

**VAX-11/785**

# INSTALLATION MANUAL

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VAX-11/785



EK-SI785-IN-001

# **VAX-11/785 Installation Manual**

Prepared by Educational Services  
of  
Digital Equipment Corporation

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• Class A Computing Devices:

Notice: This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference in which case the user at his own expense may be required to take measures to correct the interference.

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## **PREFACE**

This manual provides installation procedures for a VAX-11/785 and its options. It also describes the conversion from a VAX-11/780 to a VAX-11/785. In addition, it includes information on the new Federal Communications Commission (FCC) regulations.

The following is a list of related documents.

- *VAX-11/785 Central Processor Unit Technical Description* (EK-KA785-TD)
- *VAX-11/785 TB, Cache and SBI Control Technical Description* (EK-MM785-TD)
- *VAX-11/785 Console Subsystem Technical Description* (EK-KC785-TD)
- *MS780E Memory System Technical Description* (EK-MS78E-TD)
- *MS780 Memory System Technical Description* (EK-MS780-TD)
- *FP785 Floating Point Accelerator Technical Description* (EK-FP785-TD)
- *DW780 UNIBUS Adapter Technical Description* (EK-DW780-TD)
- *RH780 MASSBUS Adapter Technical Description* (EK-RH780-TD)
- *VAX-11/780 Power System Technical Description* (EK-PS780-TD)
- *VAX-11/785 Hardware User's Guide* (EK-11785-UG)
- *VAX Diagnostic User Guide* (EK-VX11D-UG)
- *VAX Maintenance Handbook, VAX Systems* (EK-VAXV1-HB)
- *VAX Maintenance Handbook, VAX-11/780* (EK-VAXV2-HB)
- *VAX Hardware Handbook, 1982-83* (EB-21710)
- *VAX Architecture Handbook, 1981* (EB-19580)
- *Computer Programming and Architecture - The VAX-11* (EY-AX008-DP)
- *CI780 Computer Interconnect Technical Description* (EK-CI780-TD)
- *DS780 Diagnostic System User Guide* (EK-DS780-UG)
- *DS780 Diagnostic System Technical Description* (EK-DS780-TD)



- *System Maintenance Print Set (MP01747-\*)*
- *Console Maintenance Print Set (MP01748-\*)*
- *CPU Maintenance Print Set (MP01749-\*)*
- *FPA Maintenance Print Set (MP01754-\*)*

Documents may be ordered through the nearest DIGITAL sales office or the Peripherals and Supplies Group catalog, or from one of the following sources.

**Hardware documents:**

Digital Equipment Corporation  
Publishing and Circulation Services, NRO3-1/W3  
10 Forbes Road  
Northboro, MA 01532

**Handbooks and software manuals:**

Digital Equipment Corporation  
Educational Services Distribution Center  
12A Esquire Road  
Brookside Industrial Park  
North Billerica, MA 01862

Technical and service documents that support the VAX-11/785 (including maintenance print sets and diagnostic listings) are also available on microfiche. For information on microfiche libraries contact:

Digital Equipment Corporation  
Micropublishing Systems, FPO/B5  
30 North Avenue  
Burlington, MA 01803

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\*The latest version is sent if no revision is specified.

# CHAPTER

1



## **CHAPTER 1 SYSTEM INSTALLATION**

### **1.1 UNPACKING AND INSPECTION**

#### **CAUTION**

Removing the equipment from the skids is a two-person procedure. Exercise extreme care to prevent the cabinets from rolling uncontrolled down the ramps or off either side of the skids when releasing the leveling feet. All leveling feet must be fully retracted before removing the cabinets from the skids.

1. Remove all equipment from the skids, following instructions on the boxes.
2. Remove the shipping and accessory list from the "OPEN ME FIRST" box and check the contents of all boxes against the shipping list.
3. Notify the branch manager or supervisor of any missing or incorrect items.

#### **NOTE**

Advise the customer to contact the carrier about any missing items.

4. Inform the branch service manager of the DIGITAL Traffic and Shipping Department if the carrier does not have the missing items.
5. Unpack the equipment following the instructions on the boxes.

### **1.2 INSTALLATION**

#### **NOTE**

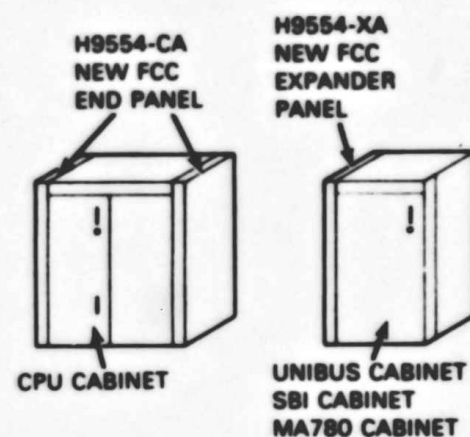
End panel and expander panel part numbers *must* be checked against Figures 1-1 and 1-2 *prior* to installation to ensure that the correct hardware will be used.

To install the equipment, follow the instructions in Figure 1-3.

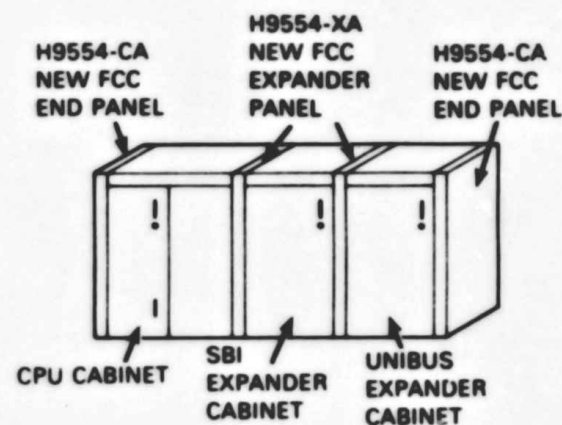
**A. END AND EXPANDER PANEL ARRANGEMENT AS SHIPPED WITH FCC-COMPLIANT OPTIONS**

**NOTE**

1. CPU CABINETS COME WITH TWO END PANELS.
2. EXPANDER CABINETS COME WITH ONE EXPANDER PANEL.



**B. END AND EXPANDER PANEL ARRANGEMENT OF AN INSTALLED SYSTEM CONSISTING OF FCC-COMPLIANT CABINET OPTIONS**



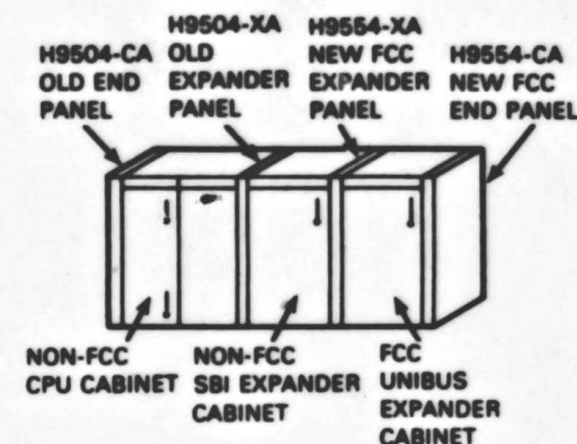
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Figure 1-1 End Panel and Expander Panel Usage in FCC-Compliant Systems

**A. END PANEL AND EXPANDER CONFIGURATION OF A SYSTEM COMPRISING NON-FCC COMPLIANT CPU AND SBI CABINETS WITH AN FCC UNIBUS CABINET ADDED TO THE RIGHT SIDE.**

**NOTE**

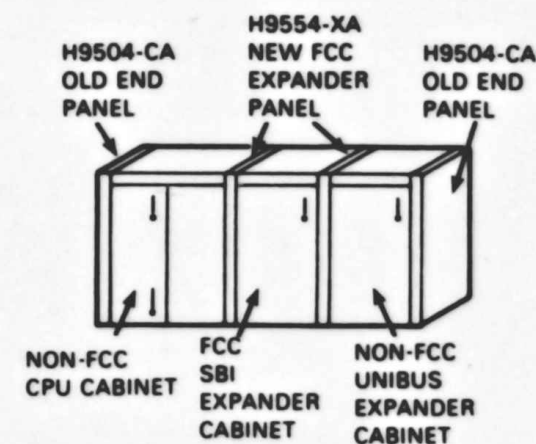
THIS CABINET CONFIGURATION REQUIRES THE ADDITION OF AN FCC-COMPLIANT END PANEL TO THE RIGHT SIDE OF THE UNIBUS CABINET. NOTE THAT THE OLD END PANEL, WHICH WAS ON THE RIGHT SIDE OF THE SBI CABINET, MUST BE DISCARDED.



**B. END PANEL AND EXPANDER PANEL CONFIGURATION OF A SYSTEM COMPRISING NON-FCC COMPLIANT CPU AND UNIBUS CABINETS WITH AN FCC SBI CABINET IN THE MIDDLE.**

**NOTE**

THIS CONFIGURATION REQUIRES THE ADDITION OF AN FCC EXPANDER PANEL FOR THE RIGHT SIDE OF THE UNIBUS CABINET. THE OLD EXPANDER PANEL, WHICH WAS BETWEEN THE CPU AND UNIBUS CABINETS, MUST BE DISCARDED.

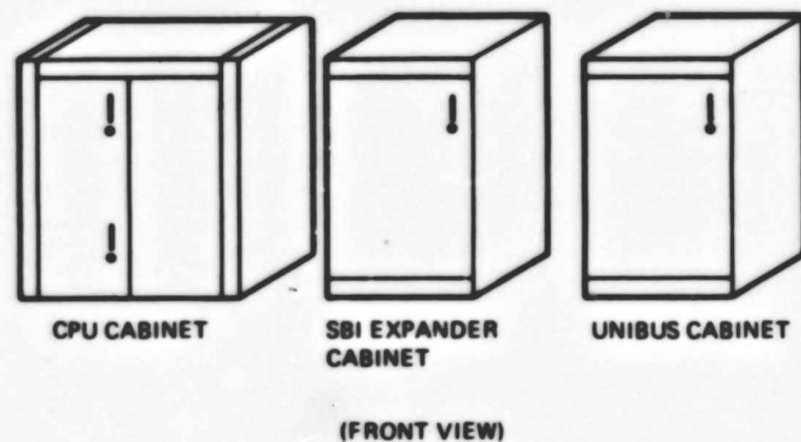


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Figure 1-2 End Panel and Expander Panel Usage in Non-FCC Compliant Systems



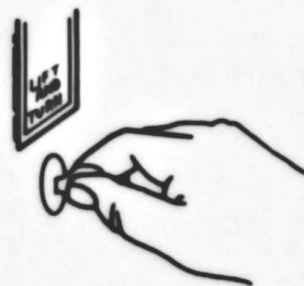
- ① ARRANGE THE EQUIPMENT WITH THE CPU CABINET ON THE LEFT, THE SBI EXPANDER CABINET (IF APPLICABLE) IN THE MIDDLE, AND THE UNIBUS CABINET ON THE RIGHT.



- ② UNLOCK ALL CABINET LOCKS.

**NOTE**

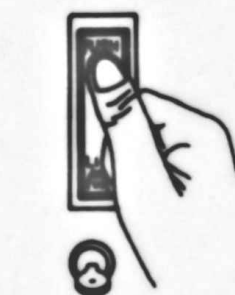
THE KEYLOCK REQUIRES ONLY A QUARTER TURN TO BE LOCKED OR UNLOCKED. THE KEY CAN BE REMOVED AFTER THE DOOR IS CLOSED AND LOCKED.



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Figure 1-3 System Installation Procedure (Sheet 1 of 14)

- ③ UNLATCH THE UNIBUS CABINET FRONT DOOR, THE SBI EXPANDER CABINET DOORS, AND THE CPU CABINET DOORS BY PUSHING AT THE TOP OF THE HANDLES AND THEN LIFTING AND TURNING THE HANDLES UNTIL THE DOORS CAN BE OPENED.



● PUSH IN

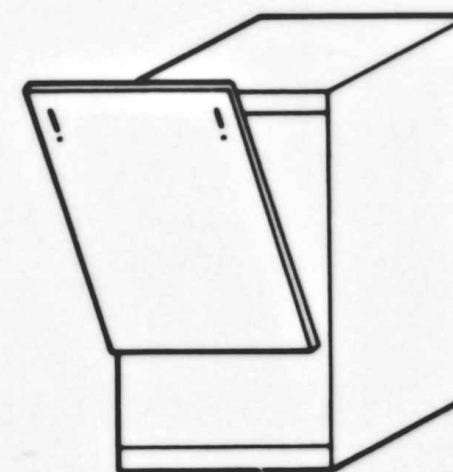


● LIFT



● ROTATE

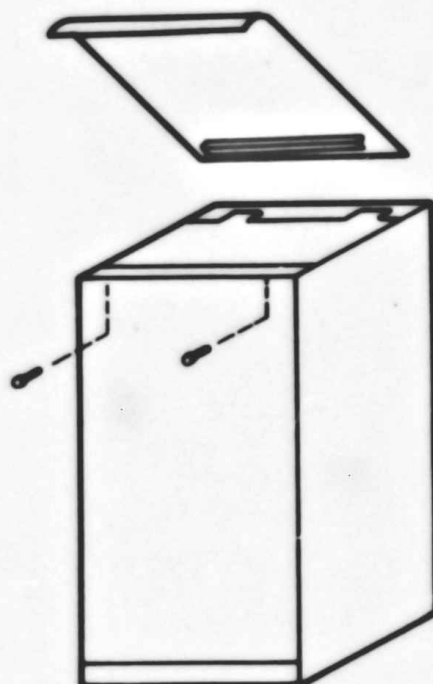
- ④ UNHINGE AND REMOVE ALL FOUR CPU CABINET DOORS, BOTH SBI EXPANDER CABINET DOORS, AND THE UNIBUS CABINET FRONT DOOR.
- ⑤ UNLATCH THE UNIBUS CABINET BACK COVER PANEL AND THEN LIFT IT UP AND AWAY FROM THE CABINET.



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Figure 1-3 System Installation Procedure (Sheet 2 of 14)

- ⑥ REMOVE TWO SCREWS FROM BENEATH THE UNIBUS CABINET BACK TO HORIZONTAL CROSSMEMBER AND THEN LIFT AND REMOVE THE TOP COVER.



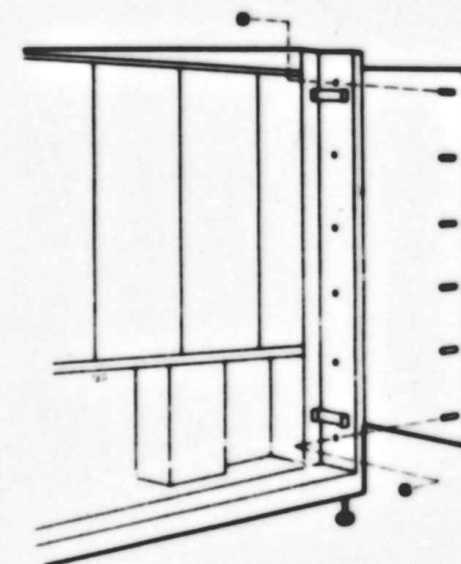
- ⑦ REMOVE TWO SCREWS FROM BENEATH THE SBI EXPANDER CABINET BACK TOP HORIZONTAL CROSSMEMBER AND THEN LIFT AND REMOVE THE TOP COVER.

- ⑧ REMOVE TWO SCREWS FROM BENEATH THE CPU CABINET BACK TOP HORIZONTAL CROSSMEMBER AND THEN LIFT AND REMOVE THE TOP COVER.

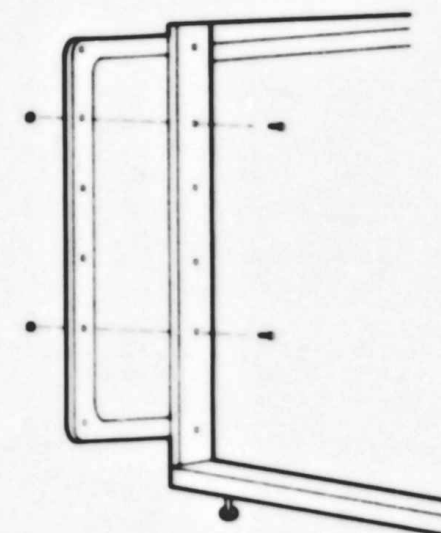
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Figure 1-3 System Installation Procedure (Sheet 3 of 14)

- ⑨ REMOVE 12 1/4-20 NUTS FROM THE CPU CABINET RIGHT FRONT AND BACK VERTICAL RAILS AND THEN REMOVE THE RIGHT END PANEL.



- ⑩ REMOVE 12 1/4-20 SCREWS AND NUTS FROM THE SBI EXPANDER CABINET LEFT FRONT AND BACK VERTICAL RAILS AND THEN REMOVE THE JOINER PANEL.



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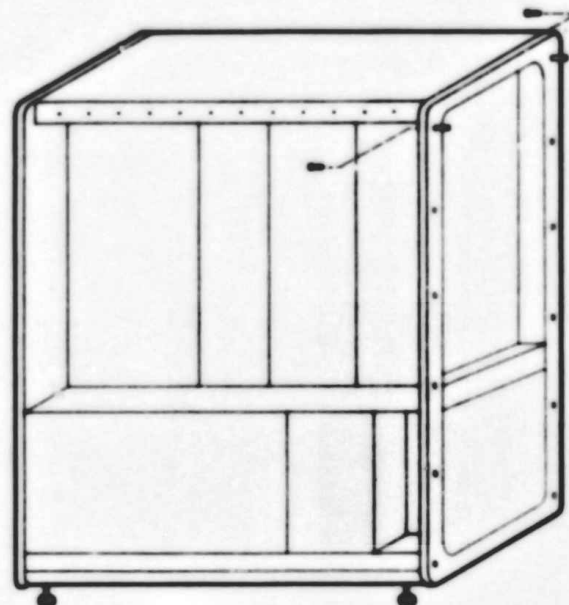
Figure 1-3 System Installation Procedure (Sheet 4 of 14)



- ⑪ LOOSELY ATTACH THE JOINER PANEL REMOVED FROM THE SBI EXPANDER CABINET TO THE RIGHT END OF THE CPU CABINET WITH TWO 1/4-20 SCREWS INSERTED FROM THE CPU CABINET SIDE OF THE JOINER PANEL.

