

VAXft Systems

Model 810 Site Preparation Information

Order Number: EK-VXFTA-SP.A01

June 1993

This manual is intended for use by Digital Services and other personnel responsible for planning and preparing VAXft Model 810 system sites.

Digital Equipment Corporation

June 1993

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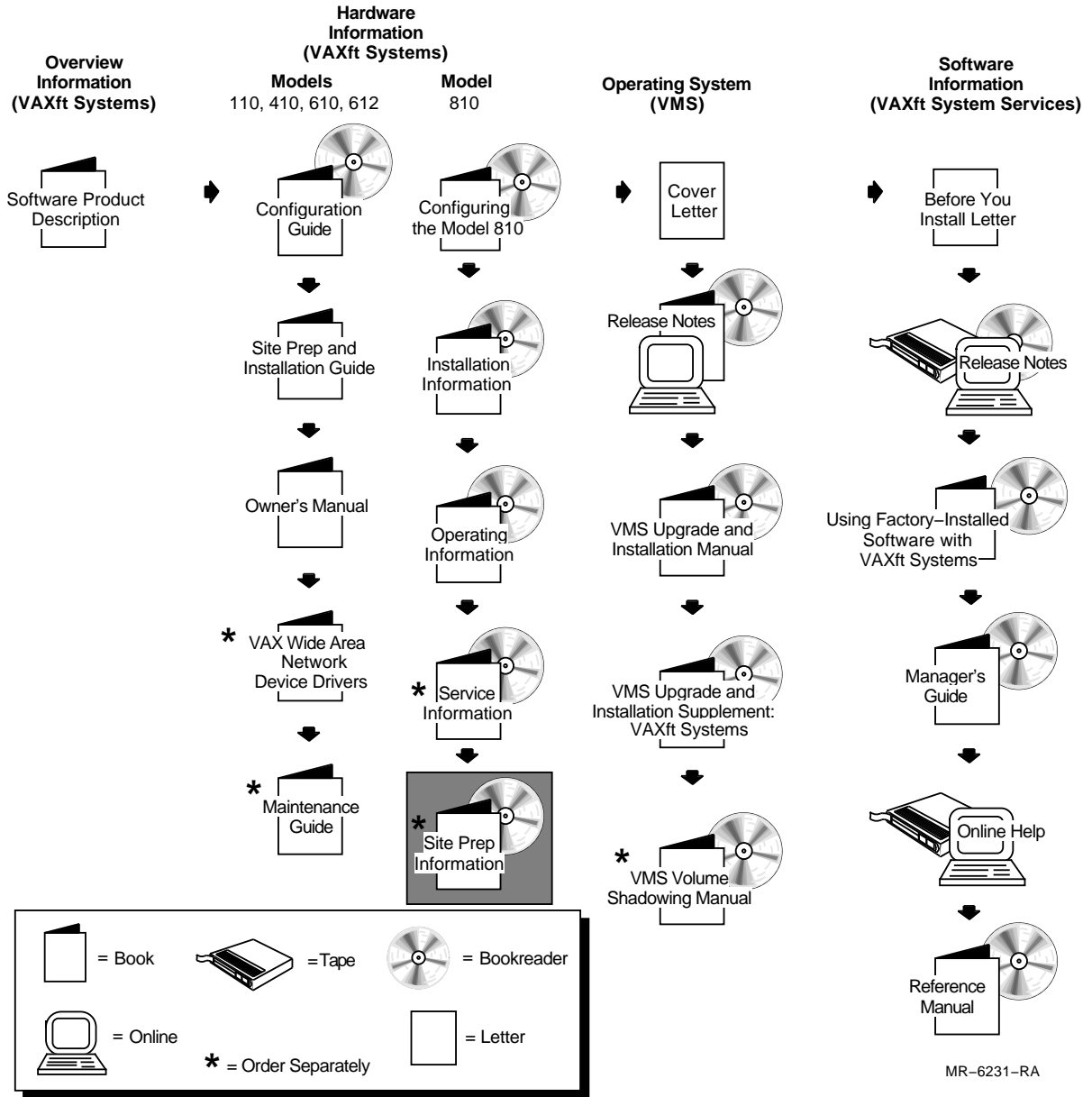
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System and Site Planning Overview

This chapter includes:

- Model 810 system overview
- System building blocks

The *Site Environmental Preparation Guide* (EK-CSEPG-MA) provides further information on site planning and computer room environments.

1.1 Model 810 System Overview

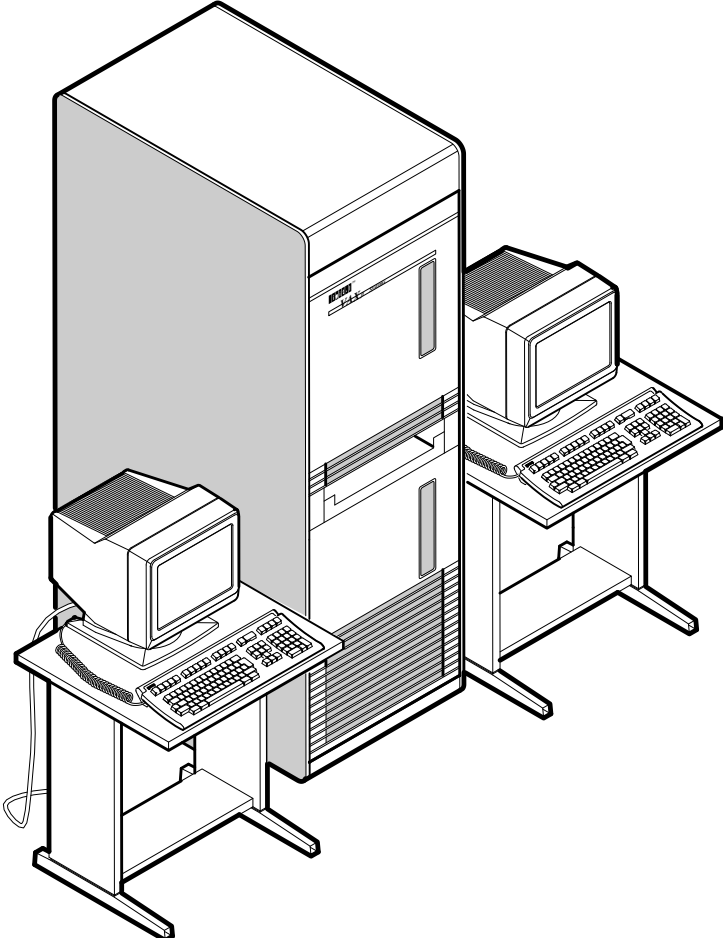
The Model 810 system uses fault-tolerant techniques for error analysis and hardware redundancy to provide a continuously operating computer environment. It has redundant modules and error checking mechanisms that provide the following functions:

- Error capture for detecting and reporting an error.
- Error recovery for removing the effects of an error.
- Faulted device restoration for returning the system to full redundancy.

