# VAX 6000: Installing Model 500 Processors

This manual tells how to install Model 500 processor modules in a VAX 6000 system. It describes adding processors to a Model 500 system. It also includes upgrading a Model 200, 300, or 400 to a Model 500 by two methods: installing the H9657-CX upgrade kit and removing the power inhibit cable.

# Contents

## Chapter 5    Installing the KA65A Processor

## Chapter 6    Verifying the System

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# Preface

## Intended Audience

This manual is written for Digital customer service engineers and for self-maintenance customers installing a VAX 6000 Model 500 processor in a VAX 6000 series system.

## Document Structure

This manual uses a structured documentation design. There are many topics, organized into small sections for reference. Each topic begins with an abstract. You can gain a comprehensive overview by reading only the abstracts. Next is an illustration or example, which also provides quick reference. Last in the structure are descriptive text and syntax definitions.

This manual has six chapters and two appendixes, as follows:

- **Chapter 1, Introduction**, shows the major upgrade paths possible when installing a Model 500 processor.

- **Chapter 2, Preparing for the Installation**, tells what to do before beginning the upgrade.

- **Chapter 3, Removing the +3.3V Inhibit Cable**, tells how to upgrade a VAX 6000 Model 300 or 400 that supplies +3.3V power, but inhibits it for older configurations. Removing the inhibit cable supplies the +3.3V necessary for the KA65A processor.

- **Chapter 4, Installing the H9657-CX Kit**, explains how to upgrade a Model 200, 300, or 400 to a Model 500 by installing a power regulator module.

- **Chapter 5, Installing the KA65A Processor**, shows how to install the module into the XMI cage.

- **Chapter 6, Verifying the System**, explains how to verify the system and how to set and save system parameters.

- **Appendix A, VAX 6000 Model 500 General Configuration Rules**, gives general rules for where to install processor, vector, memory, and

I/O modules in the XMI card cage. Configuration rules for the H9657-CX upgrade, which are different, are described in Section 4.2.

- **Appendix B, Description of KA65A LEDs**, tells how to interpret the error LEDs on the KA65A.

## Conventions Used in This Document

The icons shown below are used in illustrations for designating part placement in VAX 6000 series systems. A shaded area in the icon shows the location of the component or part being discussed.

FRONT    REAR
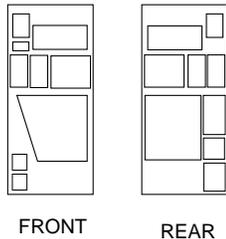
## VAX 6000 Series Documents

There are two sets of documentation: manuals that apply to all VAX 6000 series systems and manuals that are specific to a VAX 6000 model. Table 1 lists the manuals in the VAX 6000 series documentation set.

**Table 1:   VAX 6000 Series Documentation**

| Title | Order Number |
|---|---|
| **Operation** | |
| *VAX 6000 Series Owner's Manual* | EK–600EA–OM |
| *VAX 6000 Series Vector Processor Owner's Manual* | EK–60VAA–OM |
| *VAX 6000 Vector Processor Programmer's Guide* | EK–60VAA–PG |

**Table 1 (Cont.):  VAX 6000 Series Documentation**

| Title | Order Number |
|---|---|
| **Service and Installation** | |
| *VAX 6000 Platform Technical User's Guide* | EK–600EA–TM |
| *VAX 6000 Series Installation Guide* | EK–600EA–IN |
| *VAX 6000 Installationsanleitung* | EK–600GA–IN |
| *VAX 6000 Guide d'installation* | EK–600FA–IN |
| *VAX 6000 Guia de instalacion* | EK–600SA–IN |
| *VAX 6000 Platform Service Manual* | EK–600EA–MG |
| **Options and Upgrades** | |
| *VAX 6000: XMI Conversion Manual* | EK–650EA–UP |
| *VAX 6000: Installing MS65A Memories* | EK–MS65A–UP |
| *VAX 6000: Installing the H7236-A Battery Backup Option* | EK–60BBA–IN |
| *VAX 6000: Installing the FV64A Vector Option* | EK–60VEA–IN |
| *VAX 6000: Installing the VAXBI Option* | EK–60BIA–IN |

Manuals specific to models are listed in Table 2.

**Table 2:  VAX 6000 Model Level Documentation**

| Title | Order Number |
|---|---|
| **Models 200/300/400** | |
| *VAX 6000 Model 300 and 400 Service Manual* | EK–624EA–MG |
| *VAX 6000: Installing Model 200/300/400 Processors* | EK–6234A–UP |
| **Model 500** | |
| *VAX 6000 Model 500 Mini-Reference* | EK–650EA–HR |
| *VAX 6000 Model 500 Service Manual* | EK–650EA–MG |
| *VAX 6000 Model 500 System Technical User's Guide* | EK–650EA–TM |
| *VAX 6000: Installing Model 500 Processors* | EK–KA65A–UP |

# Associated Documents

Table 3 lists other documents that you may find useful.

**Table 3:  Associated Documents**

| Title | Order Number |
|---|---|
| **System Hardware Options** | |
| *VAXBI Expander Cabinet Installation Guide* | EK–VBIEA–IN |
| *VAXBI Options Handbook* | EB–32255–46 |
| **System I/O Options** | |
| *CIBCA User Guide* | EK–CIBCA–UG |
| *CIXCD Interface User Guide* | EK–CIXCD–UG |
| *DEC LANcontroller 200 Installation Guide* | EK–DEBNI–IN |
| *DEC LANcontroller 400 Installation Guide* | EK–DEMNA–IN |
| *InfoServer 100 Installation and Owners Guide* | EK–DIS1K–IN |
| *KDB50 Disk Controller User's Guide* | EK–KDB50–UG |
| *KDM70 Controller User Guide* | EK–KDM70–UG |
| *RRD40 Disc Drive Owner's Manual* | EK–RRD40–OM |
| *RA90/RA92 Disk Drive User Guide* | EK–ORA90–UG |
| *SA70 Enclosure User Guide* | EK–SA70E–UG |
| **Operating System Manuals** | |
| *Guide to Maintaining a VMS System* | AA–LA34A–TE |
| *Guide to Setting Up a VMS System* | AA–LA25A–TE |
| *Introduction to VMS System Management* | AA–LA24A–TE |
| *ULTRIX–32 Guide to System Exercisers* | AA–KS95B–TE |

**Table 3 (Cont.):   Associated Documents**

| Title | Order Number |
|---|---|
| **Operating System Manuals** | |
| *VMS Upgrade and Installation Supplement: VAX 6000 Series* | AA–LB36C–TE |
| *VMS Networking Manual* | AA–LA48A–TE |
| *VMS System Manager's Manual* | AA–LA00A–TE |
| *VMS VAXcluster Manual* | AA–LA27B–TE |
| **Peripherals** | |
| *HSC Installation Manual* | EK–HSCMN–IN |
| *H4000 DIGITAL Ethernet Transceiver Installation Manual* | EK–H4000–IN |
| *Installing and Using the VT320 Video Terminal* | EK–VT320–UG |
| *RV20 Optical Disk Owner's Manual* | EK–ORV20–OM |
| *SC008 Star Coupler User's Guide* | EK–SC008–UG |
| *TA78 Magnetic Tape Drive User's Guide* | EK–OTA78–UG |
| *TA90 Magnetic Tape Subsystem Owner's Manual* | EK–OTA90–OM |
| *TK70 Streaming Tape Drive Owner's Manual* | EK–OTK70–OM |
| *TU81/TA81 and TU/81 PLUS Subsystem User's Guide* | EK–TUA81–UG |
| **VAX Manuals** | |
| *VAX Architecture Reference Manual* | EY–3459E–DP |
| *VAX Systems Hardware Handbook — VAXBI Systems* | EB–31692–46 |
| *VAX Vector Processing Handbook* | EC–H0739–46 |

# Chapter 1

# Introduction

The VAX 6000 Model 500 processor is the KA65A, which must be used with the MS65A memory.

The KA65A processor uses +3.3V power, which may or may not be directly available on the system you are upgrading. If the system supplies +3.3V power, upgrading is simple.

If the system does not supply +3.3V power, you must tailor it so that it does before you can install the KA65A. There are two ways of doing this; the easiest way uses the H9657-CX kit, which is supplied with all orders for KA65A processors for upgrades from Model 200, 300, or 400 systems. **You may or may not need the H9657-CX kit.** Section 1.2 describes the conditions that determine whether to use the H9657-CX kit.

This chapter describes the possible upgrade paths for installing the Model 500 processor and gives preparatory steps for all upgrade paths. Sections include:

- KA65A Upgrade Paths
- Comparison of the H9657-CX and H9657-CU Upgrades
- How to Use This Book

## 1.1 KA65A Upgrade Paths

**There are four starting points from which to upgrade to a VAX 6000 Model 500 system.**

**Figure 1–1:  KA65A Upgrade Paths**



VAX 6000 Model 500

| ❶ Model 500: add CPUs | ❷ Models 300,400: remove power inhibit cable | ❸ Models 200,300,400: install H9657-CX Kit | ❹ Models 200,300,400: install H9657-CU Kit |

WITH +3.3V POWER            WITHOUT +3.3V POWER
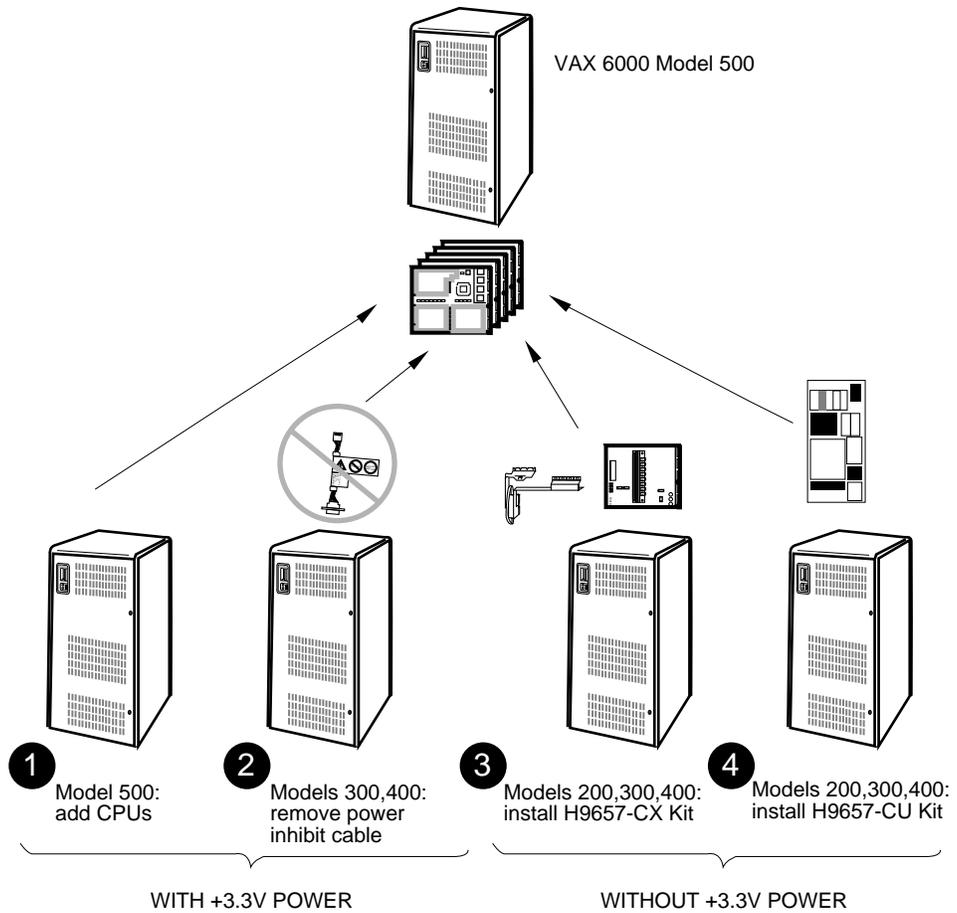
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You will need to upgrade a VAX 6000 system by installing KA65A processor boards when:

❶ The customer already has a VAX 6000 Model 500 system and simply wants to add more KA65A processors.

❷ The customer is upgrading to a Model 500 from a Model 300 or 400 that is equipped to supply +3.3V power to the KA65A.

❸ The customer is upgrading to a Model 500 from a Model 200, 300, or 400 system that is not equipped to supply the +3.3V power needed by the KA65A. In most cases, you install the H9657-CX upgrade kit, which consists of a power regulator module and a bus bar. This is cheaper and simpler than solution ❹, but there are some limitations on the new configuration.

❹ Again, the customer is upgrading to a Model 500 from a Model 200, 300, or 400 system that is not equipped to supply the +3.3V power needed by the KA65A. However, this case requires a full power and packaging upgrade.

In this upgrade, you disregard the H9657-CX kit, and instead install the H9657-CU upgrade kit. With this upgrade, you replace most of the major power elements of the system, achieving the same power environment as that available with a factory-built Model 500.

