



RAS96 RASCard - E1 User Guide

RAS96 RASCard User Guide
P/N 82066350, Revision A

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| Revision | Date | Description |
|-----------------|--------------------|--------------------------------|
| A | September 11, 2000 | Manual released at revision A. |

This product is covered by one or more of the following U.S. Patent Numbers:
This device covered by one or more of the following patents:

6,031,867; 6,012,113;6,009,082; 5,905,794; 5,864,560; 5,815,567; 5,815,503; 5,812,534;
5,790,532; 5,764,628; 5,764,627; 5,754,589; D394,250; 5,724,356; 5,673,268; 5,673,257;
5,628,030; 5,619,508; 5,617,423; 5,600,649; 5,592,586;5,577,041; 5,574,725; D374,222;
5,559,793; 5,546,448; 5,546,395; 5,535,204; 5,500,859; 5,471,470; 5,463,616; 5,453,986;
5,452,289; 5,450,425; 5,355,365; 5,309,562; 5,301,274 Other Patents Pending

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Important Safety Instructions

Caution: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

The RAS96 RASCard circuit board includes a battery that maintains the RASCard's setup information when it is turned off or disconnected from power. The battery can maintain the setup information for approximately 10 years with no external power, and longer when the RASCard is turned on and operating normally. This battery is soldered onto the circuit board and cannot be replaced by the user.

Note: There is a possibility of excessive battery drain if the RASCard is set on a metal table or stored in an anti-static bag.

If, for some reason, the RASCard's battery should fail, please contact Multi-Tech Technical Support at +(763) 717-5863 for replacement instructions.

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1 Introduction

Introduction

This manual describes the field installation and configuration of a Multi-Tech RAS96 series RASCard into a CommPlete Communications Server. It also describes the optional E1 daughter card which is required for use with MT5634HD16 modem cards.

The RASCard is a single board Pentium computer that serves as a remote access server (RAS) for the CommPlete Communications Server system. Up to four RASCards, one per segment, can be installed in one CommPlete Communications Server. Each RASCard has PCI/ISA bus architecture, a 100-, 133-, 166-, or 200-MHz Intel® Pentium® processor, up to 128 megabytes (MB) of fast page mode or EDO RAM, a 512K L2 cache, 1 MB of on-board video RAM, floppy disk and IDE hard disk controllers, a watchdog timer for an automatic reset, and an 800 MB, 1.2 GB, 1.6 GB, or 2.1 GB on-board hard disk. One optional E1 daughter card provides an E1 interface for up to two MT5634HD16 sixteen-modem cards.

Each RASCard comes with MS-DOS and RASExpress remote access server management software pre-installed on the hard disk. For software operating instructions, refer to the applicable software manual that was shipped with your software.

Manual Organization

Chapter 1 Introduction

This chapter introduces the RAS96, gives its technical specifications, and provides a guide to the organization of the manual.

Chapter 2 RASCard Description

This chapter describe the RAS96's layout, memory banks, jumpers, connectors, and front panel.

Chapter 3 Installation

This chapter describes how to install the RAS96 into the CommPlete chassis.

Chapter 4 BIOS Setup Utility

This chapter describes the options in the Award BIOS Setup utility.

Chapter 5 E1 Daughter Card

This chapter describes the optional E1 daughter card that mounts on the RAS96.

Chapter 6 Solving Problems

This chapter describes how to solve typical problems that you might encounter when running the RASCard.

Appendix A Connector Pinouts

This appendix provides technical information about the connectors used on the RAS96.

Appendix B POST Messages

This appendix describes error messages that might be encountered during the RAS96's power-on self-test (POST).

Appendix C POST Codes

This appendix describes codes generated by the BIOS during POST.

Appendix D Approved Memory

This appendix lists memory SIMMs that are known to work with the RAS96.

Appendix E Regulatory Agency Information

This appendix provides Regulatory Agency information pertaining to this E1 device.

