DIGITAL 5/233i CompactPCI™ Single-Board Computer

Installation Guide

This guide explains how to install a DIGITAL 5/233i single-board computer (SBC).

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FCC Notice:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Warning!

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung!

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungenauftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention!

Ceci est un produit de Classe A. Dans un environment domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

Canadian EMC Notice:

"This Class [A] digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations."

"Cet appareil numérique de la class [A] respecte toutes les exigences du règlement sur le matériel broilleur du Canada."

Note: Shielded data cables must be used to interconnect this equipment to comply with the FCC limits for a Class A device.

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Preface

Purpose of this Guide

This guide explains how to install and troubleshoot your DIGITAL 5/233i CompactPCI single-board computer (SBC).

Intended Audience

This guide is for system integrators, field and manufacturing technicians, and support specialists who need to install the SBC and diagnose problems. The guide assumes that readers have prerequisite knowledge and experience with the following:

- CPU modules
- CompactPCI design and specifications

Structure of this Guide

This guide consists of four chapters, an appendix, and an index organized as follows:

- Chapter 1, Preparing for the Installation, explains how to unpack and verify your kit contents and check for ordered options. It also helps you get acquainted with the SBC's major components.

- Chapter 2, Installing the SBC, provides step-by-step instructions on how to install the SBC.

- Chapter 3, Finishing the Installation, explains how to power on the SBC, monitor diagnostics, configure the system, and boot an operating system.

- Chapter 4, Troubleshooting, provides troubleshooting tips and lists possible problems with causes and corrective actions.

- Appendix A, Error Messages and Checkpoint Codes, lists error messages, blink codes, and checkpoint codes generated by the DIGITAL 5/233i CompactPCI SBC.

Conventions

This section defines terminology, abbreviations, and other conventions used in this guide.

Bit Notation

Multiple-bit fields can include contiguous and noncontiguous bits contained in angle brackets (< >). Multiple contiguous bits are indicated by a pair of numbers separated by a colon (:). For example, <9:7,5,2:0> specifies bits 9, 8, 7, 5, 2, 1, and 0. Similarly, single bits are frequently indicated with angle brackets. For example, <27> specifies bit 27.

Keyboard Keys

The following keyboard key conventions are used throughout this guide.

Convention	Example
Control and Alt key sequences are represented as Ctrl/*x*. Press Ctrl or Alt while you simultaneously press the *x* key.	Ctrl/C
In plain text, key names match the name on the actual key.	Return key
In tables, key names match the name of the actual key and appear in square brackets ([ ]).	[Return]

Examples

Prompts, input, and output in examples are shown in a monospaced font. Interactive input is differentiated from prompts and system output with bold type. For example:

```
>>> echo This is a test.[Return]
This is a test.
```

Ellipsis points indicate that a portion of an example is omitted.

Names and Symbols

The following table lists typographical conventions used for names of various items throughout this guide.

Items	Example
Bits	**sysBus<32:2>**
BIOS option	**External Cache** option
BIOS option values	***Enabled***
Files and pathnames	/usr/foo/bar
Pins	LIRQ pin
Signals	**iogrant** signal
Variables	*n*, *x*, *mydev*

Numbering

Numbers are decimal unless otherwise indicated. The prefix h indicates a hexadecimal number. For example, 19 is decimal, but h19 and h19A are hexadecimal. Otherwise, the base is indicated by a superscript; for example, 100^2 is a binary number.

Ranges and Extents

Ranges are specified by a pair of numbers separated by two periods (..) and are inclusive. For example, a range of integers 0..4 includes the integers 0, 1, 2, 3, and 4.

Extents are specified by a pair of numbers in angle brackets ($<$ $>$) separated by a colon (:) and are inclusive.

Bit fields are often specified as extents. For example, bits $<7:3>$ specifies bits 7, 6, 5, 4, and 3.

Register and Memory Figures

Register figures have bit and field position numbering starting at the right (low-order) and increasing to the left (high-order).

Memory figures have addresses starting at the top and increasing toward the bottom.

Syntax

The following syntax elements are used throughout this guide. Do not type the syntax elements when entering information.

Element	Example	Description
[ ]	[**-file** *filename*]	The enclosed items are optional.
|	- | + | =	Choose one of two or more items. Select one of the items unless the items are optional.
{ }	{- | + | =}	You must specify one (and only one) of the enclosed items.
( )	(a,b,c)	You must specify the enclosed items together.
...	arg...	You can repeat the preceding item one or more times.

UNPREDICTABLE and UNDEFINED

This guide uses the terms UNPREDICTABLE and UNDEFINED. Their meanings are different and must be carefully distinguished.

UNPREDICTABLE results or occurrences do not disrupt the basic operation of the processor. The processor continues to execute instructions in its normal manner. In contrast, UNDEFINED operations can halt the processor or cause it to lose information.

Special Notices

This section lists special notes that are used in this guide.

Warning

A warning indicates the presence of a hazard that can cause personal injury if the hazard is not avoided.

Caution

A caution indicates the presence of a hazard that might cause damage to hardware or might corrupt software.

Note.

A note emphasizes important information.

Abbreviations

The following abbreviations are used in this guide

Abbreviation	Meaning
BIOS	Basic input/output system
CD-ROM	Compact-disc read only memory
CPU	Central processing unit
DMA	Direct memory access
DRAM	Dynamic random access memory
EDO	Extended data out
EIDE	Enhanced integrated drive electronics
ESD	Electrostatic discharge
FPM	Fast page mode
HDD	Hard disk drive
HP	Horizontal pitch
IDE	Integrated drive electronics
I/O	Input/output
IRQ	Interrupt request
ISA	Industry standard architecture
MMX	Multimedia Extension
MS–DOS	Microsoft Disk Operating System
OEM	Original equipment manufacturer
PCI	Peripheral components interface
PICMG	PCI Industrial Computers Manufacturers Group
POST	Power-on self test

Abbreviation	Meaning
PSU	Power supply unit
ROM	Read only memory
RTC	Real-time clock
RTM	Rear transition module
SBC	Single-board computer
SCSI	Small computer system interconnect
SIMM	Single in-line memory modules
SVGA	Super video graphics array
TOY	Time of year
TSR	Terminate stay resident
USB	Universal serial bus
Windows NT	Microsoft Windows NT environment
ZIF	Zero insertion force

For More Information

For more information, refer to the following:

- Your supplier

- The DIGITAL OEM web site at **http://www.digital.com/oem**

- The following documentation:

    - *DIGITAL 5/233i-8 CompactPCI System Warranty and Parts Information*, EK–SY233–WI

    - *DIGITAL 5/233i-8 CompactPCI System User Manual*, EK–SY233–UM

    - DIGITAL 5/233i-8 CompactPCI System online help, **http://www.digital.com/oem**

    - *PCI Local Bus Specification*, Revision 2.1

    - *CompactPCI Specification*, Revision 2.0

    - *PCI to PCI Bridge Architecture Specification*, Revision 1.0

Latest Product Information and Updates

You can access product information and download the latest BIOS, device drivers, and software updates over the Internet from:

http://www.digital.com/oem

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Preparing for the Installation

This chapter explains how to prepare for a DIGITAL 5/233i CompactPCI SBC installation. Topics include:

- Unpacking Kit Contents
- Verifying Kit Contents
- Getting Familiar with Your SBC's Major Components
- Addressing Power Requirements
- Addressing Environmental Requirements

1.1 Unpacking Kit Contents

Start preparing for your installation by unpacking your DIGITAL 5/233i CompactPCI SBC kit.

1. Verify that the order numbers on the labels on your kit carton match the number for the product you ordered. If the order numbers do not match, contact your local DIGITAL Customer Support Center.

2. Remove the top layer of packing foam.

3. Remove all items from the carton.

4. Locate and put on the antistatic wriststrap.

5. Clip the wire attached to the wriststrap to the frame of your CompactPCI chassis.

6. Remove the hardware components from the conductive plastic bags in which they were packaged and place the components on the bags.

Note

Store the original packaging material in case a factory return is necessary.

1.2 Verifying Kit Contents

Table 1–1 lists the contents of the SBC kit. Verify that the material you unpacked matches the contents listed in the table.

If you ordered DIGITAL memory for your DIGITAL 5/233i CompactPCI SBC, your kit will also include that memory. Four memory connectors on the SBC require one or two pairs of 60 ns EDO 16, 32, or 64 MB SIMMs.

Table 1–1 Package Contents
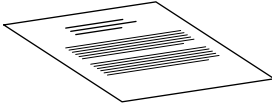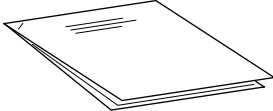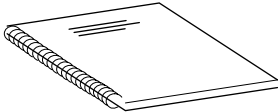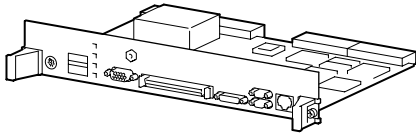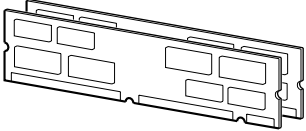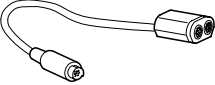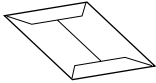
Part	Part Name	Part Number
	Cover Letter	EK–SB233–CL
	Warranty and Parts Information	EK–SB233–WI
	Installation Guide	EK–SB233–IN
	Device driver diskette	AK–RCMKA–CA
	SBC	EBC11–AS
	Memory SIMMs 2 X 16 MB 2 X 32 MB 2 X 64 MB	 EBXMB–CC EBXMB–CD EBXMB–CE
	Serial port adapter cables (2)	17–04793–01

Table 1–1 Package Contents (Continued)

Part	Part Name	Part Number
	Parallel port adapter cable	17–04794–01
	Keyboard/mouse Y-cable	17–04519–01
	Antistatic wriststrap	12–36175–01

1.3 Getting Familiar with Your SBC's Major Components

This section helps you get familiar with the DIGITAL 5/233i CompactPCI SBC and supported memory.