The Model 810 is available in two cabinet configurations: entry and expanded systems. Figure 1-1 shows the entry system configuration of a standalone CPU cabinet which includes two duplicated zones.

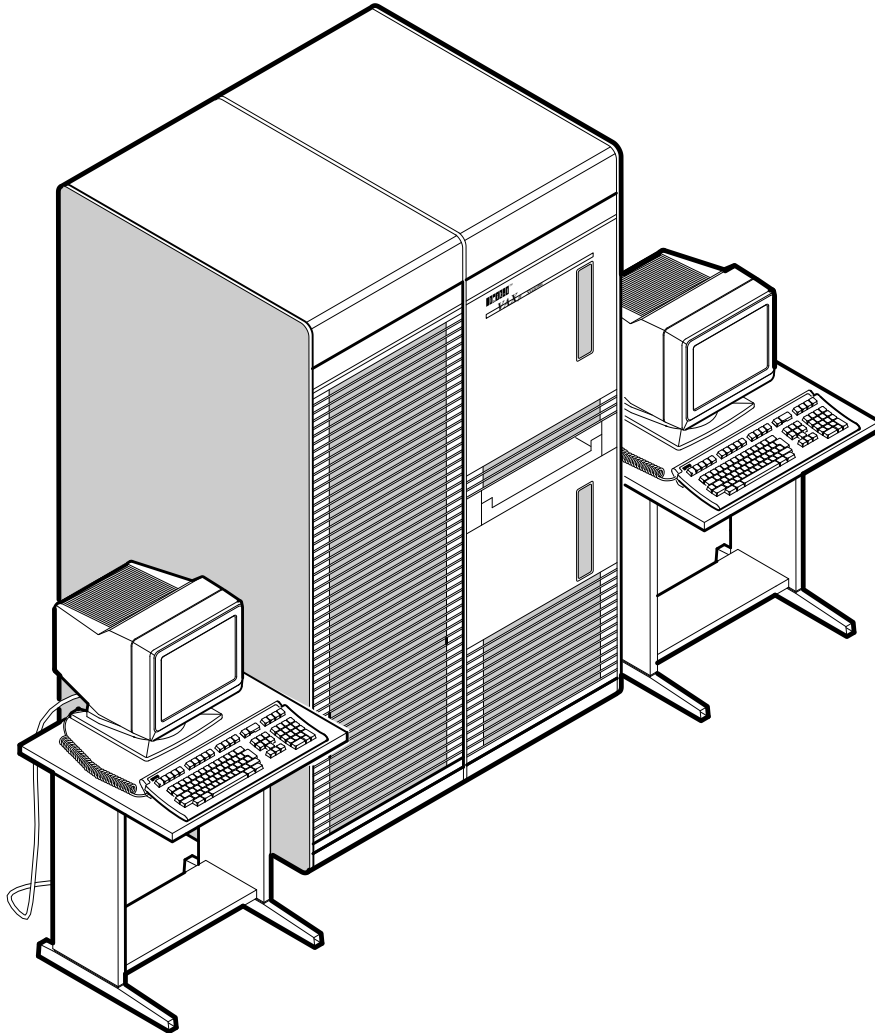
Figure 1-2 shows the expanded configuration with CPU and expansion cabinets. The expansion cabinet may contain disk storage arrays, tape drives, tape loader, and a power system.

Figure 1-1 Entry System Configuration



MR-0405-92DG

Figure 1-2 Expanded System Configuration



MR-0408-92DG

1.2 System Building Blocks

Table 1–1 specifies the system building blocks (SBBs) for each system configuration and the related components.

Table 1–1 System Building Blocks

SBB Number	System Type	Input Power	System Components
56CAA-BA	Entry System	120/240 Vac	<p>CPU cabinet with 2 zones including: 2 CPUs, 1 I/O processor, 2 DSSI interfaces, 1 Ethernet interface, 32 MB memory</p> <ul style="list-style-type: none"> - OpenVMS software - Volume Shadowing for OpenVMS - VAXft System Services
SV-56CAB-BA	Single Cabinet Package	120/240 Vac	<p>CPU cabinet with 2 zones including: 2 CPUs, 1 I/O processor, 2 DSSI interfaces, 1 Ethernet interface, 1 RF35 drive, in-zone disk cabinet kit, 64 MB memory</p> <ul style="list-style-type: none"> - OpenVMS software - Volume Shadowing for OpenVMS - VAXft System Services
SV-56CBB-BE	Dual Cabinet Package	120/240 Vac	<p>CPU cabinet with 2 zones including: 2 CPUs, 1 I/O processor, 2 DSSI interfaces, 2 Ethernet interfaces, 64 MB memory</p> <p>Expansion cabinet including: 2 SF35-BK drives, 2 power distribution boxes</p> <ul style="list-style-type: none"> - OpenVMS software - Volume Shadowing for OpenVMS - VAXft System Services
SV-56CBB-BJ	Dual Cabinet Package	120/240 Vac	<p>CPU cabinet with 2 zones including: 2 CPUs, 1 I/O processor, 2 DSSI interfaces, 2 Ethernet interfaces, 64 MB memory</p> <p>Expansion cabinet including: 2 SF35-BK drives, 2 power distribution boxes</p> <ul style="list-style-type: none"> - OpenVMS software - Volume Shadowing for OpenVMS - VAXft System Services
DV-56CBB-BE	Dual Cabinet Advantage Server	120/240 Vac	<p>CPU cabinet with 2 zones including: 2 CPUs, 1 I/O processor, 2 DSSI interfaces, 2 Ethernet interfaces, 64 MB memory</p>

