

VAXft 3000 Site Preparation and Installation Guide Addendum

Order Number EK-VXFT1-AD

**digital equipment corporation
maynard, massachusetts**

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1 Introduction

This is a preliminary procedure for OEM customers to mount VAXft 3000 BA22 boxes into custom 19-inch cabinets.

This document is meant to be used with the *VAXft 3000 Site Preparation and Installation Guide* (EK-VXFT1-IN).

The VAXft 3000 system is offered in two basic mounting styles: office pedestal and OEM rackmount. The processor and mass storage expanders are contained in BA22-style equipment boxes.

The office pedestal is designed to operate in office or computer room environments, and has the following features:

- Enclosure skins and covers
- Split-entry front door
- Base mounted on casters

The OEM rackmount box version differs from the office pedestal version in that it has:

- No skins or covers
- A rackmount base instead of the office base

The rackmount base ensures support for the transformer and allows spacing for required airflow.

The purpose of the rackmount base is to provide:

- Separate air paths between the units
- A mounting support for a lifting device, such as a forklift

The rackmount option consists of:

- Attached rackmount assembly
- Front cover
- Instructions

2 Design Concerns

The design concerns for rack mounting a VAXft 3000 system into a custom rack or cabinet are:

- Unit weight
- Center of gravity
- Unit dimensions
- Rack construction
- Rail mounting system
- Heat and air flow management
- Data cable management
- Grounding considerations
- Power distribution

2.1 Unit Weight

A major design concern for rack mounting the VAXft 3000 system is unit weight. Each VAXft 3000 BA22 box can weigh up to approximately 108 kg (240 lb) for the processor box and up to 122 kg (270 lb) for the mass storage expander box. Therefore, the cabinet's 19-inch Radio-Electronics-Television Manufacturers Association (RETMA) rail system must be designed to handle a hang weight of 231 kg (510 lb) (one BA22 processor and one BA22 expander box mounted on a one rail system) plus a safety margin. It is recommended that the final rail assembly with two BA22 boxes be designed to withstand a 10 gravity peak, 10-ms shock pulse in the vertical plane.

A second concern while handling the BA22 boxes is safety. When rack mounting the BA22 boxes into the cabinet, it is recommended that a lifting device be used. The suggested lifting device is a flat-blade fork-lift.

CAUTION

The BA22 boxes must be picked-up from the bottom. Never use any sort of hook or try to lift the unit by its sheet metal skins.

2.2 Unit Dimensions

The VAXft 3000 BA22 boxes are designed to be mounted into 19-inch RETMA rail cabinets. If your cabinet does not have a 19-inch RETMA rail system, then you have to design a conversion bracket. For example, many phone company racks are based on a 1-inch center hole pattern, so conversion brackets have to be custom made.

The dimensions for the rackmount VAXft 3000 BA22 boxes are:

- 60.96 cm (24.0 in) height of main box
- 66.14 cm (26.04 in) height of main box plus rackmount base
- 44.55 cm (17.54 in) width of main box (inside of rails)
- 46.78 cm (18.42 in) width of main box (flange to flange)
- 29.90 cm (11.77 in) depth plus 10.16 cm (4.0 in) for the rackmount base extension in the rear