**NOTE**

DO NOT USE NUTS AT THIS TIME TO ATTACH THE JOINER PANEL TO THE CPU CABINET.

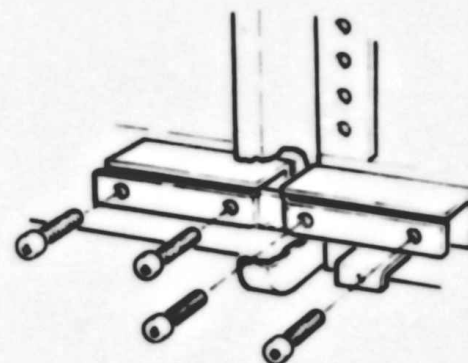


**NOTE:**  
FRONT OF CPU  
CABINET SHOWN

- ⑫ POSITION THE SBI EXPANDER CABINET AGAINST THE CPU CABINET.

**NOTE**

ADJUST THE LEVELER FEET ON BOTH CABINETS TO OBTAIN ALIGNMENT OF INTERCABINET SCREW HOLES.



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Figure 1-3 System Installation Procedure (Sheet 5 of 14)

- ⑬ INSTALL 10 ADDITIONAL 1/4-20 SCREWS IN THE EMPTY INTERCABINET HOLES AND THEN INSTALL 12 FINGER-TIGHTENED 1/4-20 NUTS.

**NOTE**

AFTER ALL SECURING HARDWARE HAS BEEN INSTALLED AND ALIGNED, TIGHTEN ALL NUTS WITH A RATCHET WRENCH.

- ⑭ REMOVE 12 1/4-20 SCREWS AND 12 NUTS FROM THE UNIBUS CABINET LEFT FRONT AND BACK VERTICAL CROSSMEMBERS AND THEN REMOVE THE JOINER PANEL.

- ⑮ LOOSELY ATTACH THE JOINER PANEL REMOVED FROM THE UNIBUS CABINET TO THE OPEN END OF THE SBI EXPANDER CABINET WITH TWO 1/4-20 BOLTS INSERTED FROM THE SBI EXPANDER CABINET SIDE OF THE JOINER PANEL.

**NOTE**

DO NOT USE NUTS AT THIS TIME TO ATTACH THE JOINER PANEL TO THE SBI EXPANDER CABINET.

- ⑯ POSITION THE UNIBUS CABINET AGAINST THE SBI EXPANDER CABINET (IF PRESENT).

**NOTE**

ADJUST THE LEVELER FEET ON BOTH CABINETS TO OBTAIN ALIGNMENT OF THE INTERCABINET BOLT HOLES.

- ⑰ INSTALL 10 ADDITIONAL 1/4-20 BOLTS IN THE EMPTY INTERCABINET HOLES AND THEN SECURE THEM WITH 12 FINGER-TIGHTENED 1/4-20 NUTS.

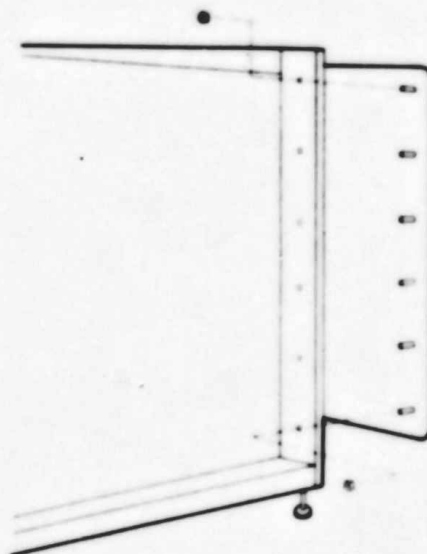
**NOTE**

AFTER ALL SECURING HARDWARE HAS BEEN INSTALLED AND ALIGNED, TIGHTEN NUTS WITH A RATCHET WRENCH.

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Figure 1-3 System Installation Procedure (Sheet 6 of 14)

- ⑮ INSTALL THE CPU CABINET RIGHT END PANEL ON THE OPEN SIDE OF THE UNIBUS CABINET AND SECURE IT WITH 12 1/4 20 NUTS



- ⑯ REINSTALL THE CPU CABINET TOP COVER AND SECURE IT WITH TWO 10 32 SCREWS.

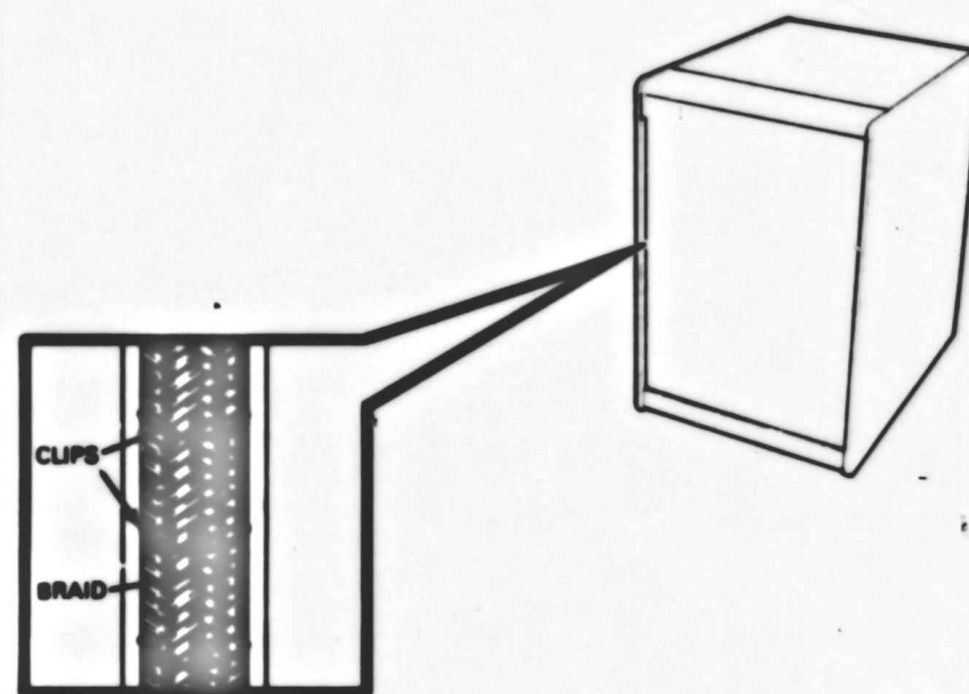
- ⑰ REINSTALL THE UNIBUS CABINET TOP COVER AND SECURE IT WITH TWO 10 32 SCREWS.

- ⑱ REINSTALL THE SBI EXPANDER CABINET TOP COVER AND SECURE IT WITH TWO 10 32 SCREWS

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Figure 1-3 System Installation Procedure (Sheet 7 of 14)

- ⑲ CHECK THAT NO BRAIDED RFI SHIELDING OR SECURING CLIPS ARE DAMAGED OR MISSING.



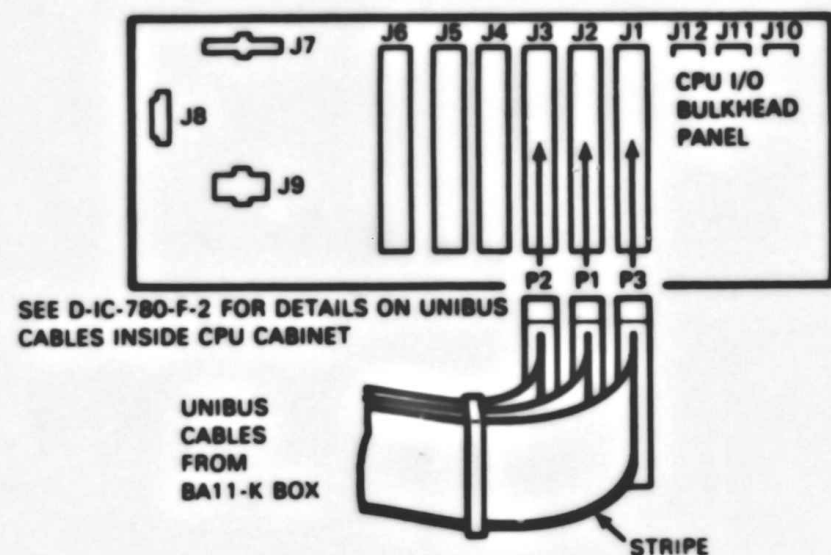
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Figure 1-3 System Installation Procedure (Sheet 8 of 14)

- 23 INSTALL THE THREE UNIBUS CABLES BY CONNECTING P2, P1, AND P3 OF THE THREE UNIBUS CABLES FROM THE BA11-K BOX IN THE UNIBUS EXPANDER CABINET TO JACKS J3, J2, AND J1, RESPECTIVELY, ON THE CPU CABINET SIDE I/O BULKHEAD PANEL.

**NOTE**

IF AN SBI EXPANDER CABINET IS USED, ROUTE THE THREE UNIBUS RIBBON CABLES THROUGH THE BOTTOM OF THE SBI CABINET AND CONNECT THEM AS DESCRIBED ABOVE.



- 24 CONNECT THE DIGITAL POWER CONTROL BUS CABLE (SHIPPED IN THE BOTTOM OF THE UNIBUS CABINET) FROM J8 ON THE 877 POWER CONTROLLER IN THE UNIBUS CABINET TO J8 ON THE CPU CABINET SIDE OF THE I/O BULKHEAD PANEL.

IF AN SBI CABINET IS USED CONNECT THE DIGITAL POWER CONTROL BUS CABLE (SHIPPED IN THE BOTTOM OF THE SBI CABINET) FROM J4 OF THE 869 POWER CONTROLLER IN THE SBI CABINET TO J8 OF THE CPU CABINET SIDE I/O BULKHEAD PANEL. NEXT, CONNECT THE POWER CONTROL BUS IN THE UNIBUS EXPANDER CABINET FROM J8 OF THE SBI CABINET SIDE I/O BULKHEAD PANEL.

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Figure 1-3 System Installation Procedure (Sheet 9 of 14)

- 25 CHECK JUMPERS FOR JCS AND THE SID REGISTER ON J11 AND J13 ON THE CPU BACKPLANE. THESE JUMPERS ARE INSTALLED IN THE STANDARD CONFIGURATION IN MANUFACTURING.

**JCS ADDRESS SELECTION**

| SLOT 18 | SLOT 20 |
|---------|---------|
| 0 TO 4K | 5 TO 8K |
| 5 TO 8K | 0 TO 4K |

**J11**

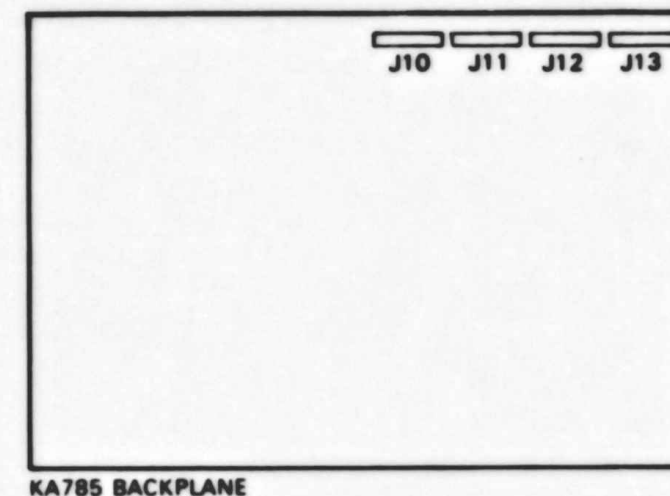
| J11-X | J11-LL        |
|-------|---------------|
| OUT   | IN (STANDARD) |
| IN    | OUT           |

**SID BITS**

| 23 | 22 | CPU      |
|----|----|----------|
| 0  | X  | 11/780   |
| 1  | 0  | 11/785   |
| 1  | 1  | RESERVED |

**J13**

| J13-NN | J13-RR        |
|--------|---------------|
| IN     | IN            |
| OUT    | IN (STANDARD) |
| OUT    | OUT           |



**EXPANDED VIEW OF J10, J11, J12, AND J13**

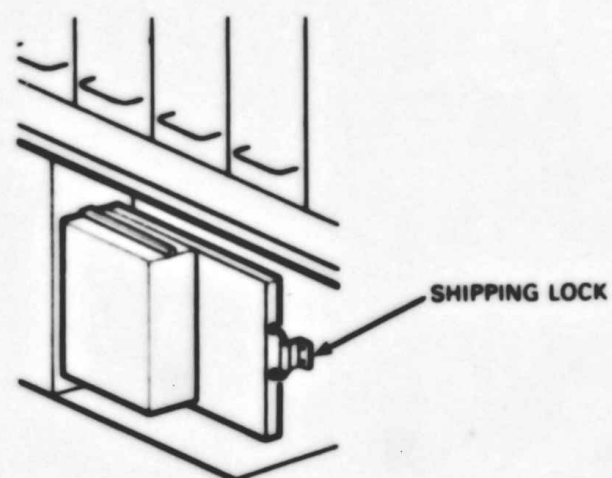
|   |   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
|---|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| B | D | D | J | L | N | R | T | V | X | Z | BB | DD | FF | JJ | LL | NN | RR | TT | VV |
| . | . | . | . | . | . | . | . | . | . | . | .  | .  | .  | .  | .  | .  | .  | .  | .  |
| A | C | E | H | K | M | P | S | U | W | Y | AA | CC | EE | HH | KK | MM | PP | SS | UU |

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Figure 1-3 System Installation Procedure (Sheet 10 of 14)



- ②⑥ REMOVE THE DISKETTE DRIVE ASSEMBLY SHIPPING LOCK.

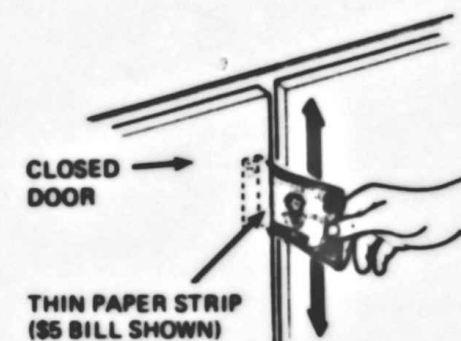


- ②⑦ REFER TO PART II, OPTIONS INSTALLATION, FOR ADDITIONAL INSTALLATION PROCEDURES.
- ②⑧ CHECK ALL INTERNAL AND EXTERNAL CABLING AND REINSTALL THE CABINET DOORS WHEN THE OPTION INSTALLATION IS COMPLETE. SECURE THE LOCKS.
- ②⑨ REINSTALL ALL DOORS AND COVERS.

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Figure 1-3 System Installation Procedure (Sheet 11 of 14)

- ③⑩ CHECK THE RF SEALS AROUND THE DOOR AND COVERS FOR CONTINUITY. TO DO THIS, INSERT A THIN STRIP OF PAPER INTO EACH SEAM AROUND DOORS AND COVERS AND CHECK FOR RESISTANCE WHILE MOVING THE STRIP ALONG THE SEAM. IF THERE IS NO RESISTANCE, THE SEAM WILL NOT PROVIDE AN EFFECTIVE RF SEAL, IN WHICH CASE, IT MUST BE ADJUSTED UNTIL A PROPER RF SEAL IS ATTAINED.



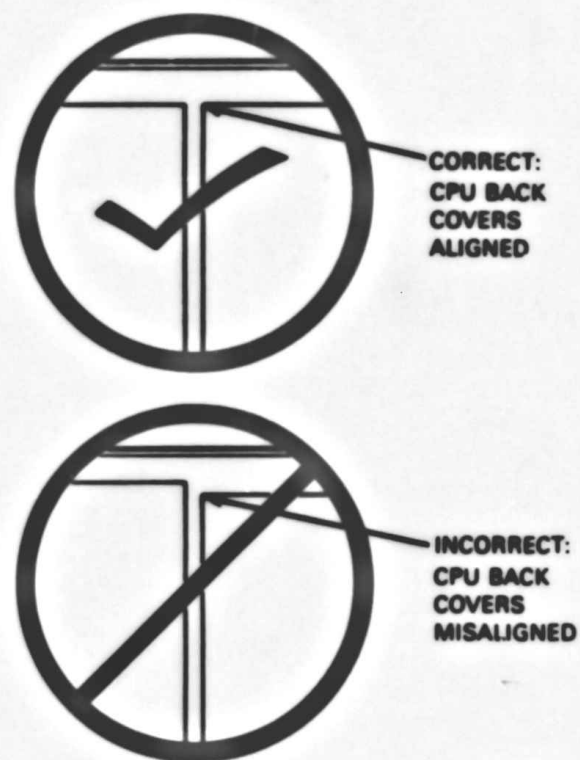
MKV84-2082

Figure 1-3 System Installation Procedure (Sheet 12 of 14)

- ③① CHECK THAT THE EQUIPMENT DOORS AND COVERS ARE ALIGNED ON THE CABINETS AND ADJUST LEVELER FEET AS NECESSARY TO ACHIEVE PROPER ALIGNMENT.

**NOTE**

DOORS MUST BE PROPERLY ALIGNED ON CABINETS SO THAT RFI SUPPRESSION FEATURES OF CABINETS WILL REMAIN VALID.



MKV84-2083

Figure 1-3 System Installation Procedure (Sheet 13 of 14)

- ③② LOCATE THE CONSOLE TERMINAL NEAR THE FRONT OF THE CPU CABINET.
- ③③ PLUG THE CONSOLE TERMINAL I/O CABLE INTO CONNECTOR LOCATION D OF THE I/O CONNECTOR PANEL AT THE LOWER BACK OF THE CPU CABINET.
- ③④ CONNECT THE CONSOLE TERMINAL POWER CABLE TO AN EXTERNAL CUSTOMER AC OUTLET NEAR THE TERMINAL.

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Figure 1-3 System Installation Procedure (Sheet 14 of 14)

### 1.3 POWER CHECK

Figure 1-4 illustrates various ac power receptacles and plugs. The CPU cabinet and the SBI expander cabinet (if used) require three-phase ac power. The UNIBUS expander cabinet requires single-phase ac power.