The H9657-CU installation is described in the *VAX 6000 XMI Conversion Manual*.

**NOTE:** *If you order a Model 500 processor (KA65A) for cases ❷, ❸, and ❹, you will receive an H9657-CX upgrade kit automatically. You only need this kit for case ❸. Disregard it for the other situations.*

Section 1.2 compares the upgrades in ❸ and ❹. Section 1.3 tells what sections of this manual you need to read for the various upgrade paths.

## 1.2 Comparison of the H9657-CX and H9657-CU Upgrades

Three factors guide the customer's choice between the H9657-CX and H9657-CU upgrades.

Figure 1–2:   Tradeoffs Between the H9657-CX and H9657-CU Upgrades
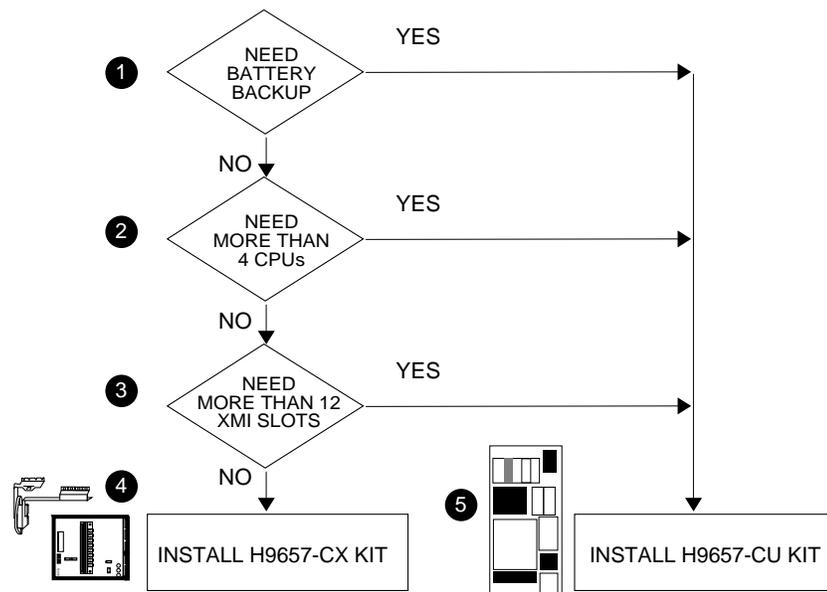


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As Figure 1–2 shows, three factors affect the customer's choice between the two ways of upgrading to a VAX 6000 Model 500 from a Model 200, 300, or 400 with an XMI that does not have +3.3V power.

❶ **Need for Battery Backup**
The H7231-N battery backup unit (used with the VAX 6000 Model 200, 300, or 400 systems without a +3.3V XMI) is incompatible with the KA65A processor. An H7236-A battery backup unit is required, and its installation entails the full power and packaging upgrade (the H9657-CU kit).

❷ **Need for More Than Four CPUs**
The H9657-CX kit generates enough +3.3V power to run four KA65A CPUs. If you need more than four CPUs, you must perform the full power and packaging upgrade, where you install the H7242 power regulator.

❸ **Need for More Than 12 XMI Slots**
The H9657 power regulator module requires two XMI slots, leaving 12 slots for processors, memories, and adapters. If you need more than 12 slots, you must install the full power and packaging upgrade.

If the customer does not need the three items mentioned, option ❹, installing the H9657-CX kit is probably the best choice. If the customer needs any of the three items, option ❺ is needed. This upgrade is described in detail in the *VAX 6000 XMI Conversion Manual*.

## 1.3 How to Use This Book

**Only some chapters of this manual are relevant to your particular installation.**

**Figure 1–3:   How to Read This Book**
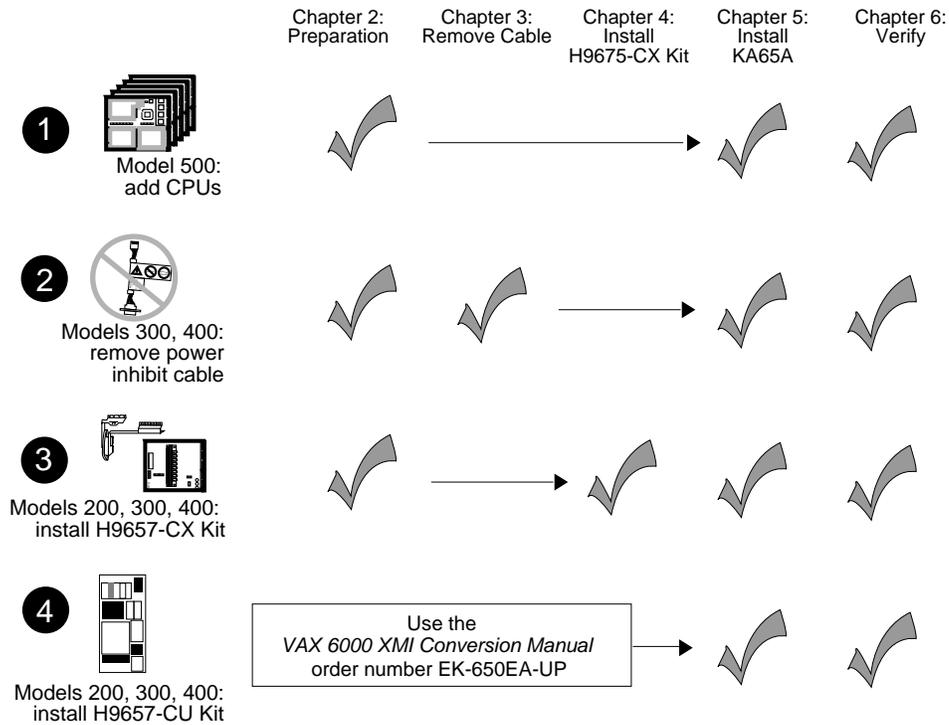


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As shown in Figure 1–3, you do not need to use this whole manual. You should read different chapters depending on what kind of system you are upgrading and how:

❶ If you have a VAX 6000 Model 500 and are adding KA65A CPUs, you should read:

- Chapter 2, Preparation
- Chapter 5, Installing the KA65A Processor
- Chapter 6, Verifying the System

❷ If you have a VAX 6000 Model 300 or 400 that supplies +3.3V power, you should read:

- Chapter 2, Preparation
- Chapter 3, Removing the +3.3V Power Inhibit Cable
- Chapter 5, Installing the KA65A Processor
- Chapter 6, Verifying the System

❸ If you have a VAX 6000 Model 200, 300, or 400 that does not supply +3.3V power and you can use an H9657-CX kit, you need to read:

- Chapter 2, Preparation
- Chapter 4, Installing the H9657-CX Kit
- Chapter 5, Installing the KA65A Processor
- Chapter 6, Verifying the System

❹ If you have a VAX 6000 Model 200, 300, or 400 that does not supply +3.3V power and you need the full power and packaging upgrade, you must use the H9657-CU kit. The manual describing this installation is the *VAX 6000 XMI Conversion Manual*. You can then read:

- Chapter 5 of this manual, Installing the KA65A Processor
- Chapter 6 of this manual, Verifying the System

**Chapter 2**

# Preparing for the Installation

Before you install the KA65A processors in your VAX 6000 system, you need to make sure that the system will work after the physical installation has been done. This chapter describes the procedure. Sections include:

- Save EEPROM Contents to TK Tape (Optional)
- Record System Parameters
- Shut Down the System
- Remove Old Modules
- Return Old Processor Modules
- Continuing the Installation

**NOTE:** *If you are upgrading a VAX 6000 Model 200, 300, or 400, make sure that the version of your installed operating system is one that supports the Model 500 (KA65A) processor. Otherwise, you will not be able to restart the system after installing the KA65A processor. VMS Version 5.4 or later supports the KA65A processor; for other operating systems, see Digital's Systems and Options Catalog.*

## 2.1 Save EEPROM Contents to TK Tape (Optional)

**You may want to prepare for the upgrade by saving or otherwise recording the EEPROM contents of the current system. This information will serve as insurance in case the installation of the new KA65A processor does not work, and you want to restore the old processors to have a working system.**

**Example 2–1: SAVE EEPROM Command for Systems with TK Tape**

```
    !  A blank TK tape is in the tape drive.  With the upper   ❶
    !  key switch at Enable and the lower key switch at Halt,
    !  press the Restart button.

#123456789 0123456789 0123456789 01234567#   ❷

F   E   D   C   B   A   9   8   7   6   5   4   3   2   1   0   NODE #

    A   A   .   .   M   M   .   .   .   .   .   .   P   P       TYP
    o   o   .   .   +   +   .   .   .   .   .   .   +   +       STF
    .   .   .   .   .   .   .   .   .   .   .   .   E   B       BPD
    .   .   .   .   .   .   .   .   .   .   .   .   +   +       ETF
    .   .   .   .   .   .   .   .   .   .   .   .   E   B       BPD

.   .   .   .   .   .   .   .   .   +   .   +   .   +   +   .   XBI D +
.   .   .   .   .   .   .   .   .   +   .   +   .   +   +   .   XBI E +

    .   .   .   .   A2  A1  .   .   .   .   .   .   .   .       ILV
    .   .   .   .   32  32  .   .   .   .   .   .   .   .       64 Mb

ROM0 = V1.00  ROM1 = V1.00  EEPROM = 1.00/1.00  ❸   SN = SG01234567

>>> SAVE EEPROM   ❹              ! Enter SAVE command.

                                 ! System prompts user to proceed.
                                 ! Enter a Y to continue.

Proceed with save to tape? (Y or N) >>>  Y

?6B EEPROM saved to tape successfully.  ❺
                                 ! System confirms SAVE is complete.
>>>                          ❻
```

In Example 2–1, the SAVE EEPROM command copies the boot processor's EEPROM contents to a TK cartridge. Earlier VAX 6000 systems have TK50 tape drives; later models have TK70 tape drives. The operation of the TK50 differs slightly from the TK70. See the *Owner's Manual* for your system for more information on the TK tape drive.

If your system does not have a TK drive, you can save the information as described in Section 2.2.

Example 2–1 shows the steps to save the EEPROM contents.

❶ Put a blank TK cartridge in the tape drive. Put the control panel's upper key switch in the Enable position and the lower key switch in the Halt position, and then press the Restart button to generate self-test results. See the *Owner's Manual* for your system for a full explanation of self-test results.

❷ These numbers appear only for Model 400 and 500 systems and indicate the progress of self-test. The progress trace line is displayed by the processor in slot 1.

❸ Note the values here for the EEPROM. The second number indicates if any patches have been installed. Whenever you do an upgrade, make sure that the boot processor has the latest patches installed on its EEPROM before you perform the save operation.

❹ Following self-test, the console prompt appears. At the prompt, enter SAVE EEPROM. The console program queries you, to confirm the SAVE EEPROM operation. Enter *Y*. This operation saves the information from the boot processor and overwrites any existing information on the TK cartridge. The save process takes less than a minute to complete.

❺ The console program confirms that the save operation has completed successfully. When the console prompt returns, the save operation is complete. Saved information includes:

    System serial number
    Systemwide console parameters (baud rate, interleave, terminal characteristics)
    Saved boot specifications
    Diagnostic patches
    Console patches
    Boot primitives

❻ Rewind the tape and remove the cartridge from the drive. Label and write-protect the tape.

**NOTE:** *The information just saved to tape should be used only on the system it was written from, with its original processor. System-specific information is stored in the processor EEPROMs.*

## 2.2 Record System Parameters

**Save a printout of the system parameters, which you'll want to restore after installation.**

**Example 2–2: Record System Parameters — INITIALIZE Command**

```
>>> INIT    ❶                  ! Resets the entire system.

#123456789 0123456789 0123456789 01234567#

F   E   D   C   B   A   9   8   7   6   5   4   3   2   1   0   NODE #

    A   A   .   .   M   M   .   .   .   .   .   .   P   P       TYP
    o   o   .   .   +   +   .   .   .   .   .   .   +   +       STF
    .   .   .   .   .   .   .   .   .   .   .   .   E   B       BPD
    .   .   .   .   .   .   .   .   .   .   .   .   +   +       ETF
    .   .   .   .   .   .   .   .   .   .   .   .   E   B       BPD

.   .   .   .   .   .   .   .   .   .   .   +   .   +   +   .   XBI D +
.   .   .   .   .   .   .   .   .   +   .   +   .   +   +   .   XBI E +

    .   .   .   .   A2  A1  .   .   .   .   .   .   .   .       ILV
    .   .   .   .   32  32  .   .   .   .   .   .   .   .       64 Mb

ROM0 = V1.00  ROM1 = V1.00   EEPROM = 1.00/1.00  ❷   SN = SG01234567  ❸

>>>                     ! Print the console display for reference.
```

To print console terminal output, use the Print Screen key (the second key at the top left of the keyboard) on the VT320 terminal. Or, you can select from four printing modes. See *Installing and Using the VT320 Video Terminal*. Example 2–2 and Example 2–3 show how to record certain system parameters.