1.3.1 SBC

Figure 1–1 shows the layout and identifies connectors, headers, and jumpers on the SBC.

Figure 1–1 SBC Layout

FRONT

TOP

ML014351
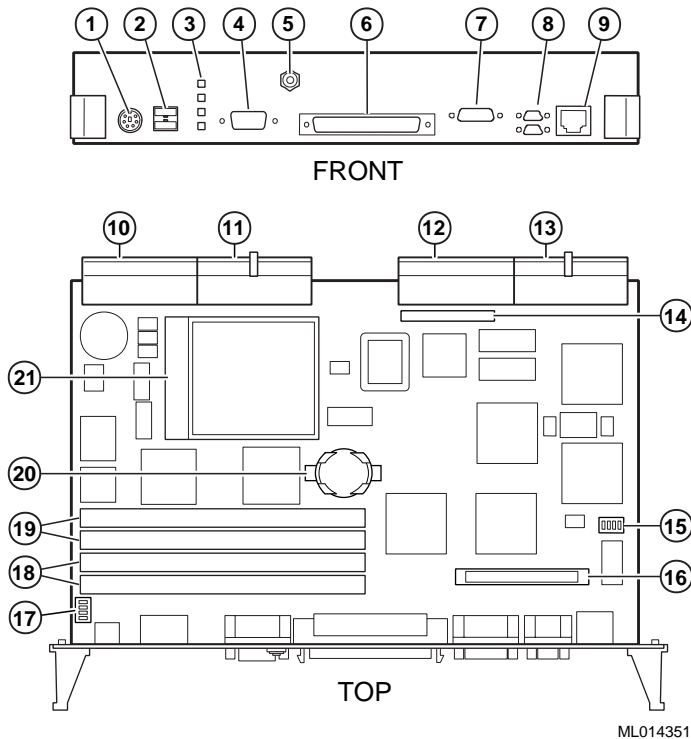
The numeric callouts in the figure identify the following key components:

1 PS/2 keyboard and mouse connector — 6-pin PS/2 female

2 USB connectors — dual 4-pin USB

3 Status LEDs (top-to-bottom – power, hard disk drive, speaker, alarm)

4 SVGA connector — 15-pin D-SUB

5 CPU reset button

6 SCSI connector — 68-pin high density

7 Bidirectional, EPP/ECP parallel port — 25-pin micro-D

8 Serial ports 1 and 2 (16550) — 9-pin micro-D

9 Ethernet connector — RJ45

10 J5 Compact PCI connector

11 J4 CompactPCI connector

12 J2 CompactPCI I/O connector

13 J1 CompactPCI I/O connector

14 Reserved

15 Ethernet jumper for front or rear I/O selection

16 Reserved

17 USB jumper for front or rear I/O selection

18 SIMM connectors for memory bank 0

19 SIMM connectors for memory bank 1

20 Lithium battery

21 Pentium P55C MMX CPU

1.3.2 Memory Modules

The DIGITAL 5/233i CompactPCI SBC is shipped with at least 32 MB of dynamic random access memory (DRAM) and supports memory configurations that range from 32 to 256 MB of DRAM. This memory is accessible from the CPU and PCI bus.

You can plug either two or four 36-bit 16, 32, or 64 MB SIMMs into the memory connectors on the SBC. SIMMs must be 36 bits wide.

Figure 1–2 shows a typical pair of memory modules.

Figure 1–2 Pair of Memory Modules

ML014381
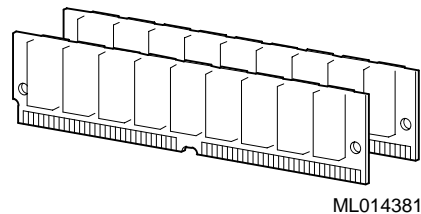
When installing memory, you must adhere to the following requirements:

- SIMMs must be installed in pairs. That is, you must populate the memory banks with one of the following combinations:

  - Two slots: slot 0 (J6) of bank 0 and slot 1 (J7) of bank 0

  - Two slots: slot 0 (J8) of bank 1 and slot 1 (J9) of bank 1

  - Four slots: slots 0 and 1 of banks 0 and 1

- SIMMs installed in a given memory bank must be of the same size. For example, if you install a 64 MB SIMM in slot 0 of bank 0 you must install a 64 MB SIMM in slot 1 of bank 0.

- All SIMMs must be 60 ns extended data out (EDO) SIMMs.

Table 1–2 shows valid SIMM combinations.

Table 1–2 Valid SIMM Combinations

Total Memory	Bank 0 Slot 0 (J6)	Bank 0 Slot 1 (J7)	Bank 1 Slot 0 (J8)	Bank 1 Slot 1 (J9)
32 MB	16 MB	16 MB		
64 MB	16 MB	16 MB	16 MB	16 MB
64 MB	32 MB	32 MB		
96 MB	16 MB	16 MB	32 MB	32 MB
96 MB	32 MB	32 MB	16 MB	16 MB

Table 1–2 Valid SIMM Combinations

Total Memory	Bank 0 Slot 0 (J6)	Bank 0 Slot 1 (J7)	Bank 1 Slot 0 (J8)	Bank 1 Slot 1 (J9)
128 MB	32 MB	32 MB	32 MB	32 MB
128 MB	64 MB	64 MB		
160 MB	16 MB	16 MB	64 MB	64 MB
160 MB	64 MB	64 MB	16 MB	16 MB
192 MB	32 MB	32 MB	64 MB	64 MB
192 MB	64 MB	64 MB	32 MB	32 MB
256 MB	64 MB	64 MB	64 MB	64 MB

1.4 Addressing Power Requirements

The DIGITAL 5/233i CompactPCI SBC requires power voltages of +3.3V, +5 V, and +12 V. The CompactPCI backplane provides the power to the logic of the SBC through the P1 and P2 CompactPCI connectors.

Table 1–3 provides the power ratings for the various voltage supplies supported by the DIGITAL 5/233i CompactPCI SBC.

Table 1–3 Input Power Requirements

Voltage Supply	Maximum Memory	Minimum Memory
+3.3 V	1.5 A	1.6 A
+5 V	5.5 A	5.0 A
+12 V	0.100 A	0.100 A

1.5 Addressing Environmental Requirements

The first step of the setup process is to ensure that the area in which the system will be used meets environmental requirements.Table 1–4 lists the environmental requirements for DIGITAL 5/233i-8 CompactPCI systems.

Table 1–4 Environmental Requirements

Condition	Requirement
Temperature range	
Operating:	0°C to 50°C (32°F to 122°F)
Nonoperating:	–40°C to 66°C (–40°F to 151°F)
Relative humidity	
Operating:	Between 10% and 95% with maximum wet bulb temperature at 32°C (90°F) and minimum dew point 2°C (36°F)
Nonoperating:	0 to 95% with maximum wet bulb at 46°C (115°F)
Altitude	
Operating:	Up to 3.0 km (10,000 ft) with derating Reduce by a factor of 1.8° per 1000 m (1°F per 1000 ft)
Nonoperating:	12.2 km (40,000 ft)

Table 1–4 Environmental Requirements (Continued)

Condition	Requirement
Shock	
Operating:	Up to a 10 G peak (±1 G) and 10 ms (±3 ms) duration
Nonoperating	Up to 40 G peak and 30 ms
Vibration	
Operating:	5 to 16 Hz 0.020 in (0.5 mm) DA 16 to 200 Hz 0.25 G peak (2.5 m/s2) 200 to 500 to 200 Hz 0.1 G peak (1.0 m/s2) 16 to 200 Hz 0.25 G peak (2.5 m/s2) 5 to 16 Hz 0.020 in (0.5 mm) DA
Nonoperating:	Vertical axis excitation • Up to 1.03 G rms overall from 5 to 300 Hz • Power spectral density up to 0.0024 g2/Hz at 5 Hz, increasing at 8 dB/octave to 0.015 g2/Hz at 10 Hz • Flat up to 0.015 g2 from 10 to 50 Hz with 8 d/octave roll off from 50 to 300 Hz Longitudinal and lateral axis excitation • Up to 0.698 G rms overall from 5 to 200 Hz • Power spectral density 0.00211 g2/Hz at 5 Hz, increasing at 8 dB/octave to 0.007 g2/Hz at 10 Hz • Flat 0.007 g2 from 10 to 50 Hz with 8 db/octave roll off from 50 to 200 Hz
Air flow	The operating temperature range is 0°C to 50°C. This is dependent on sufficient enclosure air flow to keep the CPU case temperature at or below 70°C.

2

Installing the SBC

This chapter walks you through the steps for installing a DIGITAL 5/233i CompactPCI SBC. Topics include:

- Installation at a Glance

- Taking Precautions During the Installation

- Setting I/O Access Jumpers

- Installing and Replacing Memory

- Removing a Filler Panel

- Installing the SBC

To complete the procedures explained in this chapter, you need:

- A DIGITAL 5/233i CompactPCI SBC

- SIMMs, if not already installed on the SBC

- CompactPCI chassis with an empty 8 HP dual-width system slot

- Phillips screwdriver

- Antistatic wriststrap or isolation gloves

2.1 Installation at a Glance

Section 2–1 shows a flow diagram of the installation process.

