |

| Document Title | Order Number |
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| **Modules** | |
| LSI–11 Analog System User's Guide | EK–AXV11–UG |
| Q-Bus DMA Analog System User's Guide | EK–AV11D–UG |
| RQDX2 Controller Module User's Guide | EK–RQDX2–UG |
| RQDX3 Controller Module User's Guide | EK–RQDX3–UG |
| **Disk and Tape Drives** | |
| RA60 Disk Drive Service Manual | EK–ORA60–SV |
| RA60 Disk Drive User's Guide | EK–ORA60–UG |
| RA81 Disk Drive Service Manual | EK–ORA81–SV |
| RA81 Disk Drive User's Guide | EK–ORA81–UG |
| SA482 Storage Array User's Guide (for RA82) | EK–SA482–UG |
| SA482 Storage Array Service Manual (for RA82) | EK–SA482–SV |
| RC25 Disk Subsystem User's Guide | EK–ORC25–UG |
| RC25 Disk Subsystem Pocket Service Guide | EK–ORC25–PS |
| RRD50 Subsystem Pocket Service Guide | EK–RRD50–PS |
| RRD50 Digital Disk Drive User's Guide | EK–RRD50–UG |
| RX33 Technical Description Manual | EK–RX33T–TM |
| RX50–D, –R Dual Flexible Disk Drive Subsystem Owner's Manual | EK–LEP01–OM |
| TK50 Tape Drive Subsystem User's Guide | EK–LEP05–UG |
| TS05 Tape Transport Pocket Service Guide | EK–TSV05–PS |
| TS05 Tape Transport Subsystem Technical Manual | EK–TSV05–TM |
| TS05 Tape Transport System User's Guide | EK–TSV05–UG |

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| **Systems** | |
| MicroVAX Special Systems Maintenance | EK–181AA–MG |
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| 630QE Maintenance Print Set | MP–02219–01 |
| 630QY Maintenance Print Set | MP–02065–01 |
| 630QZ Maintenance Print Set | MP–02068–01 |
| BA23 Enclosure Maintenance | EK–186AA–MG |
| BA123 Enclosure Maintenance | EK–188AA–MG |
| BA213 Enclosure Maintenance | EK–189AA–MG |
| BA214 Enclosure Maintenance | EK–190AA–MG |
| BA215 Enclosure Maintenance | EK–191AA–MG |
| H9642–J Cabinet Maintenance | EK–187AA–MG |
| H9644 Cabinet Maintenance | EK–221AA–MG |
| KA630 CPU System Maintenance | EK–178AA–MG |
| KA640 CPU System Maintenance | EK–179AA–MG |
| KA650 CPU System Maintenance | EK–180AA–MG |
| KDF11–B CPU System Maintenance | EK–245AA–MG |
| KDJ11–D/S CPU System Maintenance | EK–246AA–MG |
| KDJ11–B CPU System Maintenance | EK–247AA–MG |
| MicroPDP–11 Hardware Information Kit (for BA23) | 00–ZYAAA–GZ |
| MicroPDP–11 Hardware Information Kit (for BA123) | 00–ZYAAB–GZ |
| MicroPDP–11 Hardware Information Kit (for H9642–J) | 00–ZYAAE–GZ |
| MicroPDP–11 Hardware Information Kit (for BA213) | 00–ZYAAS–GZ |
| Microsystems Options | EK–192AA–MG |
| Microsystems Site Preparation Guide | EK–O67AB–PG |
| MicroVAX II Hardware Information Kit (for BA23) | 00–ZNAAA–GZ |
| MicroVAX II Hardware Information Kit (for BA123) | 00–ZNAAB–GZ |
| MicroVAX II Hardware Information Kit (for H9642–J) | 00–ZNAAE–GZ |
| MicroVAX 3500 Customer Hardware Information Kit | 00–ZNAES–GZ |
| MicroVAX 3600 Customer Hardware Information Kit (for H9644) | 00–ZNAEF–GZ |
| VAXstation 3200 Owner's Manual (BA23) | EK–154AA–OW |
| VAXstation 3500 Owner's Manual (BA213) | EK–171AA–OW |
| VAXstation II/GPX Owner's Manual (BA23) | EK–106AA–OW |
| VAXstation II/GPX Owner's Manual (BA123) | EK–105AA–OW |

| Document Title | Order Number |
|---|---|
| **Diagnostics** | |
| DEC/X11 Reference Card | AV–F145A–MC |
| DEC/X11 User's Manual | AC–FO53D–MC |
| XXDP User's Manual | AZ–GNJAA–MC |
| XXDP DEC/X11 Programming Card | EK–OXXDP–MC |
| MicroVAX Diagnostic Monitor Ethernet Server User's Guide | AA–FNTAC–DN |
| MicroVAX Diagnostic Monitor Reference Card | AV–FMXAA–DN |
| MicroVAX Diagnostic Monitor User's Guide | AA–FM7AB–DN |
| **Networks** | |
| Ethernet Transceiver Tester User's Manual | EK–ETHTT–UG |
| VAX/VMS Networking Manual | AA–Y512C–TE |
| VAX NI Exerciser User's Guide | AA–HI06A–TE |

# Index

## G



## H



## I



## L



## M



## O



## P



## Q



## R



## S

## T



## U



## V

# NOTES

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# Reader's Comments

**BA123 Enclosure Maintenance**
**EK–188AA–MG–001**

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