Measure the voltage between each of the three phases and neutral on the three-phase power source receptacles.

Measure the voltage between the source and neutral lines on the single-phase power source receptacles, and also to ground and between earth ground and neutral (8 volts maximum).

The ac power receptacles must meet the specifications listed in Table 1-1.

| SOURCE                                                                   | PLUG                                                | RECEPTACLE                   |
|--------------------------------------------------------------------------|-----------------------------------------------------|------------------------------|
| 120 V<br>15 A<br>1-PHASE                                                 | HUBBEL<br>#0000-C<br>NEMA # 5-15P<br>DEC # 00-00000 | #0000<br>5-15R<br>12-00001   |
| 120 V<br>20 A<br>1-PHASE                                                 | HUBBEL<br>#2011<br>NEMA # L5-20P<br>DEC # 12-11100  | #2010<br>L5-20R<br>12-11104  |
| 120/200-240 V<br>20 A<br>2-PHASE<br>OR<br>120/200 V<br>20 A<br>3-PHASE Y | HUBBEL<br>#2011<br>NEMA # L14-30P<br>DEC # 12-11040 | #2010<br>L14-30R<br>12-11040 |
| 120/200 V<br>20 A<br>3-PHASE Y                                           | HUBBEL<br>#2011<br>NEMA # L21-30P<br>DEC # 12-11200 | #2010<br>L21-30R<br>12-11210 |
| 240 V<br>15 A<br>1-PHASE                                                 | NEMA # 6-15P<br>DEC # 00-00003                      | 6-15R<br>12-11204            |
| 240 V<br>20 A<br>1-PHASE                                                 | HUBBEL<br>#2321<br>NEMA # L6-20P<br>DEC # 12-11102  | #2320<br>L6-20R<br>12-11101  |
| 240/415 V<br>20 A<br>3-PHASE Y                                           | NEMA # -- NOT NEMA<br>DEC # 12-00010                | NOT NEMA<br>12-11200         |
| 120/200 V<br>30 A<br>3-PHASE Y                                           | HUBBEL<br>#2011<br>NEMA<br>L21-30P<br>DEC 12-12314  | #2010<br>L21-30R<br>12-12316 |

MX V04-1010

Figure 1-4 Power Plugs and Receptacles



**Table 1-1 AC Power Requirements**

| <b>Three-Phase</b>                                | <b>Nominal</b> | <b>Minimum</b> | <b>Maximum</b> |
|---------------------------------------------------|----------------|----------------|----------------|
| Vac                                               | 120            | 100            | 127            |
| Hz                                                | 50             | 49             | 61             |
| Hz                                                | 60             | 59             | 61             |
| Current in amps                                   |                |                | 20             |
| Vac                                               | 240            | 200            | 254            |
| Hz                                                | 50             | 49             | 51             |
| Hz                                                | 60             | 59             | 61             |
| Current in amps                                   |                |                | 10             |
| <b>Single-Phase (for UNIBUS expander cabinet)</b> |                |                |                |
| Vac                                               | 120            | 90             | 132            |
| Hz                                                | 50             | 47             | 63             |
| Hz                                                | 60             | 47             | 63             |
| Current in amps                                   | 12             |                |                |
| Vac                                               | 240            | 180            | 264            |
| Hz                                                | 50             | 47             | 65             |
| Hz                                                | 60             | 47             | 63             |
| Current in amps                                   | 7              |                | 10             |

# CHAPTER

2

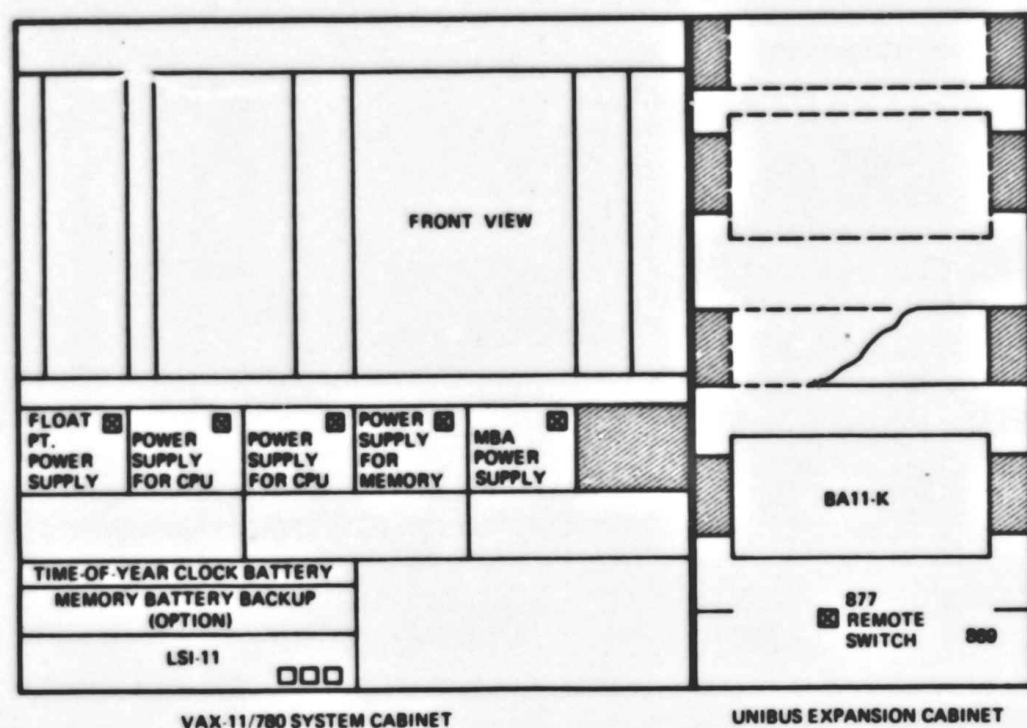


## CHAPTER 2 CHECKOUT AND ACCEPTANCE PROCEDURE

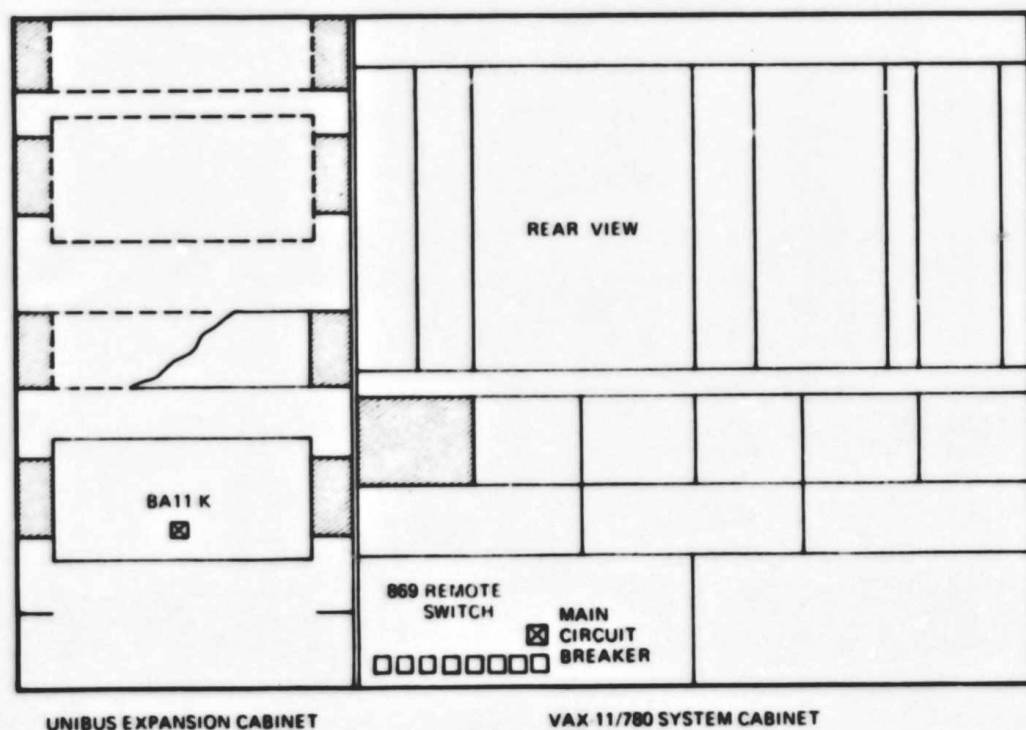
### 2.1 SYSTEM INITIAL START-UP PROCEDURE

1. Check that all circuit breakers (Figure 2-1), including those in the system power supplies, are off.
2. Check that all power control sense switches are in the remote position.
3. Check that the auto restart switch on the control panel (top front of system cabinet) is in the off position.
4. Connect the power cable for the system cabinet to the customer power source. Connect the power cable for the UNIBUS expander cabinet to the customer power source. Connect the power cable for the console terminal and the other free-standing peripheral devices to the customer power source. Note that the system cabinet (and the SBI expander cabinet) and the RP06 disk drive require, if used, three-phase ac power. The UNIBUS expander cabinet and the remaining peripheral devices require single-phase ac power.
5. Set the main circuit breaker on the power controller to on (up).
6. Check that the memory blower (the middle blower) is functioning.
7. Set the three secondary circuit breakers on the 869 power control module to on.
8. Set all remaining circuit breakers (including the following) to the on (up) position.
  - a. H7111 battery back-up circuit breakers
  - b. H7112 battery back-up circuit breakers (if used)
  - c. 869 circuit breakers in the CPU cabinet and the CPU expander cabinet
  - d. 877 circuit breakers in the UNIBUS expander cabinet
  - e. All circuit breakers on free-standing peripheral devices
9. Check that the console terminal power is on. The LSI-11 halt enable switch should be set to enable (up), the LSI-11 power switch set to on (up), and the LTC switch set to off (down).
10. Set the five-position key switch on the control panel to the local position.
11. Check that all blowers are functioning.





FRONT VIEW



REAR VIEW

Figure 2-1 Circuit Breaker Locations

TK-7100

## 2.2 SYSTEM CHECK-OUT PROCEDURE

The system check-out procedure consists of running all diskettes listed in Table 2-1.

Table 2-1 on Separate Sheet

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ENLARGED BELOW

The check-out procedure includes running microdiagnostics (RX2A and either RX3A or RX8A), running macrodiagnostics, and then booting VMS and running UETP.

### NOTE

In the following procedures, items in blue indicate input to be typed at the console terminal.

Table 2-1 Basic VAX-11/785 Diskette Directory

| RX Number                                                                               | Diagnostic Title                                                                                                                                                                                          | Part Number |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 2A                                                                                      | 11785 Microdiagnostic #1                                                                                                                                                                                  | AS-T623?-DE |
| 3A *                                                                                    | 11785 Microdiagnostic #2                                                                                                                                                                                  | AS-T679?-DE |
| 5                                                                                       | 11785 Microdiagnostic #4                                                                                                                                                                                  | AS-T791?-DE |
| 7                                                                                       | VAX11780 Diagnostic Supervisor                                                                                                                                                                            | AS-E160?-DE |
| EVSA.A.EXE<br>EVSA.A.HLP<br>DIAGBOO.EXE<br>SBBBOO.CMD                                   | VAX Diagnostic Supervisor<br>Supervisor Help File<br>VAX Diagnostic Secondary Boot Program<br>VAX Diagnostic Supervisor Boot Command                                                                      |             |
| 8A *                                                                                    | 11785 Microdiagnostic #3                                                                                                                                                                                  | AS-T680?-DE |
| 25                                                                                      | VAX-11 Instruction #2                                                                                                                                                                                     | AS-F748?-DE |
| EVKAC.EXE<br>EVKAC.HLP<br>EVKAD.EXE<br>EVKAE.EXE<br>EVKAE.HLP<br>EVKAM.EXE<br>EVKAM.HLP | Floating Point Instruction<br>Help File for EVKAC.EXE<br>Compatibility Mode Instruction<br>Privileged Arch Instruction<br>Help File for EVKAE.EXE<br>VAX Memory User Mode Test<br>Help File for EVKAM.EXE |             |
| 61                                                                                      | 11780/11785 VAX Bus and Autosizer                                                                                                                                                                         | AS-T139?-DE |
| ESCAA.EXE<br>ESCBA.EXE<br>EVCEA.EXE<br>EVCEA.HLP<br>EVSBA.EXE<br>EVSBA.HLP              | MASSBUS Channel Adapter Diagnostic<br>UNIBUS Channel Adapter Diagnostic<br>VAX UNIBUS Switch Function<br>Help File for EVCAE.EXE<br>VAX Autosizer<br>Help File for EVSAB.EXE                              |             |
| 62                                                                                      | VAX-11 Instruction #1                                                                                                                                                                                     | AS-T140?-DE |
| EVKAA.EXE<br>EVKAB.EXE<br>EVKAB.HLP                                                     | VAX-11 Hardcore Instruction<br>VAX-11 Architectural Instruction<br>Help File for EVKAB.EXE                                                                                                                |             |

\*Run either RX3A or RX8A.

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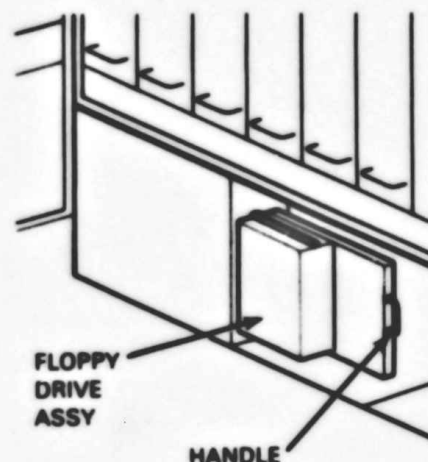
### 2.2.1 Bootstrapping the System

Insert console diskette RX1A VAX-11/785 console package into the drive assembly, following the instructions in Figure 2-2.

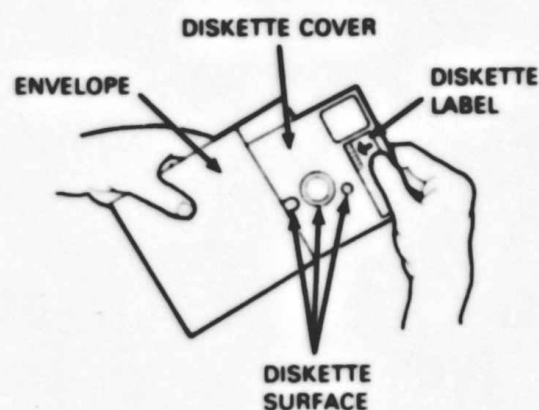
- ① UNLOCK AND OPEN THE FRONT DOORS OF THE CPU CABINET.
- ② GRASP THE HANDLE ON THE SIDE OF THE DISKETTE DRIVE ASSEMBLY AND SWING THE DRIVE OUT PERPENDICULAR TO THE CPU CABINET.

#### NOTE

DISKETTES CANNOT BE INSERTED IF THE DRIVE ASSEMBLY IS NOT PERPENDICULAR TO THE CPU CABINET.



- ③ GRASP THE DISKETTE AT THE LABEL AND REMOVE IT FROM THE PROTECTIVE COVER.



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Figure 2-2 Diskette Loading Procedure (Sheet 1 of 3)

#### CAUTION

HOLD THE DISKETTE ONLY BY THE LABEL AREA.

DO NOT TOUCH ANY EXPOSED AREA OF THE DISKETTE.

NEVER WRITE ON THE DISKETTE COVER.

IF THE DISKETTE BECOMES DIRTY OR DUSTY, DO NOT ATTEMPT TO CLEAN IT. DISPOSE OF IT INSTEAD.

NEVER INSERT A DIRTY OR DUSTY DISKETTE INTO THE DRIVE ASSEMBLY.

DO NOT USE PAPER CLIPS ON THE DISKETTE.

KEEP THE DISKETTE AWAY FROM ANY METAL OR OTHER MATERIAL THAT MIGHT BE MAGNETIZED.

DO NOT BEND THE DISKETTE.

DO NOT EXPOSE THE DISKETTE TO HEAT OR SUNLIGHT.

RETURN THE DISKETTE TO ITS PROTECTIVE COVER WHENEVER IT IS REMOVED FROM THE DRIVE ASSEMBLY.

STORE DISKETTES FLAT IN BOXES WHEN NOT IN USE.

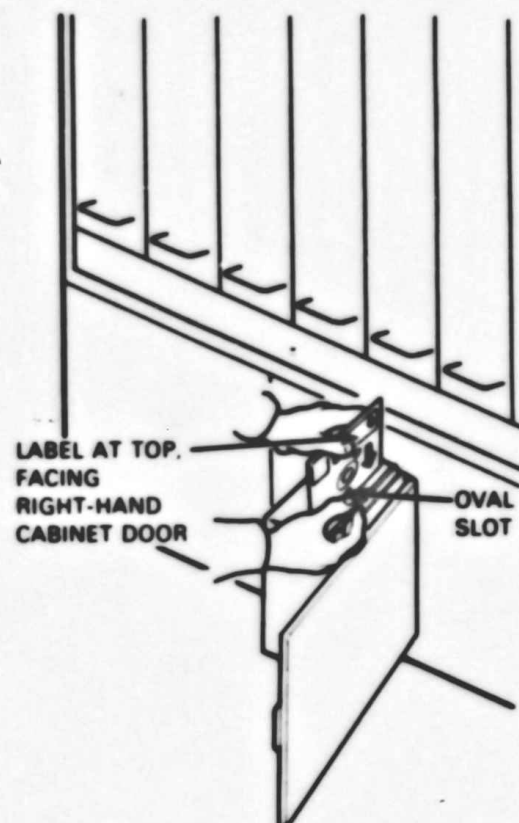
- ④ SQUEEZE THE DRIVE ASSEMBLY HANDLE WITH THE THUMB AND FOREFINGER; THE HANDLE WILL SPRING ASIDE.

MKV84-2201

Figure 2-2 Diskette Loading Procedure (Sheet 2 of 3)



- ⑤ HOLD THE DISKETTE BY THE LABEL AREA AND INSERT IT INTO THE DRIVE ASSEMBLY.



- ⑥ CLOSE THE DRIVE ASSEMBLY SLOT COVER.