Figure 2–1 Installation at a Glance
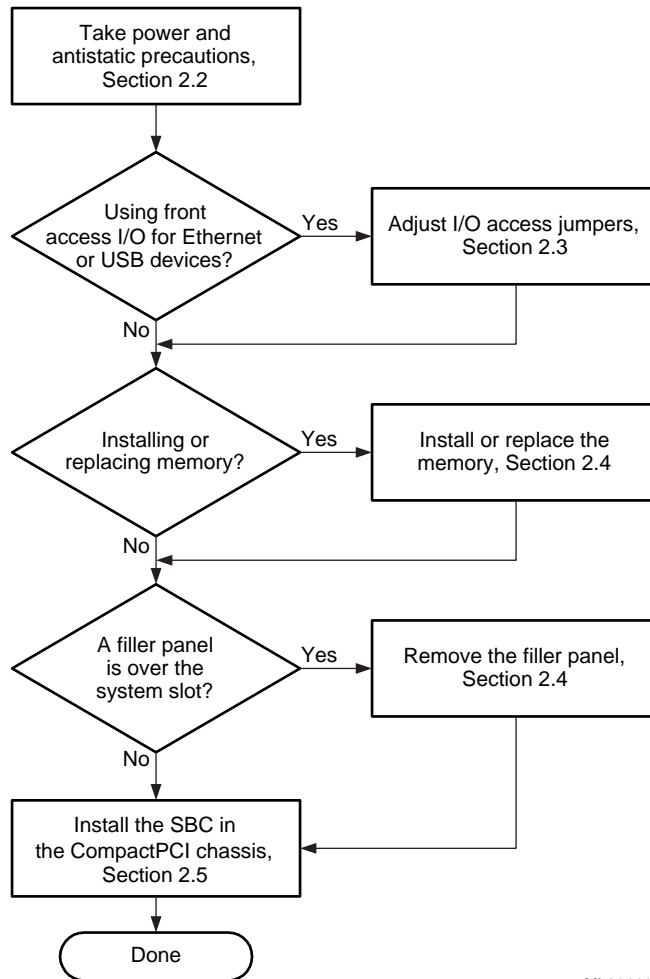
ML014444

2.2 Taking Precautions During the Installation

To avoid possible injury and damage to the SBC, take appropriate power supply and antistatic precautions before and while performing the installation. Section 2.2.1 discusses power supply precautions and Section 2.2.2 discusses antistatic precautions.

2.2.1 Taking Power Supply Precautions

Before removing any enclosure panels, CompactPCI modules, or filler panels, take the following power supply precautions:

1. Power off external devices connected to the system.

2. Power off the system.

3. Unplug the power cord from the system's AC power inlet.

After you complete the installation, reverse these steps to restore power.

2.2.2 Taking Antistatic Precautions

When handling circuit boards and associated internal computer components, use an antistatic wriststrap or wear isolation gloves.

Caution

Circuit boards and associated system components are sensitive to and can be damaged by electrostatic discharge (ESD). To avoid damaging boards or components, take appropriate precautions when handling them.

Vorsicht!

_____

Gedruckte Schaltungen und dazu gehörende Systemkomponenten reagieren empfindlich auf elektrostatische Entladung und können durch elektrostatische Entladung sogar beschädigt werden. Treffen Sie die erforderlichen Vorsichtsmaßnahmen, damit Schaltplatten oder Systemkomponenten beim Ein- und Ausbau nicht beschädigt werden.

_____

In addition to using an antistatic wriststrap or wearing isolation gloves, consider the following precautions:

- Do not allow a circuit board or other component to make contact with non-conductors, including your clothing.

- Keep loose circuit boards inside or on top of conductive plastic bags.

- Before touching a loose circuit board or component, discharge static electricity.

2.3 Setting I/O Access Jumpers

Two jumpers on the SBC specify front access I/O through the SBC or rear access I/O through a rear transition module for the Ethernet and universal serial (USB) ports.The DIGITAL 5/233i CompactPCI SBC assumes rear I/O access by default. If you are not using the DIGITAL 5/233i CompactPCI SBC with a rear transition module, you must adjust the jumpers.

Figure 2–2 identifies the Ethernet (1) and USB (2) front/rear I/O access jumper blocks on the SBC. To adjust Ethernet access, you must set the jumper for rear or front access as shown in Figure 2–2. To adjust USB access, you must install or remove the jumper block. When the jumper block is installed, the system is set up for rear I/O access. For front USB access, remove the jumper block.

Figure 2–2 Setting Front/Rear I/O Access Jumpers

ML014373
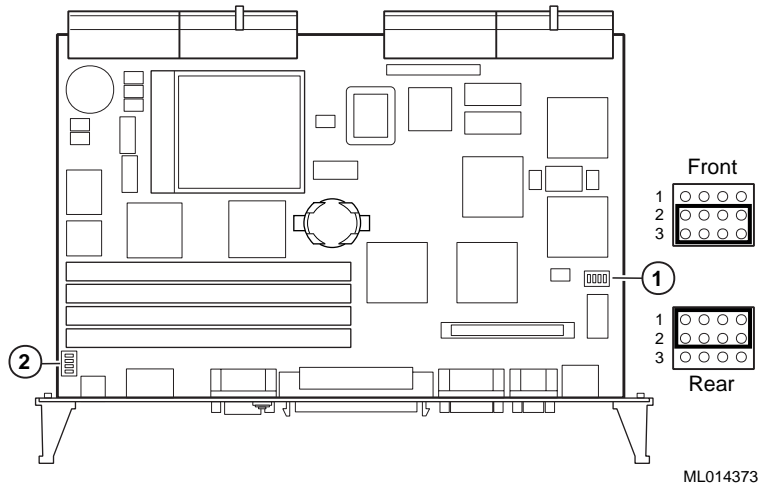
2.4 Installing and Replacing Memory

Before installing or replacing memory, make sure you are familiar with the system's memory configuration requirements and options. Section 1.3.2 discusses valid memory configurations.

To upgrade memory or replace SIMMs, install and remove SIMMs as explained in Sections 2.4.1 and 2.4.2.

Caution

Take care when handling SIMMs. Circuit boards are sensitive to and can be damaged by electrostatic discharge (ESD). To avoid damaging the memory modules, take appropriate precautions when handling them.

Vorsicht!

_____

Seien Sie vorsichtig beim Umgang mit SIMM-Modulen. Gedruckte Schaltungen reagieren empfindlich auf elektrostatische Entladung und können durch elektrostatische Entladung sogar beschädigt werden. Treffen Sie die erforderlichen Vorsichtsmaßnahmen, damit die SIMM-Module nicht beschädigt werden.

_____

2.4.1 Installing SIMMs

To install SIMMs on the SBC, complete the following steps. Refer to Figure 2–3, as necessary.

1. Locate the memory connectors into which the SIMMs are to be installed.

2. Align pin 1 of the SIMM with pin 1 on the connector. The position of the orientation notches (1) on the SIMM assure proper connectivity.

3. Install the SIMM into the connector at a 45-degree angle (2). Rock the SIMM gently until it seats evenly into the bottom of the connector.

4. Tip the SIMM upright until the retaining clips at the ends of the connector engage (3).

5. Repeat steps 3 through 5 for other SIMMs being installed.

Figure 2–3 Installing a SIMM
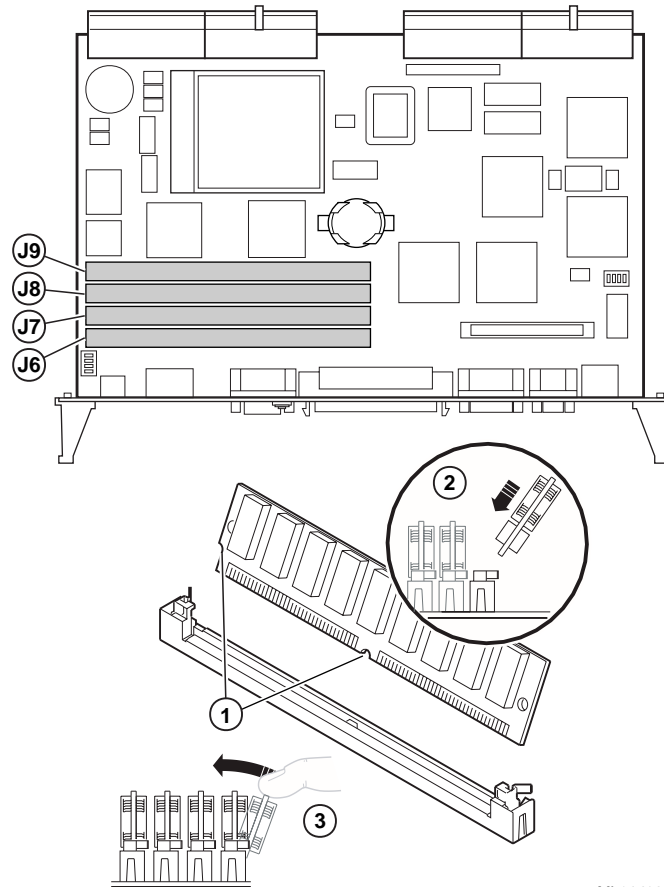
ML014382

2.4.2 Removing SIMMS

To remove SIMMs from the SBC, complete the following steps. Refer to Figure 2–4, as necessary.

1. Locate the SIMMs that you need to remove.

2. Apply pressure to the retaining clips (1) at the ends of the SIMM connector until the clips disengage.

3. Tip the SIMM until it is at a 45-degree angle (2).

4. Rock the SIMM gently as you remove it from the connector.

5. Repeat steps 3 through 5 for other SIMMs being removed.

Figure 2–4 Removing a SIMM
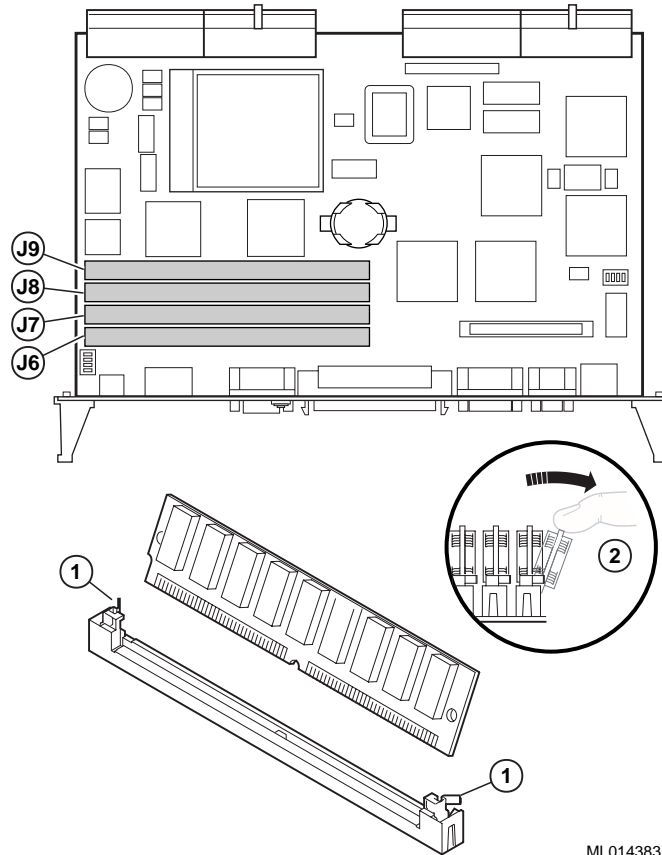
ML014383

After you remove the SIMMs, install new SIMMs, if appropriate, as explained in Section 2.4.1.