❶ Initialize to reset the entire system. The self-test results are displayed. These should be saved as they show the processor and memory configurations, adapters installed, and other important information.

❷ The EEPROM information gives the boot processor's version of the EEPROM and the patch level.

❸ SN gives the system serial number. The system serial number is also on the cabinet.

**Example 2–3: Record System Parameters — SHOW ALL Command**

```
>>> SHOW ALL    ❶
    Type            Rev      ! Lists all system parameters,
1+  KA64A  (8082) 000B       ! beginning with the system
2+  KA64A  (8082) 000B       ! configuration
9+  MS62A  (4001) 0002
A+  MS62A  (4001) 0002
D+  DWMBA/A (2001) 0002
E+  DWMBA/A (2001) 0002

XBI D
1+  DWMBA/B (2107) 000A
2+  CIBCA-B (0108) 41C2
4+  DEBNA   (410F) 0248

XBI E
1+  DWMBA/B (2107) 000A
2+  DEBNI   (0118) 0100
4+  KDB50   (010E) 0F1C
6+  TBK70   (410B) 0307

Current Primary: 1              ! Shows the status of CPUs
/NOENABLED-
/NOVECTOR_ENABLED-
/NOPRIMARY-
                                ! Shows the memory interleave
F   E   D   C   B   A   9   8   7   6   5   4   3   2   1   0   NODE #
    .   .   .   .   A2  A1  .   .   .   .   .   .   .   .   .       ILV
    .   .   .   .   32  32  .   .   .   .   .   .   .   .   .       64 Mb
/INTERLEAVE:DEFAULT
/SCOPE    /SPEED: 9600 /NOBREAK
English
XMI:D BI:4  08-00-2B-0B-8E-94
XMI:E BI:2  08-00-2B-15-7F-C3
DEFAULT    /XMI:E /BI:4 DU0
>>>    ❷
```

❶ At the console prompt, enter SHOW ALL.

❷ If you have not selected one of the printing modes, use the Print Screen key to print this screen.

**NOTE:** *Store these two printouts in the Site Management Guide for later reference.*

## 2.3 Shut Down the System

Before doing anything more to install KA65A processors, shut down the operating system and turn off the upper key switch. If you are installing an H9657-CX or an H9657-CU kit, you also need to turn off the AC power supply and unplug the machine.

**Figure 2–1: Power Down the System**
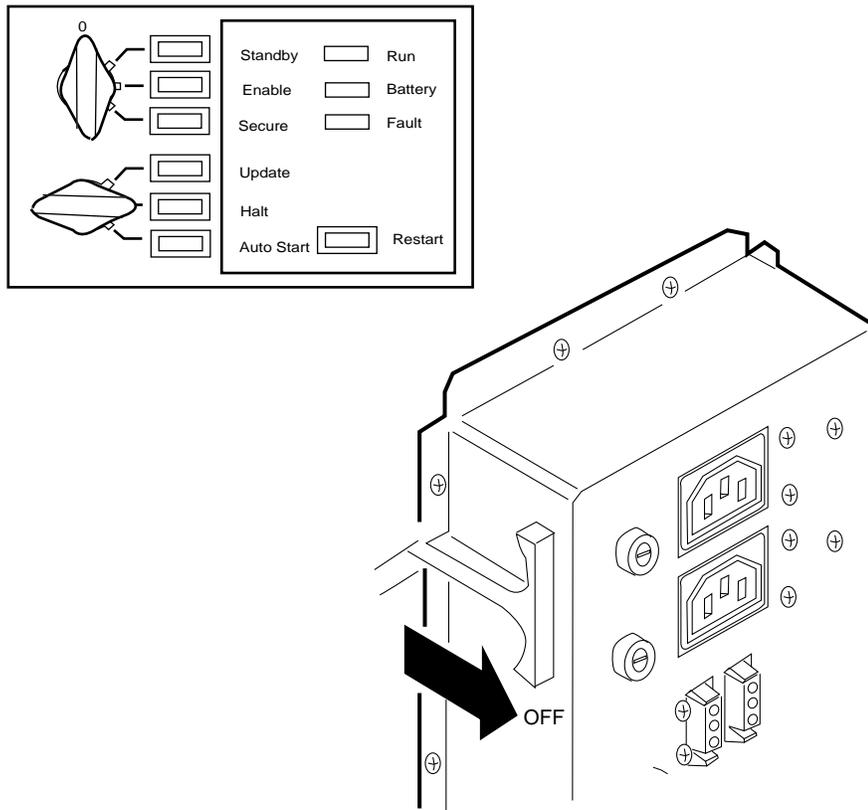


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1. Perform an orderly shutdown of the operating system.

2. Turn the upper key switch on the front control panel to the Off (0) position (see Figure 2–1).

3. Open the front cabinet door.

4. Remove the clear plastic door in front of the XMI card cage.

For all systems except those using the H9657-CX kit or the H9657-CU kit to provide power, further work will involve taking modules in and out of the XMI card cage, and you can proceed while electrical power is being supplied to the system.

**If you are using the H9657-CX or the H9657-CU kit, you will be working directly with power bus bars; turn off the power supply.**

1. Open the rear cabinet door.

2. At the rear of the cabinet, pull out the circuit breaker on the AC power controller to the Off position (see Figure 2–1).

3. Unplug the system power cord; wait 2 minutes for capacitors to discharge.

## 2.4 Remove Old Modules

Before installing new processor modules, take out the old
ones.

**Figure 2–2: Removing Old Modules from the XMI Card Cage**
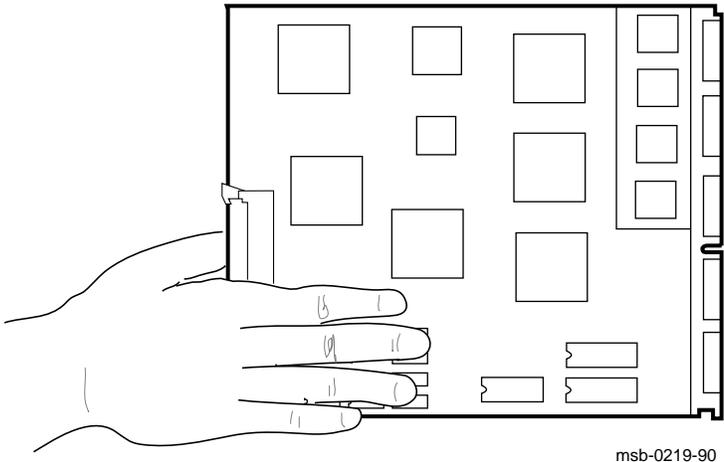


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Upgrading a VAX 6000 to a Model 500 may require changing memory or I/O modules. Table 2–1 lists the compatibility restrictions inherent with (1) using the H9657-CX to provide the +3.3V power needed for the KA65A and (2) all other ways of obtaining the +3.3V power.

**Table 2–1: Kit-Compatible Memory and I/O Modules**

| Module | Upgrade with H9657-CX Kit | Other Upgrades |
|---|---|---|
| MS62A memory | No | No |
| MS65A memory | Yes | Yes |
| DWMBA adapter | Yes | No |
| DWMBB adapter | Yes | Yes |
| CIBCA-A adapter | No | No |
| CIBCA-B adapter | Yes | Yes |

**CAUTION:** *You must wear an antistatic wrist strap attached to the cabinet when you handle any modules.*

When you take out a module from the XMI card cage, follow these rules:

1. Hold the XMI card cage handle when removing the module. If you do not, the handle can spring down and damage the module.

2. Make sure that no part of the module touches another module or a cable.

3. Place the module in an ESD box or on an ESD mat. If a mat, make sure the mat is on a stable, uncluttered surface. Side 1 of the module (with the heat sinks) should face up.

4. Return processor modules, as described in Section 2.5.

## 2.5 Return Old Processor Modules

**Processor modules removed from machines are to be returned to the Returns Sort Center.**

**CAUTION:** *Use proper ESD procedures when handling these modules.*

These instructions for the return of modules apply to the U.S. area only. Those installing upgrades in other areas should follow procedures for those countries.

1. Package the modules removed from the VAX systems in the same container(s) in which the upgrade option was shipped. Be sure to remove the return address label from inside the box prior to packing.

2. Seal the container securely with packing tape.

3. Attach the return address label. Be sure to cover all previous shipping information with the label and/or packing tape.

4. Contact your district Customer Administration Services (CAS) representative for a Return Authorization Number (RA#). CAS will need the Digital order number and customer name. CAS will arrange for pickup of this material. (If you do not know the district CAS representative, contact the district sales office for instructions.)

5. Write the RA# on the return address label. Please be sure this is legible.

6. Customers should be advised that they will be billed for modules not returned to Digital.

7. Send the package to the customer shipping area for pickup.

8. Digital customer service must fill out the LARS form as follows:

    System/Processor Type:      6XXX

    Activity:                   N

    Call Type:                  I

    Module/Fail Area:           63XUX–XX  RA# _ _ _ _

    (Fill in "X" with information from shipping paperwork and give the RA number.)

## 2.6 Continuing the Installation

**You are now ready to proceed with the installation of the VAX 6000 Model 500 processors. As noted in Chapter 1, you read only the chapters that apply to your installation.**

- **Upgrading a Model 500 System.** Proceed to Chapter 5 (Installing the KA65A Processor) and Chapter 6 (Verifying the System).

- **Upgrading a Model 300 or 400 System with +3.3V XMI.** Proceed to Chapter 3 (Removing the +3.3V Power Inhibit Cable) and then to Chapters 5 and 6 (Installing the KA65A Processor and Verifying the System).

- **Upgrading a Model 200, 300, or 400 with an H9657-CX Kit.** Proceed to Chapter 4 (Installing the H9657-CX Kit) and then to Chapters 5 and 6 (Installing the KA65A Processor and Verifying the System).

- **Upgrading a Model 200, 300, or 400 with an H9657-CU Kit.** See the *VAX 6000 XMI Conversion Manual* for directions on how to convert the power system. You can then refer to Chapters 5 and 6 of this manual to tell you how to install KA65A processor(s) and verify the installation.

# Removing the +3.3V Inhibit Cable

If the VAX 6000 Model 300 or 400 has a +3.3V XMI, you need to remove a power-inhibit cable before installing any KA65A processors.

Go to the rear of the cabinet and unplug the small cable from connection J1 of the H7242 regulator with the main cable to the H7206-B. Plug the end of the main cable back into connection J1 of the H7242 regulator.

**Figure 3–1:   Removing the +3.3V Inhibit Cable**



H7215 (10 PIN)

H7214 (12 PIN)

H7242 (12 PIN)

H7206-B

H7242 Inhibit Cable

INTERLOCK (2 PIN) TO H7215

msb-0449C-90
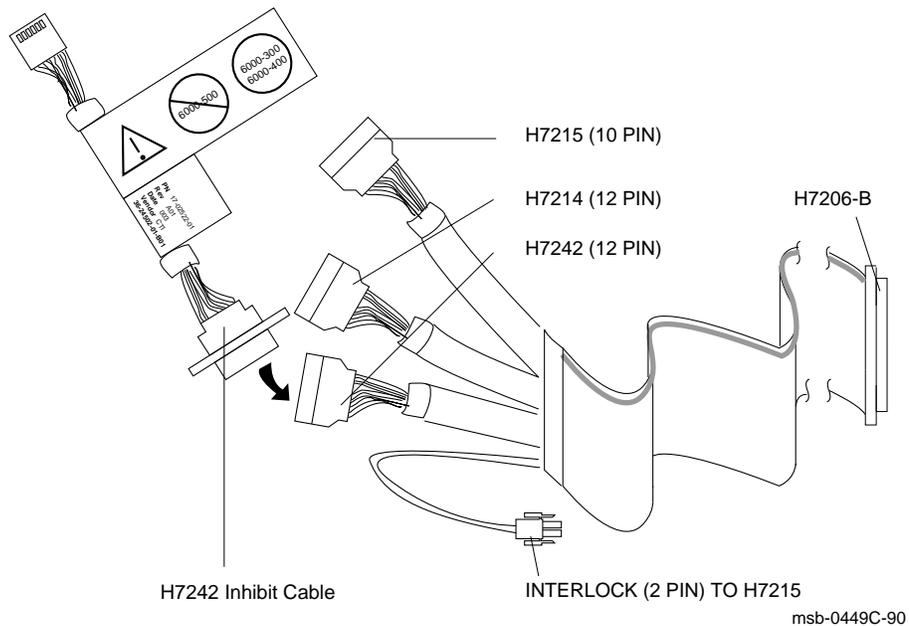
# Chapter 4

# Installing the H9657-CX Kit

If you have a VAX 6000 Model 200, 300, or 400 system that does not have a +3.3V XMI, the H9657-CX kit lets you upgrade the system to a Model 500 without going through the full power and packaging upgrade (kit H9657-CU).