(continued on next page)

Table 1–1 (Cont.) System Building Blocks

SBB Number	System Type	Input Power	System Components
DV-56CBB-BJ	Dual Cabinet Advantage Server	120/240 Vac	<p>Expansion cabinet including: 2 SF35-BK drives, 2 power distribution boxes, 1 TF85C-BA tape drive</p> <ul style="list-style-type: none"> - OpenVMS software - Volume Shadowing for OpenVMS - VAXft System Services - NAS400 software <p>CPU cabinet with 2 zones including: 2 CPUs, 1 I/O processor, 2 DSSI interfaces, 2 Ethernet interfaces, 64 MB memory</p> <p>Expansion cabinet including: 2 SF35-BK drives, 2 power distribution boxes, 1 TF85C-BA tape drive</p> <ul style="list-style-type: none"> - OpenVMS software - Volume Shadowing for OpenVMS - VAXft System Services - NAS400 software

System Site Preparation

This chapter includes:

- Site planning guidelines
- Preparing for delivery
- Environmental limits

2.1 Site Planning Guidelines

When planning a computer facility, the recommended guidelines are to:

1. Identify space, environmental, and power requirements.
2. Determine whether the computer facility meets the requirements and list necessary enhancements and changes.
3. The following steps are recommended:
 - a. Prepare a layout diagram of the installation area. Table 2–1 lists the system cabinet dimensions and weights.
 - b. Determine the air quality and cooling capabilities of the installation area. Table 2–2 lists the system temperature and humidity requirements.
 - c. Determine the required number, type, and location of ac power receptacles and circuit breakers. Section 3.1.4 lists the system power requirements.

2.1.1 Fire and Safety Codes

The computer facility should conform to local fire and safety codes. The power distribution panel and master circuit breaker must be easily accessible.

For further information on fire and safety codes and practices, refer to the following U.S. National Fire Protection Association publications or to equivalent associations and codes:

- Standard for the Protection of Electronic Computer/Data Processing Equipment (NFPA 75)
- National Electrical Code (NFPA 70)

2.1.2 Computer Security

Computer security can be important even where confidential work is not common practice. It is advisable to provide a separate computer room or facility, or to improve or extend the existing building security practices.

The goal is to provide protection for the computer area against potential damage to the equipment or its programs through carelessness, vandalism, or unauthorized operation.

2.1.3 Data Protection

Consider the security of the system media, programs, and databases. Personnel, medical, financial, research, and other sensitive information should be safeguarded from unauthorized access, tampering, or disclosure.

Special safeguards should be considered for protecting vital data such as business records or information that is expensive or difficult to duplicate. Important data should be copied onto removable media on a regular basis and stored away from the computer area, preferably in a fireproof storage vault.

2.2 Preparing for Delivery

In advance, review the route over which the equipment will be moved after delivery. Factors to consider are availability of an elevator, width and location of doors and aisles along the route, hallway restrictions (bends, slopes, or obstructions), and floor surfaces/protection.

If problems require the equipment to be unpacked and removed from the skids, remember that a cabinet is too heavy to be handled by one person.

Doors along the route should allow passage for the equipment and be without saddles or sills to allow movement of dollies.

To protect against marring of the floor surface, a suitable material such as 0.64 cm (0.25 in) plywood should be used to cover the floor along the route.

2.2.1 Facility Layout

In advance, prepare the layout of the computer facility to determine the area required for the complete system configuration plus airflow and service access areas. Allow enough operating and maintenance access space for the terminals and printers you plan to connect to the system. Also consider human factors in the layout.

Other important factors to consider:

- **System access requirements**—A minimum of 1000 mm (39.4 in) is required in the front and rear of the cabinets for service and operating access.
- **Cooling airflow access**—A minimum of 61 cm (24 in) is required above the cabinets for cooling exhaust airflow.

Note

If the system is to be installed in an enclosed space, additional air cooling equipment may be required.

- **Floor requirements**—The system must rest on a firm surface to allow full exhaust from the bottom. Soft surfaces, such as shag or deep-pile carpet, must be avoided unless a firm surface (such as floor tile) is installed on top of the carpet. The floor should be made of a material that minimizes static electricity, which can cause system failures or media damage.
- **Storage area**—A safe storage area should be provided for magnetic computer media, supplies, documents, spare parts, and maintenance tools.

Caution

Do not place food, beverages, offices supplies, or other materials on top of the cabinets. Areas around the system should not be used for storage.

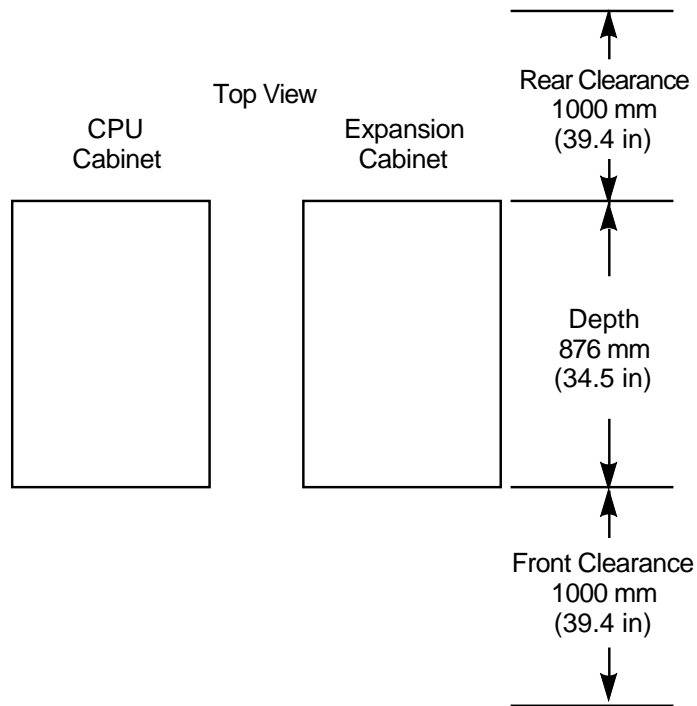
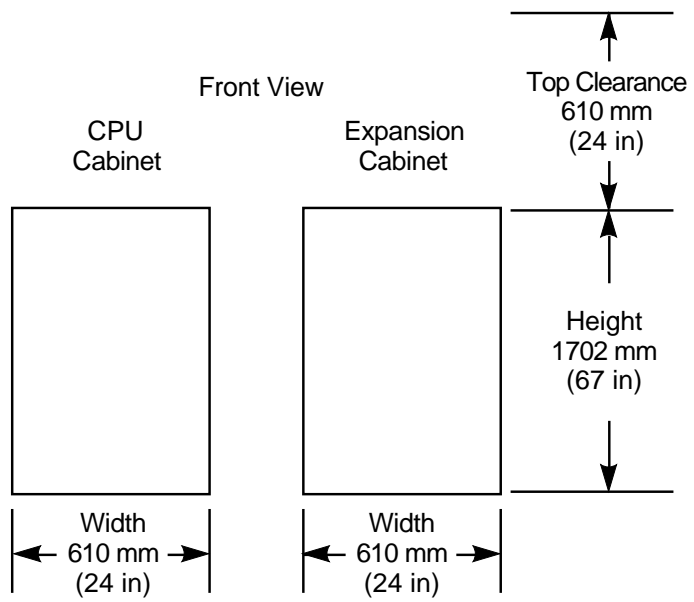
2.2.2 Space Requirements