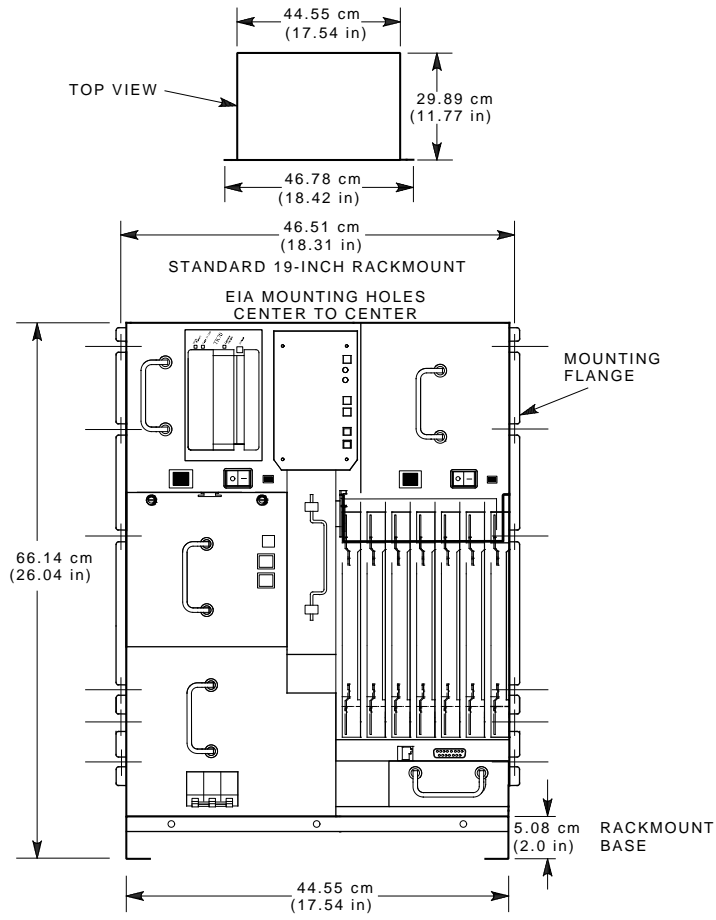
See Figures 1 and 2 for front views. See Figure 3 for the rail hole pattern. See Figure 4 for a side view.

2.3 Center of Gravity

As seen in Figures 1 and 2, the BA22 boxes are 29.90 cm (11.77 in) deep. This means that much of the center of gravity is toward the front rail system. If your cabinet is, for example, 121.9 cm (48.0 in) deep, the center of gravity is in the front quarter of the cabinet, causing a possible tip hazard. If you use a cabinet that is 76.2 cm (30.0 in) wide by 152.4 cm (60.0 in) high by 66.14 cm (26.04 in) deep, the center of gravity is acceptable approximately 35.56 cm (14.0 in) from the front of the cabinet. See Figure 5 and Figure 6.

If deep cabinets (for example, 121.9 cm (48.0 in)) are used, and if no equipment is going to be mounted on the cabinet's rear rails to counter balance the front load of the BA22 boxes, then an anti-tip front foot plate must be used, if the cabinet is mounted on casters. If the cabinet is bolted to the floor, then such an anti-tip plate can be omitted. In either case, the shipping skid must be designed to handle the cabinet's center of gravity correctly and not accidentally tip while being moved.

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Figure 1 BA22A Box — Front View