This chapter assumes that you have powered the system down as described in Chapter 2. Sections include:

- Contents of the H9657-CX Kit

- Configuration Rules for the H9657-CX Kit

- Installing the Bus Bar

- Installing the T2019 Module

**NOTE:** *The H9657-CX kit, consisting of a power regulator module and a bus bar, is provided with KA65A processor modules when the customer is upgrading from a VAX 6000 Model 200, 300, or 400 system.* **You do not use the kit in all cases, however.** *The H9657-CX kit is only used for an upgrade from a VAX 6000 Model 200, 300, or 400 system with an XMI that does not supply +3.3V, and where the following conditions hold:*

- *No battery backup is needed*

- *No more than 4 processors are needed*

- *No more than 12 XMI slots are needed*

# 4.1 Contents of the H9657-CX Kit

The H9657-CX kit contains a blue bus bar (with four screws) and a T2019 power regulator module.

**Figure 4–1: T2019 Power Regulator Module and Bus Bar**



4 SCREWS

BLUE BUS BAR

T2019 MODULE

msb-0702A-90
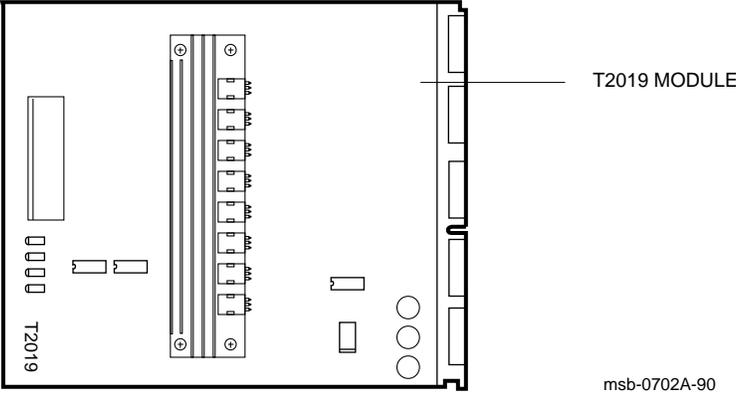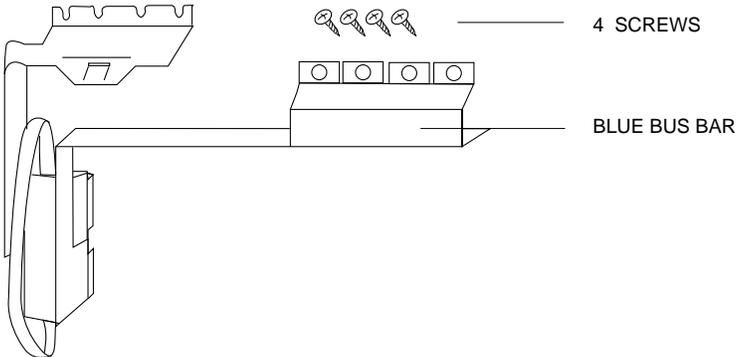
The H9657-CX kit contains:

- A T2019 power regulator module that you install in the XMI-1 cage. This module converts the +5V power supplied to the XMI-1 backplane to +3.3V required by the KA65A processor.

- A blue bus bar that routes the +5V and +3.3V power to the appropriate places.

- Four screws to install the bus bar.

## 4.2 Configuration Rules for the H9657-CX Kit

**Install the T2019 power regulator module in slot 2 of the XMI-1 card cage. Slot 1 must be vacant, since the T2019 has heat sinks that protrude into slot 1 space.**

**Figure 4–2: XMI Configuration When Using the H9657-CX Kit**

XMI CARD CAGE

E  D  C  B  A  9  8  7  6  5  4  3  2  1

❶

❷

T2019

Processor Slots ❸

Memory Slots ❹

I/O Slots  ❺  I/O Slots
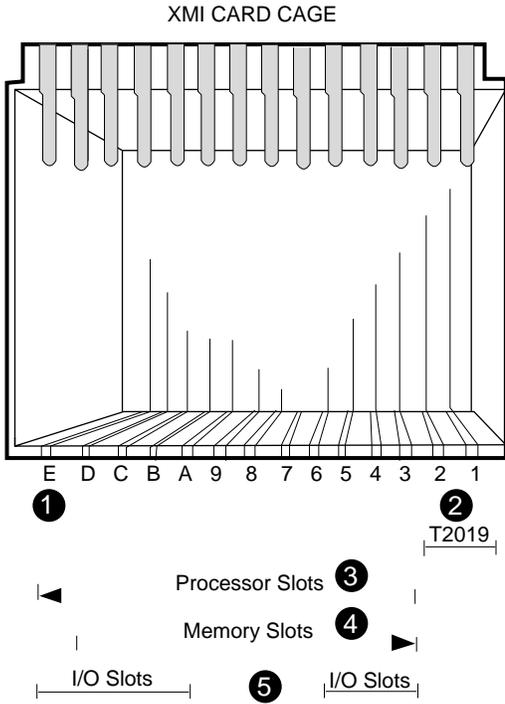
msb-0133C-90

Figure 4–2 shows the XMI configuration rules that apply to systems with a T2019 power regulator module installed.

❶ Slot E of the XMI must be filled for the system to operate. **Slot E may contain a processor or an I/O adapter, but not a memory module.** For systems with VAXBI buses, a DWMBx-A is typically in this slot, to be close to a corresponding DWMBx/B in the VAXBI card cage. Note that the VAX 6000 Model 500 supports the DWMBA *only* when the H9657-CX kit is installed. Other Model 500 systems use the DWMBB for communication with the VAXBI.

❷ The T2019 module is installed in slot 2. Heat sinks on the module protrude into the space allotted for slot 1. **Do not insert the T2019 in any other slot.**

❸ By convention, install processor modules at slot 3 and proceed to the left. A maximum of four processors can be installed when you upgrade using the H9657-CX kit.

❹ Memory modules can be placed in slots 3 through D. By convention in Model 500 systems, memory modules are first placed at slot 9 and then proceed to the right. Additional memory would then be installed beginning at slot 10 and proceeding to the left to slot D.

❺ No I/O adapters can be placed in slots 6, 7, 8, and 9.

## 4.3 Installing the Bus Bar

The blue bus bar in the H9657-CX kit transfers the incoming +5V power to the T2019 module and delivers the +3.3V power produced by that module to the appropriate place on the XMI backplane.

**Figure 4–3:   Installing the H9657-CX Bus Bar**
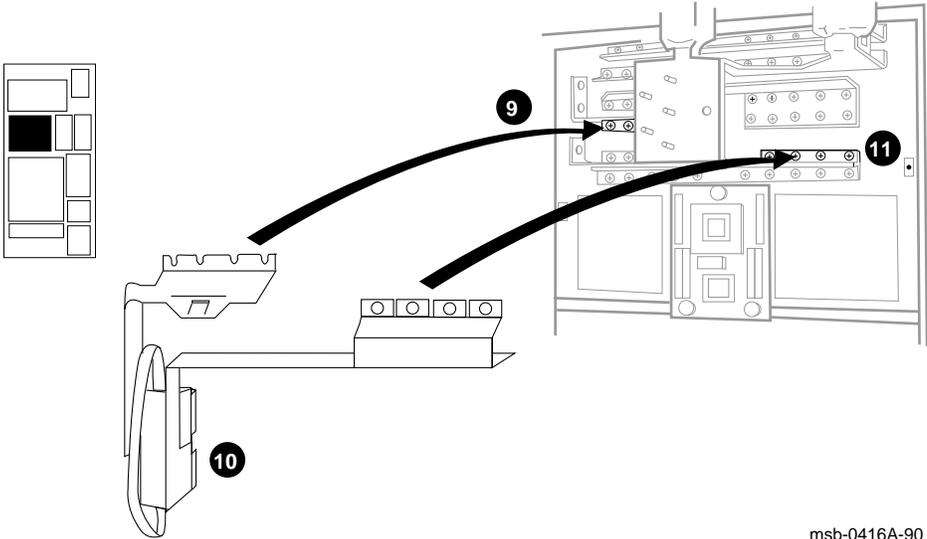


msb-0416A-90

To install the H9657-CX components, you should:

1. Perform an orderly shutdown of the operating system.

2. Turn the upper key switch on the front control panel to the 0 (Off) position.

3. Open the front and rear doors.

4. At the rear of the cabinet, pull the circuit breaker on the AC power controller to the Off position. The AC power controller is at the bottom rear of the cabinet.

5. Unplug the system power cord.

   **WARNING:** *Wait at least 2 minutes after unplugging the system before touching any components of the machine. Voltage discharges slowly and can hurt you if you touch some of the components. Damage can also occur to the modules.*

6. At the front of the system, remove the clear plastic door in front of the XMI cage.

   **CAUTION:** *Always wear an antistatic wrist strap before handling XMI modules.*

7. Remove the old processor (and memory) modules and put them in ESD boxes. (See Chapter 5 for module handling procedures.)

8. At the rear of the cabinet, lower the I/O tray to gain access to the back of the XMI.

9. Loosen the four screws on the +5V rail at the upper left of the XMI card cage and slide the left part of the bus bar under the four screws. (See ❾ in Figure 4–3.)

10. Install the connectors at the bottom of the bus bar into slot 2 segments D and E. (See ❿.)

11. Using a large Phillips screwdriver, screw the right portion of the new bus bar onto the +3V rail using the four screws in the kit. Position the bus bar so that the screws go in the four holes at the far right of the rail. (See ⓫.)

12. With the bus bar in place, tighten the four screws on the +5V rail. Torque the screws to 9 (+/-1.8) inch-pounds.

13. Fold up the I/O tray to its original position. Close the rear cabinet door.

## 4.4 Installing the T2019 Module

**The T2019 power regulator module transforms the +5V
supplied to the XMI-1 backplane to the +3.3V needed by the
KA65A processor. Install the T2019 in slot 2 of the XMI cage.**

**Figure 4–4:   Installing the T2019 Power Regulator Module**
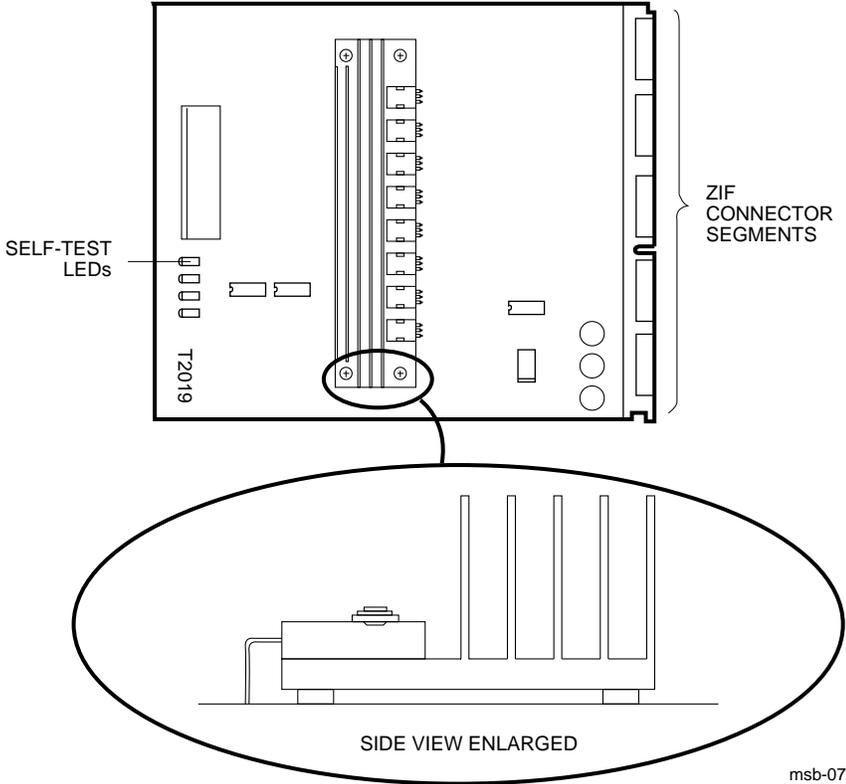


msb-0702C-90

Figure 4–4 shows the T2019 power regulator module. It must be inserted in slot 2 of the XMI cage with slot 1 empty. (The heat sinks on the T2019 protrude into slot 1.)

Follow these steps to install the T2019 module:

1. At the front of the cabinet, insert the T2019 module in slot 2 of the XMI card cage.

2. Power up the system with only the T2019 module in the XMI card cage. The four LEDs on the module indicate status, as listed in Table 4–1.

Table 4–1 lists the meaning of the LEDs. The top two lights should be lit to indicate that the H9657-CX kit has been properly installed and is working.