Table 2–1 specifies the CPU and expansion cabinet dimensions and weights. Figure 2–1 specifies the dimensions and clearance requirements for the CPU and expansion cabinets.

Table 2–1 Model 810 Cabinet Dimensions and Weights

Specification	Value
Skid and packaging removed:	
Height	1702 mm (67 in)
Width	610 mm (24 in)
Depth	876 mm (34.5 in)
Weight (maximum)	342 kg (755 lb)
Point load	86 kg (189 lb)
Skid and packaging intact:	
Height	2083 mm (82 in)
Width	914 mm (36 in)
Depth	1194 mm (47 in)
Weight (maximum)	390 kg (860 lb)

Figure 2-1 Model 810 Cabinet Space Requirements



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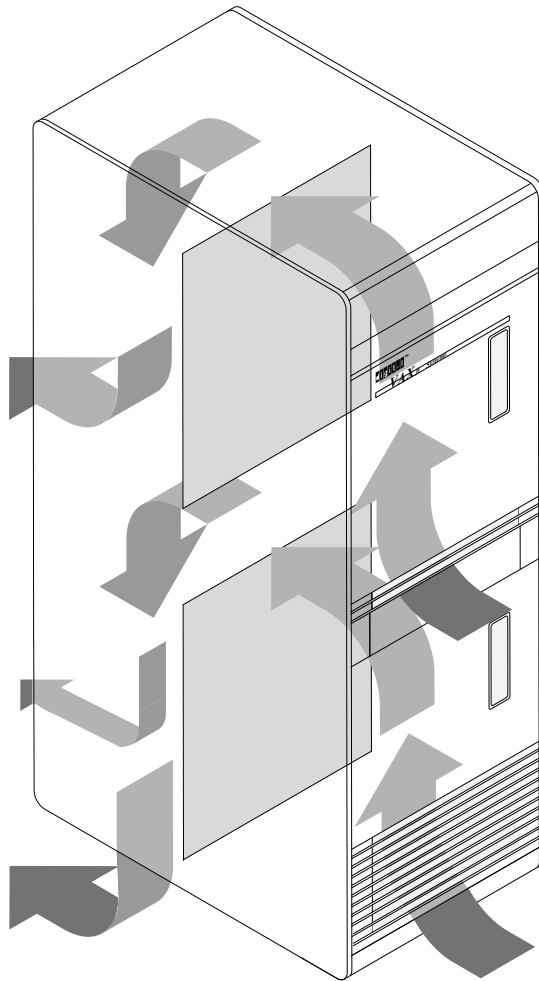
2.2.3 Airflow

The system layout must allow enough cool air to be delivered to the cabinets. Position the cabinets so the heated air from one system is not directed into the intake airflow of other systems.

Figure 2–2 shows airflow pattern for the CPU cabinet.

The devices installed in the expansion cabinet are equipped with internal cooling fans. Airflow through the expansion cabinet is front to rear.

Figure 2–2 CPU Cabinet Airflow Pattern



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2.2.4 Raised Floor Environment

Raised flooring is frequently used in an air-conditioned computer facility. A raised floor provides optimum cooling, and reduces hazards and obstructions caused by power and communication cables.

Cutouts in the floor tiles must be large enough to allow cable connectors to pass through. The cutouts should be rounded and have molding to prevent cable damage.

Do not position the system cabinets over cool air outlets, perforations, or grills.

2.3 Environmental Limits

The limits specified in this section must be observed to maintain maximum availability. Figure 2-3 shows the recommended environmental limits for the Model 810.

2.3.1 Temperature and Humidity

A computer system may generate heat that cannot be dissipated without the use of air cooling equipment. A computer room should be capable of:

- Heating the computer room with all equipment off
- Cooling all equipment with all the equipment operating at maximum capacity on the warmest day
- Humidifying and dehumidifying the room within predetermined limits under all anticipated weather conditions