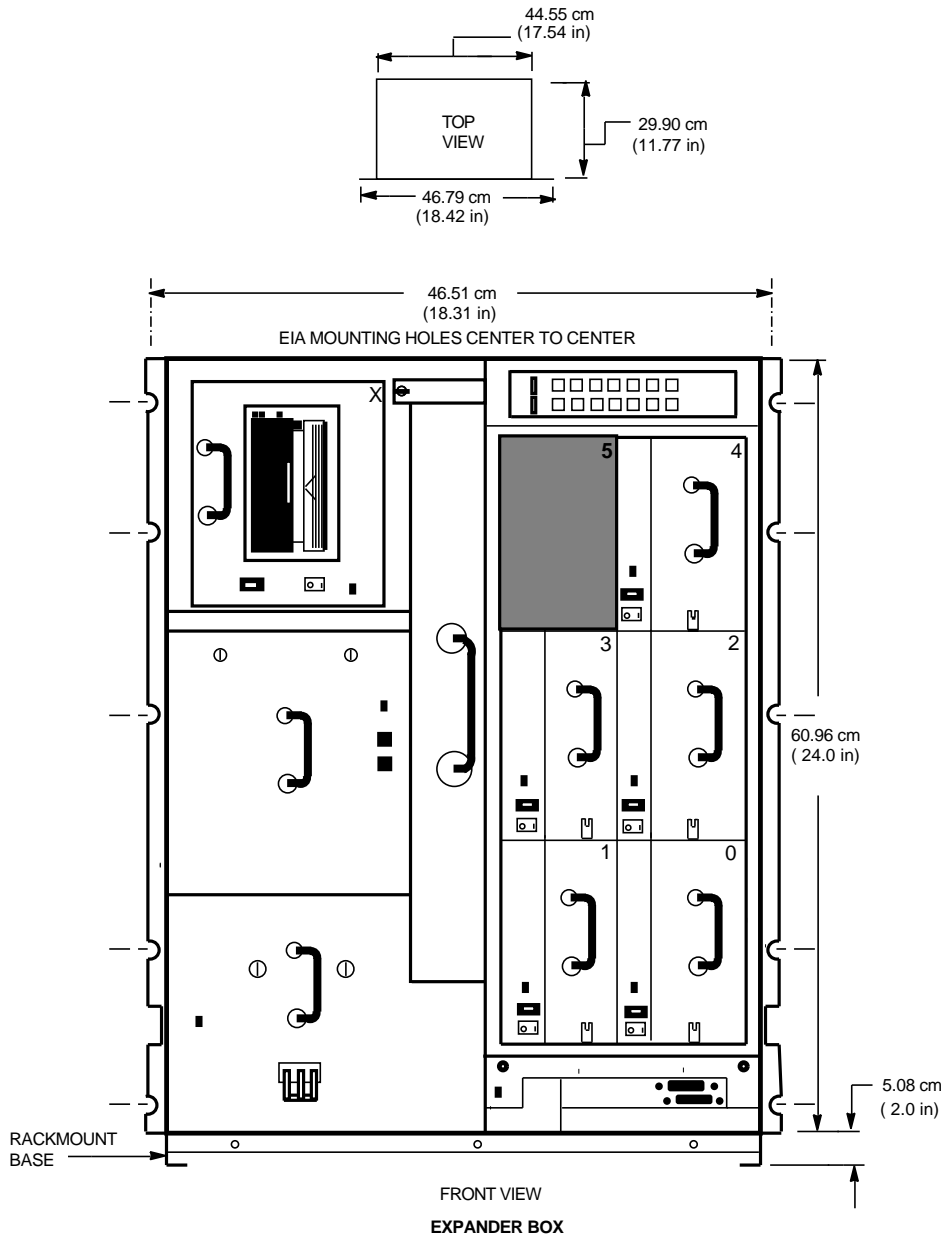
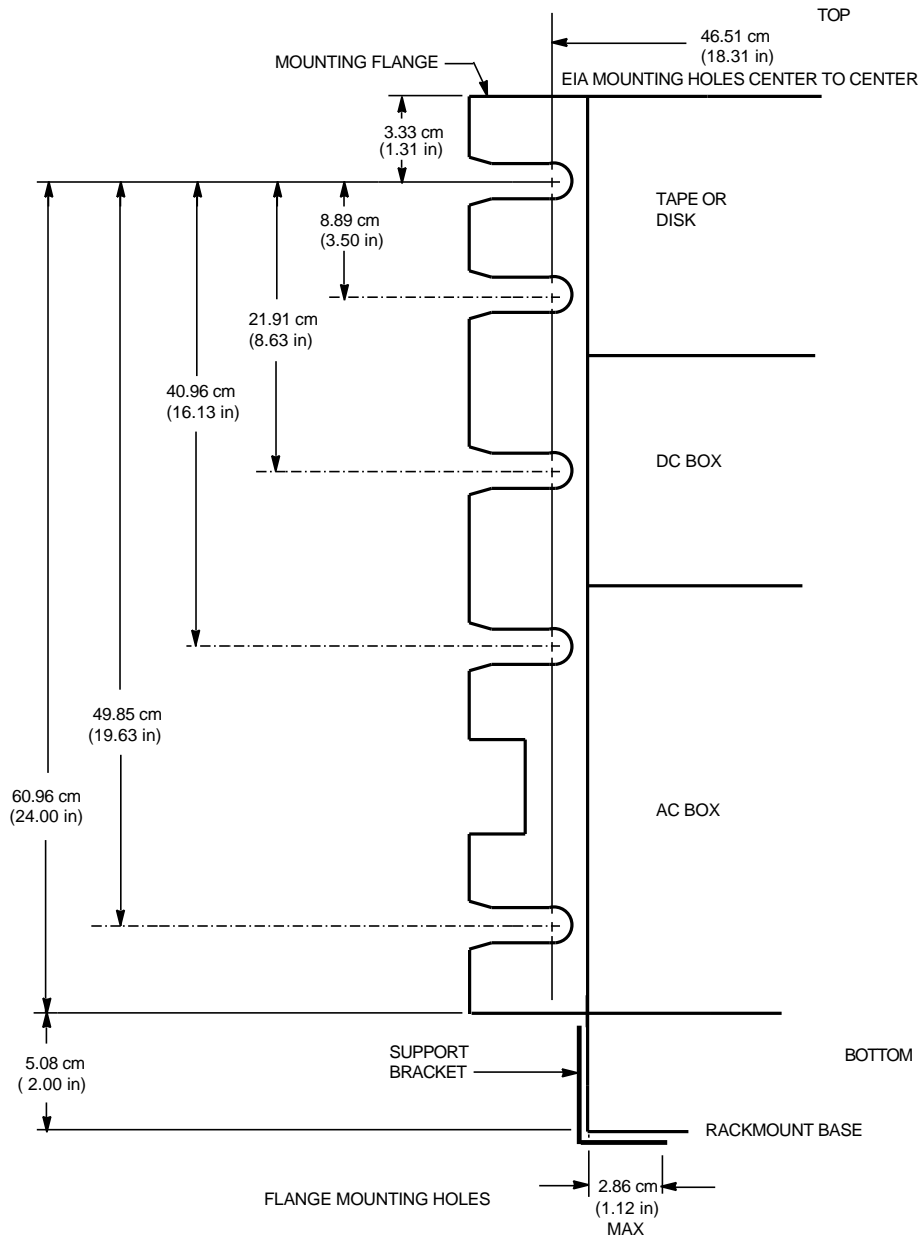