**Table 4–1:  T2019 Power Regulator Module LEDs**

| LED Top to Bottom | Color | Meaning |
| --- | --- | --- |
| 1 | Clear | +3.3V supplied |
| 2 | Clear | +5V supplied |
| 3 | Red | +3.3V not supplied |
| 4 | Red | System shutdown |

# Chapter 5

# Installing the KA65A Processor

This chapter tells how to handle the KA65A processor and install it in the XMI card cage. Sections include:

- Holding the KA65A Processor
- Inserting the KA65A Processor Into an XMI Card Cage

Chapter 4 gives configuration rules for systems upgraded with an H9657-CX kit. See Appendix A for configuration rules for all other cases.

Note that the KA65A processor will only work with MS65A memories. The manual *VAX 6000: Installing MS65A Memories* describes the installation of MS65A memories.

**NOTE:** *The H9657-CX kit, consisting of a power regulator module and a bus bar, is provided with KA65A processor modules when the customer is upgrading from a VAX Model 200, 300, or 400 system.* **You do not use the kit in all cases, however.** *The H9657-CX kit is only used for an upgrade from a VAX 6000 Model 200, 300, or 400 system with an XMI that does not supply +3.3V, and where the following conditions hold:*

- *No battery backup is needed*
- *No more than 4 processors are needed*
- *No more than 12 XMI slots are needed*

## 5.1 Holding the KA65A Processor

**Handle the KA65A modules with care. The technology used on this module is more vulnerable to static than past technology. Also, these modules have 25 mil leads to the chips; these leads are very small, close together, and easily bent.**

**Figure 5–1: Holding the KA65A Processor**
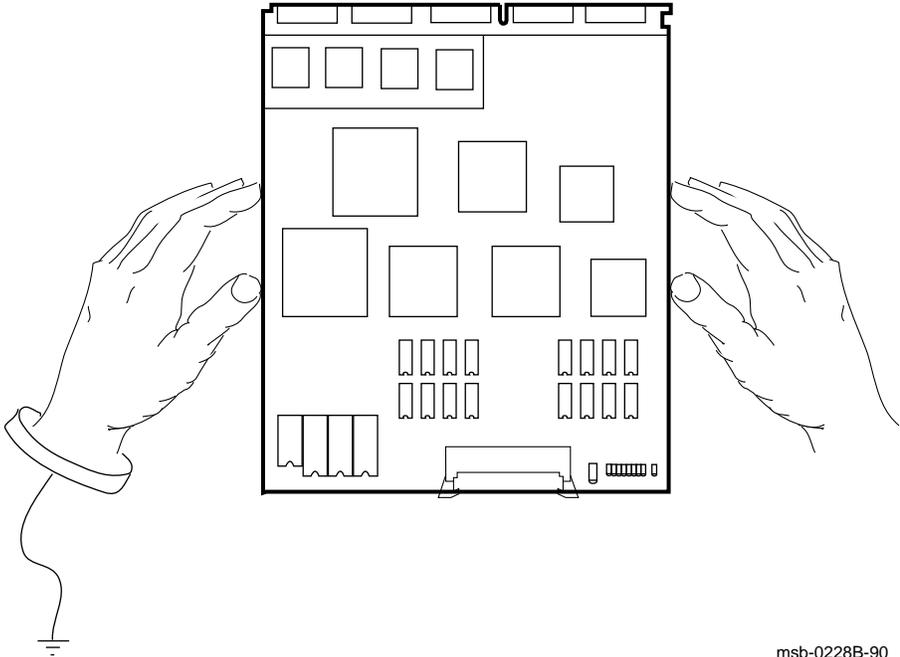


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The KA65A processor requires careful handling. Prepare yourself and the work area before handling these modules. Roll up your sleeves and remove any jewelry. Figure 5–1 shows the proper way to hold the module.

Follow these handling procedures to avoid damaging the KA65A module:

1.  Always wear an antistatic wrist strap.

2.  Before removing the module from its ESD box, place the box on a clean, stable surface.

    Be sure the box will not slide or fall. **Never** place the box on the floor. And be sure no tools, papers, manuals, or anything else that might damage the module are near it. Some components on this module can be damaged by a 600-volt static charge. Paper, for example, can carry a charge of 1000 volts.

3.  Hold the module only by the edges, as shown in Figure 5–1.

    Do not hold the module so that your fingers touch any 25 mil devices, leads, or XMI fingers. Be sure you do not bend the module as you are holding it.

4.  Be sure nothing touches the module surface or any of its components.

    If anything touches the module, components or leads can be damaged. This includes the antistatic wrist strap, clothing jewelry, cables, components on other modules, and anything in the work area (such as tools, manuals, or loose papers.)

## 5.2 Inserting the KA65A Processor Into an XMI Card Cage

**Lift the lever for the XMI slot where you wish to install the KA65A, insert the processor, and lower the lever.**

**Figure 5–2:   Inserting the KA65A Processor in an XMI Card Cage**
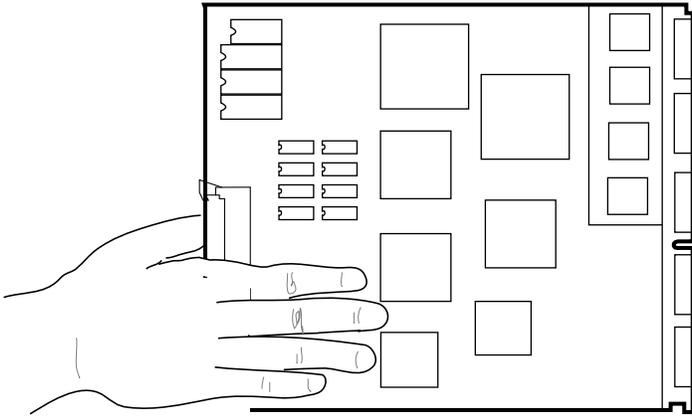


msb-0219A-90

You must take special precautions when inserting the KA65A module in or removing it from the XMI card cage.

1. Do not let the module touch other modules or cables when you are putting it in or taking it out of the XMI card cage.

2. When you swap out a module, temporarily place it in an unused XMI slot, if one is available, or put it in an ESD box or on an ESD mat before you install the new module.

   An unused XMI slot is the best place to leave a module that is being swapped out until it can be placed in the ESD box.

   **CAUTION:** *If you temporarily leave a module in an unused XMI slot, be sure to remove the module before powering up the system.*

   If you put the module on an ESD mat, make sure the mat is on a stable, uncluttered surface, with side 1 of the module facing up (the side with the heat sinks). Do not put it on the top of the system cabinet. And never slide the module across any surface. The leads on the components are fragile and can be damaged by contact with fingers or any surface.

3. Hold the XMI card cage handle while removing or inserting the module. If it is not held in place, the handle can spring down and damage the module.

4. When inserting the module in the card cage, grasp it as shown in Figure 5–2, being careful not to touch any 25 mil devices, and slide it slowly and gently into the slot.

5. Make sure that the module is seated firmly in the XMI slot and engaged with the XMI backplane. Then lower the lever to close the connector.

6. When all new modules have been installed and old modules repositioned (if necessary), note the new configuration, and replace the clear door in front of the XMI card cage.

**NOTE:** *If you are doing a full power and packaging upgrade (H9657-CU kit), the installation will entail changing DWMBA-A modules in the XMI card cage to DWMBB-A modules.*

# Chapter 6

# Verifying the System

The steps in verifying the correct operation of the upgraded system are described in this chapter. Sections include:

- Verification Overview

- Power Up the System

- Examine the Self-Test

- Set System Parameters (Mandatory)

- Run EVUCA to Apply Current ROM Patches (Mandatory)

- Run the VAX Vector Instruction Exerciser (Optional)

- Print System Parameters

- Save EEPROM to TK Tape (Optional)

- Verify System Under Operating System

- Change System Number Plate

If you want to run ROM-based diagnostics, see the diagnostics chapter of the *VAX 6000 Model 500 Service Manual* for more information.

## 6.1 Verification Overview

**To verify the new processors, turn the system on and let self-test run. Set system parameters. Apply current ROM patches with EVUCA. For systems with vector processors, run the VAX Vector Instruction Exerciser. Then save system parameters, boot the operating system, and run applicable tests.**

**Figure 6–1: Verification Flowchart**



**❶** Power-Up System. Self-Test Runs. — See Sections 6.2 and 6.3

**❷** Set System Serial Number and Parameters — See Section 6.4

**❸** Run EVUCA to Apply Current ROM Patches — See Section 6.5

**❹** Vector Processor in System — Yes → Run the VAX Vector Instruction Exerciser — See Section 6.6

No

**❺** Save System Parameters — See Sections 6.7 and 6.8

**❻** Verify System Under Operating System — See Section 6.9

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To verify the upgraded system:

❶ Power up the system. Self-test runs and tests all modules. If your system has more than one Model 500 processor, the multiprocessor tests are automatically run in self-test. See Section 6.2 and Section 6.3.

❷ Set the system serial number on all processors. (Error messages show that processor serial numbers have not been initialized.) See Section 6.4. Set system parameters. As part of the preparation for the upgrade, you issued a SHOW ALL console command (see Chapter 2). Using this listing, restore system-specific parameters such as boot specifications, console baud rate, memory interleave, and so forth. See Section 6.4.

❸ Boot the VAX Diagnostic Supervisor and run the EVUCA program to apply current ROM patches. See Section 6.5.

❹ If the system has vector processors, run the VAX Vector Instruction Exerciser. See Section 6.6. Otherwise, proceed to ❺.

❺ Record and save the new customized parameters. First make a hardcopy record for future maintenance with the SHOW FIELD and SHOW ALL commands. Then, if your system has a TK tape, use the SAVE EEPROM command. See Sections 6.7 and 6.8.

❻ Verify the system under the operating system. See Section 6.9.

## 6.2 Power Up the System

For the **H9657-CX** and **H9657-CU** upgrades, you now restore power to the system. For all upgrades, turn the upper key switch on the front panel to the Enable position.

**Figure 6–2:   Return Power to the System**



REAR

ON

OFF

msb-0405-90
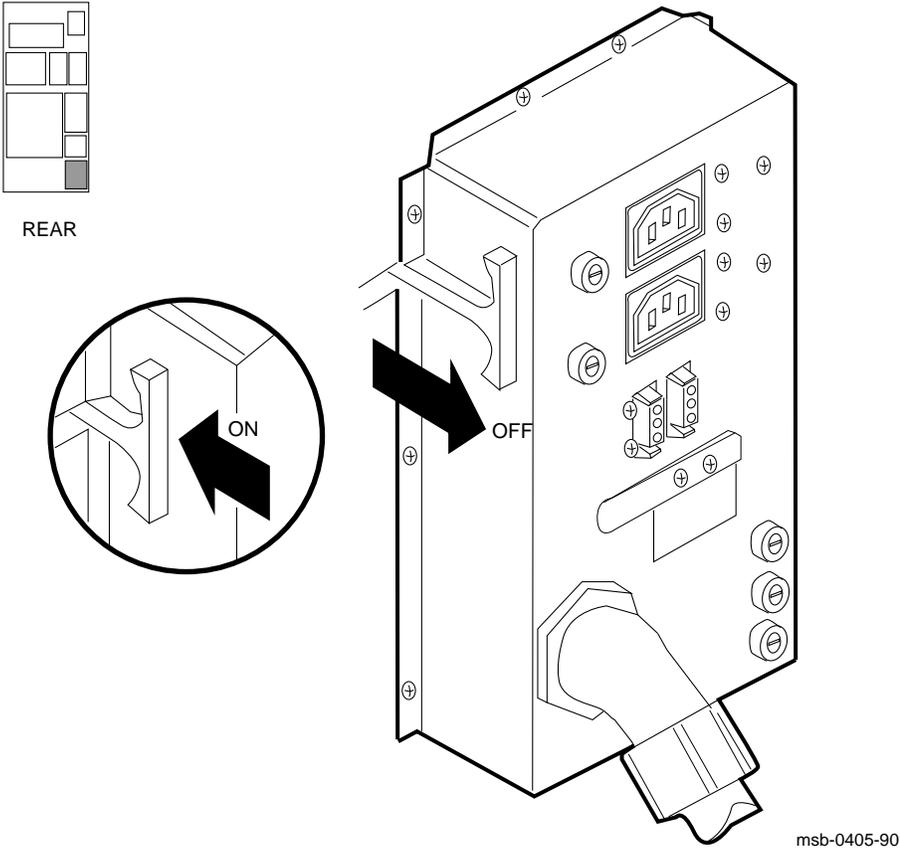
**For system upgrades using the H9657-CX and H9657-CU kits, restore power to the system by:**

1. Plugging in the system power cord.

2. Pushing the circuit breaker on the AC power controller to the On position. The AC power controller is at the bottom rear of the cabinet, as shown in Figure 6–2.