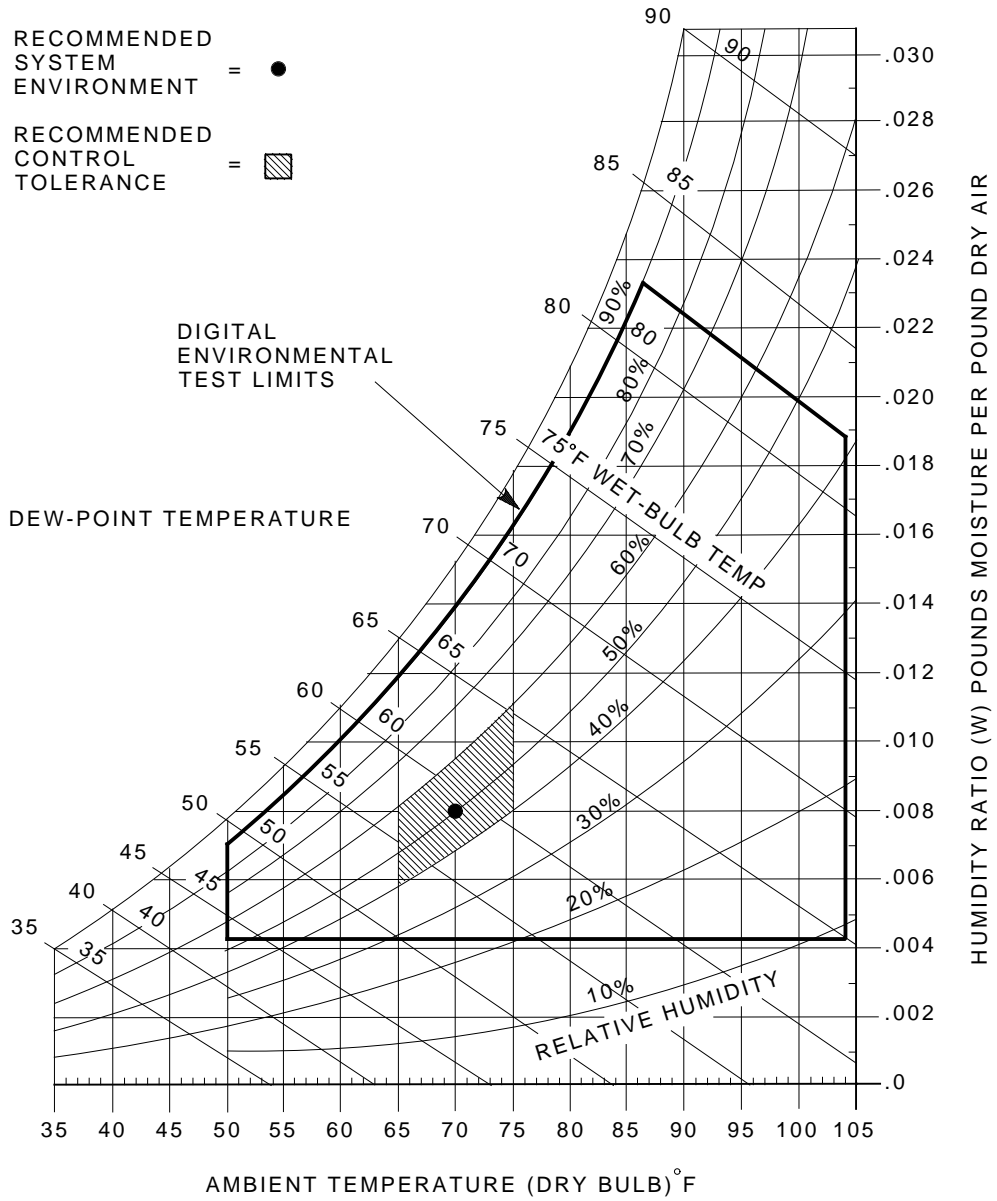
Low humidity allows static electricity to build up, while high humidity promotes corrosion. Both can affect storage media and should be avoided (Figure 2-3).

Temperature and humidity should be monitored and recorded at all times. The relative humidity may be increased or decreased, as necessary, using humidification and dehumidification equipment. The temperature and humidity requirements are specified in Table 2-2.

Table 2-2 Temperature and Humidity Specifications

Specification	Value
Temperature:	
Operating	15°C to 32°C (59° to 90°F)
Nonoperating	-40°C to 66°C (-40°F to 151°F)
Storage	-40°C to 66°C (-40°F to 151°F)
Rate of change	9°C/hr (16°F/hr)
Relative humidity:	
Operating	10% - 90%
Nonoperating	10% - 95%
Storage	10% - 95%
Operating rate of change	50%/hr (maximum)
Maximum wet-bulb temperature (operating)	28°C (82°F)
Maximum wet-bulb temperature (storage)	46°C (115°F)
Minimum dew point temperature (operating)	2°C (36°F)

Figure 2-3 Psychrometric Chart



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2.3.2 Air Filtration

Air cleanliness is important for the reliability of the disk drives and computer logic. The air conditioning system should filter the air to minimize dust, pollen, and other air contaminants.

If salt air, corrosive gases, or other pollutants are present, special chemical filtering may be required. In this case, consult a specialist in air conditioning and electronic corrosion.

2.3.3 Shock and Vibration

The Model 810 is constructed to withstand normal intermittent building vibrations. However, it is impossible to anticipate all vibration conditions that might be encountered at all computer facilities. If shock and vibration levels at the site are severe or continuous, they should be measured and discussed with a Digital environmental support engineer and/or an engineering consultant.

Table 2-3 lists the shock and vibration specifications.

Table 2-3 Model 810 Shock and Vibration Specifications

Specification	Value
Shock:	
Operating	5.0 g vertical for 10 ms
Nonoperating	Incline impact 1 m/sec (3.25 ft/sec) Tilt drop 20.8 cm (8 in)
Operating vibration	0.10 g at 5 Hz to 500 Hz
Nonoperating vibration:	
Frequency range, vertical	1.19 g at 5 Hz to 300 Hz
Frequency range, longitudinal	0.698 g at 5 Hz to 200 Hz
Frequency range, lateral	0.698 g at 5 Hz to 200 Hz

Power and Safety Requirements

This chapter includes:

- Power distribution and requirements
- Safety requirements

3.1 Power Distribution and Requirements

3.1.1 Power Distribution

To maintain redundancy, a separate, dedicated circuit is required for each zone.

The recommended power source should include three additional, unused circuits for future expansion. The electrical system must conform to applicable national and local codes and ordinances.

Convenience outlets are not provided in the cabinets. Separate circuits are required for each terminal, modem, printer, or any other additional devices connected to the system.

Note

An uninterruptible power supply (UPS) is classified as an orderable option. However, the UPS is a mandatory element in a Model 810 configuration for true fault tolerant operation. The UPS should not be considered an optional component.

During a total power failure, the uninterruptible power supply (UPS) supports all internal components (including logic modules and drives) for a minimum of 30 minutes. The UPS does not support any external devices such as terminals and printers.

The Model 810 system design ensures satisfactory operation on the line power supplied by most power companies. However, there are many outside variables over which Digital Equipment Corporation and your power company have no control.