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Figure 2-2 Diskette Loading Procedure (Sheet 3 of 3)

#### NOTE

If the system has been turned off, turn it on by setting the auto restart switch to off and the keyswitch to local. If the system has already been powered on, and it is not in the console mode (>>> prompt), momentarily set the LSI-11 halt/enable switch to halt (down). This will output the PC+2 of the LSI-11 and produce an ODT prompt (Ⓢ) on the console terminal. Type 173000G to bring the system to console mode.

With the auto restart switch set to off, turn the keyswitch to local. The console software (CONSOL.SYS) loads into the LSI-11 memory from the diskette. The control store then loads into the VAX-11/785 CPU from the SSunnn.WCS file, where nnn is the writable control store version number. The console is now in the console I/O mode of operation.

Type:

>>>B

to boot the CPU from the default device (DEFBOO.CMD).

#### 2.2.2 Running Microdiagnostics

1. Microdiagnostic Test #1 - The RX2A Microdiagnostic Volume 1 diskette is used to run the following diagnostics:
  - ETKAB VAX-11/785 (KA785) microdiagnostic monitor
  - ETKAD VAX-11/785 (KA785) hardcore test stream
  - ETKAH VAX-11/785 (KA785) microdiagnostic test #1

#### NOTE

The names of these tests are printed out as microdiagnostic test #1 runs.

- A. Insert RX2A, VAX-11/785 microdiagnostic #1 diskette (AS-T623?-DE), into the the disk drive (Figure 2-2).
- B. Notify the console that the test (T) will enter the control mode (C) by typing:
 

>>>T/C
- C. Run two (2) passes (PA) of microdiagnostic (DI) tests by typing, after the microdiagnostic (MIC>) prompt:
 

MIC>DI PA:2
- D. Remove the microdiagnostic #1 diskette from the disk drive (Figure 2-2).

2. Microdiagnostic Test #3 - The Microdiagnostic #3 diskette is used to run ETKAR, VAX-11/785 (KA785) microdiagnostic test #3, to test systems with MS780-E memory.

- A. Insert RX8A, VAX-11/785 microdiagnostic #3 diskette (AS-T680?-DE), into the disk drive (Figure 2-2).
- B. Run the microdiagnostic #3 test by typing, after the prompt:  
MIC> DI PA:2
- C. Remove the microdiagnostic #3 diskette from the disk drive assembly.

**NOTE**

If the system being installed contains an MS780-C memory, use RX3A microdiagnostics diskette #2 in place of RX8A.

### 2.2.3 Running Macrodiagnostics

1. Install the standard console diskette RX1A.
2. Reload, after bringing up the console prompt, the VAX-11/785 microcode by typing:  
>>>LOAD WCS
3. Remove the standard console diskette.
4. Install the diagnostic supervisor diskette RX7.
5. Type the following:  
>>>L ESSAA.EXE/S:FE00  
>>>S 10000
6. Remove the diagnostic supervisor diskette.
7. Run the VAX autosizer, EVSBA, located on diskette RX61.

**NOTE**

The autosizer passes configuration information to the diagnostic supervisor. It creates a series of attach commands, based on the hardware it found during its sizing process, which it passes to the supervisor and which may be written to the console load medium for later use. Running EVSBA at this time determines which devices are configured properly and which are not. Fix any hardware not "seen" by the autosizer and then rerun the autosizer until each device is "seen." Proceed to step 8.

8. Install VAX INSTR #1 diskette RX62.
9. Type, after the prompt (DS>) the following:  
DS> L EVKAB  
DS> ATTACH KA785

Use the attach command if EVSBA has not been run and answer the following questions:

**NOTE**

These questions appear only if the prompt mode is entered by pressing returns.

Device Link? HUB

Device Name? KA0

G-floating instructions? Y

H-floating instructions? Y

JCS last address? 1FFF

ACC TYPE 1 or 0? 1

Then type the following:

DS> SEL KA0

DS> START

10. Remove the VAX INSTR #1 diskette.
11. Run the remainder of the diskettes listed in Table 2-1.

### 2.2.4 Booting VMS and Running UETP

1. Boot VMS by typing, after the console prompt:  
>>>BOOT DDn  
"DD" is the device type and "n" is the unit number. See Table B-1 for a list of device types.
2. Log into the SYSTEST account:  
USERNAME: SYSTEST  
PASSWORD: UETP

**NOTE**

**This password will not echo when you type it.**

**3. Run UETP**

**To run UETP, type:**

**\$ @UETP**

**NOTE**

**Refer to the *VAX/VMS User's Guide* (AA-D643C-TE) for information on running UETP.**



# CHAPTER

3

## CHAPTER 3 UNPACKING AND INSPECTING OPTIONS

### NOTE

See the *VAX-11/780 Installation Manual* (EK-SI780-IN or EK-SI78F-IN) for installation information on the following options: DW780, DR780, RH780, MS780, and CI780.

### 3.1 GENERAL

Unpacking and inspecting of options consists of:

1. Setting up a static discharge system
2. Unpacking and inspecting option component parts

### CAUTION

Small component parts such as cardcage assemblies, modules, and chips must be unpacked and inspected on the static discharge system mat to prevent equipment damage from static electricity discharges.

### 3.2 STATIC DISCHARGE SYSTEM SET-UP

### NOTE

The following information is for the field service representative. The self-maintenance customer must follow similar precautions.

1. Unpack a Velostat™ static discharge system (CD kit number A2-W0299-10).
2. Unfold the Velostat™ mat.
3. Attach the 15-foot ground cord to the mat snap fastener.
4. Connect the 15-foot ground cord alligator clip to a good electrical ground point in the VAX-11/785.
5. Attach the wrist strap to your wrist.
6. Connect the wrist strap grounding strap to a convenient part of the mat.

---

Velostat™ is a trademark of the Minnesota Mining and Manufacturing Company.

### **3.3 UNPACKING**

1. Check that the shipping container is sealed and undamaged and that the correct number of containers was shipped. Report any differences to the customer and also on a LARS report form.

#### **CAUTION**

Use the static discharge system when handling component parts small enough to be placed on the static discharge system mat. Use of the mat will prevent equipment damage from static electricity discharges.

2. Open the containers one at a time, starting with the one marked "Open Me First." Check the contents against the packing slip and record any missing items on the installation report.

#### **NOTE**

If any items are missing, the customer should check with the carrier.

Packing materials (such as foam fillers and plastic inserts) should be retained if reshipment is expected.

### **3.4 INSPECTING**

Inspect the equipment for any damage. If any damage is found notify the customer and also record it on the installation report. Damaged components requiring replacement should be immediately reported to the branch service manager.

#### **CAUTION**

Use the static discharge system when handling component parts small enough to be placed on the static discharge system mat. Use of the mat will prevent equipment damage from static electricity discharges.



# CHAPTER

4

## **CHAPTER 4**

### **FP785 FLOATING-POINT ACCELERATOR**

#### **4.1 GENERAL**

The FP785 is a high-performance, floating-point accelerator for single- and double-precision floating-point instructions and POLY, EMOD, and MULL.

The FP785 consists of:

- Five extended hex modules (M7540, M7541, M7542, M7543, and M7544)
- H7100 power supply
- Interconnecting power supply cables

#### **CAUTION**

FP785 modules contain components that can be damaged by electrostatic discharge. Do not handle without the use of a Velostat™ kit, (CD kit A2-W0299-10) or other approved antistatic material. See Chapter 3 for the installation of the Velostat™ kit.

#### **4.2 FP785 INSTALLATION**

1. Shutdown the system (Figure 4-1).
2. Install the FP785 (Figure 4-2).

#### **4.3 FP785 DIAGNOSTICS**

1. Power up the system (Figure 4-3).
2. Run one pass for each of the following diagnostics:
  - a. ETKAJ
  - b. EVKAC
  - c. UETP

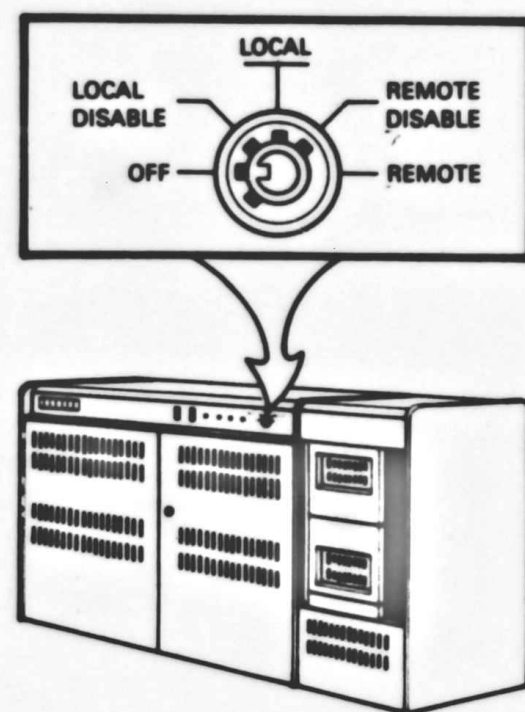
#### **NOTE**

Chapter 2 describes the running of diagnostics.

① HALT THE SYSTEM BY LOGGING IN AND TYPING:

USERNAME: SYSTEM  
PASSWORD: MANAGER  
\$ @SYSSSYSTEM: SHUTDOWN  
HOW MANY MINUTES UNTIL SHUTDOWN? 0  
REASON? MAINT  
DO YOU WANT TO SPIN DOWN THE DISKS? NO

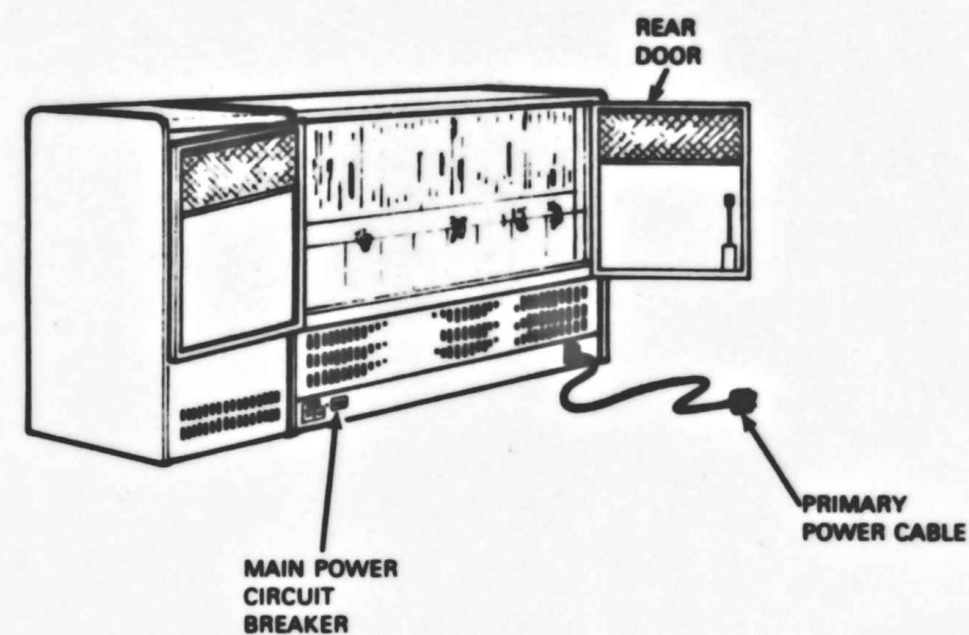
② TURN THE KEYSWITCH TO OFF.



MKV84-2086

Figure 4-1 System Shutdown Procedure (Sheet 1 of 2)

③ SET THE MAIN POWER CIRCUIT BREAKER TO OFF (DOWN).



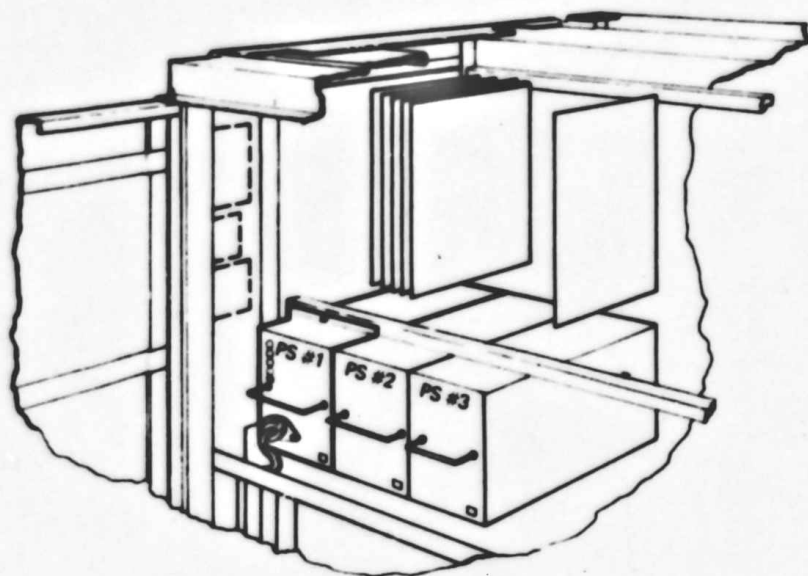
④ DISCONNECT THE PRIMARY POWER CABLE FROM THE OUTLET.

MKV84-2087

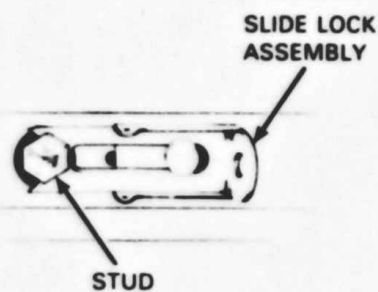
Figure 4-1 System Shutdown Procedure (Sheet 2 of 2)



- ① TURN OFF THE SYSTEM POWER (FIGURE 4-1).
- ② REMOVE THE BLANK POWER SUPPLY PANEL FROM POWER SUPPLY SLOT 1.



- ③ INSTALL THE H7100 POWER SUPPLY IN SLOT 1.
- ④ ENGAGE THE STUD WITH THE SLIDE LOCK ASSEMBLY AT THE REAR OF POWER SUPPLY 1.

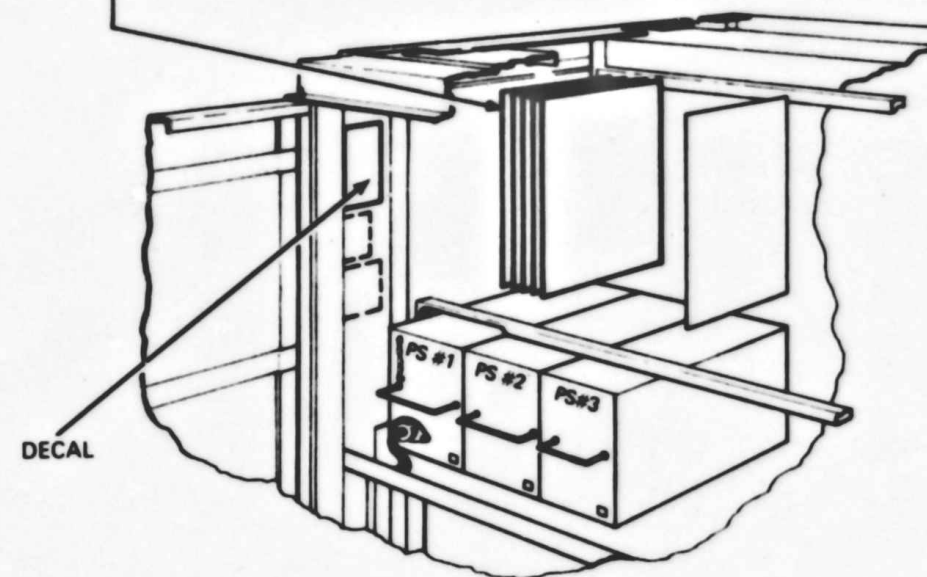


MKV84-2088

Figure 4-2 FP785 Installation Procedure (Sheet 1 of 4)

- ⑤ REMOVE THE MODULE SIMULATORS FROM BACKPLANE SLOTS 24 THROUGH 28.
- ⑥ INSTALL THE FP785 MODULES IN SLOTS 24 THROUGH 28.

|   | 29 | 28 | 27 | 26 | 25 | 24 | 23 |
|---|----|----|----|----|----|----|----|
| A |    | M  | M  | M  | M  | M  |    |
|   |    | 7  | 7  | 7  | 7  | 7  |    |
| B |    | 5  | 5  | 5  | 5  | 5  |    |
|   |    | 4  | 4  | 4  | 4  | 4  |    |
| C |    | 4  | 3  | 2  | 1  | 0  |    |

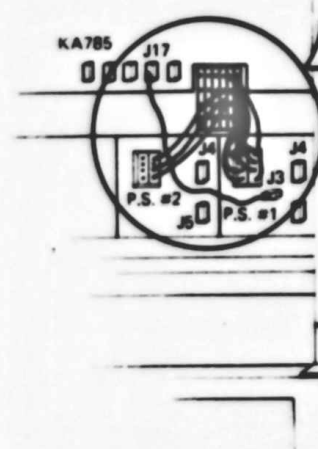
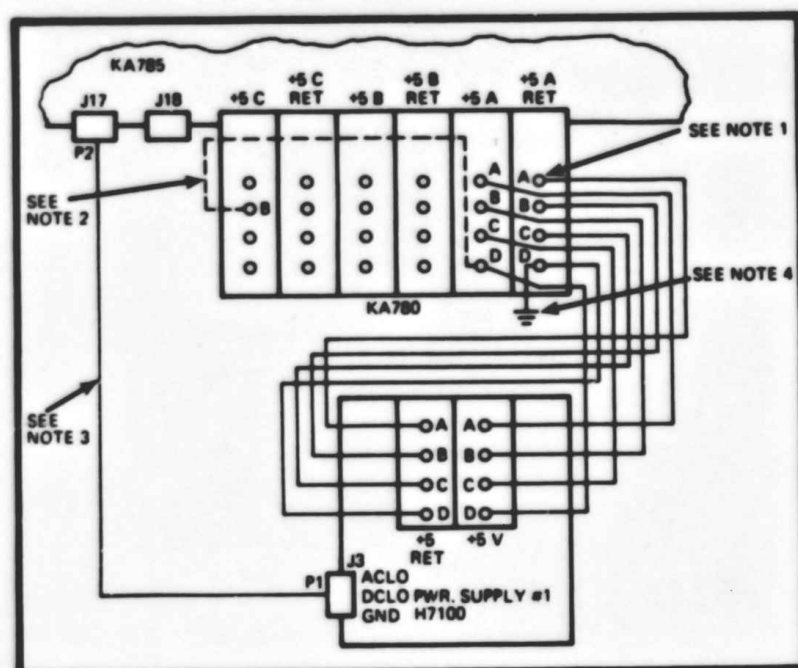


- ⑦ ATTACH THE DECAL.