2.5 Removing a Filler Panel

If the system slot is covered with a filler panel, remove the panel as shown in Figure 2–5.

1. Loosen the captive screws (1) that attach the filler panel to the chassis.

2. Remove the panel.

3. Store the filler panel for possible future use.

Figure 2–5 Removing a Filler Panel
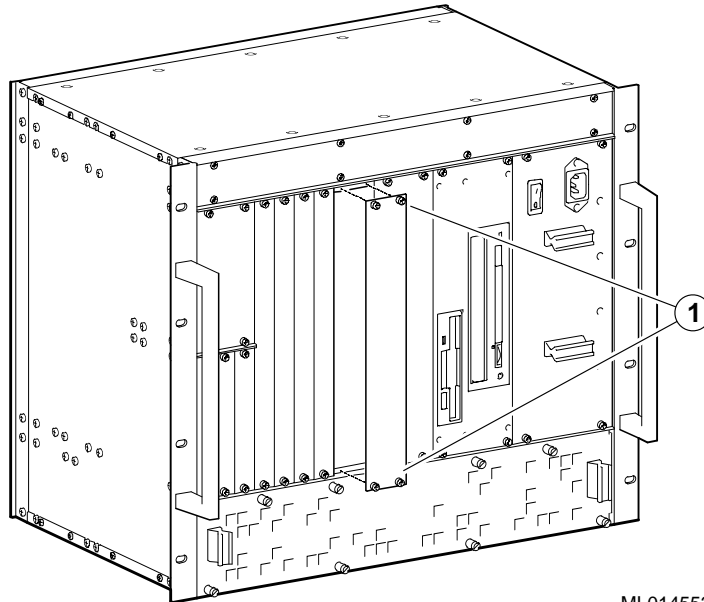
ML014552

2.6 Installing the SBC

Before you install the SBC, make sure you:

1. Power off external devices connected to the system.

2. Power off the system.

3. Unplug the power cord from the system's AC power inlet.

Caution

Take care when handling the SBC. Circuit boards are sensitive to and can
be damaged by electrostatic discharge (ESD). To avoid damaging the
SBC, take appropriate precautions when handling it.

Vorsicht!

Seien Sie vorsichtig beim Umgang mit der SBC-Platine. Gedruckte
Schaltungen und dazu gehörende Systemkomponenten reagieren
empfindlich auf elektrostatische Entladung und können durch
elektrostatische Entladung sogar beschädigt werden. Treffen Sie die
erforderlichen Vorsichtsmaßnahmen, damit die SBC-Platine nicht
beschädigt wird.

To install the SBC complete the following steps. Refer to Figure 2–6 as necessary.

1. Place the top and bottom edges of the module in the guides (1) of the chassis for slot 1 (the system slot).

2. Check that the injector/ejector levers (2) of the two handles are in the outward position.

3. Slide the module into the chassis until you feel resistance (approximately 1/4 inch short of full insertion).

4. Simultaneously move the injector/ejector levers of the two handles to the inward position.

5. Verify that the module is seated properly.

6. Tighten the two captive screws (3), behind the handles, which secure the module to the chassis.

Figure 2–6 Installing the SBC

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3
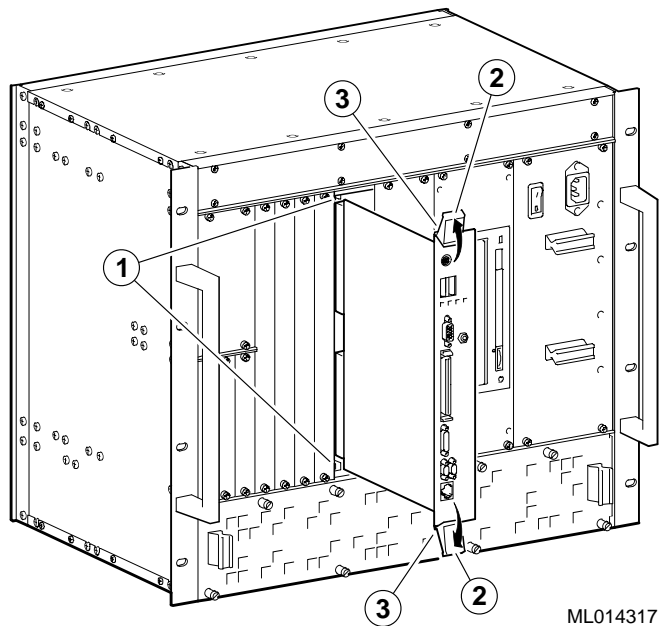
Finishing the Installation

This chapter explains how to finish the installation of the DIGITAL 5/233i CompactPCI SBC. Topics include:

- Powering the SBC On

- Installing Windows NT

- Booting the Operating System

- Installing Supplied Device Drivers

- Considering System Configuration Changes

- Powering the System Off

- Restarting the System

3.1 Powering the SBC On

After installing the SBC in the CompactPCI chassis, power the SBC on by pressing the On/Off button for your system enclosure. When you turn the power on, the power LED lights, and the SBC runs its power-on self test (POST) diagnostics.

3.1.1 System Startup

Figure 3–1 shows the system startup screen display. The numeric callouts in the figure identify the following:

1 The CPU type and speed.

2 Power-on self test (POST) diagnostic messages.

When you power on or reset the system, AMIBIOS runs the POST diagnostics. The POST diagnostic that is identified on the screen is the memory test.

3 Instruction on how to invoke the WINBIOS Setup utility.

If you need to adjust the system configuration, press the Delete key.

4 AMIBIOS identification string.

Figure 3–1 System Startup Screen Display


```
        American        AMIBIOS (C) 1996 American Megatrends Inc.
        Megatrends

( 1 )  Pentium (MMX), 233MHz
( 2 )  Checking NVRAM...

       xxxxxxKB OK


( 3 )  Hit <Del> If you want to run SETUP



       (C) American Megatrends Inc.
( 4 )  xx-xxxx-xxxxxx-xxxxxxxx-xxxxxx-xxxx-x
```

ML014439
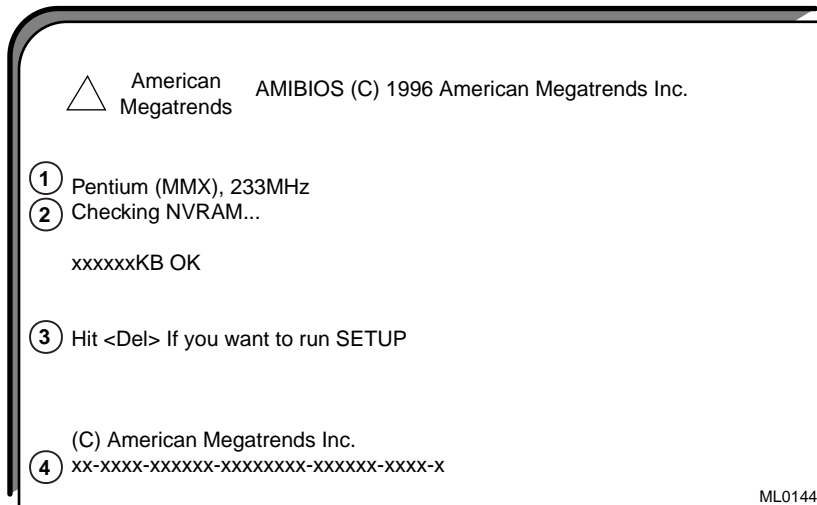
When the memory tests complete, AMIBIOS configures the IDE devices and then prompts you to press Ctrl/A if you want to run the SCSISelect Utility.

When the POST diagnostics complete, AMIBIOS displays the system's configuration. Figure 3–2 shows a sample display.

Figure 3–2 System Configuration Screen Display


```
Main Processor     :  Pentium MMX      Base Memory Size :  640 KB
Math Processor     :  Built-in         Ext. Memory Size :  130048 KB
Floppy Drive A:    :  1.44 MB 3 1/2"   Display Type     :  VGA/EGA
Floppy Drive B:    :  None             Serial Port(s)   :  3F8, 2F8
AMIBIOS Date       :  03/13/98         Parallel Port(s) :  378
Processor Clock    :  233MHz           External Cache   :  512 KB, Enabled
Power Management   :  APM, SMI
```

Hard Disk(s)	Cyl	Head	Sector	Size	LBA Mode	32Bit Mode	Block Mode	PIO Mode
Primary Master :	14848	9	63	4111 MB	LBA	On	16 Sec	4
Primary Slave :	CDROM							3

```
PCI Devices:
PCI Onboard USB Controller, IRQ10    PCI Onboard IDE
PCI Onboard SCSI, IRQ10              PCI Onboard PCI Bridge
PCI Onboard VGA                     PCI Onboard Ethernet, IRQ9
PCI Onboard VGA                     PCI Onboard Ethernet, IRQ9
```

ML014440

3.1.2 BIOS Version

After displaying the configuration, AMIBIOS identifies the version of the BIOS that is running. Figure 3–3 shows the BIOS version message.