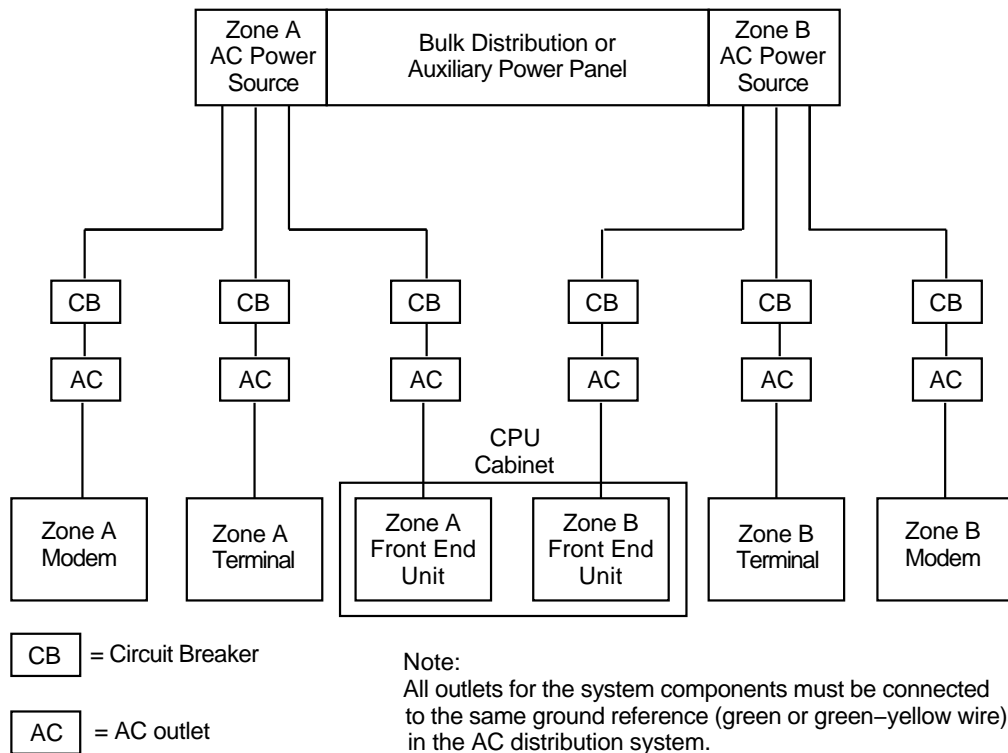
Receptacles and circuit breakers should be installed and tested by a licensed electrician prior to the delivery of the system to the facility. To guard against possible malfunctions from externally radiated or conducted transient voltages, or from electrical signals superimposed on the power lines, power distribution within the facility should comply with the following requirements:

- Each piece of equipment must receive ac power through a single, dedicated power receptacle and circuit breaker of the recommended value. No other equipment or loads may be connected to these circuits. See Figure 3-1, Figure 3-2, and Figure 3-3.

- All ac power must come from the same bulk distribution panel to ensure reliable operation. If the building has dedicated lines for auxiliary power or a backup generator, the power should come from that source.
- The same ground point must be used in all circuits to the system and to any equipment connected to it. This ensures the ground (earth) references for all equipment are at the same potential. For 120 Vac installations, the potential between neutral and ground (earth) should be no greater than 1 Vac at each receptacle. In Europe, apply local standards and codes.

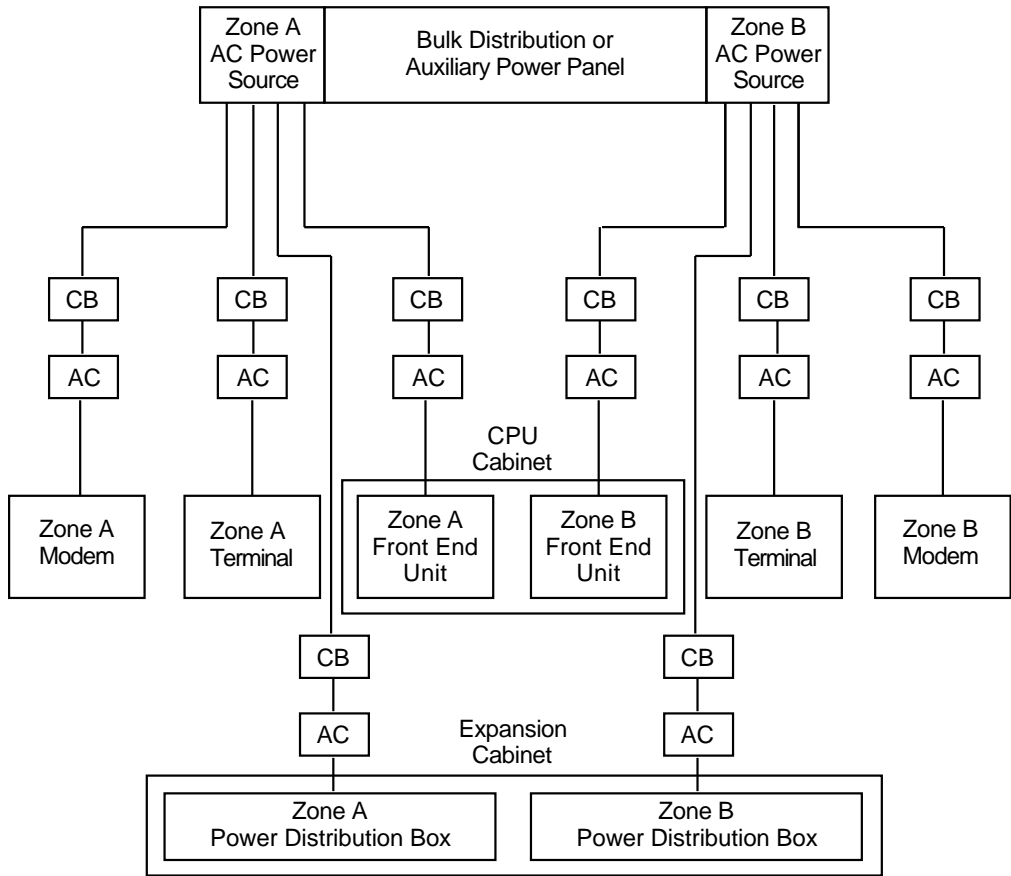
If circuit problems exist, rewiring and rerouting of the circuits may be necessary.