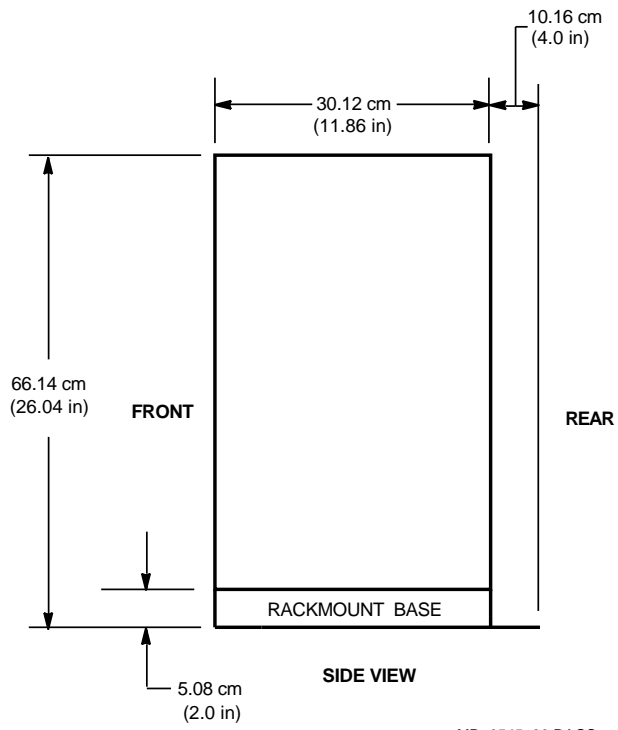
Figure 2 BA22B Box — Front View

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Figure 3 Flange Mounting Holes



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Figure 4 BA22 Box — Side View