Technical Specifications

- Intel 430FX Triton chipset
- Supports 100 MHz, 133 MHz, 166 MHz, and 200 MHz Intel® Pentium® processors.
- PCI/ISA bus architecture for full PCI bus support.
- On-board PCI-bus SVGA video controller with 1 MB of video DRAM supports resolutions to 1024 by 768 pixels by 256 colors.
- Supports 72-pin SIMMs of 4 MB, 8 MB, 16 MB, or 32 MB to form a memory size between 8 MB and 128 MB. Memory type can be fast page or EDO, 60 ns or 70 ns, parity or non-parity.
- 512K of L2 cache memory.
- One parallel port and two RS-232C serial ports with 16550 UARTs (DB-9P connector for COM1; COM2 is for E1 cards).
- 1.44 MB floppy disk controller.
- IDE hard disk interface.
- 2.5-inch on-board hard disk. Available disk sizes include 800 MB, 1.2 GB, 1.6 GB, and 2.1 GB.
- Keyboard and speaker interfaces.
- Real-time clock with battery backup.
- Award BIOS with custom features.
- Watchdog timer.
- **E1 frame format:** CRC4, FAS, and ITU Q.400-Q.490
- **E1 line coding:** AMI, HDB3
- **E1 signal start method:** R2DIGITAL
- **Switches:** Power switch and reset switch on front panel.
- **Indicators:** Front panel LEDs for monitoring network and E1 operations.
- **Dimensions:** 23.4 × 4.32 × 29.2 cm (9.22 × 1.70 × 11.5 in.) H × W × D.
- **Weight:** 1.0 kg (2.2 lb).
- **Operating temperature:** 0° to 40° C (32° to 104° F).

- **Humidity range:** 20–90% (noncondensing).
- **Power consumption:** 4.5 A @ +5 VDC.
- **Limited warranty:** Two years.

2 RASCard Description

Introduction

The RAS96 assembly consists of a Pentium computer card to which is mounted a 2.5-inch hard disk drive, up to two optional E1 cards, and a front panel. Figure 1 shows the layout of the RAS96 card. The RAS96 assembly plugs into bus connectors on the inside of the CC9600 chassis that supply power and support data communications among the various components of the CommPlete Communications Server. The remainder of this chapter describes the RASCard's memory banks, configuration jumpers, connectors, and front panel switches and indicators.

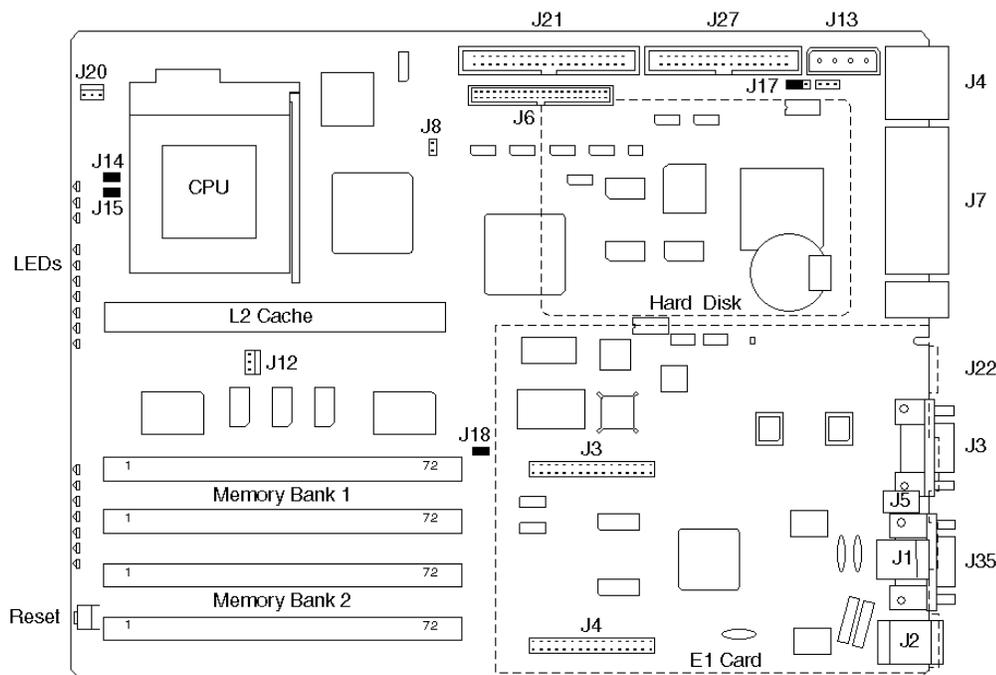


Figure 1. RAS96 RASCard.