MKV84-2089

Figure 4-2 FP785 Installation Procedure (Sheet 2 of 4)

8 INTERCONNECT THE FP785 AND THE H7100.



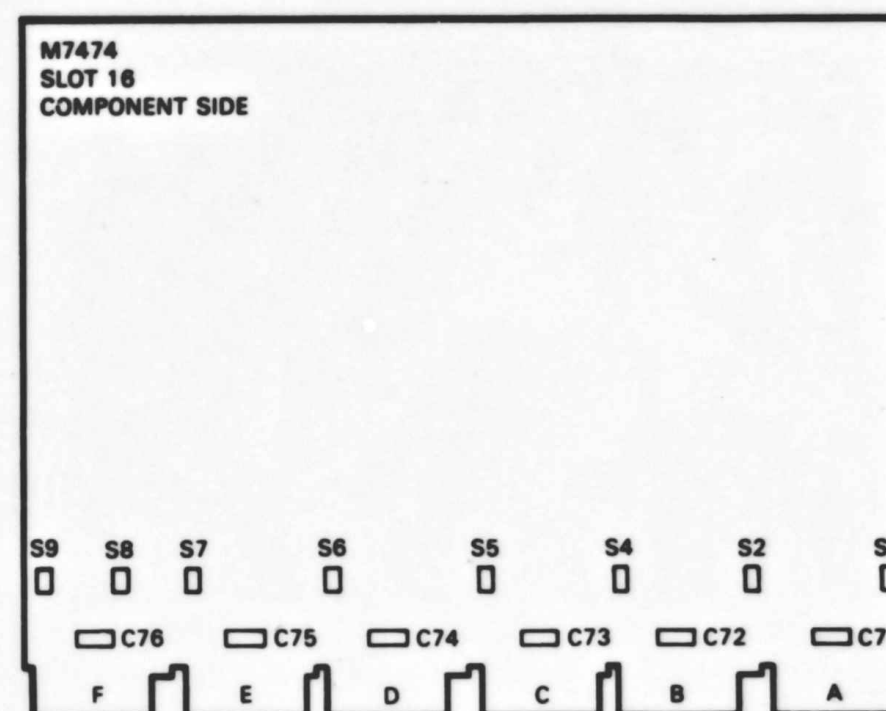
NOTE

1. COVER TERMINALS WITH PLASTIC NUTS.
2. REMOVE JUMPER WIRE (+5C-B TO +5A-D) WHEN FP785 IS INSTALLED.
3. REMOVE END OF CABLE PLUGGED INTO J13 OF DW780 AND PLUG IT INTO J3 OF POWER SUPPLY.
4. VERIFY THAT WIRE FROM KA785 (+5 RET-D) TO CAB FRAME REMAINS CONNECTED WHEN INSTALLTION OF WIRE FROM P.S. NO. 1 (+5 RET D) TO KA785 (-5 RET-D) IS COMPLETE.

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Figure 4-2 FP785 Installation Procedure (Sheet 3 of 4)

- 9 TORQUE GROUND AND +5 V WIRES ON POWER SUPPLY TO 30 INCH-POUNDS.
- 10 CONNECT POWER SUPPLY 1 AC POWER CABLE TO J1, J3, J4, OR J5 OF THE 889 POWER CONTROLLER.
- 11 REMOVE M7474 FROM BACKPLANE SLOT 16 AND TURN ON SWITCHES S1, S2, S4, S5, S6, S7, S8, AND S9. (THE ON POSITION IS AWAY FROM THE MODULE FINGERS.) ALL OTHER SWITCHES ARE OFF.

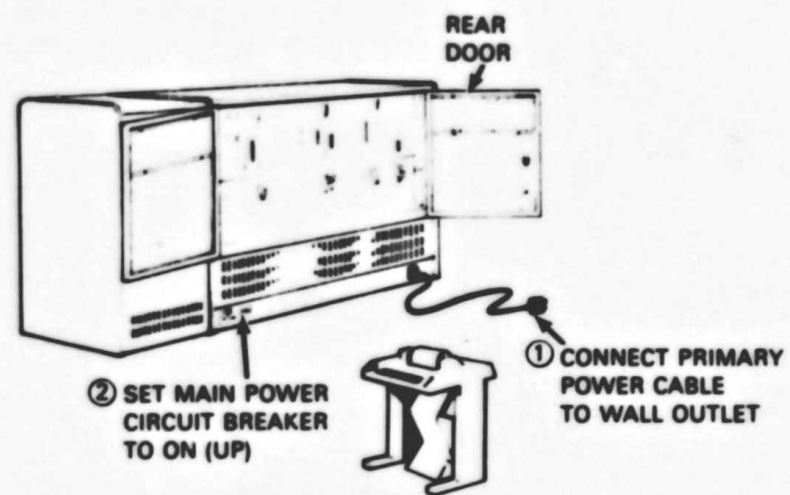


- 12 REINSTALL M7474.

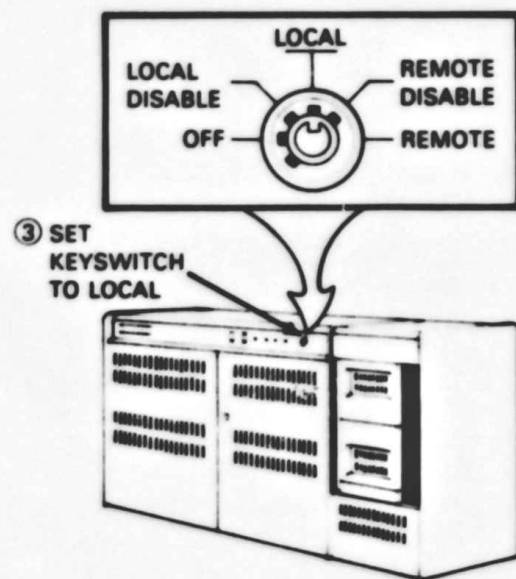
MKV84-2081

Figure 4-2 FP785 Installation Procedure (Sheet 4 of 4)

- ① CONNECT THE PRIMARY POWER CABLE TO THE WALL OUTLET.
- ② SET THE MAIN POWER CIRCUIT BREAKER TO ON (UP).



- ③ TURN THE KEYSWITCH TO LOCAL.



MKV84-2092

Figure 4-3 System Power-Up Procedure



# CHAPTER

5

## CHAPTER 5 780UP UPGRADE KIT INSTALLATION

### 5.1 GENERAL

#### 5.1.1 Upgrade Configuration

Upgrading a KA780 to a KA785 consists of replacing the CPU cardcage and backplane assembly, inserting new CPU modules, replacing the memory board in the LSI-11, and attaching a new logo to the CPU cabinet.

#### NOTE

The following configuration rules must be followed:

1. Check that all system options are at the minimum acceptable revision or higher. See Section 5.2 for information on revision levels.
2. The FP785 is not interchangeable with the FP780. The FP785 can be used only with the KA785, and the FP780 only with the KA780.

#### 5.1.2 Upgrade Variations

Four variations of the upgrade kit are available. The variation is indicated on the outside of the upgrade kit master carton.

- 780UP-XA standard upgrade kit, includes FPA
- 780UP-XB standard upgrade kit, does not include FPA
- 780UP-XC special upgrade kit, includes FPA
- 780UP-XD special upgrade kit, does not include FPA

The standard upgrade kit is for existing VAX-11/780 systems. The special upgrade kit is for customers who took early delivery of a VAX-11/780 with the intention of upgrading it to a VAX-11/785. Special upgrades always go into FCC-compliant cabinets.

Upgrade kits contain the following:

- Twenty CPU modules
- Five FPA modules \*
- One MSV11-EA LSI-11 memory module
- One CPU cardcage and backplane assembly

\*Upgrade Kits 780UP-XA and 780UP-XC only.



- Two logo strips†
- Diagnostic diskettes ‡
- Documentation

## 5.2 REVISION CONTROL

The starting revision level of VAX-11/785 and VAX-11/780-5 systems is Rev 00. The revision levels of kernel options, individual options, and software that are compatible with Rev 00 are detailed below.

### 5.2.1 Kernel Options

The revision level of the system depends upon the revision levels of the kernel options. Table 5-1 indicates the revision levels of the kernel options required for system Rev 00.

**Table 5-1 Kernel Options Revision Levels**

| Kernel Option | Revision Level |
|---------------|----------------|
| KA785         | 00             |
| MS780-C       | 1B             |
| MS780-E       | 00             |

### 5.2.2 Individual Options

To be compatible with the VAX-11/785 or VAX-11/780-5 system, individual options must be at specified revision levels. These revision levels are listed in Table 5-2.

### 5.2.3 Software

The levels of microcode and VMS required for VAX-11/785 and VAX-11/780-5 systems are listed in Table 5-3.

†Upgrade Kits 780UP-XA and 780UP-XB only. Upgrade Kits 780UP-XC and 780UP-XD each include only one logo strip.

‡Upgrade Kits 780UP-XA and 780UP-XC each include eight diskettes. Upgrade Kits 780UP-XB and 780UP-XD each include seven diskettes.

**Table 5-2 Individual Options Revision Levels**

| Option | Revision Level            |
|--------|---------------------------|
| DW780  | 1B                        |
| FP785  | 00                        |
| RH780  | 04, AA1, or B1 (see note) |
| DR780  | 00                        |
| CI780  | 01                        |
| MA780  | 01                        |

**NOTE:** Option RH780 Rev 04 or Rev AA1 is the minimum revision required for all VAX-11/785 and VAX-11/780-5 systems. Option RH780 Rev B1 replaces the M8277 with the M8274, which is needed for high speed RP07s.

VAX-11/785 and VAX-11/780-5 systems may contain a mixture of RH780s with Rev 04 (AA1) and RH780s with Rev B1 with no compatibility problems.

The above configuration revisions are valid at FCS of the product (summer 1984). Refer to the VAX-11/785 revision matrix document for the most recent revision information.

**Table 5-3 Software Revision Levels**

| Software  | Revision Level |
|-----------|----------------|
| Microcode | 01             |
| VMS       | 3.6 (version)  |



### 5.3 UNPACKING AND INSPECTING UPGRADE KIT

The upgrade kit is shipped in one large container bolted and strapped to a skid. This is the master carton and it contains four smaller cartons:

- One accessories box
- Two module boxes
- One CPU cardcage and backplane assembly carton

See Figure 5-1 for the location of these boxes in the master carton.

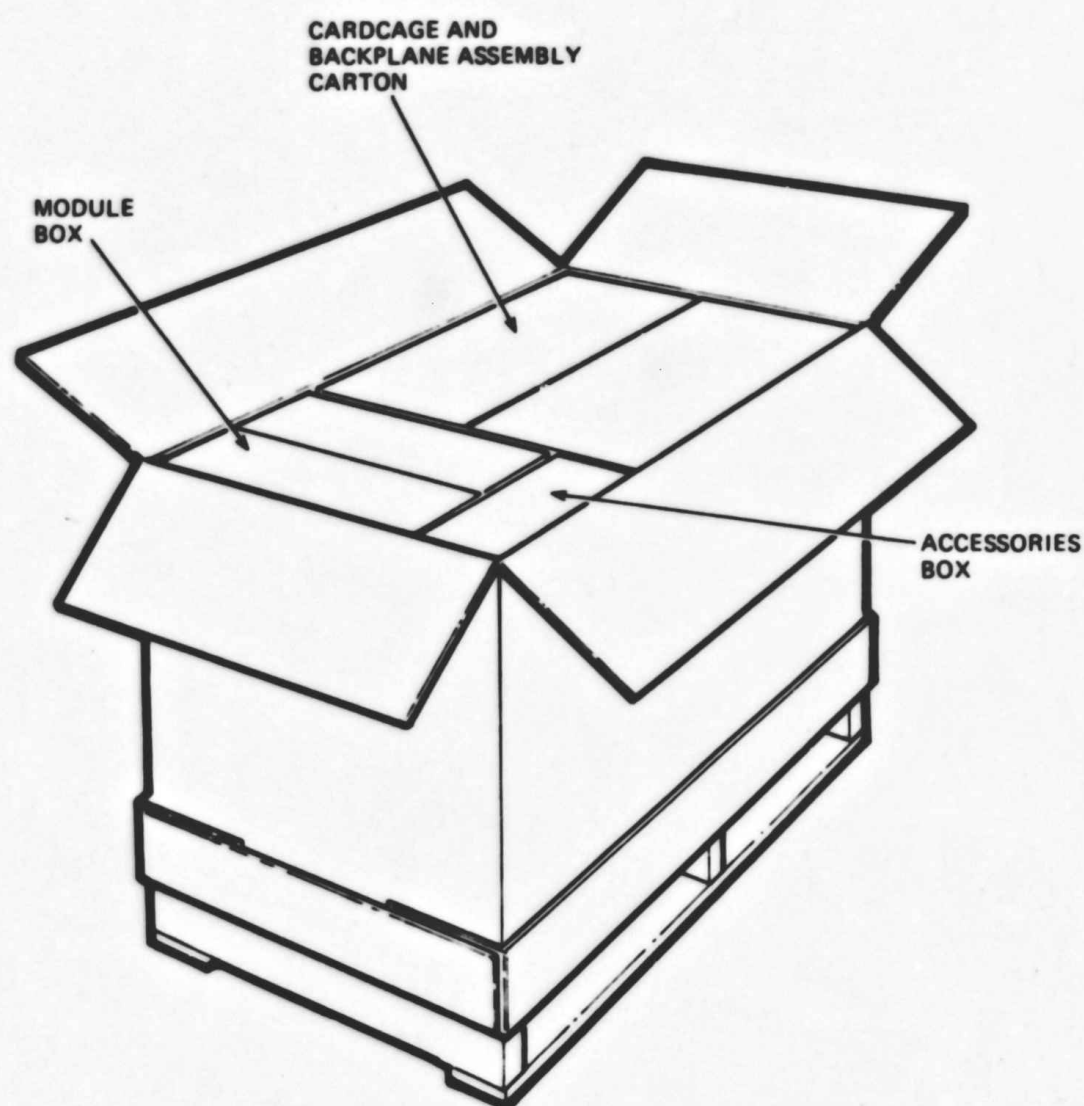


Figure 5-1 780UP Master Carton

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Remove the shipping list from the outside of the upgrade kit master carton and check the contents of the four inner boxes against this list. Notify the branch manager or supervisor of any missing or incorrect items. The following sections detail the distribution of materials among the four boxes.

#### NOTE

Save all packing materials. The KA780 hardware is returned to manufacturing in this packaging.

#### 5.3.1 Accessories Box

The accessories box contains the following items:

- VAX-11/785 Installation Manual
- MSV11-EA LSI-11 memory module
- VAX-11/785 print set
- KA785 print set
- KC785 print set
- FP785 print set\*
- Logo strips†
- Diagnostic diskettes‡
- Decals (module utilization and ECO)
- Return label
- Tape for sealing cartons
- Nylon strapping

#### 5.3.2 Module Boxes

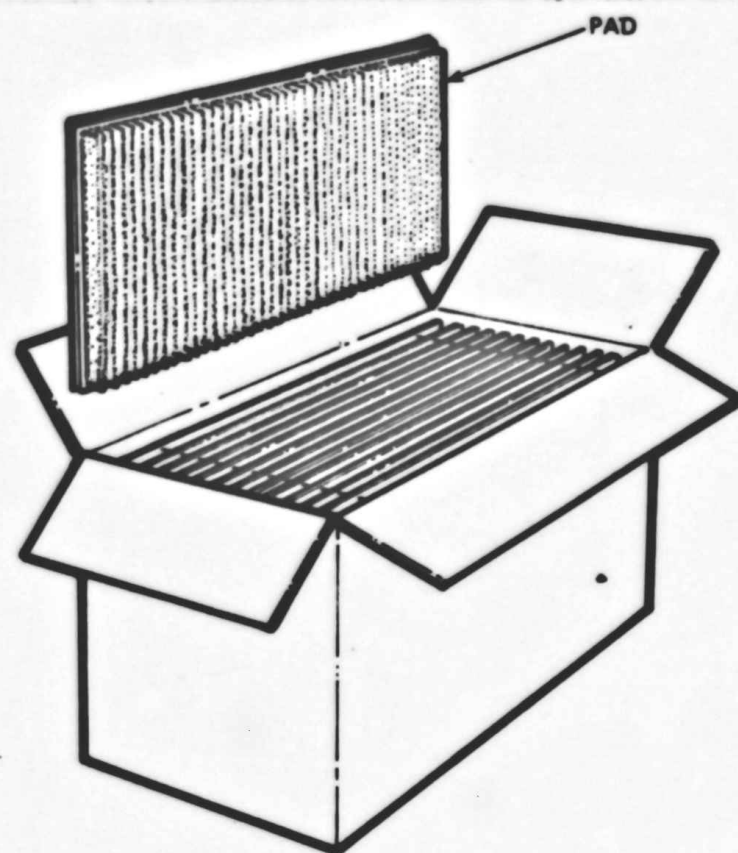
The module boxes are stacked one on the other in one end of the master carton. Each module box can hold up to 14 modules. The complete set of CPU (and, if applicable, FPA) modules is packaged in these.

1. Open both module boxes and remove the top pad from each box (Figure 5-2). Set the pads aside.
2. Leave all modules in the module boxes until ready to insert them into the cardcage.

\*Upgrade Kits 780UP-XA and 780UP-XC only.

†Upgrade Kits 780UP-XA and 780UP-XB each contain two logo strips (VAX-11/785 and VAX-11/780-5 systems). Upgrade Kits 780UP-XC and 780UP-XD each contain only one logo strip (VAX-11/785 systems).