Figure 3–3 BIOS Version Screen Display

Digital Equipment Corporation 1998 V1.00**

ML014441
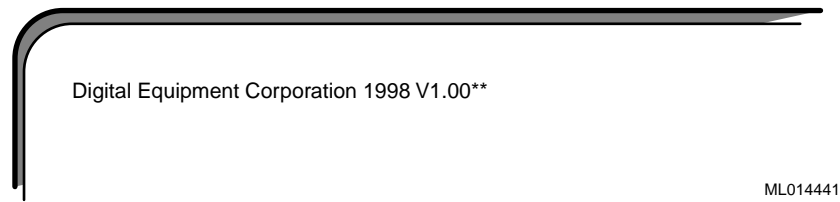
3.1.3 System Management Screen Display

AMIBIOS then reports System Management data — the measurement and status of the system's voltages, fans, temperature, and intrusion. Figure 3–4 shows how this information is reported.

Figure 3–4 System Management Screen Display

```
CPU Voltage Measurement :      2.70V      CPU Voltage Status   :    Pass
Voltage 1 Measurement   :      3.47V      Voltage 1 Status     :    Pass
Voltage 2 Measurement   :      5.08V      Voltage 2 Status     :    Pass
Voltage 3 Measurement   :     12.03V      Voltage 3 Status     :    Pass
Voltage 4 Measurement   :    -12.06V      Voltage 4 Status     :    Pass
CPU Fan Speed           :    No Tach      CPU Fan Status       :    Fail
Fan 2 Speed             :    No Tach      Fan 2 Status         :    Pass
Fan 3 Speed             :    No Tach      Fan 3 Status         :    Pass
Temperature Measurement :      29 C       Temperature Status   :    Pass
Intrusion Alert         :   Disabled      Intrusion Status     :    Pass
```

ML014442

The BIOS then tries to find the boot device.

Note

A normal power-up emits a single blink on the status LED on the front panel of the CPU module. A sequence of blinks during start-up indicates errors. If the system fails the startup tests or you see multiple blinks and the system halts, power the system off, wait approximately 15 seconds, and then power it on again. If the system continues to fail the tests or emits multiple blinks, consult Chapter 4 for information on troubleshooting possible problems.

3.2 Installing Windows NT

Install Windows NT Workstation or Window NT Server as explained in the Windows NT documentation.

Before you begin the installation, be sure to:

- Read the Windows NT readme file on the Windows NT CD–ROM.

- Back up all files currently on the system to a network or a tape storage device.

- Check all installed hardware (network adapter cards, video drivers, sound cards, and so forth) against the *Windows NT Hardware Compatibility List*.

3.3 Booting the Operating System

If AMIBIOS finds a boot device, the BIOS loads the operating system. You are prompted to select the Windows NT operating system to be started as shown in Figure 3–5. However, if you do not respond within the timeout period, or if you press the Enter key, the highlighted choice is started automatically.

Figure 3–5 Booting the Operating System

```
OS Loader V4.00

Please select the operating system to start:

 Windows NT Workstation Version 4.00
 Windows NT Workstation Version 4.00 [VGA Mode]

Use ↑ and ↓ to move the highlight to your choice.
Press enter to choose

Seconds until highlighted choice will be started automatically: nn

                                                       ML014443
```
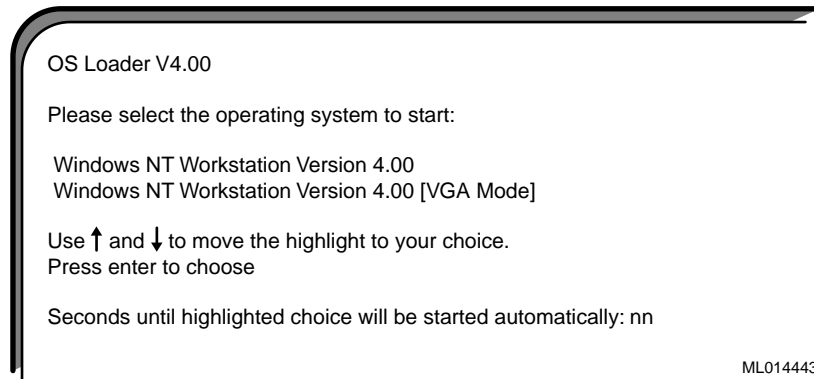
If you allow the countdown to reach zero, NTDETECT V4.0 checks system hardware and then provides you with an opportunity to recall the system's last BIOS setting.

```
Press spacebar NOW to invoke Hardware Profile/Last
Known Good Menu.
```

Press the spacebar to recall the system's BIOS settings (system configuration) prior to the current reboot.

3.4 Installing Supplied Device Drivers

Your DIGITAL 5/233i-8 CompactPCI system kit includes a device drive diskette. This diskette contains device drivers for the following system components:

- Intel 82558 10/100 Ethernet controller

- Adaptec AIC 7880 UltraSCSI controller

- Cirrus Logic video controller

If your application requires the use of these controllers, you must install the device drivers as explained in the readme.txt file on the device driver diskette supplied in your system kit (see Table 1–1).

Note

The installation instructions provided in readme.txt file assume that Windows NT has been installed on the system.

3.5 Considering System Configuration Changes

Depending on the option modules you may have installed, the I/O devices being used, and other application-specific system requirements, you may need to adjust your system configuration. See the *DIGITAL 5/233i CompactPCI Single-Board Computer User Manual*, which is available on the World Wide Web at `http://www.digital.com/oem`, for information on using WINBIOS Setup to configure a DIGITAL 5/233i CompactPCI SBC.

3.6 Powering the System Off

You may need to power the system off to resolve system hangs or similar problems.

Caution

Before you power off your computer, make sure you save and close all open files if at all possible. If the system shuts down before you save and close open files, you may lose data.

To power off the system:

1. Close application data files that are open.

2. Close applications that are running.

3. Complete any additional shutdown procedures appropriate for the operating system being used.

4. Press the system's power On/Off button to the Off (0) position.

If you need to power off your system for an extended period, power off the system and unplug the power cord from the system's power inlet.

3.7 Restarting the System

You can restart your system by using a hard boot or a soft boot.

Method	How to Invoke	Action Performed
Hard boot	Power the system off for five seconds, then back on, by pressing the power On/Off button on the front panel of the power supply module.	Runs memory tests and clears all terminate stay resident (TSR) programs and memory registers.
Soft boot	Press [Ctrl]/[Alt]/[Delete]	Does not run memory tests but clears all TSR programs and memory registers.

4

Troubleshooting

This chapter explains how to troubleshoot systems that include the DIGITAL 5/233i CompactPCI SBC. Topics include:

- Basic Troubleshooting Tips
- Troubleshooting Your System
- Responding to Blink Codes and Error Messages

4.1 Basic Troubleshooting Tips

Most computer system failures result from incorrect installation, improper config-uration, or incompatible application software or hardware. The following trouble-shooting tips can help you solve most system problems:

- Troubleshoot one problem at a time and make only one change at a time. For example, if the hard disk drive fails to boot, do not try all suggested corrective actions at once. Start with one suggestion, such as checking the cables. After securing the cables, try rebooting the system. If it does not work, try another suggestion.

- Look for abnormal LED behavior. For example, make sure the power LED lights when you power on the system and that the drive access indicators light when using the diskette, hard disk, or CD–ROM drive.

- If power-on self test (POST) errors appear on the monitor screen, run WIN-BIOS Setup and correct the problems identified by the POST error messages.

- If you installed external devices, make sure all cables are correctly and securely connected to the appropriate devices.

- If you installed internal devices, make sure nothing was bumped or jarred loose, and that all cable connections are securely in place.

- Make sure all device drivers are installed correctly.

- If your system hangs, soft boot the system (press the Ctrl, Alt, and Del keys simultaneously). If the system fails to boot, power it off, wait until the disk drives spin down completely, and power the system back on.

- Pay close attention to error messages that appear on the monitor screen. If an error message is system related, see Section A.2 for recommended actions. If an error message is specific to the operating system, refer to the online help and appropriate operating system documentation.

- Watch the speaker LED for blink codes. Record the number of blinks and their pattern. Check the blink code descriptions in Section A.1 for recom-mended actions.

- After the POST completes, check each line of the system startup and configuration files as appropriate for the operating system being used.

- Read any available README files. README files might be on the CD–ROM disk, or available as printed material. This information can help you set up, configure, and operate your system.

4.2 Troubleshooting Your System

This section will help you troubleshoot problems in systems that include the DIGITAL 5/233i CompactPCI SBC. System problems are usually caused by components being jarred loose during relocation, loose cables, cables connected to the wrong devices, and external device failure.

Table 4–1 lists possible system problems with probable causes and corrective actions to take. If you are not able to solve a problem after consulting the information in this chapter, see the Warranty and Parts Information that shipped with the SBC for information on how to contact customer support.

Table 4–1 Troubleshooting System Problems

Problem	Possible Cause	Action
No response when the system is **powered on**.	System is not plugged in.	Power off the system, plug it in, and power it back on.
	No power at the power outlet.	Use another power outlet.
	Voltage select switch is set incorrectly.	Adjust the voltage select switch.
	Internal system cables are loose.	Check the connections of all internal cables.
	CPU module components were jarred loose during shipping.	Remove the CPU module and check that the CPU and SIMMs are seated properly.
	Pins in a backplane connector are bent or broken.	Contact your service provider.
	Power supply failure.	Contact your service provider.
	SBC failure.	Replace the SBC.
Power is on and a display appears on the monitor screen, but the system does not respond to **keyboard or mouse input**.	Keyboard or mouse is not connected.	Connect the keyboard and mouse to the front panel of the SBC.
	The keyboard or mouse is connected to the wrong port.	If the keyboard and mouse are connected, confirm that they are connected to the correct ports.
Power is on, but no **display** appears on the monitor screen.	Brightness and contrast controls are not set correctly.	Adjust the brightness and contrast controls.
	The monitor-off timer has powered the monitor off.	Press the [Shift] key to reactivate the monitor.
	The monitor is not powered on.	Power on the monitor.
	The monitor cable is installed incorrectly.	Check all monitor cable connections.
	The required video driver is not installed.	Install the required video driver.
	Monitor failure.	Try another monitor.
	Video controller failure.	Replace the SBC.