Memory Banks

The RASCard is shipped from the factory with 512K of L2 cache memory, which is the maximum amount that can be installed.

Two memory banks (Bank 1 and Bank 2) with two SIMM sockets per bank (M1 through M4) are provided on the RASCard. The standard configuration has 16 MB of EDO DRAM in Bank 1. The RASCard supports four 72-pin SIMMs of 4 MB, 8 MB, 16 MB, or 32 MB DRAM to form a memory size from 8 MB to 128 MB. The DRAM can be 60 ns or 70 ns, fast page mode or EDO, 32-bit non-parity or 36-bit. For a list of approved SIMMs, see Appendix D.

Note: Each bank must have the same size memory installed in pairs. Always fill Bank 1 first.

Table 1. Memory Configurations.

| Bank 1 | Bank 2 | TOTAL |
|-----------|-----------|--------|
| None | None | 0 MB |
| 2 x 4 MB | None | 8 MB |
| 2 x 4 MB | 2 x 4 MB | 16 MB |
| 2 x 8 MB | None | 16 MB |
| 2 x 8 MB | 2 x 4 MB | 24 MB |
| 2 x 8 MB | 2 x 8 MB | 32 MB |
| 2 x 16 MB | None | 32 MB |
| 2 x 16 MB | 2 x 8 MB | 48 MB |
| 2 x 16 MB | 2 x 16 MB | 64 MB |
| 2 x 32 MB | None | 64 MB |
| 2 x 32 MB | 2 x 16 MB | 96 MB |
| 2 x 32 MB | 2 x 32 MB | 128 MB |

Jumpers

The RASCard has five configuration jumpers. One is used for the watchdog timer; the other four are used to select the CPU frequency and the CPU-to-bus frequency ratio.

J17 Watchdog Timer

Jumper pins 1 and 2 to enable the watchdog timer. Jumper pins 2 and 3 to disable the watchdog timer. The watchdog timer is enabled by default, as shown in Figure 1.

J14, J15, J16, J18 CPU Frequency Selection

Jumper J14, J15, J16, and J18 to select the CPU frequency and CPU-to-bus frequency ratio for the installed CPU, as shown in the following table. In Figure 1, the jumpers are shown configured for a 166 MHz Pentium.

Warning: The RASCard supports only the following Intel Pentium CPUs. Do not replace the original CPU with a Pentium Pro, MMX, AMD, or Cyrix CPU.

| Intel Pentium | J14 | J15 | J16 | J18 |
|---------------|-----|-----|-----|-----|
| 100 MHz | Out | Out | In | In |
| 133 MHz | In | Out | In | In |
| 166 MHz | In | In | In | In |
| 200 MHz | Out | In | In | In |

Internal Connectors

The RASCard has several internal connectors, which are described from front to back.

J20 CPU Fan

This is the 5 VDC power connector for the CPU's cooling fan.

J12 Power Switch

This is the connector for the power switch.

J8 Speaker

This connector can be used to connect a speaker to the RASCard. However, it is normally not used when more than one RASCard is installed in the CommPlete chassis.

J1, J10 E1 Card

This connector provides power, ground, and data connections for the optional E1 daughter card. It is not used on a RASCard with a PRI card.

J6 Internal Hard Disk Drive

This IDE connector provides control and data signals, power, and ground for the RASCard's 2.5-inch hard disk drive. The control and data lines are shared with J21. Therefore, if you connect a second hard disk drive or an IDE CD-ROM drive to J21, you must configure it to slave mode by setting its jumper accordingly.

J21 IDE Drive

This connector can be used to connect a second IDE hard disk drive or a CD-ROM drive to the RASCard. The IDE control and data lines are shared with J6. There is no secondary IDE controller; if you install two hard disk drives, you must configure the second one to slave mode by setting its jumper accordingly.

J27 Floppy Drive

This connector can be used to connect a floppy disk to the RASCard, e.g., for software updates. Normally, it is not used.

J13 Drive Power

This connector can be used to supply standard voltages to a disk drive or CD-ROM drive. Normally, it is not used.

J4, J7 Bus Connectors

These two connectors connect the RASCard to the CommPlete chassis' control, data, E1, and Ethernet busses.

J2 Power Connector

This connector supplies power and ground to the RASCard.