‡Upgrade Kits 780UP-XA and 780UP-XC each contain eight diskettes. Upgrade Kits 780UP-XB and 780UP-XD each contain seven diskettes.



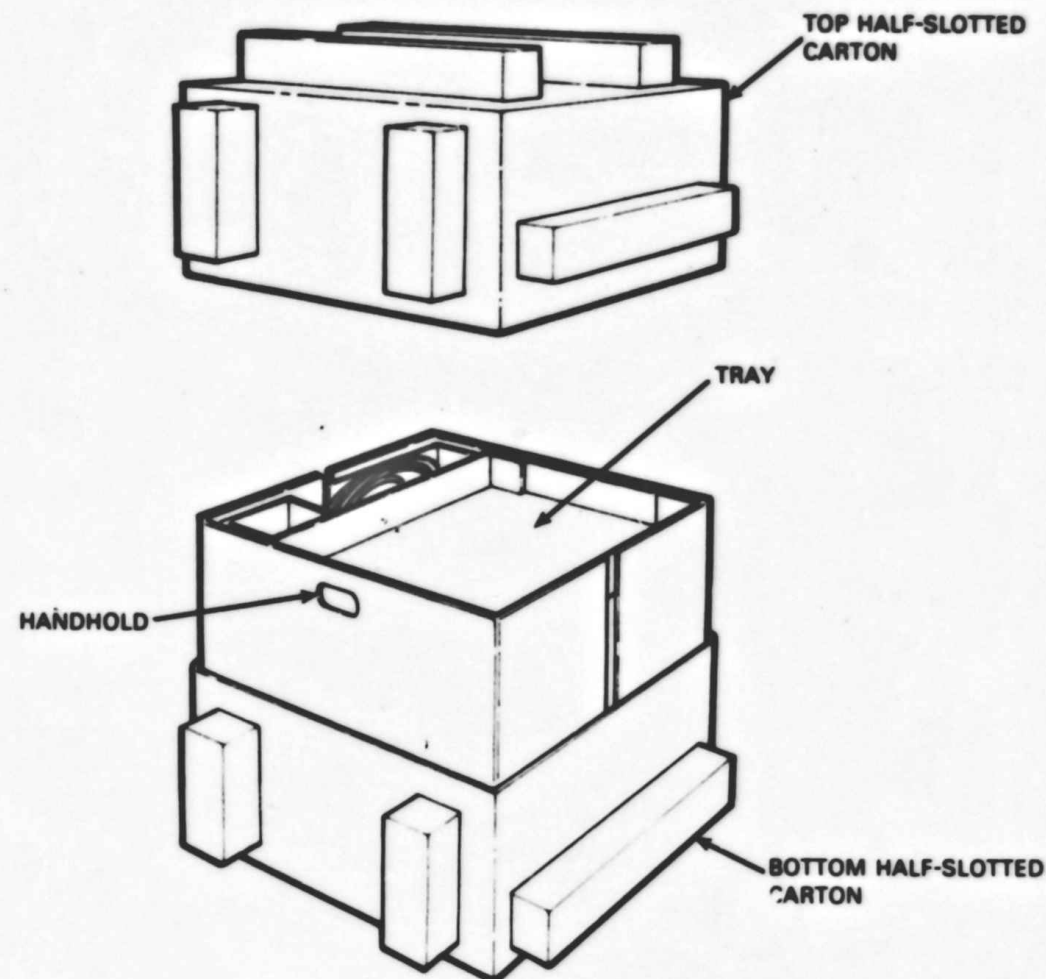
MKV84-1044

Figure 5-2 Module Box

### 5.3.3 Cardcage and Backplane Assembly Carton

1. Slit the tape and open the flaps of the cardcage and backplane assembly carton, with the carton remaining in the master carton.
2. Remove the top half-slotted carton insert (Figure 5-3) by pulling it straight up and out of the box. Set the half-slotted carton aside.
3. Remove the tray from the backplane and set it aside (Figure 5-3).
4. Place your hands in the handholds on either side of the cardcage and backplane assembly wrapper (Figure 5-3). Lift the wrapper straight up and out of the carton. The bottom half-slotted carton will remain in the cardcage and backplane assembly carton.
5. Place the cardcage and backplane assembly on its side on the work surface.
6. Open the ends of the cardcage and backplane assembly wrapper.
7. Carefully raise the edges of the upper part of the wrapper and slide the pad out of the cardcage side support (Figure 5-4).

8. Remove the bus bar support from under the bus bar (Figure 5-4). Do not remove the tape from the bus bar support.
9. Tip the cardcage and backplane assembly onto the center of the wrapper, while carefully sliding the wrapper bottom pad out of the cardcage side support.

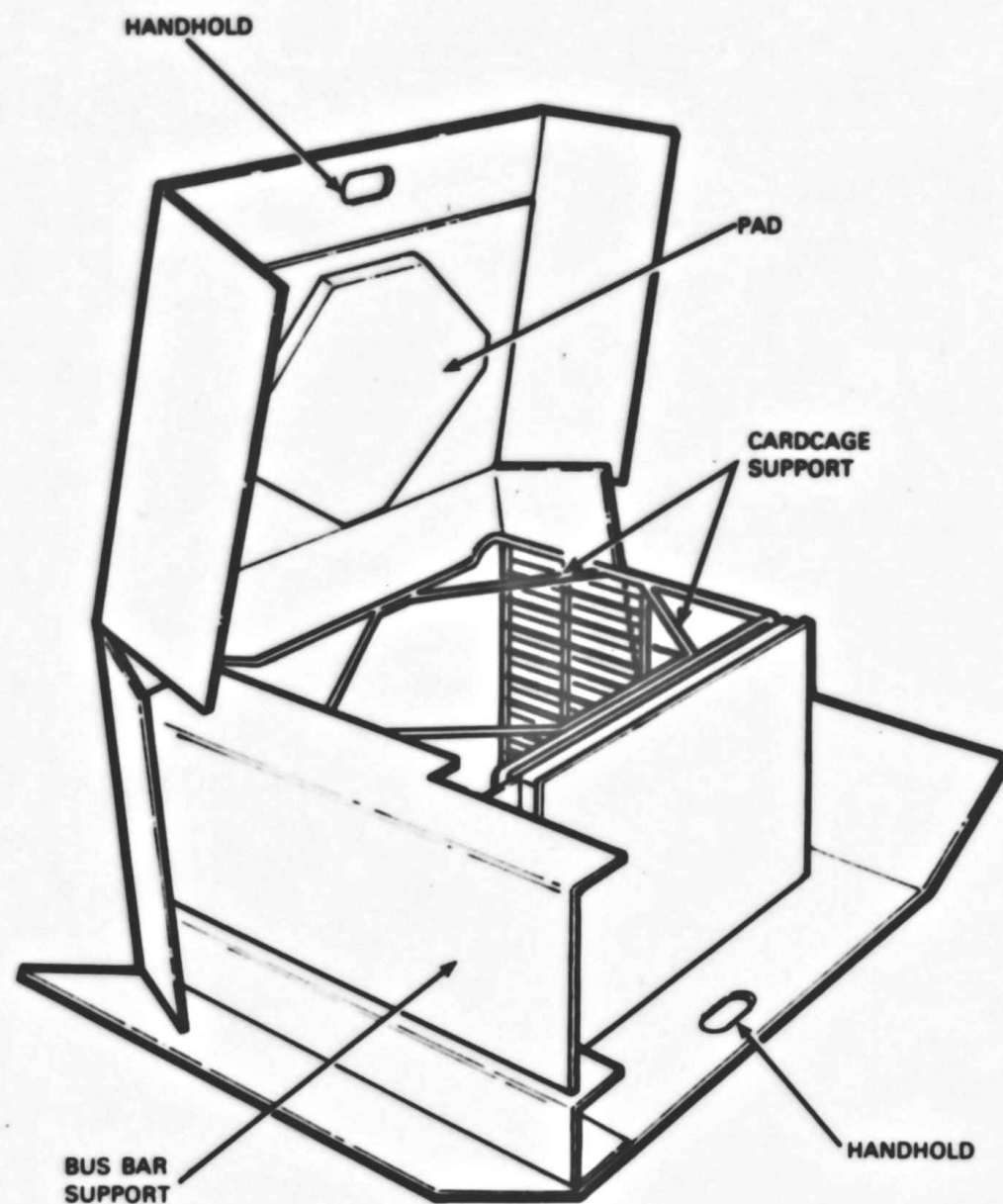


#### NOTE

THE BOTTOM HALF-SLOTTED CARTON REMAINS IN THE CARDCAGE AND BACKPLANE ASSEMBLY CARTON.

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Figure 5-3 Cardcage and Backplane Assembly Packaging



MKV84-2094

Figure 5-4 Cardcage and Backplane Assembly Wrapper

## 5.4 UPGRADE PROCEDURE

### 5.4.1 System Shut Down

1. Type @SYSSYSTEM:SHUTDOWN and answer the questions asked.
2. Examine the SID register by typing:  

```
>>>E/ID 3E
```

Note the contents of bits 0 through 11, the serial number field. This information will be used later in this procedure.
3. Turn the keyswitch to off.
4. Set the main power circuit breaker on the 869 power controller to off (down).
5. Disconnect the primary power cable from the outlet.
6. Power down the LSI-11.
7. Set the circuit breakers to off (down) on power supplies 2 and 3, and on power supply 1 if present.

### 5.4.2 KA780 Cardcage and Backplane Assembly Removal

1. Remove all modules from the CPU cardcage.
2. Remove the right rear door of the CPU cabinet.
3. Disconnect all cables from the CPU backplane. See Figure 5-5 for the location of the following cables.
  - a. Disconnect all CPU power bus cables at the power supply end. Leave these cables connected to the backplane. Save all screws and washers.
  - b. Disconnect the ground wire from the cabinet frame.
  - c. Remove and set aside the six SBI cables connecting J1 through J6 of the CPU backplane to J1 through J6 of the UBA backplane.

#### NOTE

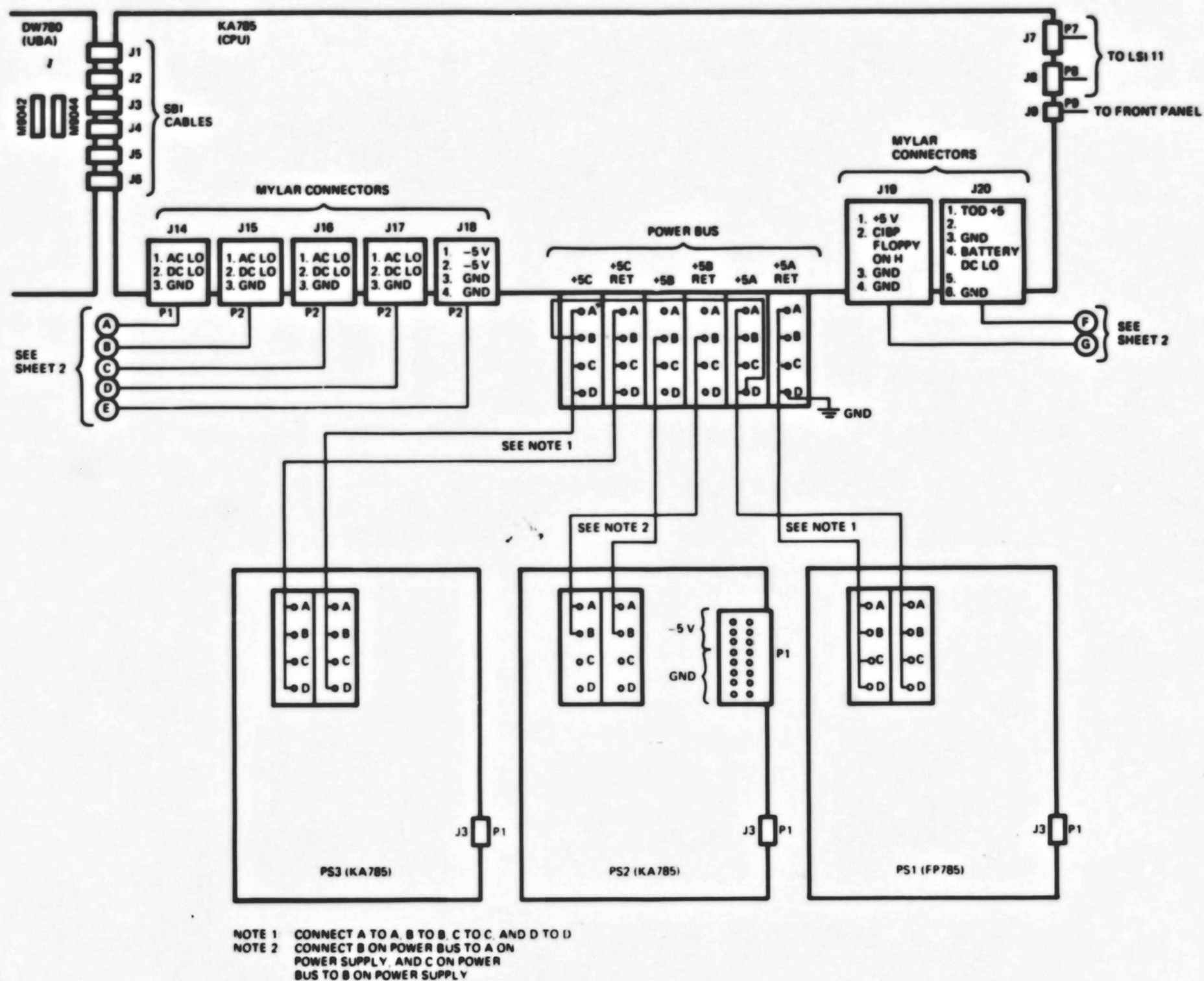
Before removing the following cables, mark the "J" number on the end of each cable with masking tape.

- d. Disconnect the plugs from the Mylar™ connectors J14 through J20.

Mylar™ is a trademark of DuPont de Nemours and Co., Inc.



- e. Disconnect the front panel connector cable (P/N 9107747-02) by unplugging P9 from connector J9 on the CPU backplane. Temporarily drape the loose portion of this cable over the cable management rack so that it will not interfere with the removal of the cardcage and backplane assembly.
  - f. Disconnect the LSI-11 bus cables (P/N BC05L-10) by unplugging P7 and P8 from connectors J7 and J8 respectively on the CPU backplane. Temporarily lay these cables in the bottom of the cabinet so that they will not hinder removal of the cardcage and backplane assembly.
- 4. Remove the M9042 UNIBUS paddle card and the M9044 UNIBUS terminator module from the pin side of the UBA backplane. Temporarily lay the M9042 module with cables attached across the top of the cable management rack. Set aside the M9044 module.
  - 5. Remove and save the four screws and washers from the top back of the CPU cardcage and backplane assembly.
  - 6. Remove and save the four screws and washers from the bottom front of the CPU cardcage and backplane assembly.
  - 7. Slide the CPU cardcage and backplane assembly out from the rear of the cabinet.



| FROM *<br>(KA785) |          | TO                                                                                                                                                                                   |
|-------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A                 | J14 - P1 | DW780<br>J14 - P2                                                                                                                                                                    |
| B                 | J15 - P2 | PS 3 (KA785)<br>J3 - P1                                                                                                                                                              |
| C                 | J16 - P2 | SFT<br>J8 - P2                                                                                                                                                                       |
| D                 | J17 - P2 | PS 1 (FP785)<br>J3 - P1<br>DW780<br>J13 - P1                                                                                                                                         |
| E                 | J18 - P2 | DW780<br>+5 RET (D)<br>+5 (D)<br>J15 - P6<br>PS 2 (KA785)<br>(-5 V, GND) - P1<br>MS780<br>J19 - P5<br>RH780 (optional)<br>J15 - P4<br>RH780 (optional)<br>J15 - P3<br>SFT<br>J7 - P1 |
| F                 | J20 - P2 | TOD CLOCK PS<br>J1 - P1                                                                                                                                                              |
| G                 | J19 - P1 | SCP<br>J3 - P2<br>RX01 RELAY<br>J1 - P3                                                                                                                                              |

\*DISCONNECT CABLE AT THIS POINT ONLY.

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Figure 5-5 KA785 Backplane Interconnects (Sheet 2 of 2)

### 5.4.3 KA785 Cardcage and Backplane Assembly Installation

1. Remove the acrylic cover from the KA785 backplane.
2. Slide the KA785 cardcage and backplane assembly into the cabinet from the rear.
3. Fasten the cardcage and backplane assembly at the bottom front using the four reserved screws and washers. Do not tighten the screws.
4. Fasten the cardcage and backplane assembly at the top back with the four reserved screws and washers.
5. Tighten the front screws.
6. Connect the backplane cables. Refer to Figure 5-5 for the location of these cables.
  - a. Attach the power bus cables to the power supplies.
  - b. Attach the ground wire to the cabinet frame.
  - c. Connect P7 and P8 of the LSI-11 bus cable to J7 and J8 respectively on the CPU backplane.
  - d. Connect P9 of the console cable to J9 on the CPU backplane.
  - e. Insert the plugs into Mylar™ connectors J14 through J20. Figure 5-5 (sheet 2) lists all connections to these plugs.
  - f. Connect the SBI cables from J1 through J6 of the CPU to J1 through J6 of the UBA.
7. Connect the UBA cables. (Install the M9042 UNIBUS paddle card and the M9044 UNIBUS terminator into the pin side of the UBA backplane.)
8. Connect the primary power cable to the outlet and power up the system to verify that power is operating properly before inserting the modules.
9. Power down the system and disconnect the primary power cable.
10. Insert the CPU modules following the module utilization chart in Figure 5-6.
11. Install the SID register and JCS jumpers (J13 and J11 respectively on the CPU backplane).
  - a. See Figure 1-13, step 25, for the location of J13 and J11. Check that the jumpers called out in that figure are properly installed.
  - b. Set the SID serial number field. Remove from KA785 J13-V through J13-VV any jumpers necessary to duplicate the jumper configuration of KA780 J13-V through J13-VV. This gives the KA785 the same serial number as the removed KA780.

#### NOTE

Be sure to remove jumpers from J13-V through J13-VV only.