Figure 3–1 Single Cabinet AC Power Distribution



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Figure 3–2 Dual Cabinet AC Power Distribution



CB = Circuit Breaker

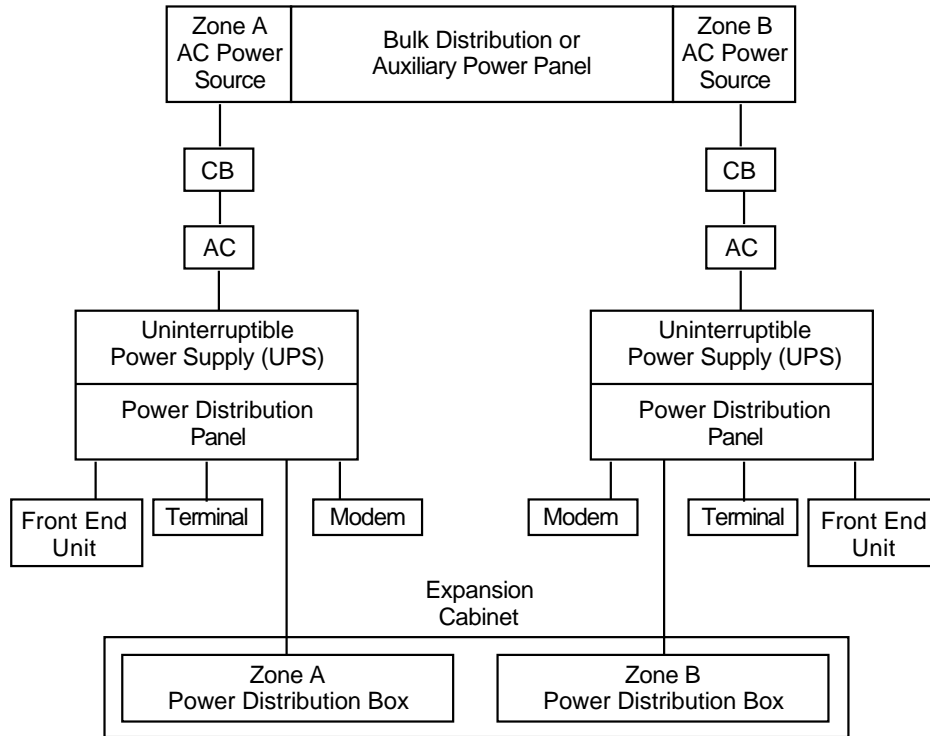
AC = AC outlet

Note:

All outlets for the system components must be connected to the same ground reference (green or green–yellow wire) in the AC distribution system.

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Figure 3–3 AC Power Distribution with Uninterruptible Power Supplies



CB = Circuit Breaker

AC = AC outlet

Notes:

All domestic outlets for the system components must be connected to the same ground reference (green or green–yellow wire) in the AC distribution system.

The domestic UPS must be connected to a three–phase utility outlet with a connector.

The international UPS must be hardwired to a single–phase outlet. The power distribution panel must be hardwired to the UPS.

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3.1.2 Electrical System

The electrical system within the facility should comply with the following requirements:

- The power distribution panel must be easily accessible, or a master switch or circuit breaker provided, to remove all power to the computer facility in the event of an emergency.
- The electrical system must be stable and free from electrical noise and transients. Do not connect electric motors, air conditioners, office copiers, or convenience outlets to the same circuits or panels where the system components are connected. If power disturbances cannot be avoided, power conditioning equipment may be required.
- Single-point grounding is required. This is important if the building power supplies heavy-duty electrical equipment or machinery. The ground terminals from the receptacles must be connected to the building ground only at the distribution panel. No equipment connected to the Model 810 should be connected to any other electrical box, conduit, or water pipe that could cause heavy ground currents to flow during an electrical malfunction in another part of the building.

3.1.3 AC Power Cables and Connectors

Digital does not supply circuit breakers, power receptacles, or other items that may be purchased locally.

The Model 810 ac power connectors and receptacles are specified in Table 3–1.

Table 3–1 AC Power Connectors

Plug	Receptacle
Single-Phase Power Connectors	
3-pin NEMA L5-20P	3-pin NEMA L5-20R
3-pin NEMA L5-15P	3-pin NEMA L5-15R
Three-Phase Power Connectors	
Hubbel Number 2811	Hubbel Number 2810
5-pin NEMA L21-30P	5-pin NEMA L21-30R
Twist Lock 30 A	Twist Lock 30 A
DEC PN 12-12314-00	DEC PN 12-12315-01

The international power cables are specified in Table 3–2.

Table 3–2 International Power Cables

Cable Number	Country
BN25T-4E	Austria, Belgium, France, Germany, Finland, Netherlands, Sweden, Norway, Portugal, Spain
BN18B-4E	UK/Ireland
BN27T-4E	Switzerland
BN27U-4E	Denmark
BN18E-4E	Italy

3.1.4 Power Requirements

Table 3–3 specifies the 120 Vac power requirements for the:

- Entry System, SBB 56CAA-BA
- Single Cabinet Package, SBB SV-56CAB-BA

Each zone has one power cord. The current ratings in Table 3–3 are for one zone power cord, with a fully loaded zone.

Table 3–3 Entry System and Single Cabinet Package 120 Vac Power

Parameter	Minimum	Typical	Maximum
Nominal voltage	—	120 Vac	—
Operational voltage range	100 Vac	—	264 Vac
Nominal frequency	—	60/50 Hz	—
Frequency range	47 Hz	—	63 Hz
Number of phases	—	1	—
RMS steady state current:			
Phase A	—	16 A	20 A
Neutral N	—	16 A	20 A
Peak steady state current:			
Phase A	—	—	23.8 A
Neutral N	—	—	23.8 A
Power consumption	—	—	1853 W
Apparent power	—	—	1949 VA
Power factor	—	.95	—

Table 3–4 specifies the 240 Vac power requirements for the:

- Entry System, SBB 56CAA-BA
- Single Cabinet Package, SBB SV-56CAB-BA

Each zone has one power cable. The current ratings in Table 3–4 are for one zone power cable, with a fully loaded zone.