Table 4–1 Troubleshooting System Problems (Continued)

Problem	Possible Cause	Action
Serial ports are not functional.	A serial port cable is installed incorrectly.	Check all serial port cable connections.
	The serial ports are disabled in the BIOS setup.	Run the BIOS setup utility and enable the serial ports.
	Serial port failure.	Try the other serial port. If the second port fails, contact your service provider.
	Controller failure.	Replace the SBC.
Parallel port is not functional.	The parallel port cable is installed incorrectly.	Check all parallel port cable connections.
	The parallel port is disabled or is not configured correctly in the BIOS setup.	Run the BIOS setup utility and enable the parallel port. Also, make sure the port is configured correctly for the type of printer that is being used.
	Parallel port failure.	Replace the SBC.
	Controller failure.	Replace the SBC.
Ethernet port is not functional.	The Ethernet cable is installed incorrectly.	Check all Ethernet cable connections.
	The onboard Ethernet controller is disabled in the BIOS setup.	Run the BIOS setup utility and enable the onboard Ethernet controller.
	Ethernet port failure.	Replace the SBC.
	Ethernet controller failure.	Replace the SBC.
USB port is not functional.	A USB cable is installed incorrectly.	Check all USB cable connections.
	The USB ports are disabled or are not configured correctly in the BIOS setup.	Run the BIOS setup utility and enable the USB ports. Also, make sure the USB ports are configured correctly for the types of devices being used.
	USB port failure.	Replace the SBC.
	Controller failure.	Replace the SBC.

Table 4–1 Troubleshooting System Problems (Continued)

Problem	Possible Cause	Action
System operates incorrectly after installing optional **SIMMs**.	SIMMs are installed incorrectly.	Remove the CPU module and make sure that both SIMM connectors in each bank are filled with the correct SIMM size, speed, and type.
	SIMM failure.	Remove and reinstall the SIMMs as explained in Section 2.4.1.
		Make sure that both SIMM connectors in each bank are filled with the correct SIMM size, speed, and type.
		Replace the SIMMs, following instructions in Section 2.4.1.
System fails to retain **setup information**.	System battery failure.	Replace the system battery.
System displays **HIMEM.SYS errors**.	Unstable memory at the specified address.	Run diagnostics.
		Replace faulty SIMMs as explained in Section 2.4.1
System displays a System **Error F002** message	Faulty hardware.	Run diagnostic software to identify the faulty hardware. Replace the faulty hardware or contact your service provider.
"**Error 0000001E**"	Your hard disk drive might have corrupted system files.	Run **chkdsk** on your hard disk drive to correct corrupted files.
		If the problem still exists, contact your service provider.
"**NMI Hardware Error**"	Faulty hardware.	Make sure all SIMM and SBC connectors are clean and properly seated in their respective sockets.
		Run diagnostic software, such as AMIDIAG, to identify the faulty hardware. Replace the faulty hardware or contact your service provider.
Services or subsystems do not start properly	Improper configuration, required files are missing, or required files are not installed.	Check for status. Also, check the system log for entries relating to the problem.
		If the problem still exists, contact your service provider.

Table 4–1 Troubleshooting System Problems (Continued)

Problem	Possible Cause	Action
System does not recognize a **SCSI hard disk drive or device**.	SCSI ID conflicts exist.	See the SCSI device kit installation instructions on setting SCSI IDs.
	Terminating resistors have not been removed from the SCSI device.	Remove the terminating resistors. See the SCSI device kit installation instructions.
	SCSI option is not enabled in the BIOS setup.	Run the BIOS setup utility and enable the onboard SCSI controller.
	SCSI cable is not terminated.	Terminate each end of the SCSI cable.
	SCSI device is not plugged in.	Check power and SCSI cable connections.
	Loose SCSI cable connections.	Check and secure all SCSI cable connections.
	Hard disk boot sector is missing.	Repartition and reformat your hard disk drive.
		Caution: This procedure erases what is currently on your hard disk drive.
		Consider repairing the hard disk drive by using a disk drive repair utility. You can purchase disk drive repair utilities from a local software supplier.
System does not recognize a **SCSI hard disk drive or device**.	A boot sector virus might exist.	Run anti-virus software.
	SCSI adapter failure.	Replace the SBC.
	SCSI ribbon cable failure.	Replace the cable.
	SCSI device failure.	Replace the SCSI device
No response to **keyboard** commands.	Keyboard is password protected.	Enter the keyboard password.
	Keyboard is not connected.	Power off the system and connect the keyboard.
	Keyboard is connected to the mouse port.	Power off the system and connect the keyboard to the keyboard port.
	System halted.	Reboot the system.
	Keyboard failure.	If available, try another keyboard. If the new keyboard operates correctly, replace the old keyboard.
	Keyboard/mouse controller failure.	Replace the SBC.

Table 4–1 Troubleshooting System Problems (Continued)

Problem	Possible Cause	Action
Keyboard keys type incorrectly.	Keyboard failure.	If available, try another keyboard. If the new keyboard operates correctly, replace the old keyboard.
No response to **mouse** activity	Mouse is not connected.	Power off the system and connect the mouse.
	Mouse is connected to the keyboard port.	Power off the system and connect the mouse to the mouse port.
	System halted.	Reboot the system.
	Mouse driver is not installed.	Install the required mouse driver. See your application software documentation.
	Mouse port is disabled or not configured correctly in the BIOS setup.	Run the BIOS setup utility and enable the PS/2 mouse port. If you are using a PS/2 mouse, also make sure the **IRQ12/M Mouse Function** option is enabled.
	Mouse failure.	If available, try another mouse. If the new mouse operates correctly, replace the old mouse.
	Keyboard/mouse controller failure.	Replace the SBC.
Mouse sticks.	Dirty mouse ball.	Remove mouse ball and clean it.

4.3 Responding to Blink Codes and Error Messages

When you power on your system, the BIOS runs power-on self test (POST) routines that initialize the system and compare the defined configuration with hardware that is actually installed. The system monitor or terminal displays codes and initialization messages as the POST routines run.

The BIOS reports errors with blink codes and error messages. A blink code is a series of light blinks on the system's speaker LED, which is identified in Figure 1–1.

Note

The BIOS for DIGITAL 5/233i-8 CompactPCI systems displays blink codes on the speaker LED instead of sounding beep codes, because the systems do not include a speaker.

The method the BIOS uses for reporting an error depends on when the error occurs as indicated in Table 4–2.

Table 4–2 BIOS Error Reporting

If...	Then...
The error occurs before the display device is initialized	A series of blinks appear on the speaker LED. Blink codes indicate that a fatal error has occurred. For a listing of blink codes, see Section A.1.
The error occurs after the display device is initialized	An error message is displayed. A prompt to press the <F1> key might also appear with some error messages. For a listing of error messages, see Section A.2.

4.3.1 Responding to Blink Codes

Table 4–3 lists corrective actions if the system displays blink codes on the speaker LED. For a listing of possible blink codes and descriptions, see Section A.1.

Table 4–3 Troubleshooting Based on Blink Codes

If the LED Blinks...	Then...
1, 2, or 3 times	Reseat the memory SIMMs. If this does not correct the problem, replace the SIMMs.
8 times	The video adapter is not accessible or has a problem. Replace the SBC.
9 times	The BIOS PROM is not accessible or has a problem. Replace the SBC.
11 times	A problem exists in the onboard cache memory. Replace the SBC.
4, 5, 6, 7, or 10 times	Replace the SBC.

4.3.2 Responding to Error Messages

If the BIOS detects an error while the system is powering up and the system monitor has been initialized and is functional, the BIOS displays an error message as follows:

```
ERROR Message Line 1
```

If this message appears, press the F1 key to continue.

The following message might also appear:

```
RUN SETUP UTILITY.
```

If this message appears, press the F1 key to run WINBIOS Setup.

For a listing of BIOS error messages and descriptions, see Section A.2.

A

Error Messages and Checkpoint Codes

The BIOS reports errors with blink codes and error messages. A blink code is a series of light blinks on the system's speaker LED. For the location of the speaker LED, see Figure 1–1.

Note

The BIOS for DIGITAL 5/233i-8 CompactPCI systems displays blink codes on the speaker LED instead of sounding beep codes, because the systems do not include a speaker.

This appendix lists the blink codes and error messages with descriptions for quick reference.

A.1 BIOS Blink Codes

The BIOS communicates fatal errors that halt the boot process prior to system monitor initialization by using blink codes. Table A–1 lists error messages.

Table A–1 BIOS Blink Codes

Number of Blinks	Error Message	Explanation	Action
1	Refresh failure	The memory refresh circuitry is faulty.	Reseat the memory SIMMs. If this does not correct the problem, replace the SIMMs.
2	Parity error	A parity error occurred in the first 64 KB block of memory.	Reseat the memory SIMMs. If this does not correct the problem, replace the SIMMs.
3	Base 64 KB memory failure	A memory failure occurred in the first 64 KB block of memory.	Reseat the memory SIMMs. If this does not correct the problem, replace the SIMMs.
4	Timer not operational	A memory failure occurred in the first 64 KB block of memory, or a timer is not functioning.	Replace the SBC.
5	Processor error	The CPU generated an error.	Replace the SBC.
6	8042 – gate A20 failure	The system is unable to switch to protected mode.	Replace the SBC.

Table A–1 BIOS Blink Codes (Continued)

Number of Blinks	Error Message	Explanation	Action
7	Processor exception interrupt error	The CPU generated an exception interrupt.	Replace the SBC.
8	Display memory read/write error	The system video adapter is missing or its memory is faulty. This is not a fatal error.	Replace the SBC.
9	ROM checksum error	The ROM checksum value does not match the value encoded in the BIOS.	Update the BIOS in flash ROM.
10	CMOS shutdown register read/write error	The shutdown register for CMOS RAM failed.	Replace the SBC.
11	Cache memory bad — do not enable cache	The cache memory test failed. Cache memory is disabled. Do not press the [Ctrl], [Alt], [Shift] and [+] key combination to enable the cache memory.	Replace the SBC.