12. Install the KA785 module utilization sticker on the inside of the cabinet in place of the existing KA780 sticker.
13. Attach the acrylic backplane cover over the CPU backplane.
14. Replace the CPU cabinet right rear door.

| MODULE UTILIZATION KA785                        |         |              |   |
|-------------------------------------------------|---------|--------------|---|
| 29                                              | M7477   | CIB          |   |
| 28                                              | M7544   | FCT          | * |
| 27                                              | M7543   | FAD          | * |
| 26                                              | M7542   | FML          | * |
| 25                                              | M7541   | FMH          | * |
| 24                                              | M7540   | FNM          | * |
| 23                                              | M7476   | USC          |   |
| 22                                              | 7014103 | Blank Module |   |
| 21                                              |         |              |   |
| 20                                              | M7475   | JCS          |   |
| 19                                              |         |              |   |
| 18                                              | M7475   | JCS          |   |
| 17                                              |         |              |   |
| 16                                              | M7474   | CLK          |   |
| 15                                              | M7473   | ICL          |   |
| 14                                              | M7472   | CEH          |   |
| 13                                              | M7471   | DAP          |   |
| 12                                              | M7470   | DCP          |   |
| 11                                              | M7469   | DDP          |   |
| 10                                              | M7468   | DEP          |   |
| 9                                               | M7467   | DBP          |   |
| 8                                               | M7466   | IRC          |   |
| 7                                               | M7465   | IDP          |   |
| 6                                               | M7464   | TBM          |   |
| 5                                               | M7463   | CDM          |   |
| 4                                               | M7462   | CAM          |   |
| 3                                               | M7461   | SBH          |   |
| 2                                               | M7460   | SBL          |   |
| 1                                               | M7459   | TRS          |   |
| *FPA Option - Install 7014103 when not ordered. |         |              |   |

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Figure 5-6 KA785/FP785 Module Utilization Chart

#### 5.4.4 LSI-11 Memory Module Installation

##### NOTE

Refer to Figure 5-7 for the locations of the LSI-11 modules.

1. Remove and save the screws from both sides of the LSI-11 front cover.
2. Remove the LSI-11 cover.
3. Remove the LSI-11 module retainer.
4. If M7264 is not a -YA variation, remove the module and make the following changes. (See Figure 5-8.)
  - a. Remove the wire wrap at W2.
  - b. Install a wire wrap at W4.
  - c. Install a jumper (0 ohm resistor) at W9.
  - d. Remove the wire wrap at W11.
  - e. Reinsert the M7264.
5. Remove the M7944 from slot 3 row A/B.

##### NOTE

Do not ship the M7944 to manufacturing. Return this module to the customer.

6. Check that switches S1 through S5 on the M8044 and the 32K byte LSI-11 memory module from the upgrade kit are closed (Figure 5-9). Insert the M8044 in slot 3 row A/B. (See Figure 5-7.)
7. Do the following if this installation is to be equipped with remote diagnosis. If it is not, go on to step 8.
  - a. Detach the cables from the M9400, slot 3 row C/D, and remove the module.
  - b. Check the jumpers on the M8017 against Table 5-4 and Figure 5-10. Make any necessary changes to the jumper configuration on M8017.
  - c. Insert the M8017 in slot 3 row C/D.
  - d. Reattach the cables and insert the M9400 in slot 4 row C/D.
8. Reinstall the LSI-11 module retainer.
9. Replace the LSI-11 cover.
10. Replace the reserved screws and tighten.

|   |                         |          |   |   |   |
|---|-------------------------|----------|---|---|---|
| 1 | M7264 LSI-11 CPU MODULE |          |   |   | 1 |
| 2 | M7946                   | M7940    |   |   | 2 |
| 3 | M7944                   | M9400-YE |   |   | 3 |
| 4 |                         |          |   |   | 4 |
|   | A                       | B        | C | D |   |

(A) BEFORE MEMORY MODULE INSTALLATION

|   |                            |          |   |   |   |
|---|----------------------------|----------|---|---|---|
| 1 | M7264-YA LSI-11 CPU MODULE |          |   |   | 1 |
| 2 | M7946                      | M7940    |   |   | 2 |
| 3 | M8044-EA                   | M9400-YE |   |   | 3 |
| 4 |                            |          |   |   | 4 |
|   | A                          | B        | C | D |   |

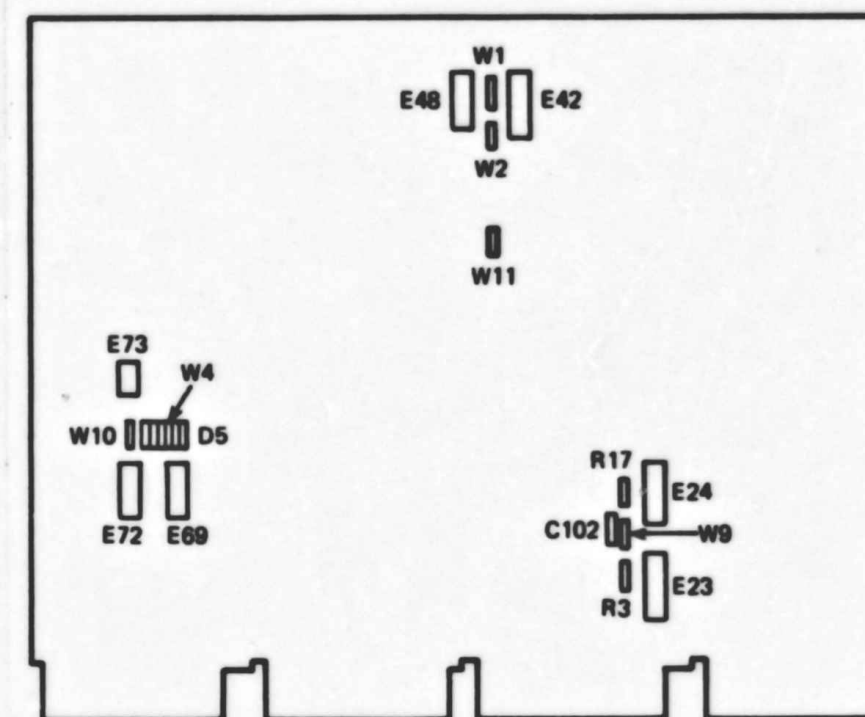
(B) AFTER MEMORY MODULE INSTALLATION

|   |                            |          |   |   |   |
|---|----------------------------|----------|---|---|---|
| 1 | M7264-YA LSI-11 CPU MODULE |          |   |   | 1 |
| 2 | M7946                      | M7940    |   |   | 2 |
| 3 | M8044-EA                   | M8017-AA |   |   | 3 |
| 4 |                            | M9400-YE |   |   | 4 |
|   | A                          | B        | C | D |   |

(C) AFTER MEMORY MODULE INSTALLATION AND WITH REMOTE DIAGNOSIS

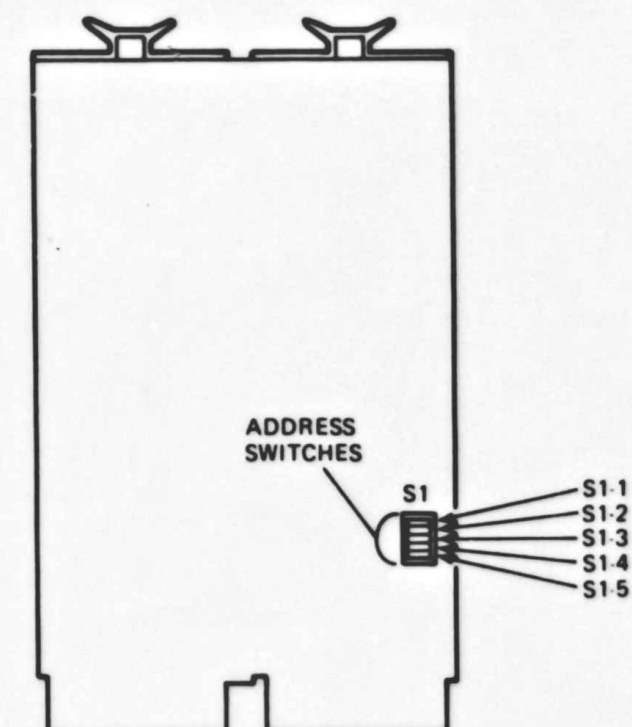
Figure 5-7 LSI-11 Module Placement

MKV84-1070



MKV84-1057

Figure 5-8 M7264 Jumper Locations



MKV84 1058

Figure 5-9 M8044 Switchpack Location

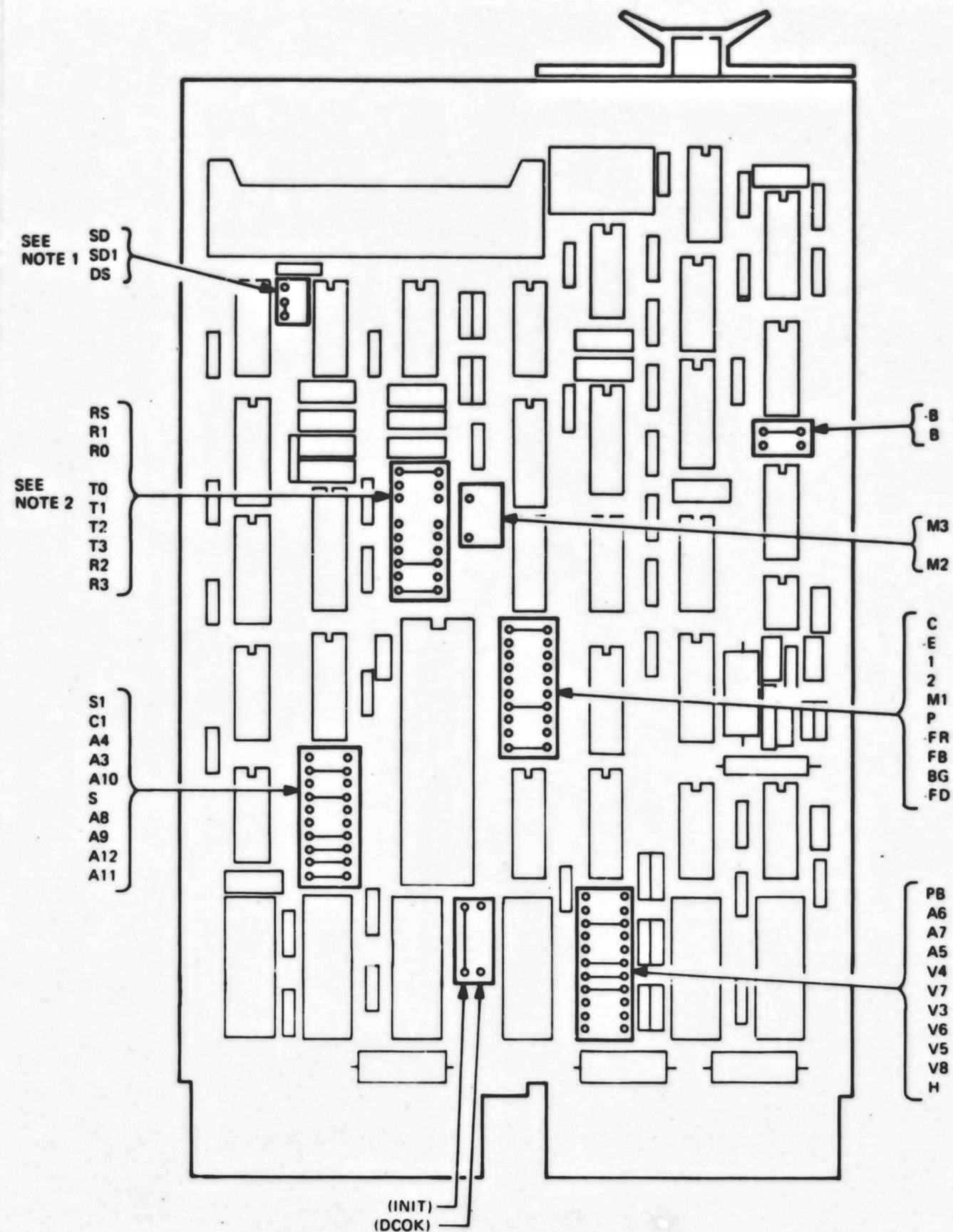
Table 5-4 DLV11-E Jumper Configurations for the M8017-AA (KC780-DA)

| Jumper State<br>From Factory<br>In | Jumper State<br>Out        | Jumper Removed<br>or Inserted<br>at Field<br>Installation | Description                                                                                                                                                                                                                                                                              |
|------------------------------------|----------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A3                                 | A4<br>A5<br>A7<br>A8<br>A9 |                                                           | These jumpers are for bits 3-12 of the address word. Device address 17756X is set. Bits 0, 1, and 2 are hardwired on the module to address the four device registers as follows:                                                                                                         |
| A11<br>A12                         | A10                        |                                                           | X=0 RCSR      X=4 XCSR<br>X=2 RBUF      X=6 XBUF                                                                                                                                                                                                                                         |
| V6<br>V7                           | V3<br>V4<br>V5<br>V8       | Insert V3                                                 | These jumpers determine vector generation during an interrupt. An inserted jumper asserts the corresponding address bit on the LSI-11 bus. This jumper configuration implements interrupt vector address 310 (octal) for receiver interrupts and 314 (octal) for transmitter interrupts. |
| For 300 Baud Only                  |                            |                                                           |                                                                                                                                                                                                                                                                                          |
| R0<br>R2<br>R3                     | R1                         | Remove R0<br>Insert R1                                    | This configuration sets the receiver and transmitter for 300 baud (enables common speed operation).                                                                                                                                                                                      |
| T0                                 | T1<br>T2<br>T3             | Remove T0<br>Insert T1<br>Insert T3                       | This configuration sets the transmitter to 300 baud. It is identical to the "R" jumpers.                                                                                                                                                                                                 |
| For 1200 Baud Only                 |                            |                                                           |                                                                                                                                                                                                                                                                                          |
| R0<br>R2<br>R3                     | R1                         | Remove R0<br>Remove R2                                    | This configuration sets the receiver and transmitter for 1200 baud (enables common speed operation).                                                                                                                                                                                     |
| T0                                 | T1<br>T2<br>T3             | Remove T0<br>Insert T3                                    | This configuration sets the DF03 transmitter to 1200 baud. It is identical to the "R" jumpers.                                                                                                                                                                                           |

Table 5-4 DLV11-E Jumper Configurations for the M8017-AA (KC780-DA) (Cont)

| Jumper State<br>From Factory<br>In | Jumper State<br>Out | Jumper Removed<br>or Inserted<br>at Field<br>Installation | Description                                                                                                  |
|------------------------------------|---------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| BG                                 | P<br>-E             | Remove BG                                                 | Disable break generation operation without parity. Parity type -does not apply when "P" is removed.          |
|                                    | 1<br>2              |                                                           | Operation with 8 data bits per character.                                                                    |
|                                    | PB                  |                                                           | Programmable baud rate function disabled.                                                                    |
| C<br>CI                            |                     |                                                           | Common speed operation enabled.                                                                              |
|                                    | S<br>SI             |                                                           | Split speed operation disabled.                                                                              |
|                                    | H                   |                                                           | Halt on framing error disabled.                                                                              |
|                                    | B<br>-B             |                                                           | Boot on framing error disabled.                                                                              |
|                                    | -FD                 |                                                           | Data terminal ready is not forced continuously true.                                                         |
|                                    | -FR                 |                                                           | Request to send is not forced continuously true.                                                             |
|                                    | RS                  |                                                           | Request to send is enabled.                                                                                  |
|                                    | FB                  |                                                           | Force busy is disabled.                                                                                      |
|                                    | M1                  |                                                           | Factory test jumper.                                                                                         |
|                                    | M2<br>M3            |                                                           | Maintenance jumpers disabled.                                                                                |
| INIT                               | DCOK                |                                                           | UART clear signal enabled.                                                                                   |
| SD1<br>to SD                       | SD1<br>to DS        | Remove<br>SD1 to SD<br>Insert<br>SD1 to DS                | Data set ready is enabled. Change jumpers. Cut the etch on side 2 between SD1 and SD if it has not been cut. |





NOTE:

1. CHECK THAT THE ETCH BETWEEN SD & SD1 IS CUT.
2. 1200 BAUD SHOWN. SEE TABLE 5-4 FOR 300 BAUD.

MKVB4 1059

Figure 5-10 M8017-AA Jumper Configuration

#### **5.4.5 Logo Installation**

Attach the logo to the CPU front panel. If two logos are included in the accessories box, it is necessary to decide which logo to install. The logo to be used is determined by the type of CPU cabinet. The VAX-11/785 logo may be attached only to FCC-compliant cabinets. If the cabinet is not FCC-compliant, use the VAX-11/780-5 logo.

### **5.5 KA780 PACKAGING**

#### **5.5.1 Cardcage and Backplane Assembly**

1. Place the KA780 cardcage and backplane assembly on the wrapper with the backplane surface up (Figure 5-4). Note that the corrugated pads are off-center on the sides of the wrapper. Position the cardcage and backplane assembly so that the bus bar is toward the end of the wrapper that is further from the pads.
2. Tip the cardcage and backplane assembly on its side, easing the corrugated pad into the cardcage side support.
3. Place the bus bar support under the bus bar (Figure 5-4). Tuck the power cables into the support.
4. Fold the wrapper around the cardcage and backplane assembly. Ease the corrugated pad into the cardcage side support.
5. Fold in the wrapper end flaps (Figure 5-4).
6. Tape the ends of the wrapper.
7. Lift the cardcage by the wrapper handholds and place the cardcage and backplane assembly in the bottom half-slotted carton in the master carton (Figure 5-3).
8. Place the tray over the backplane (Figure 5-3).
9. Place the top half-slotted carton over the cardcage and backplane assembly.
10. Close the flaps and seal the cardcage and backplane assembly carton.

#### **5.5.2 Modules**

Pack the KA780 and, if applicable, the FP780 modules in the two module cartons.

1. Check that a corrugated-and-foam pad is in the bottom of each module carton, foam side up. The modules must rest on the foam.
2. Insert the modules, one per slot, into the cartons.
3. Place a corrugated-and-foam pad on top of the modules in each carton. The foam side must be toward the modules.
4. Close the flaps and seal each module carton.