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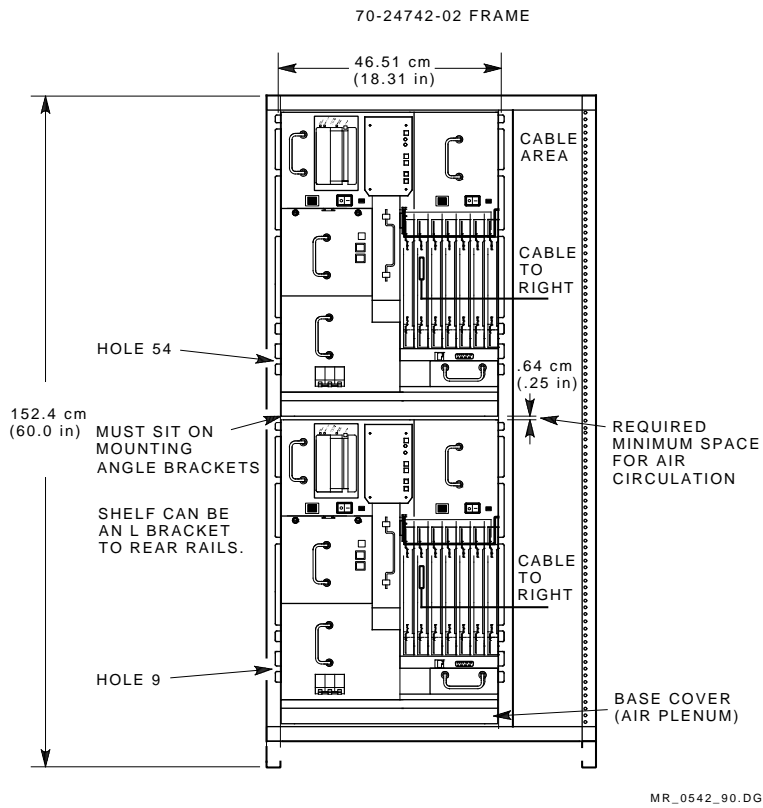


Figure 5 Rackmount Example — Front View

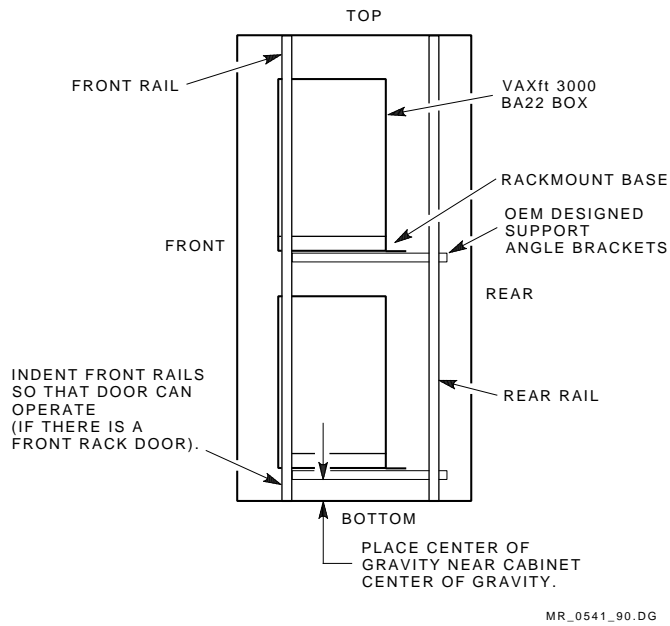


Figure 6 Typical VAXft 3000 Rack Mounted — Side View

2.4 Rack Construction

Many 19-inch RETMA rail racks are not designed to support a heavy weight on the front rail system alone. Such racks are designed to hold front to back equipment boxes where the box weight is distributed between the front and rear rails. See Figure 7. This distribution makes sure that the cabinet does not flex.

The VAXft 3000 BA22 boxes are designed to be mounted on the front and rear rail system. See Figures 4, 6, and 7. The front flanges are designed for a RETMA hole pattern. The unit sits on an integral rackmount base assembly that extends 10.16 cm (4.0 in) beyond the rear of the box (see Figure 4). The BA22 boxes must then be supported by a customer-designed right angle bracket that connects to both the front and rear mounting rack rails (see Figure 6).

CAUTION

Never mount the BA22 boxes by the front mounting flanges only. Always include supporting angle brackets so that the weight can be distributed to the rear rail system. The front mounting flanges can be damaged without the use of the angle brackets.