Table 3–4 Entry System and Single Cabinet Package 240 Vac Power

Parameter	Minimum	Typical	Maximum
Nominal voltage	—	240 Vac	—
Operational voltage range	100 Vac	—	264 Vac
Nominal frequency	—	50 Hz	—
Frequency range	47 Hz	—	63 Hz
Number of phases	—	1	—
RMS steady state current:			
Phase A	—	7.5 A	20 A
Neutral N	—	7.5 A	20 A
Peak steady state current:			
Phase A	—	—	23.8 A
Neutral N	—	—	23.8 A
Power consumption	—	—	1853 W
Apparent power	—	—	1949 VA
Power factor	—	.95	—

Table 3–5 specifies the 120 Vac power requirements for the:

- Dual Cabinet Package, SBB SV-56CBB-BE (with power distribution boxes)
- Dual Cabinet Advantage Server, SBB DV-56CBB-BE (with power distribution boxes)

The current ratings in Table 3–5 are for each power distribution box supporting one half of a fully loaded expansion cabinet. Refer to Table 3–3 for the CPU cabinet power requirements.

Table 3–5 Dual Cabinet/Advantage Server 120 Vac Power

Parameter	Minimum	Typical	Maximum
Nominal voltage	—	120/208 Vac	—
Operational voltage range	174 Vac	—	264 Vac
Nominal frequency	—	60/50 Hz	—
Frequency range	47 Hz	—	63 Hz
Number of phases	—	1	—
RMS steady state current:			
Phase A	—	—	NA
Phase B	—	—	8.2 A
Phase C	—	—	8.2 A
Neutral N	—	—	14 A
Peak steady state current:			
Phase A	—	—	NA
Phase B	—	—	12 A
Phase C	—	—	12 A
Neutral N	—	—	17 A
Power consumption	—	—	1853 W
Apparent power	—	—	1949 VA
Power factor	—	.95	—

Table 3–6 specifies the 240 Vac power requirements for the:

- Dual Cabinet Package, SBB SV-56CBB-BJ (with power distribution boxes)
- Dual Cabinet Advantage Server, SBB DV-56CBB-BJ (with power distribution boxes)

The current ratings in Table 3–6 are for each power distribution box supporting one half of a fully loaded expansion cabinet. Refer to Table 3–3 for the CPU cabinet power requirements.

Table 3–6 Dual Cabinet/Advantage Server 240 Vac Power

Parameter	Minimum	Typical	Maximum
Nominal voltage	—	220/240 Vac	—
Operational voltage range	100 Vac	—	264 Vac
Nominal frequency	—	60/50 Hz	—
Frequency range	47 Hz	—	63 Hz
Number of phases	—	1	—
RMS steady state current:			
Phase A	—	—	8.2 A
Neutral N	—	—	12 A
Peak steady state current:			
Phase A	—	—	12 A
Neutral N	—	—	12 A
Power consumption	—	—	1853 W
Apparent power	—	—	1949 VA
Power factor	—	.95	—

Table 3–7 specifies the 120 Vac power requirements for the:

- Dual Cabinet Package, SBB SV-56CBB-BE (with power distribution boxes and uninterruptible power supplies)
- Dual Cabinet Advantage Server, SBB DV-56CBB-BE (with power distribution boxes and uninterruptible power supplies)

The current ratings in Table 3–7 are for each power distribution box supporting one half of a fully loaded expansion cabinet. Refer to Table 3–3 for the CPU cabinet power requirements.

Table 3–7 Dual Cabinet Package/Advantage Server 120 Vac Power

Parameter	Minimum	Typical	Maximum
Nominal voltage	—	120 Vac	—
Operational voltage range	100 Vac	—	264 Vac
Nominal frequency	—	60/50 Hz	—
Frequency range	47 Hz	—	63 Hz
Number of phases	—	3	—
RMS steady state current:			
Phase A	—	9 A	15 A ¹
Phase B	—	9 A	15 A ¹
Phase C	—	9 A	0 ¹
Neutral N	—	0	26 A ¹
Peak steady state current:			
Phase A	—	13 A	21 A ¹
Phase B	—	13 A	21 A ¹
Phase C	—	13 A	0 ¹
Neutral N	—	—	37 A ¹
Power consumption	—	—	1853 W
Apparent power	—	—	1949 VA
Power factor	—	.95	—

¹Current rating during bypass

Table 3–8 specifies the 240 Vac power requirements for the:

- Dual Cabinet Package, SBB SV-56CBB-BJ (with power distribution boxes and optional uninterruptible power supplies)
- Dual Cabinet Advantage Server, SBB DV-56CBB-BJ (with power distribution boxes and optional uninterruptible power supplies)

The current ratings in Table 3–8 are for each power distribution box supporting one half of a fully loaded expansion cabinet. Refer to Table 3–3 for the CPU cabinet power requirements.

Table 3–8 Dual Cabinet Package/Advantage Server 240 Vac Power

Parameter	Minimum	Typical	Maximum
Nominal voltage	—	240 Vac	—
Operational voltage range	100 Vac	—	264 Vac
Nominal frequency	—	50 Hz	—
Frequency range	47 Hz	—	63 Hz
Number of phases	—	1	—
RMS steady state current:			
Phase A	—	15 A	15 A
Neutral N	—	15 A	15 A
Peak steady state current:			
Phase A	—	—	21 A
Neutral N	—	—	21 A
Power consumption	—	—	1853 W
Apparent power	—	—	1949 VA
Power factor	—	.95	—

3.2 Safety Requirements

When installing this computer system, observe the following standard safety requirements:

- Use caution when deskidding and moving system cabinets; if not handled correctly, personal injury or property damage can occur.
- Never move any of the cabinets while they are connected.
- Have a licensed electrician verify correct grounding of power receptacles.
- Remove all watches and jewelry before working on power supplies.
- Turn on all circuit breakers before plugging in the power cable.
- Verify that all connections to utility power are correct before turning on power.
- Remember that safety features built into the system override the power system. It will shut down before causing damage to the system or personnel.
- Disconnect the main power plug from utility power before working on the power system. Wait about 2 minutes for the storage capacitors to discharge.
- Replace fuses or circuit breakers with a Digital part of the same type and current rating to prevent damage to the power system and computer area.