A.2 BIOS Error Messages

Table A–2 lists the error messages that the BIOS displays.

Table A–2 Error Messages

Message	Explanation	Action
8042 gate-A20 error	Gate A20 on the keyboard controller is not working.	Replace the SBC.
Address line short!	An error exists in the address decoding circuitry.	Replace the SBC.
C: drive error	Hard disk drive C: does not respond.	Run the BIOS setup utility and check whether the correct disk type is specified for the drive. If necessary, use diagnostics software, such as the AMIDiag Utility, to find and correct the problem.
C: drive failure	Hard disk drive C: does not respond.	Replace the hard disk drive.
Cache memory bad – do not enable cache	Cache memory is defective.	Replace the SBC.
CH–2 timer error	An error exists in timer 2.	Replace the SBC.
CMOS battery state low	The power of the system battery is low.	Replace the battery.
CMOS checksum failure	The CMOS RAM checksum is different than the previous value.	Run the BIOS setup utility.
CMOS system options not set	The BIOS option values stored in the CMOS RAM are destroyed.	Run the BIOS setup utility and reset the values.

Table A–2 Error Messages (Continued)

Message	Explanation	Action
CMOS display type mis-match	The video type found by the BIOS does not match the type detected by the BIOS.	Run the BIOS setup utility and specify the correct video type.
CMOS memory size mis-match	The amount of memory found by the BIOS is different than the amount specified in CMOS RAM.	Run the BIOS setup utility and specify the correct amount of memory.
CMOS time and date not set	The system time and date are not set.	Run the BIOS setup utility and set the time and date.
D: drive error	Drive D: does not respond.	Run the BIOS setup utility and check whether the correct disk type is specified for the drive.
		If necessary, use diagnostics software, such as the AMIDiag Utility, to find and correct the problem.
D: drive failure	Drive D: does not respond.	Replace the device.
Diskette boot failure	The diskette in drive A: is not a bootable diskette.	Use another boot diskette and follow the instructions that appear on the monitor screen.
Display switch not set properly	The system's video switch is not set correctly.	Power off the system, set the video switch to color or monochrome, as appropriate, and power the system on.
DMA error	An error exists in the DMA controller.	Replace the SBC.
DMA 1 error	An error exists in the first DMA channel.	Replace the SBC.
DMA 2 error	An error exists in the second DMA channel.	Replace the SBC.
FDD controller failure	The BIOS cannot communicate with the diskette drive controller.	Power off the system, remove the rear access panel, and check the diskette drive cable connections. Replace the rear access panel and power on the system.
HDD controller failure	The BIOS cannot communicate with the hard disk drive controller.	Power off the system, remove the rear access panel, and check the IDE disk drive cable connections. Replace the rear access panel and power on the system.
INTR1 error	Interrupt channel 1 failed the POST.	Replace the SBC.
INTR2 error	Interrupt channel 2 failed the POST.	Replace the SBC.
Invalid boot diskette	The BIOS can read the diskette in the diskette drive, but it cannot boot from the diskette.	Use another boot diskette and follow the instructions that appear on the monitor screen.
Keyboard is locked. You must unlock it.	The system's keyboard lock is engaged.	Unlock the keyboard.

Table A–2 Error Messages (Continued)

Message	Explanation	Action
Keyboard error	The keyboard has a timing problem.	Run the BIOS setup utility and make sure a keyboard controller is installed. To skip the POST routines for the keyboard, set the **System Keyboard** option in **Advanced Setup** to *Absent*.
KB/Interface error	An error exists in the keyboard connector.	Verify that the keyboard is connected correctly. If it is, replace the SBC.
No ROM Basic	The BIOS cannot find a valid bootable sector on either drive A: or C:.	Insert a valid bootable diskette in drive A:.
Off-board parity error	A parity error occurred in memory installed on an adapter card in an expansion slot. The message format is as follows: OFF BOARD PARITY ERROR ADDR = (*xxxx*) The *xxxx* is the hexadecimal address where the error occurred.	Use diagnostics software, such as the AMIDiag Utility, to find and correct the memory problem.
On-board parity error	A parity error occurred in DRAM memory. The message format is as follows: ON BOARD PARITY ERROR ADDR = (*xxxx*) The *xxxx* is the hexadecimal address where the error occurred.	Check that the SIMMs are installed correctly. If the errror persists, use diagnostics software, such as the AMIDiag Utility, to find and correct the memory problem.
Parity error ????	A parity error exists in memory at an unknown address.	Check that the SIMMs are installed correctly. If the error persists, use diagnostics software, such as the AMIDiag Utility, to find and correct the memory problem.

A.3 EISA BIOS Error Messages

The EISA BIOS can generate additional error messages. None of these messages is fatal. Table A–3 lists the error messages.

Table A–3 EISA BIOS Error Messages

Message	Explanation
EISA CMOS Checksum Failure	The checksum for EISA CMOS is bad. The battery for EISA CMOS RAM can be bad.
EISA CMOS Inoperational	A read/write error occurred in extended CMOS RAM. The battery may be bad.
Expansion Board Not Ready at Slot *X, Y, Z*	The BIOS cannot find the expansion board in Slot *x*, *y*, or *z*. Make sure the board is in the correct slot and is correctly seated.
Fail-Safe Timer NMI Inoperational	Devices that depend on the fail-safe NMI timer is not operating correctly.

Table A–3 EISA BIOS Error Messages (Continued)

Message	Explanation
ID Information Mismatch for Slot *X, Y, Z*	The ID of the EISA Expansion Board in Slot *x*, *y*, or *z* does not match the ID in EISA CMOS RAM.
Invalid Configuration Information for Slot *X, Y, Z*	The configuration information for EISA expansion board *x*, *y*, or *z* is not correct. The board cannot be configured. Run the ECU.
Software Port NMI Inoperational	The software port NMI is not working.

A.4 ISA NMI Handler Messages

Table A–4 lists ISA non-maskable interrupt (NMI) handler error messages.

Table A–4 ISA NMI Handler Messages

Message	Explanation
Memory parity error at *xxxxx*	Memory failed. If the memory location can be determined, it is displayed as *xxxxx*. If not, the message indicates a memory parity error.
I/O card parity error at *xxxxx*	An option module failed. If the address can be determined, it is displayed as *xxxxx*. If not, the message indicates an I/O card parity error.
DMA bus timeout	A device has driven the bus signal for more than 7.8 microseconds.

A.5 EISA BIOS NMI Error Messages

The EISA BIOS can generate additional NMI messages that are specific to EISA systems. Table A–5 lists these messages.

Table A–5 EISA BIOS NMI Error Messages

Message	Explanation
BUS Timeout NMI at Slot *n*	A bus timeout NMI occurred at slot *n*.
(E)nable (D)isable Expansion Board	Type E to enable the expansion board that had an NMI or D to disable the board.
Expansion Board Disabled at Slot *n*	The expansion board in slot *n* has been disabled.
Expansion Board NMI at Slot *n*	An expansion board NMI was generated from slot *n*.
Fail-Safe Timer NMI	A file-safe timer NMI has been generated.
Software Port NMI	A software port NMI has been generated.

A.6 POST Checkpoint Codes

When AMIBIOS runs the POST diagnostics, it writes checkpoint codes to I/O port 0080h. If the system does not complete the boot process, you can attach diagnostic equipment to the system to read that I/O port. Sections A.6.1 through A.6.3 list the following types of checkpoint codes:

- Uncompressed initialization checkpoint codes
- Runtime checkpoint codes
- Bus checkpoint codes

A.6.1 Uncompressed Initialization Checkpoint Codes

Table A–6 lists the uncompressed initialization checkpoint codes in the order of execution.

Table A–6 Uncompressed Initialization Checkpoint Codes

Code	Explanation
D0h	The NMI is disabled and power on delay is starting. The initialization code checksum will be verified.
D1h	Initializing the DMA controller, performing the keyboard controller BAT test, starting memory refresh, and entering 4 GB flat mode.
D3h	Determining the amount of memory that is installed.
D4h	Returning to real mode, executing OEM patches, and setting the stack.
D5h	Passing control to the uncompressed code in shadow RAM at address E000:0000h. The initialization code is copied to segment 0 and control will be transferred to segment 0.
D6h	Control is in segment 0. Checking if the [Ctrl] [Home] key combination was pressed and verifying the system BIOS checksum. If either [Ctrl] [Home] was pressed or the system BIOS checksum is bad, jumping to checkpoint code E0h. Otherwise, continue to checkpoint code D7h.
D7h	Passing control to the interface module.
D8h	Decompressing the main system BIOS runtime code.
D9h	Passing control to the main system BIOS in shadow RAM.

A.6.2 Runtime Checkpoint Codes

Runtime checkpoint codes are uncompressed in shadow RAM at address F0000h. Table A–7 lists the runtime checkpoint codes in order of execution.

Table A–7 Runtime Checkpoint Codes

Code	Explanation
03h	The NMI is disabled. Checking for a soft reset or a power on condition.
05h	The BIOS stack has been built. Disabling cache memory.
06h	Uncompressing the POST code.
07h	Initializing the CPU and the CPU data area.
08h	Calculating the CMOS checksum.
0Bh	Performing any required initialization before the keyboard BAT command is issued.
0Ch	The keyboard controller input buffer is free. Issuing the BAT command to the keyboard controller.