**For all upgrades,** turn the upper key switch on the front control panel to the Enable position. The lower key switch should be set at Update position. The system should run self-test, as described in Section 6.3.

# 6.3 Examine the Self-Test

**At system power-up, self-test runs, checking all modules.**

**Example 6–1:  Self-Test for Upgrading VAX 6000 System 510 to 520**

```
#123456789 0123456789 0123456789 0123456789 012345#

F   E   D   C   B   A   9   8   7   6   5   4   3   2   1   0   NODE #

    A   A   .   .   .   M   M   .   .   .   .   .   P   P       TYP
    +   +   .   .   .   +   +   .   .   .   .   .   +   +       STF
    .   .   .   .   .   .   .   .   .   .   .   .   E   B       BPD
    .   .   .   .   .   .   .   .   .   .   .   .   +   +       ETF
    .   .   .   .   .   .   .   .   .   .   .   .   E   B       BPD

    .   .   .   .   .   A2  A1  .   .   .   .   .   .   .       ILV
    .   .   .   .   .  128 128  .   .   .   .   .   .   .       256 Mb

Console = V2.00  RBDs = V2.00  EEPROM = 2.00/2.00 SN = SG01234567

?002D  For Secondary Processor n
?005A  System serial number mismatch
       Secondary Processor has xxxxxxxx
>>>
```

**Example 6–2:  Self-Test for an H9657-CX Upgrade**

```
F   E   D   C   B   A   9   8   7   6   5   4   3   2   1   0   NODE #

    A   A   .   .   .   M   M   .   P   P   P   P   .   .❶      TYP      ❷
    o   o   .   .   .   +   +   .   +   +   +   +   .   .       STF
    .   .   .   .   .   .   .   .   E   E   E   B   .   .       BPD      ❸
    .   .   .   .   .   .   .   .   +   +   +   +   .   .       ETF
    .   .   .   .   .   .   .   .   E   E   E   B   .   .       BPD

.   .   .   .   .   .   .   .   .   .   .   +   .   +   +   .   XBI D +❹
.   .   .   .   .   .   .   .   .   +   .   +   .   +   +   .   XBI E +

    .   .   .   .   .   A2  A1  .   .   .   .   .   .   .       ILV
    .   .   .   .   .  128 128  .   .   .   .   .   .   .       256 Mb

Console = V2.00  RBDs = V2.00  EEPROM = 2.00/2.00 SN = 0000000000

?004F System serial number has not been initialized. ❺
>>>
```

The first phase of verification involves checking the self-test results. When you power up the system, self-test runs, showing the state of each module in the XMI card cage. (Entering the INITIALIZE command at the console prompt also generates self-test.)  Example 6-1 shows a self-test of an upgrade from a VAX 6000 Model 510 to a Model 520. Another processor has been added. Example 6-2 shows an upgrade using the H9657-CX kit.

**NOTE:** *If you are replacing a single processor, or the boot processor of a multiprocessor system, and self-test does not display on power-up, the console baud rate and your terminal baud rate may not be set the same. Hit the* BREAK *key, which steps the terminal baud rate in the available increments, until you get the console prompt (>>>). Then type INIT to start self-test.*

❶ Examine your self-test results.  Self-test results differ for the H9657-CX upgrade at the TYP line where it shows XMI slots 1 and 2 as empty (see ❶ of Example 6–2.  The T2019 module actually occupies slot 2, and its components (heat sinks) protrude into slot 1.

❷ Check the STF line to see that all Model 500 processors and other modules passed self-test.

❸ Check the ETF line to see that all CPUs passed the extended test.  For Model 500 systems, the multiprocessor tests are run every time self-test runs.

❹ Check the XBI lines for self-test results for VAXBI modules.

❺ The system serial number error message appears, indicating that the processors do not have the system serial number in their EEPROMs.

If a KA65A processor module fails self-test, as shown by a minus (–) rather than a plus in the STF or ETF rows, the most likely problem is that the module is improperly seated in the XMI slot.  Power the system down, reseat the failed module, and power the system up again.

If the KA65A module still fails self-test, it should probably be replaced. You can further isolate the problem by looking at the KA65A LEDs.  See Appendix B for a discussion of the KA65A LEDs.

## 6.4 Set System Parameters (Mandatory)

**You must set the system serial number on all new processors and enter the power indication on H9657-CX or -CU upgrades.**

**Example 6–3: Setting the System Serial Number and Parameters**

```
>>> SET CPU n                          ! Make the rightmost new CPU
                                       ! the boot processor.

>>> ESC DEL  SET SYSTEM SERIAL  RET  ❷
Enter system serial number? aannnnnnnn ! System prompts for serial
                                       ! number; enter 2-alpha,
                                       ! 8-numeric digit serial number.

  Update EEPROM?  (Y or N) >>> Y       ! System prompts for response.
  ?0073 System serial number updated.  ! Enter Y to update the boot
                                       ! processor's serial number.
>>> SET POWER       ❸
  Power System>>> A                    ! For H9657-CX and -CU upgrades,
  Power System Read as  A              ! set system power.

  Update EEPROM?  (Y or N) >>> Y       ! System prompts for response.
  ?011B Power System updated.          ! Enter Y to update the boot
                                       ! processor's power indication.

>>> UPDATE m                           ! Use the UPDATE command to
Now updating the EEPROM of node m      ! specifically update the EEPROM
                                       ! on any other new processors.
                                       ! UPDATE takes several minutes
                                       ! per CPU.  Update each new CPU
                                       ! separately.

>>> SET BOOT DEFAULT /XMI:E /BI:4 DU0  ❼
```

You must set the system serial number on each new processor. In addition, if you have upgraded using an H9657-CX or -CU kit, you must set the power indication in all processors.

To set these parameters, issue the SET SYSTEM SERIAL command to the rightmost new processor after making it the primary by using the SET CPU *n* command. After setting power and system serial numbers on this new processor, update any other new processors using the UPDATE *m* command,

where *m* is the node of another new processor. You must wait for the UPDATE command to finish processing, which takes up to 4 minutes for each secondary processor.

To update system parameters:

❶ Set the lower key switch to Update and issue the SET CPU command to make the rightmost new processor the boot processor. If you forget to set the key switch, you will receive a console error message.

❷ Set the system serial number to be the same as the old serial number. To issue the SET SYSTEM SERIAL command, depending on your keyboard, you enter one of the following:

```
>>> CTRL/3  DEL  SET SYSTEM SERIAL NUMBER ! VT200 terminals and higher

>>> ESC  DEL  SET SYSTEM SERIAL NUMBER   ! VT100 and hardcopy terminals
```

At the prompt enter the serial number.[1] The console program prompts for confirmation to update the EEPROM. Type *Y* to change the EEPROM.

❸ If you have gone through an H9657-CX or H9657-CU upgrade, you must use the SET POWER command to store the power conversion information in EEPROM. Otherwise, proceed to ❹. The SET POWER command accepts three options:

> A — Power system upgraded with an H9657-CX kit
> B — Power system includes a battery backup system
> C — Power system upgraded with an H9657-CU kit

Again, the console prompts for EEPROM update, and then confirms the setting.

❹ Issue an UPDATE *m* command to propagate the system serial number and power information to the new CPU's EEPROM on node *n*.

❺ Now issue other console commands to customize system parameters. These commands include SET BOOT, SET TERMINAL, SET LANGUAGE. Refer to the printout you created in Section 2.2, Record System Parameters.

---

[1] You can find the correct serial number by issuing a SET CPU command to a previously installed CPU and then the command:

```
CTRL/3  DEL  SHOW SYSTEM SERIAL
```

## 6.5 Run EVUCA to Apply Current ROM Patches (Mandatory)

You must run EVUCA to ensure that all modules are up to the latest patch revision. Boot the VAX Diagnostic Supervisor (VAX/DS), run the autosizer EVSBA, and load and run the EVUCA program.

**Example 6–4:   EVUCA Program (Part 1)**

```
>>> BOOT /XMI:D /R5:10 /BI:4 DU0  ❶
                [The VAX Diagnostic Supervisor banner appears.]

DS> RUN EVSBA  ❷
DS> SELECT ALL  ❸
DS> SET TRACE
DS> RUN EVUCA  ❹
.. Program: EVUCA - VAX 6000 EEPROM Update Utility, revision 1.0, 5 tests,
   at 00:05:57.61.
Testing: _KA0 _KA1

Booting secondary CPU 02.
Test 2: Load data from media

Data file? <EMUCA.BIN>  ❺

Searching for data file.
Data file loaded.

Looking for patch for CPU 01 - ROM 02.00 EEPROM 02.00.
Patch image is revision 02.01
Do you really want to apply this patch [(No), Yes] YES ❻

Looking for patch for CPU 02 - ROM 02.00 EEPROM 02.00.
Patch image is revision 02.01
Do you really want to apply this patch [(No), Yes] YES ❻

Test 3: Determine Typecodes Updated
Test 4: Update EEPROM data

Getting selectable boot primitives for CPU 01, ROM 02.00
```

EVUCA checks ROM levels on all processors and applies the latest patches to each processor. Example 6–4 and Example 6–5 show a sample EEPROM update of a Model 500 two-processor system. In these examples, the boot processor is in slot 1 of the XMI card cage, and a secondary processor is in slot 2.

❶ At the console prompt, boot VAX/DS. The /R5 qualifier specifies the VAX Diagnostic Supervisor program.

❷ At the VAX/DS prompt, run the autosizer EVSBA to attach all devices. This process takes time now, but saves you time when you run the other subtests.

❸ Type SELECT ALL to select all devices in the system configuration. SET TRACE enables printing of test numbers and names when EVUCA runs. It allows you to follow the progress of testing.

❹ Issue the RUN EVUCA command to start the program. The EVUCA banner appears, with its revision level and subtest numbers. It tests all processors and then loads test 2.

❺ EVUCA prompts for input on what data file you want to run. Load EMUCA.BIN to update KA65A processors. Press Return to continue the program.

EVUCA finds and loads the data file indicated at ❺. Program messages inform you of progress.

❻ EVUCA prompts you to verify that a patch is to be made. The program requires verification for each processor to apply patches. Enter *YES* to continue the program.

**Example 6–5: EVUCA Program (Part 2)**

```
CPU 02 has the same ROM revisions as CPU 01 ❼
Boot primitives are the same for these CPUs.

Updating CPU 01 ❽
Primary CPU 01 Done.

Secondary CPUs are being updated, please wait a maximum of 20 seconds. ❾
Updating CPU 02
Secondary CPU 02 Done.
Test 5: Show Boot primitives ❿

ROM boot primitives for CPU 01, revision 02.00 are:

1        This boot primitive supports the following:
         - boot primitive designation CI
           Device CIBCA, device type 0108
           Device CIXCD, device type 0C05

2        This boot primitive supports the following:
         - boot primitive designation DU
           Device KDB50, device type 010E
           Device KDM70, device type 0C22

3        This boot primitive supports the following:
         - boot primitive designation ET
           Device DEBNI, device type 0118
           Device DEBNA, device type 410F
           Device DEMNA, device type 0C03

4        This boot primitive supports the following:
         - boot primitive designation MU
           Device TBK50, device type 410E
           Device TBK70, device type 410B
No boot primitives found in EEPROM for CPU 01

CPU 02 has the same ROM revisions as CPU 01 ⓫
Boot primitives are the same for these CPUs.

The primary CPU was successfully updated.
Secondary CPU 02 was successfully updated.  ⓬

Current ROM and EEPROM revisions for each CPU are:
CPU 01 - ROM 02.00 EEPROM 02.01
CPU 02 - ROM 02.00 EEPROM 02.01 ⓭

.. End of run, 0 errors detected, pass count is 1,
   time is  31-DEC-1990 00:04:45.16
DS> EXIT  ⓮

>>>
```

❼ EVUCA program compares the existing ROM revisions of all CPUs attached. Here, it notes that both CPUs are at the same revision level.

❽ Program informs you that it is updating the CPU at node 1.

❾ Program informs you that it is updating secondary CPUs. In this example, there is only one secondary CPU at node 2.

❿ EVUCA program begins display of boot primitives that are being loaded into EEPROM.

⓫ Again, the program checks that the ROM revision levels of all CPUs match. This is similar to ❼.

⓬ Update of secondary processor(s) reported.

⓭ ROM and EEPROM levels are reported. These revision numbers will appear at the bottom line of the system's self-test printout at next system reset.

⓮ Issue an EXIT command to exit EVUCA and the VAX Diagnostic Supervisor. The console prompt returns.