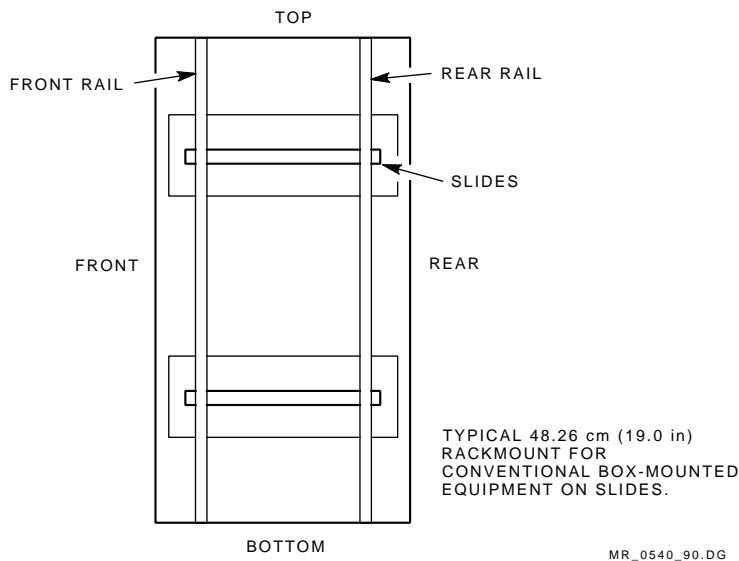


Figure 7 Traditional Rackmounted Equipment — Side View

2.5 Heat and Airflow Management

The maximum power for each BA22 box is 750 Watts, or 2557 BTUs. It is recommended that the cabinet be designed for the maximum configuration per the user's environment (temperature, humidity).

The tested operating ranges for the VAXft 3000 system are:

- 10°C to 40°C
- 50°F to 104°F
- 10% to 90% RH noncondensing
- 28°C (82°F) maximum wet-bulb temperature
- 2°C (36°F) minimum dew-point temperature

It is recommended that the rack environment be near the middle of the tested operating ranges. This would be in the area of 40% to 60% RH, 18.3°C (65°F) to 23.8°C (75°F).

The rackmount version of the VAXft 3000 BA22 boxes comes with a rackmount base. The base adds 5.08 cm (2.0 in) to the overall height of the unit and 10.16 cm (4.0 in) to the overall depth (see Figures 1 through 4). The rackmount base adds the 10.16 cm (4.0 in) so that air can be baffled correctly. If the rack has enough free airspace surrounding the BA22 boxes, a flushing fan is not needed inside the rack.* Initial tests of two boxes mounted in a one and one-half bay cabinet with dimensions of 152.4 cm (60.0 in) height, 76.2 cm (30.0 in) width and 66.04 cm (26.0 in) depth, showed that a flushing fan is not needed provided that the ambient temperature is held below 40°C (104°F). If the rack has smaller dimensions, some sort of blower, heat exchanger, or active cooling (air conditioner) need to be considered.

The cabinet rackmount and airflow design depends on the following factors:

- Internal BTUs generated in the cabinet
- Temperature differential between the inside cabinet temperature and outside cabinet temperature
- Surface area of all the outside walls of the cabinet
- Whether cabinet rack walls are insulated or not insulated
- Mounting configuration of the BA22 boxes within the cabinet
- Airspace within the cabinet
- Air vents on the front and rear doors or panels

* If a flushing fan is used, note that the BA22 airflow is from top to bottom.

2.5.1 Internal BTUs

The internal BTUs generated by a dual zone VAXft 3000 system mounted in a single cabinet would be a maximum of $750 \text{ Watts} \times 2 \text{ zones} \times 3.41$ equals 5115 BTUs. A 20 percent safety factor should be added to this.

$$5115 \times 1.2 = 6138 \text{ BTUs}$$

Therefore, a maximum system cabinet should be designed to remove 6138 BTUs worth of heat (one cabinet with two processor cabinets or one cabinet with a processor and expander cabinet).

2.5.2 Air Vents

The air intake slots in the front rack door should be a minimum of 225.82 cm (35.0 sq in) to allow for adequate intake airflow. The same is true for the rear cabinet exhaust panel or door.