Table A–7 Runtime Checkpoint Codes (Continued)

Code	Explanation
0Eh	The keyboard controller BAT command result is verified. Performing any necessary initialization after the keyboard controller BAT command test.
0Fh	Initialization after the keyboard controller BAT command test is complete. Writing the keyboard command byte.
10h	The keyboard controller command byte is written. Issuing the pin 23 and pin 24 blocking and unblocking commands.
11h	Checking whether the [End] or [Ins] keys were pressed when the system was powered on. Initializing CMOS RAM if the AMIBIOS POST option to initialize CMOS RAM in every boot was set in AMIBCP or the [End] key was pressed.
12h	Disabling DMA controllers 1 and 2 and interrupt controllers 1 and 2.
13h	The video display is disabled. Port B is initialized. Initializing the chipset.
14h	Starting the 8254 timer test.
19h	The 8254 timer test is complete. Starting the memory refresh test.
1Ah	The memory refresh line is toggling. Checking the 15 second on/off time.
23h	Reading the 8024 input port and disabling the MEGAKEY Green PC feature. Making the BIOS code segment writable and performing any necessary configuration before initializing the interrupt vectors.
24h	The configuration required before interrupt vector initialization is complete. Starting interrupt vector initialization.
25h	Interrupt vector initialization complete. Clearing the password if the POST DIAG switch is on.
27h	Completing initialization required before video mode is set.
28h	Initialization required before the video mode is set and is complete. Configuring the monochrome and color mode settings.
2Ah	Initializing bus initialization system, static, and output devices, if present. See Section A.6.3 for more information.
2Bh	Passing control to the video ROM for any required configuration before the video ROM test.
2Ch	All necessary processing before passing control to the video ROM is complete. Looking for and passing control to the video ROM.
2Dh	The video ROM returned control to the BIOS POST. Performing processing that is required after the video ROM had control.
2Eh	Completed post-video ROM test processing. If the EGA/VGA controller is not found, performing the display memory read/write test.
2Fh	The EGA/VGA controller was not found. Starting the display memory read/write test.
30h	The display memory read/write test passed. Looking for retrace checking.
31h	The display memory read/write test or retrace checking failed. Performing the alternate display memory read/write test.

Table A–7 Runtime Checkpoint Codes (Continued)

Code	Explanation
32h	The alternate display memory read/write test passed. Looking for alternate display retrace checking.
34h	Video display checking is complete. Setting the display mode.
37h	The display mode is set. Displaying the power-on message.
38h	Initializing the bus input, IPL, and general devices, if present. See Section A.6.3 for more information.
39h	Displaying bus initialization error messages. See Section A.6.3 for more information.
3Ah	The new cursor position is read and saved. Displaying the Hit <DEL> message.
40h	Preparing the descriptor tables.
42h	The descriptor tables are prepared. Entering protected mode for the memory test.
43h	Entered protected mode. Enabling interrupts for diagnostics mode.
44h	Interrupts are enabled if the diagnostics switch is on. Initializing data to check memory wraparound at 0:0.
45h	Data is initialized. Checking for memory wraparound at 0:0 and determining the total amount of memory installed.
46h	The memory wraparound test is complete. The total memory calculation is complete. Writing patterns to test memory.
47h	The memory pattern was written to extended memory. Writing patterns to the base 640 KB of memory.
48h	The memory patterns were written to base memory. Determining the amount of memory below 1 MB.
49h	The amount of memory below 1 MB was found and verified. Determining the amount of memory above 1 MB of memory.
4Bh	The amount of memory above 1 MB was found and verified. Checking for a soft reset and clearing the memory below 1 MB for the soft reset. If this is a power-on situation, going to checkpoint 4Eh.
4Ch	The memory below 1 MB was cleared for a soft reset. Clearing the memory above 1 MB.
4Dh	The memory above 1 MB was cleared for a soft reset. Saving the memory size. Going to checkpoint 52h.
4Eh	The memory test started, but not as the result of a soft reset. Displaying the first 64 KB memory size.
4Fh	The memory size display started. The display is updated during the memory test. Performing the sequential and random memory test.
50h	The memory below 1 MB was tested and initialized. Adjusting the displayed memory size for relocation and shadowing.
51h	The memory size display was adjusted for relocation and shadowing. Testing the memory above 1 MB.

Table A–7 Runtime Checkpoint Codes (Continued)

Code	Explanation
52h	The memory above 1 MB was tested and initialized. Saving the memory size information.
53h	The memory size information and the CPU registers are saved. Entering real mode.
54h	Shutdown was successful. The CPU is in real mode. Disabling the Gate A20 line, parity, and the NMI.
57h	The A20 address line, parity, and the NMI are disabled. Adjusting the memory size depending on relocation and shadowing.
58h	The memory size was adjusted for relocation and shadowing. Clearing the Hit <DEL> message.
59h	The Hit <DEL> message is cleared. The <WAIT...> message is displayed. Starting the DMA and interrupt controller test.
60h	The DMA page register test passed. Performing the DMA controller 1 base register test.
62h	The DMA controller 1 base register test passed. Performing the DMA controller 2 base register test.
65h	The DMA controller 2 base register test passed. Programming DMA controllers 1 and 2.
66h	Completed programming DMA controllers 1 and 2. Initializing the 8259 interrupt controller.
7Fh	Extended NMI source enabling is in progress.
80h	The keyboard test started. Clearing the output buffer and checking for stuck keys. Issuing the keyboard reset command.
81h	A keyboard reset error or stuck key was found. Issuing the keyboard controller interface test command.
82h	The keyboard controller interface test completed. Writing the command byte and initializing the circular buffer.
83h	The command byte was written and global initialization has completed. Checking for a locked key.
84h	Locked key checking is complete. Checking for a memory size mismatch with the CMOS RAM data.
85h	The memory size check is complete. Displaying a soft error and checking for a password or bypassing WINBIOS Setup.
86h	The password was checked. Performing required programming before WINBIOS Setup runs.
87h	The programming before WINBIOS Setup runs is complete. Uncompressing the WINBIOS Setup code and executing WINBIOS Setup.
88h	Returned from WINBIOS Setup and cleared the screen. Performing required programming after WINBIOS Setup runs.
89h	The programming after WINBIOS Setup ran is complete. Displaying the power-on screen message next.

Table A–7 Runtime Checkpoint Codes (Continued)

Code	Explanation
8Bh	The first screen message was displayed. The <WAIT...> message is displayed. Performing the PS/2 mouse check and an extended BIOS data area allocation check.
8Ch	Programming the WINBIOS Setup options.
8Dh	The WINBIOS Setup options are programmed. Resetting the hard disk drive controller.
8Fh	The hard disk drive controller was reset. Configuring the diskette drive controller.
91h	The diskette drive controller was configured. Configuring the hard disk drive controller.
95h	Initializing the bus option ROMs starting at address C800h. For more information, see Section A.6.3.
96h	Initializing before passing control to the adaptor ROM at address C800h.
97h	Initialization before the C800h adaptor ROM gains control completed. Checking the adaptor ROM.
98h	The adaptor ROM had control and returned control to the BIOS POST. Performing any required processing after the option ROM returned control.
99h	Initialization required after the option ROM test completed. Configuring the timer data area and printer base address.
9Ah	Setting the timer and printer base addresses. Setting the RS–232 base address.
9Bh	Returned after setting the RS–232 base address. Performing any required initialization before the coprocessor test.
9Ch	Required initialization before the coprocessor test is complete. Initializing the coprocessor.
9Dh	Coprocessor initialized. Performing required initialization after the coprocessor test.
9Eh	Initialization after the coprocessor test is complete. Checking the extended keyboard, keyboard ID, and Num Lock key. Issuing the keyboard ID command.
A2h	Displaying soft errors.
A3h	The soft error display completed. Setting the keyboard typematic rate.
A4h	The keyboard typematic rate is set. Programming the memory wait states.
A5h	Memory wait state programming is complete. Clearing the screen and enabling parity and the NMI.
A7h	NMI and parity are enabled. Performing any initialization required before passing control to the adapter ROM at address E000h.
A8h	Initialization before passing control to the adapter ROM at address E000h is complete. Passing control to the adapter ROM at address E000h.
A9h	Returned from the adapter ROM at address E000h. Performing required initialization after the E000h option ROM has control.
AAh	Initialization after E000h option ROM control completed. Displaying the system configuration.

Table A–7 Runtime Checkpoint Codes (Continued)

Code	Explanation
ABh	Building the multiprocessor table, if necessary
ACh	Uncompressing the Device Initialization Manager (DIM) data and initializing the DIM POST.
B0h	Displaying the system configuration.
B1h	Copying code to specific areas.
00h	Copying code to specific areas is complete. Passing control to the boot loader at INT 19h.

A.6.3 Bus Checkpoint Codes

The system BIOS passes control to different buses at various checkpoints. Table A–8 lists the bus checkpoint codes.

Table A–8 Bus Checkpoint Codes

Code	Explanation
2Ah	Initializing the different bus system, static, and output devices, if present.
38h	Initializing bus input, IPL, and general devices, if present.
39h	Displaying bus initialization messages, if there are any.
95h	Initializing the bus adapter ROMs from addresses C8000h through D8000h.

While the bus routines have control, additional checkpoints are written to I/O port address 0080h. These checkpoints identify the routines that are executed and consist of two parts:

- A low nibble (four bits) that represents the system BIOS checkpoint where control is passed to the different bus routines

- A high nibble (four bits) that indicates a routine is being executed on different buses

Table A–9 lists the possible settings for the additional bus checkpoints.

Table A–9 Additional Bus Checkpoint Codes

Bits	Value	Explanation
<7:4>	0000	Function 0. Disable all devices on the bus.
	0001	Function 1. Initialize static devices on the bus.
	0010	Function 2. Initialize output devices on the bus.
	0011	Function 3. Initialize input devices on the bus.
	0100	Function 4. Initialize IPL devices on the bus.
	0101	Function 5. Initiate general devices on the bus.
	0110	Function 6. Initialize error reporting on the bus.
	0111	Function 7. Initialize add-on ROMs for all buses.
<3:0>	0	Generic Device Initialization Manager (DIM)
	1	Onboard system devices
	2	ISA devices
	3	EISA devices
	4	ISA plug and play devices
	5	PCI devices

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