## 6.6 Run the VAX Vector Instruction Exerciser (Optional)

**If your system has a vector processor, use the VAX Diagnostic Supervisor to run the two-part vector diagnostic, EVKAG and EVKAH, on each scalar/vector pair.**

**Example 6–6:   Running the Vector Diagnostics**

```
DS>
DS> SET QUICK    ❶          ! Do quick version to take about 6 mins.

DS> DESELECT KA1 ❷

DS> RUN EVKAG    ❸

.. Program: ZZ-EVKAG, VAX Vector Instr Exer Pt I, revision 1.0, 35 tests,
at 16:02:48.71.
Testing: _KA0

Testing the vector unit attached to _KA0.
Test 1: VVADDL Instruction Test
Test 2: VSADDL Instruction Test
  [other subtests are displayed as testing proceeds]

DS> RUN EVKAH ❹
  [tests are displayed]

DS> BOOT 4  ❺             ! Change the boot processor.
DS> DESELECT KA0 ❻
DS> SELECT KA1
DS> RUN EVKAG
  [tests are displayed]
DS> RUN EVKAH
  [tests are displayed]
DS> BOOT 1 ❼             ! Restore original boot processor.
DS> EXIT
>>>
```

Example 6–6 shows how to run the vector diagnostics from the VAX Diagnostic Supervisor.  The example assumes that you have run the autosizer program and selected all devices, as in Example 6–4. If you need additional information on the VAX Vector Instruction Exerciser, see the *VAX 6000 Model 500 Service Manual*.

❶ Issue the SET QUICK command to run the shorter version of the tests.

❷ All devices were selected previously, so you must now deselect the second scalar/vector pair from the test sequence while KA0 is being tested.

❸ Run the EVKAG diagnostic. The VAX Vector Instruction Exerciser runs only on the scalar/vector pair from which VAX/DS was booted. The self-test display in Example 6–7 shows that the boot processor is at node 1; its attached vector module is being tested.

❹ Run the EVKAH diagnostic.

❺ From the self-test display (Example 6–7), find the node number of any other scalar that has a vector module attached. Then issue the VAX/DS BOOT command specifying the node number of that scalar CPU. At ❺, the BOOT command specifies the CPU at node 4 as the boot processor.

❻ Deselect KA0, select KA1, and run EVKAG and EVKAH on KA1.

❼ Issue the BOOT command to return the CPU at node 1 to boot processor and exit.

**Example 6–7:   Self-Test from System with Vector Processors**

```
#123456789 0123456789 01234567890 0123456789 0123456789 01234567#

F   E   D   C   B   A   9   8   7   6   5   4   3   2   1   0   NODE #

    A   A   .   .   .   M   M   .   M   V-  -P  M   V-  -P      TYP
    +   +   .   .   .   +   +   .   +   +   +   +   +   +       STF
    .   .   .   .   .   .   .   .   .   E   E   .   E   B       BPD
    .   .   .   .   .   .   .   .   .   +   +   .   +   +       ETF
    .   .   .   .   .   .   .   .   .   E   E   .   E   B       BPD

    .   .   .   .   .   A4  A3  .   A2  .   .   A1  .   .       ILV
    .   .   .   .   .   32  32  .   32  .   .   32  .   .       128Mb
Console = V2.00   RBDs = V2.00   EEPROM = 2.00/2.01   SN = SG01234567
```

## 6.7 Print System Parameters

Using the SHOW FIELD and SHOW ALL commands, print the system parameters in effect for this system. Using console commands, print the parameters to the console terminal printer and save the printout in two places: the maintenance envelope attached to the back door of the cabinet and in your Site Management Guide.

**Example 6–8: System Parameters Printout**

```
❶ >>> SHOW FIELD
   Saved boot specifications:
     DEFAULT /XMI:E /BI:4 DU0

   Console terminal parameters:
     /SCOPE    /SPEED: 9600  /BREAK

   Console error message language mode:
     English

   Memory configuration:
   F  E  D  C  B  A  9  8  7  6  5  4  3  2  1  0   NODE #
      .  .  .  .  .  A2 A1 .  .  .  .  .  .  .      ILV
      .  .  .  .  . 128 128 .  .  .  .  .  .  .     256 Mb
     /CONSOLE_LIMIT:01000000
     /INTERLEAVE:DEFAULT

   Power system:   A

   System serial number: SG01234567

❷ >>> SHOW ALL
       Type           Rev
    3+ KA65A    (8080)   0008
    4+ KA65A    (8080)   0008
    5+ KA65A    (8080)   0008
    6+ KA65A    (8080)   0008
    8+ MS65A    (4001)   0084
    9+ MS65A    (4001)   0084
    D+ DWMBA/A  (2001)   0002
    E+ DWMBA/A  (2001)   0002

    XBI D
    1+ DWMBA/B  (2107)   000A
    2+ CIBCA-B  (0108)   41C2
    4+ DEBNA    (410F)   0248
```

**Example 6–8 Cont'd on next page**

**Example 6–8 (Cont.):  System Parameters Printout**

```
XBI E
1+  DWMBA/B    (2107)   000A
2+  DEBNI      (0118)   0100
4+  KDB50      (010E)   0F1C
6+  TKB70      (410B)   0304

Current Primary:  3
/NOENABLED-
/NOVECTOR_ENABLED-
/NOPRIMARY-
F  E  D  C  B  A  9  8  7  6  5  4  3  2  1  0  NODE #
.  .  .  .  .  . A2  A1  .  .  .  .  .  .  .  .  ILV
.  .  .  .  . 128 128  .  .  .  .  .  .  .  .  256 Mb

/CONSOLE_LIMIT: 01000000
/INTERLEAVE:DEFAULT
/SCOPE    /SPEED:  9600  /BREAK
English
XMI:D BI:4  08-00-2B-0B-8E-94
XMI:E BI:2  08-00-2B-15-7F-C3
DEFAULT  /XMI:E  /BI:4 DU0
```

For future troubleshooting and maintenance, record system parameters. This step is especially important for single-processor systems and systems that have a CD load device. Use hardcopy printout and save the printout in two places: the maintenance envelope attached to the back door of the cabinet and in your *Site Management Guide*.

**❶ SHOW FIELD**

Enter the SHOW FIELD command at the console prompt. This display includes the system serial number and power system, which are not included in the SHOW ALL command.

**❷ SHOW ALL**

Use the SHOW ALL command to record all other relevant information for the system for future reference.

## 6.8 Save EEPROM to TK Tape (Optional)

**If your system has a TK tape, save EEPROM to the TK. This tape would be used in case the EEPROM contents become corrupted and must be restored.**

**Example 6–9:   Saving EEPROM to TK Tape**

```
>>> SAVE EEPROM     ❶

Proceed with save to tape?  (Y or N) >>> Y   ❷
  ?006B EEPROM saved to tape successfully
>>>
```

Put a blank cartridge in the TK drive, write-enabled.  The following steps save the contents of the EEPROM to TK tape:

❶  Enter the SAVE EEPROM command (see ❶).

❷  The console program queries you (see ❷).  Enter *Y* to save the EEPROM contents to tape.  The console program then confirms that the save operation completed successfully.

Label the cartridge and store on site.  Leave the TK cartridge with the system manager, in case EEPROM contents become corrupted and need to be restored.

**NOTE:** *Use this TK cartridge with this system only.  TK tapes are not transferable, since the parameters saved are system-specific.*

## 6.9 Verify System Under Operating System

After you have started the operating system, run any appropriate tests. For VMS, as noted in Chapter 2, you need to have Version 5.4 to be able to use the Model 500 processors. With VMS, you can use a set of programs called UETP (User Environment Test Package). First log in and check the devices. Then start the tests.

**Example 6–10: Running UETP**

```
Username:  SYSTEST    ❶
Password:

     Last interactive login on Thursday, 31-DEC-1990 13:11

$ @UETP   ❷
         Welcome to VAX/VMS UETP Version V5.x  ❸

Run "ALL" UETP phases or a "SUBSET" [ALL]?
How many passes of UETP do you wish to run  [ 1 ]?
How many simulated user loads do you want [145]?
Do you want Long or Short report format [Long]?

UETP starting at 31-DEC-1990 13:12:23.00 with parameters:
DEVICE LOAD DECNET CLUSTER  phases, 1 pass, 145 loads, long report.
```

❶ Enter SYSTEST as the username. Obtain the password from the system manager. After you log in, check all devices.

❷ Enter the command @UETP to start the program.

❸ The VAX/VMS UETP banner appears and UETP prompts you with questions. The default answer for each question is in square brackets. Press Return if you wish to enter the default answer. UETP testing begins when the final question is answered. For more information, refer to *VMS Upgrade and Installation Supplement: VAX 6000 Series*.

## 6.10 Change System Number Plate

On the system cabinet front door, change the number plate
to reflect the number of your system upgrade.

**Figure 6–3:   Front Door (Inside View)**



msb-0092-89
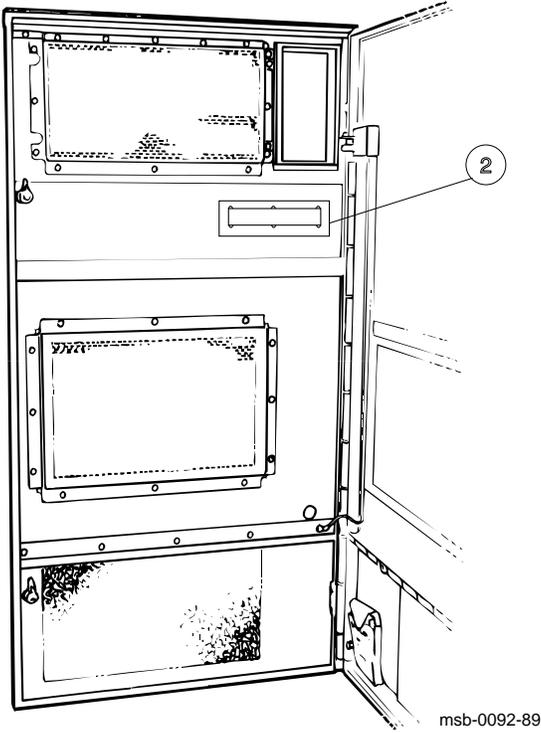
1. Locate the number plate (74-39700-XX) in your upgrade kit.

2. To change the VAX number plate, working from the inside of the front cabinet door, remove the retainer and push out the system numbers. See ❷. Install the new number for your upgraded system.

# Appendix A
# VAX 6000 Model 500 General Configuration Rules

This appendix gives general configuration rules for the installation of VAX 6000 Model 500 modules. It does not include systems using the H9657-CX upgrade. See Chapter 4 for configuration rules when installing the H9657-CX kit.

The sections in this appendix include:

- General Configuration Rules
- FV64A Vector Configuration Rules

## A.1 General Configuration Rules

**Figure A–1 gives the general XMI configuration rules for VAX 6000 Model 500 scalar systems.**

**Figure A–1: Configuration Rules for Model 500 Scalar Systems**



msb-0133F-90
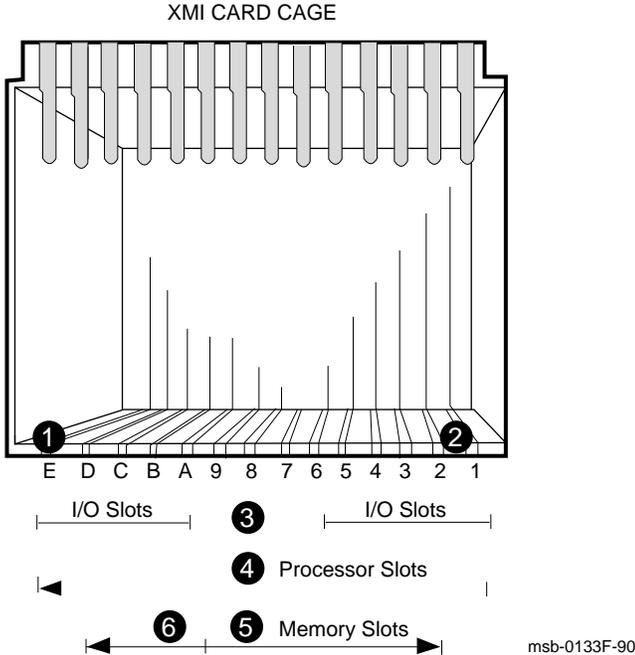
Figure A–1 gives an overview of the general rules for installing modules in the XMI card cage.

❶ ❷ An XMI processor or I/O module must be in either slot E or slot 1. See Figure A–1, at callouts ❶ and ❷.

**CAUTION:** *No memory modules should be placed in slot E or slot 1.*

❸ I/O adapters should be configured first, from left to right, in I/O slots E through A and then in slots 5 through 1.

❹ Processors should be configured next. For scalar-only systems, start with the rightmost available slot and continue right to left, installing each processor in the next available slot. See Section A.2 for rules on scalar/ vector systems.

❺ Memories are installed last. For scalar systems, fill available slots from left to right, slots 9 through 2, and then right to left, slots A through D.