### **5.5.3 Packing the Master Carton**

1. Stack the module boxes, one on the other, in the end of the master carton (Figure 5-1).
2. Fold the accessories box on the score lines and tape the ends shut. Place the box in the corner of the master carton, at the end of the module cartons (Figure 5-1). The accessories box is needed to keep the module cartons in place during shipment.
3. Close the flaps and seal the master carton. Attach the return label over the original shipping label.

## **5.6 CHECK-OUT PROCEDURE**

### **5.6.1 System Power Up**

1. Reconnect the primary power cable to the outlet.
2. Set the main power circuit breaker on the 869 power controller to on (up).
3. Set the circuit breakers on power supplies 2 and 3, and on power supply 1 if present, to on (up).
4. Power up the LSI-11.
5. Load the console diskette RX1A in the diskette drive.
6. Turn the auto restart switch to off.
7. Turn the keyswitch to local to boot the system.
8. Check the serial number field of the SID register by typing:

>>>E/ID 3E

Check that bits 0 through 11 match the result shown in Section 5.4.1, step 2. If they do not match, power down the system and correct the jumper configuration (see Section 5.4.3, step 11).

### **5.6.2 Diagnostics**

See Section 2.2 for information on running diagnostics. Run all microdiagnostics and macrodiagnostics indicated in Chapter 2, and run UETP.

### **5.6.3 Documentation**

1. Update the Site Management Guide.
2. Fill out a LARS Report.



# APPENDIX

A

## **APPENDIX A FCC COMPLIANCE GUIDELINES**

### **NOTE**

This appendix pertains to computer systems installed in geographical areas over which the Federal Communications Commission (FCC) has jurisdiction (all the areas covered by United States Customs).

### **A.1 GENERAL**

The FCC has created new rules that require computers and computer devices to comply with set standards for reducing radio frequency interference (RFI) [also known in broader terms as electromagnetic interference (EMI)] to television and radio communications. The new rulings are directed towards the entire computer industry for computers and devices that are marketed in the United States.

### **NOTE**

The FCC defines a computer as a specific class of restricted radiation device that generates radio frequency (RF) energy and uses digital techniques and may radiate RF energy as an undesired by-product. Specifically, it is any electronic device or system that generates and uses timing signals and pulses at a rate in excess of 10,000 pulses (cycles) per second and uses digital techniques.

Equipment which has been manufactured in compliance with the FCC RFI rules must be both installed and operated properly to ensure that the state of compliance is maintained. This requires that the installer become familiar with the FCC RFI rules and also that the installer understands the following FCC compliance guidelines that outline the cause and prevention of RFI.

### **NOTE**

Computer products used in non-US installations are exempt from the FCC compliance ruling, but may be required to meet similar rules in the country where they are installed (for example, VDE rules in West Germany).



#### NOTE

For computers used in the USA there are exemptions to the FCC compliance ruling:

- A computing device used in any transportation vehicle including motor vehicles and aircraft.
- An electronic control or power system used by a public utility or in an industrial plant.
- Industrial, commercial, and medical test equipment.
- A computing device used in an appliance, such as a microwave oven, dishwasher, or clothes dryer.
- Specialized medical computing devices (generally used at the direction of or under the supervision of a licensed health care practitioner) whether used in a patient's home or a health care facility. Non-specialized medical devices marketed through retail channels for use by the general public are not exempted. This exemption also does not apply to computers used for record keeping or any purpose not directly concerned with medical treatment.
- Carriers transporting radio frequency devices without trading in them.
- RF devices manufactured solely for export.
- The manufacture, assembly, or installation of RF devices for its own use by a public utility engaged in providing electric service, provided, however, that no such device shall be operated if it causes harmful interference to radio communications.
- RF devices for use by the US government or agency thereof, provided, however, that this exception shall not be applicable to any device after it has been disposed of by such government or agency.

#### A.2 FCC COMPLIANCE RULINGS

The new FCC rulings were primarily created to reduce the potential for RFI produced by home computers. However, the new rulings were changed to also include commercial and industrial computers. The potential for EMI/RFI has been a growing issue for the past several years due to the large number of home and personal computing devices being marketed to US consumers.

EMI can be defined as any electrical disturbance that causes an undesirable response or a malfunction in a piece of equipment. RFI is often used interchangeably with EMI; however, RFI is usually restricted to the radio frequency band of 10 KHz to 10 GHz. The FCC compliance ruling pertains to the 300 KHz to 1 GHz frequency range.

Many electrical devices, in addition to computers, are capable of producing EMI. Switching devices used in power supplies, rotating electrical machinery, ignition systems, radio and TV receivers and generators all can produce EMI. EMI can also come from natural sources, such as lightning discharges, precipitation, solar activity, and sand and dust storms. Computer-emitted interference signals usually originate from one or more particular components or devices.

Computer equipment electrical interference problems are solved by redesign or suppression methods. Redesign may simply involve replacement of component parts. Suppression of interference can be accomplished by filtering, grounding, shielding, rerouting of cables, using coaxial cables, or a combination of these.

#### NOTE

Digital Equipment Corporation has decided at this time to use shielding techniques for most RFI suppression, rather than electronic redesign of equipment to meet FCC compliance rules. However, some equipment EMI has been suppressed by electronic redesign only.

#### A.3 FCC COMPUTER DEFINITIONS

The FCC compliance ruling defines computer devices as being either Class A or Class B.

##### A.3.1 Class A Computing Device

A Class A computing device is marketed for use in a commercial, industrial, or business environment, exclusive of a device which is marketed for general public or home usage.

##### A.3.2 Class B Computing Device

A Class B computing device is marketed for use in a residential environment, notwithstanding use in a commercial, business or industrial environment. Examples of such devices include, but are not limited to, electronic games, personal computers, calculators, and similar electronic devices that are marketed for use by the general public.

##### A.3.3 Personal Computing Device

A personal computer is an electronic computer that is marketed for such use as in the home, notwithstanding business applications. Such computers are considered Class B computing devices. Computers that use a standard television receiver for a display device or meet all of the following conditions are considered examples of personal computers:

- Marketed through a retail outlet or a direct mail order catalog.
- Notices of sale or advertisement are distributed or directed to the general public or hobbyist user, rather than restricted to commercial users.
- Operates on a battery or 120 volt electrical supply.



#### A.4 SYSTEM INTEGRATION

The non-interference requirement of the new FCC compliance ruling states, "The operator of a computing device may be required to stop operating his device upon a finding that the device is causing harmful interference and it is in the public interest to stop operation until the interference problem has been corrected."

Therefore, equipment that is manufactured FCC-compliant must be maintained, both during system installation/integration and during equipment operation. Maintaining compliance requires that the user possess a knowledge of the applicable FCC rules, observe basic system integration guidelines, and perform visual equipment checks during initial installation and also during any preventive or periodic maintenance. EMI testing may be required if an apparently unresolvable interference problem occurs.

##### A.4.1 Understanding of User Responsibility

The user is responsible for compliance of the entire system if the user assembled the system for purpose of resale.

Even if the user has bought only FCC-compliant devices, improper interconnection of the devices, for example, can raise the noise level dramatically. Thus the "final integrator," the person who assembled the system and added the last piece of equipment that could raise the system EMI level, must assume responsibility that the assembled system is "quiet" and FCC compliant.

##### A.4.2 "Grandfathered" Product Definition

Any commercial or industrial component product or computer device first put into production before October 1, 1981, is considered to be "grandfathered" and was allowed to be manufactured as was until October 1, 1983. Units manufactured after October 10, 1983, must meet the technical requirements of the FCC rulings.

During the next few years, many commercial systems may consist of some "grandfathered" untested products as well as some Class A tested products. These systems are called "mixed systems", and they comply with FCC regulations.

Products already built before the rules went into effect do not have to be tested or labeled. If you sell one of these systems it does not have to be labeled because change of ownership does not change the label status of products, with one exception. If equipment is unlabeled because of end-use exemption, and is later moved to a non-exempt environment, it must then be labeled.

If you are selling systems into the commercial or industrial market and have been adding components to the system, compliance retesting may be required. For example, if you add a labeled disk drive to an existing Class A system, retesting is not required. However, the addition of subassemblies, such as memory boards, requires your engineers to re-evaluate the system to make sure that it continues to comply with FCC requirements.

##### A.4.3 Equipment Add-Ons

Check the compliance status of any equipment that is being added to a Class A product. The new FCC ruling prohibits any add-on to an FCC-compliant labeled product that would cause the resulting product to fail the appropriate Class A or Class B FCC compliance criteria.

#### NOTE

Adding on to a grandfathered system must not raise the system emission level more than 6 dB.

Only options which Digital Equipment Corporation has determined will not take the product out of compliance will be used on, or as spares for, compliant products.

#### A.4.4 Cables

The interference potential of a computer system is greatly affected by the number of peripherals, the interconnecting cables, and the "handshaking" that takes place between the computer and the peripheral. Therefore, all interconnecting cables must be checked for the proper part number and also for any damage which could result in EMI being generated.

#### CAUTION

The interconnection of FCC EMI-compliant labeled products with cables that would cause the resultant equipment configuration to fail the appropriate Class A or Class B FCC EMI criteria is prohibited.

#### A.5 COMPLIANCE CHECKING

##### A.5.1 Cabinets

Specially designed equipment cabinets lessen EMI signals by absorbing the radiated energy. Therefore, it is vital that all cabinet components (doors, covers, etc.) be maintained with the same status as when the equipment was manufactured (FCC compliant).

##### A.5.2 Doors

Check that doors have not been bent out of alignment with the cabinet. Any discontinuity along the door edge could render door RF gaskets or the fingerstock ineffective at RFI frequencies.

#### CAUTION

All cabinet doors, covers, and panels must be secured after maintenance and also during normal equipment operation.

Door-to-gasket continuity can be checked via insertion of a thin strip of paper between a closed door and the mating gasket. If there is no resistance to movement of the paper strip the door does not have an effective RF seal.

##### A.5.3 Covers and Panels

Because of the timing frequencies used in most computer devices, any misalignment or omission of covers and panels could result in interfering signals being radiated from the equipment. Any openings can function as slot antennas at higher frequencies and, therefore, increase the amplitude of unwanted signal radiation.

##### A.5.4 RF Gaskets and Fingerstock

Cabinet gaskets and fingerstock require a certain uniform pressure with the mating piece to provide an effective electrical seal. This pressure can only be maintained when undamaged gaskets and fingerstock are compressed by doors or panels which have been properly closed and locked.

##### A.5.5 Line Filters

Filters consist of metal boxes that house components such as capacitors, inductors, resistors, and diodes in network configurations.

Line filters carry the interference back to the source via the ground connection instead of allowing it to travel to the power lines. Therefore, it is necessary that filters be checked to make sure that the metal box is in good contact with the metal it is bolted to.

Signal wire filters are usually built into connectors, but may be housed in separate metal boxes. These filters carry the interference to the RF shield, without lessening the desired signal. Signal filters should be checked to assure that they are well bonded to the metal I/O bulkhead.

#### **A.5.6 RF Bonds**

Good RF bonding is essential in interference reduction. A poor RF bond creates an impedance that raises the RF potential of the connection, causing it to function as an antenna that radiates interference.

The material and configuration of shield connections is also important. In the audio frequency ranges a stranded wire used as a shield connection may offer zero impedance, but this same wire acts as an inductor at radio frequencies. Shielded cables employ metal backshells which make a 360-degree peripheral shield connection, and carry it to the mating connector mounted on the I/O bulkhead. This makes a very low impedance connection.

The connection at each end of a shielded conductor should be checked for good metal-to-metal contact between the connector and I/O bulkhead. Any corrosion and dirt must be removed.

#### **A.6 EQUIPMENT LABELS**

Many system builders buy subassemblies which they integrate into their own products. The subassemblies do not have to be tested or labeled, but the completed products do.

##### **A.6.1 FCC Labels on Compliant Products**

Class A computing devices are required to be marked with a conspicuously placed label advising the operator of an interference possibility. Figure A-1 provides some examples of these labels.

##### **A.6.2 FCC Labels on FCC-Exempt-Ordered Products**

Certain exempt users of Digital Equipment Corporation FCC-compliant products render these products non-compliant by integrating into them options or subassemblies which are not completely compliant.

In such instances the equipment installer (DIGITAL Field Service or Customer/OEM/Third Party) is responsible for removing the FCC-compliance notice labels from the Digital Equipment Corporation equipment involved.

##### **A.6.3 Removal of FCC Labels**

**A.6.3.1 Removal of FCC Labels by DIGITAL Field Service** – Labels on Digital Equipment Corporation equipment installed by DIGITAL Field Service will be removed when the following notice appears on the shipping container(s).

#### **CAUTION**

This equipment has been sold for an FCC-Exempt end use. The enclosed packing list lists certain items that are to be delabeled.

After you have removed the label from the appropriate equipment notify the branch supervisor in writing and also inform the equipment user.

#### **CAUTION**

No attempt should be made to remove labels from options or spared subassemblies in the repair centers. DIGITAL field service will assume no responsibility for this. Modules will be returned to stock status and upgraded to the latest revision per the repair plans for each option.

#### **COMPUTER**

THIS EQUIPMENT COMPLIES WITH THE REQUIREMENTS IN PART 15 OF FCC RULES FOR A CLASS A COMPUTING DEVICE. OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA MAY CAUSE UNACCEPTABLE INTERFERENCE TO RADIO AND TV RECEPTION, REQUIRING THE OPERATOR TO TAKE WHATEVER STEPS ARE NECESSARY TO CORRECT THE INTERFERENCE.

#### **PERIPHERAL**

THIS EQUIPMENT HAS BEEN TESTED WITH A CLASS A COMPUTING DEVICE AND HAS BEEN FOUND TO COMPLY WITH PART 15 OF FCC RULES. SEE INSTRUCTION MANUAL. OPERATION IN A RESIDENTIAL AREA MAY CAUSE UNACCEPTABLE INTERFERENCE TO RADIO AND TV RECEPTION, REQUIRING THE OPERATOR TO TAKE WHATEVER STEPS ARE NECESSARY TO CORRECT THE INTERFERENCE.

#### **WARNING**

THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE INTERFERENCE TO RADIO COMMUNICATIONS. IT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS A COMPUTING DEVICE PURSUANT TO SUBPART J OR PART 15 OF FCC RULES, WHICH ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST SUCH INTERFERENCE WHEN OPERATED IN A COMMERCIAL ENVIRONMENT. OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA MAY CAUSE INTERFERENCE IN WHICH CASE THE USER AT HIS/HER OWN EXPENSE MAY BE REQUIRED TO TAKE MEASURES TO CORRECT THE INTERFERENCE.

MKV84-2087

Figure A-1 FCC Labels for Compliant Products



**A.6.3.2 Removal of FCC Labels by Customer/OEMs/Third Parties** - Labels on Digital Equipment Corporation equipment installed by the customer, original equipment manufacturer (OEM), or third party will be removed by these people when the following notice appears on the shipping container(s).

**NOTE**

DIGITAL Field Service assumes no delabeling responsibility for action or inaction of the customer, OEM, or the third party.

**NOTE**

DIGITAL Field Service may be contracted for assistance in any delabeling decisions and/or actions due to Point of Manufacture (POM) products configured in the field. DIGITAL Field Service can assist you in resolving potential problems with regulatory compliance. Because the equipment operator is responsible for the final equipment configuration meeting and maintaining EMI compliance, it is Digital Equipment Corporation's policy to offer assistance (on a time and materials basis) when so requested, but not to "police" the computer industry.

**A.7 BULLETINS**

**A.7.1 DIGITAL Bulletins**

Digital Equipment Corporation has published a question and answer brochure that provides an overview of the FCC rulings and customer responsibilities for compliance. You can read about the sixteen FCC-related questions that Digital Equipment Corporation customers most often ask by ordering:

FCC Computer Regulations Questions and Answers  
EA 23749 98/82 011 07 10.0  
Digital Equipment Corporation

**A.7.2 FCC Bulletins**

Maintaining compliance requires that the user completely understand his responsibility and also that the user learn system integration rules which include the "grandfathered" product definition, interconnection of cables, equipment add-on status, etc. All of this is described in certain FCC bulletins that you, the "final integrator," should obtain for your own interpretation.

Table A-1 lists some of the FCC bulletins you may obtain. They are available from:

FCC Consumer Assistance Office  
Washington, D.C. 20554  
(phone: 202-632-7000)

**Table A-1 FCC Bulletins**

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Computer Rules (47 CFR Part 15, Subpart J)

Measurement Procedures for Computers (47 CFR Part 15, Subpart J, Appendix A)

Marketing Rules (47 CFR Part 2, Subpart I)

Certification/Verification Rules (47 CFR Part 2, Subpart J)

Importation Rules (47 CFR Part 2, Subpart K)

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- NOTE:**
1. Parts 2 and 15 are contained in Volume II of the FCC rules. Volume II can be purchased from the U.S. Government Printing Office, Washington, D.C. 20402.
  2. Penalties for non-compliance of the FCC rules are described in sections 501 through 504, inclusive.
-



# APPENDIX

B

## APPENDIX B VMS BOOT PROCEDURE

To perform a normal, non-interactive boot from standard devices, use the boot command (which is abbreviated B) as shown below.

>>>BOOT dd n <RET>      ! Boot device "dd" unit "n"

(Example: >>>B DR2 <RET> boots RM05 unit 2 using DRBOO.CMD.)

See Table B-1 for a list of device types.

Table B-1 Device Types

| Device | Device Name |
|--------|-------------|
| RA60   | DUn         |
| RA80   | DUn         |
| RA81   | DUn         |
| RM05   | DRn         |
| RP07   | DBn         |

The console reads the specified device from the boot command line. If the third character is an integer in the range 0-7, it strips off the unit number and deposits it into R3, and then executes the appropriate ddBOO.CMD command file. Two-character device names are handled in a similar manner; the console assumes a unit number of zero. When the device name is other than the two types just mentioned, the console searches for nnnBOO.CMD, where "nnn" is the three character sequence following the boot command.

Only one boot file per device type is provided on the console diskette. This is due to the size of the VAX-11/785 writable control store (WCS), which does not leave enough space on the diskette for boot files for all units.