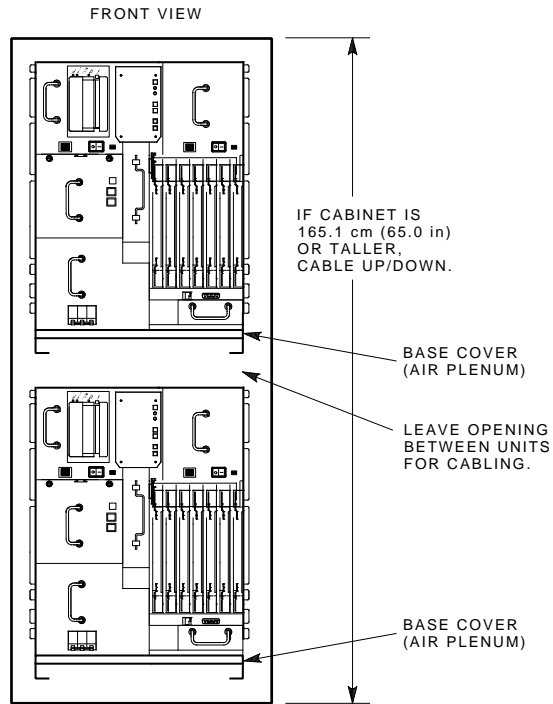
2.6 Data Cable Management

All cables connect to the VAXft 3000 BA22 boxes by means of the front module panels, DSSI cable bulkheads, and console bulkheads. This means all cable routing must be addressed from the front of the units.

Figure 8 shows the recommended cable dressing.

If the BA22 boxes are mounted in a 152.4 cm (60.0 in) high rack, there is no room between the BA22 boxes for the routing of cables. All I/O cables must be routed to the right or left sides. Cross-link cables must be mounted vertically.

If the BA22 boxes are mounted in a 165.1 cm (65.0 in) or higher rack, cables may be routed between the BA22 boxes.



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Figure 8 Cable Routing Example — Front View

2.7 Grounding Considerations

It is very important to have a good common ground between the two BA22 boxes when mounted in a rack assembly. The following rules apply:

- The mounting rails should be conductive so that there is a good ground contact between the upper BA22 front mounting rails and the bottom BA22 front mounting rails.
- If the rails are to be painted, consult with Digital Equipment Corporation.
- The mounting rails should be connected to a cabinet ground.
- In multiple cabinet systems, all cabinet grounds must be tied together.

2.8 Power Distribution

Each VAXft 3000 BA22 box has its own power cord. Each cord is rated for a 12 A, 120 Vac outlet or 6 A, 240 Vac outlet maximum. These are standard wall outlets.

The one major concern when adding power controllers to a cabinet or rack is that a single point of failure should be avoided. For example, it would be easy to add a 30 A, 120 Vac rated power controller to the cabinet for 120 Vac systems, and plug both BA22 boxes into the one power controller. This is fine, but by doing this, a single point of failure is introduced — the power controller. If the relays or EMI/RFI filter fail, both BA22 boxes go down.

3 Summary

In summary, the OEM designer should use the following guidelines when designing a 19-inch cabinet rack for VAXft 3000 systems:

- Use the rackmount version of the VAXft 3000 system. Do not try to convert an office version, since the office version is not supplied with the appropriate rackmount base.
- Two BA22 boxes weigh up to 108 kg (240 lb) for the processor BA22 plus 122 kg (270 lb) for the expander BA22 for a total of 231 kg (510 lb). The cabinet and rail system must be designed to support this weight plus a safety margin. Both the front and rear rails must be used to distribute the weight. A custom mounting shelf or angle brackets must be designed by the OEM customer to do this.
- The BA22 boxes are shallow (29.89 cm or 11.77 in). Special consideration must be made about the cabinet's center of gravity, especially during transportation.
- The maximum heat generated by a single BA22 box is 2557 BTUs. A single 60 inch cabinet could be designed to hold two BA22 boxes, therefore generating 5115 BTUs. It is suggested that a 20 percent safety factor be added to this resulting in a 6138 BTU design center, maximum.
- A minimum of 225.82 sq cm (35.0 sq in) must be allowed for air intake vent open area (total slot size open area). The same is true for the exhaust area.
- If the air temperature outside of the cabinet is expected to be above the range of 18.3°C to 23.8°C (65°F to 75°F), active cooling such as industrial cabinet air conditioners should be investigated.
- Airflow in the BA22 boxes is from top to bottom. If cabinet flushing fans are needed as a result of airflow studies, the flushing fans should not work against the BA22 airflow.
- The use of a single power controller for two BA22s within the same 19-inch cabinet can introduce a single point of failure.
- Grounding is very important. Use conductive mounting rails.