## A.2 FV64A Vector Configuration Rules

**A vector processor must be installed to the left of its companion scalar processor. An intermodule cable connects the two modules. A memory module or an empty slot must be to the left of the vector processor. Any other configuration may damage the vector module.**

**Figure A–2:   Scalar/Vector Configurations**



M  V  P  M  V  P
            SLOT 1

M  V  P  P  P  P
            SLOT 1

TWO SCALAR/VECTOR PAIRS          ONE SCALAR/VECTOR PAIR
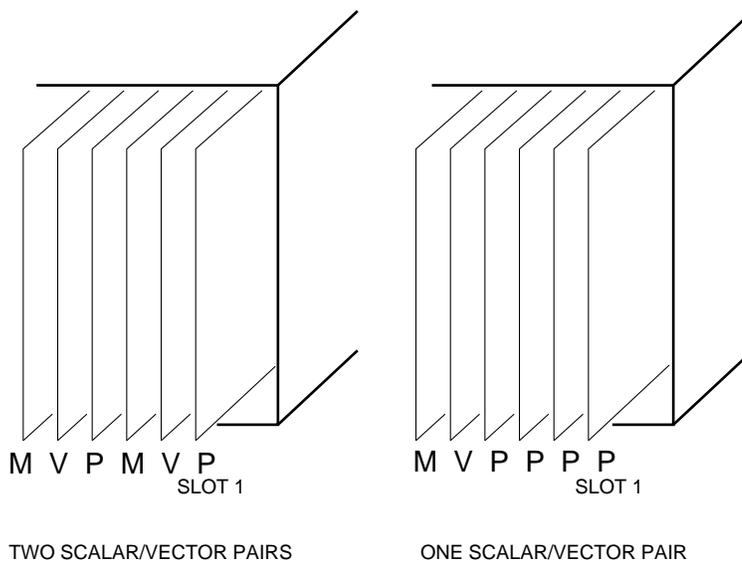
KEY:
M = MEMORY
V = VECTOR PROCESSOR
P = SCALAR PROCESSOR

msb-0373-90

Table A–1 shows the maximum number of scalar and vector processors supported in a VAX 6000 Model 500 system.

**Table A–1:  Processor Module Combinations**

| Maximum Scalar Processors | Maximum Vector Processors | Configuration (Slot 1 at Right) |
|:---:|:---:|---|
| 6 | 0 | P P P P P P |
| 4 | 1 | M V P P P P |
| 2 | 2 | M V P M V P |

Figure A–2 shows system configurations for a VAX 6000 Model 500 system with one or two vector processors. The left side of the figure indicates the configuration for two scalar/vector pairs with a memory module in the slot to the left of the vector processor. The right side of the figure shows a single scalar/vector pair with additional scalar processors.

As described in Section A.1, processor modules are configured after I/O adapters. (I/O adapters are installed, from left to right, in slots E to A and then 5 to 1.) Processors are configured from right to left, filling available slots starting with slot 1. Memories are configured last, from left to right, filling available slots from 9 to 2. However, in a system with a vector processor, the modules should be installed as shown in Figure A–2. These configurations must be followed to avoid damage to the modules and for performance reasons:

- Because the FV64A module has VLSI components with heat sinks protruding from both sides, only a memory module, with its low components, can be placed next to side 2 of the FV64A module.

- In a system with one scalar/vector pair and one or more additional scalar processors, the scalar processor of the pair should be prevented from being the boot processor for performance reasons.

  If the scalar/vector pair is to the left of other scalar processors, then the processor of the scalar/vector pair will not become the boot processor unless other processors fail self-test or have been disabled with the SET CPU console command. Alternatively, you can issue the SET CPU/NOPRIMARY command and give the node number of the attached scalar processor that you do not want to be the boot processor.

# Appendix B

# Description of KA65A LEDs

This appendix tells what the KA65A processor module LEDs indicate. You can use this information to isolate a problem in a module that fails self-test.

The sections include:

- Overview of KA65A LEDs

- Determining Failing Test from LEDs

- KA65A Error LED

# B.1 Overview of KA65A LEDs

**The KA65A LEDs indicate if self-test passed or failed, if the
module is the boot processor or a secondary, and the failing
test number.**

**Figure B–1:   KA65A LEDs After Power-Up Self-Test**
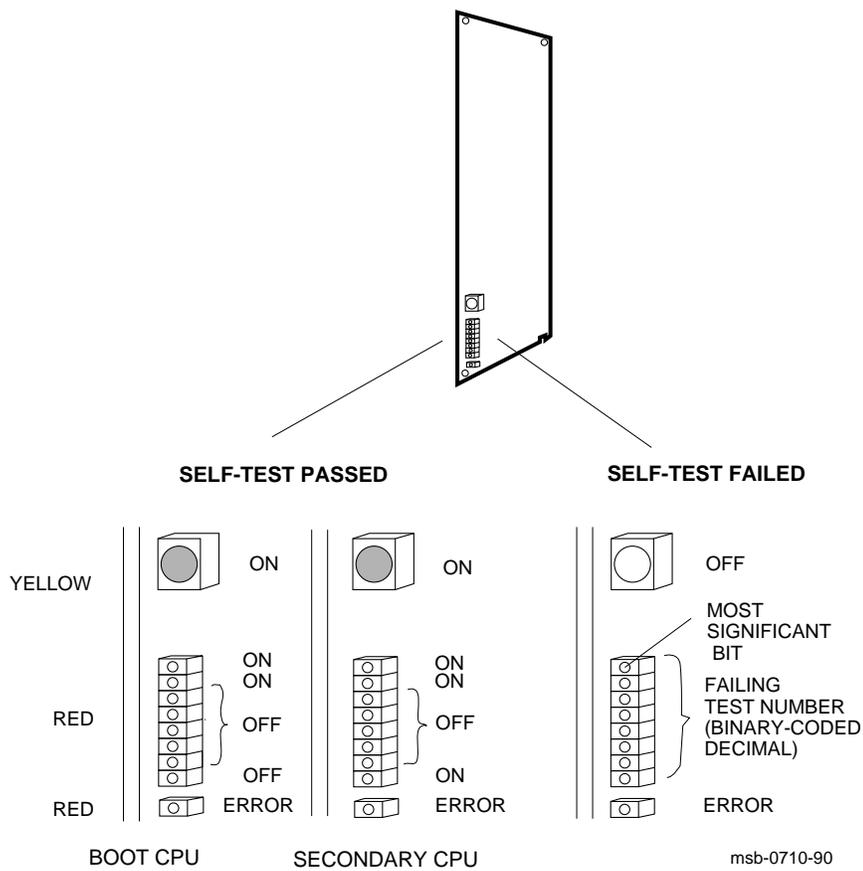
If self-test passes, the large yellow LED at the top of the LEDs is ON. (Here self-test means the on-board power-up tests, RBD 0, the CPU/memory interaction tests, RBD 1, and the multiprocessing tests, RBD 5.) The top two red LEDs (next to the yellow one) are also ON, and the next five red LEDs are OFF. The LED next to the Error LED is OFF if the processor is the boot processor, and ON if it is a secondary processor.

If self-test fails, the yellow LED is OFF, and the top eight red LEDs contain an error code that corresponds to the number of the failing test. The test number is represented in binary-coded decimal, with the most significant bit at the top. A bit is ONE if the light is ON.

For example, assume a processor fails self-test (yellow LED is OFF) and shows the following pattern in the top eight red LEDs:

```
TOP
    (MSB) off      0
          off      0  =  3
          on       1
          on       1

          off      0
          off      0
          on       1  =  2
    (LSB) off      0
BOTTOM
```

The failing test number decodes to 0011 0010 (binary-coded decimal 32). If you then ran RBD 0 with the /TR and /HE qualifiers, the last test number you would see displayed is T0032.

If either of the top two red LEDs is off, a failure has occurred during the self-test sequence. But system power-up self-test actually comprises four sets of tests: KA65A power-up tests (RBD 0), CPU/memory interaction tests (RBD 1), DWMBA or DWMBB tests (RBD 2), and multiprocessing tests (RBD 5). Interpretation of the red LEDs depends on which set of tests was running, as explained in Section B.2. Interpretation of the error LED is explained in Section B.3.

## B.2 Determining Failing Test from LEDs

When self-test fails, the red LEDs on the KA65A contain the failing test number. Check the state of other module LEDs to determine the failing RBD and device, as shown in Table B–1.

**Table B–1: KA65A Status LEDs**

| KA65A LEDs | | Diagnostic and | | Self-Test |
|---|---|---|---|---|
| Yellow | Red | Test Number | Device Failing | Line |
| **FV64A Yellow LED OFF** | | | | |
| OFF | 1–45 | Power-up self-test (RBD 0) T0001–T0045 | KA65A | STF |
| ON | 46–57 | Power-up self-test (RBD 0) T0046–T0057 | FV64A | STF |
| OFF | 61–82 | CPU/memory test - Memory 1 (RBD 1) T0001–T0022 | KA65A, FV64A, or MS65A 1 (module with lowest XMI node number) | ETF |
| ON | 79–82 | CPU/memory test - Memory 1 (RBD 1) T0079–T0082 | FV64A | ETF |
| OFF | 83 | CPU/memory test - Memory 2 T0003 (equivalent to ST1/T=3) | MS65A 2 | ETF |
| OFF | 84 | CPU/memory test - Memory 3 | MS65A 3 | ETF |
| OFF | 85 | CPU/memory test - Memory 4 | MS65A 4 | ETF |
| OFF | 86 | CPU/memory test - Memory 5 | MS65A 5 | ETF |
| OFF | 87 | CPU/memory test - Memory 6 | MS65A 6 | ETF |
| OFF | 88 | CPU/memory test - Memory 7 | MS65A 7 | ETF |
| OFF | 89 | CPU/memory test - Memory 8 | MS65A 8 | ETF |

**Table B–1 (Cont.):   KA65A Status LEDs**

| KA65A LEDs | | Diagnostic and | | Self-Test |
|---|---|---|---|---|
| Yellow | Red | Test Number | Device Failing | Line |
| **FV64A Yellow LED ON** | | | | |
| OFF | 91–97 | Multiprocessor test (RBD 5) T0001–T0007 | KA65A or FV64A | ETF |
| **DWMBB/A Yellow LED OFF** | | | | |
| ON | 1–48 | DWMBB test (RBD 2) T0001–T0048 | DWMBB | XBI |

If a processor's yellow LED is OFF and the red LEDs show an error code in the range 1–45, the power-up self-test failed and the processor board is bad. If the processor board has an attached vector processor and the error code is 46–57, the vector processor board is bad. On the self-test console display, the processor shows a minus sign (–) on the STF line.

After the power-up tests, each processor runs the CPU/memory interaction tests and the multiprocessor tests. If a test fails, the processor shows a minus sign (–) on the ETF line of the self-test console display. The LED error codes are numbered from 61 to 82, which is the failing CPU/ memory test number (1 through 22) plus 60, or 91 to 97, which is the failing multiprocessor test number (1 through 7) plus 90.

Each processor, after testing with the first memory, runs the CPU/memory interaction tests on every other good memory module. (However, only CPU/ memory interaction test T0003 is run.) If a failure occurs, the memory module is probably bad, although the processor's yellow light is OFF and the memory module's yellow light is ON. If several processors fail on the same memory, that memory module is certainly bad. Try using SET MEMORY to configure the bad module out of the interleave set. For error codes 83 through 89, consult Table B–1 to determine the failing memory.

The last series is the DWMBB tests. If one fails, the red LEDs contain an error code, although the processor's yellow self-test LED is ON (because the CPU itself has passed). Note that only the boot processor performs the DWMBB tests.

## B.3 KA65A Error LED

**The KA65A error LED (bottom red LED) is an error summary or indicates the state of backup cache.**

**Table B–2: KA65A Error LED**

| XCR0<14> | XCR0<13> | Error LED ON |
|----------|----------|--------------|
| 0 | 0 | Error summary (power-up state) |
| 0 | 1 | Backup cache is off |
| 1 | 0 | Error summary or backup cache is off |
| 1 | 1 | Off—Error LED does not light |

**Example B–1: Examining the XCR0 and XBER Registers**

```
>>> E/P/L E1880024          ! Examine the XCR0 register of the KA65A
E1880024  00000200          ! processor in slot 1.  The result shows
                            ! bits 14 and 13 are clear.
>>> E/P/L E1880004          ! Then examine the XBER register of the
E1880004  8000A300          ! same processor.  The result shows bit
                            ! 31 is set.
```

The state of the error LED depends on bits in two registers. At power-up it reflects the state of XBER bit 31, the Error Summary bit. (The error LED is ON if the Error Summary bit is set.)

At times other than power-up, the meaning of the error LED is determined by the state of XCR0 bits 14 and 13. See Table B–2 and Example B–1.

In Example B–1 the error LED on the KA65A processor in slot 1 is lit. The reason for this is determined by examining the XCR0 and XBER registers. The addresses for these registers are calculated by adding an offset to the base address of the slot that contains the KA65A module. The offset for XCR0 is 24; for XBER it is 4. (All numbers are hexadecimal.)

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