External Connectors

The RASCard has four connectors that are accessible from the rear of the CommPlete chassis.

J22 E1 Alarm

This RJ-11 jack can be used to connect an external alarm system (not supplied by Multi-Tech) to monitor the online or alarm condition of the E1 link.

J3 COM1

COM1, a male DB-9 connector, is the RASCard's serial port. It can be used to connect a dumb terminal to the RASCard for configuration, or to connect a pointing device such as a mouse or trackball.

J35 Video

This female DB-15 connector provides video output for a standard VGA or SVGA display monitor.

J11 Keyboard

This female 6-pin mini DIN connector can be used to connect a keyboard to the RASCard.

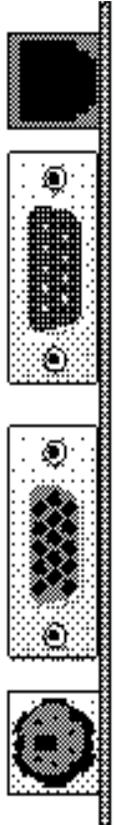


Figure 2. External connectors.

Front Panel

LED Indicators

Ethernet Status LEDs

The RASCard front panel contains three indicators that show the status of the RASCard's Ethernet port.

| LED Indicator | Color | Indication |
|----------------------------|--------|------------------------------|
| XMT Transmit | Green | On during Ethernet transmit. |
| RCV Receive | Green | On during Ethernet receive. |
| LINK Link Integrity | Yellow | On during a good link. |

E1 Status LEDs

The RASCard front panel contains seven indicators that show the status of the RASCard's optional E1 port.

| LED Indicator | Color | Indication |
|----------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ONLINE | Green | On indicates that the E1 card is online and no errors are detected. Off indicates that the E1 card is offline due to one of the following errors. |
| RED ALARM | Red | On indicates that a loss of E1 signal has been detected. Off indicates that the E1 card is detecting an incoming E1 signal. |
| YELLOW ALARM | Red | On indicates that the remote E1 channel bank or network is in red alarm and transmitting a yellow frame pattern. Off indicates that the remote channel bank or network is not transmitting a yellow alarm. |
| SYNC LOSS | Red | On indicates that the E1 card has lost synchronization with the receive E1 line. Off indicates that the E1 card is synchronized with the receive E1 line. |
| BPV VIOLATION | Red | On indicates that a received bipolar violation (BPV) is being detected. Off indicates that no BPV is being detected. |



Figure 3. RAS96-E1 front panel.

| LED Indicator | Color | Indication |
|---------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RAI ALARM | Red | Also known as RAI (REMOTE ALARM INDICATION). On indicates that the E1 card is receiving unframed all 1s, indicating disconnection or attached device failure. Off indicates that the attached device is operating correctly. |
| TEST MODE | Red | On indicates that the E1 card is in one of several possible test modes. Off indicates that the E1 card is not in a test mode. |

Switches

Power Switch

The power switch turns the RASCard on and off. An LED indicator in the switch lights when the RASCard is on.

Reset Switch

The reset switch is a momentary push-button that is recessed behind a small hole in the front panel. It provides a hardware reset (hard boot) for the CPU should it become locked up. Use a straightened paper clip or similar device to activate it.

3 Installation

Introduction

This chapter describes how to install the RAS96 RASCard into a CommPlete Communication Server chassis (either CC9600 or CC2400). This equipment should be installed only by a qualified service person.

Safety Warnings

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jacks are specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electrical shock from lightning.
- Do not use the telephone to report a gas leak in the vicinity of the leak.
- Ports that are connected to other apparatus are defined as SELV. To ensure conformity to EN 41003, ensure that these ports are only connected to the same type on the other apparatus.

Pre-Installation Notes

Warning: Interconnection directly, or by way of other apparatus, of ports marked “SAFETY WARNING see instructions for use” with ports marked or not so marked may produce hazardous conditions on the network. Advice should be obtained from a competent engineer before such a connection is made.

- All installation must be done by a qualified service person.
- To reduce emissions, be sure to use blanking plates to cover empty slots in the CommPlete chassis.

Installation Procedure

1. Unpack the RAS96 RASCard assembly from its packaging and save the packaging for possible future use. Perform a visual inspection of the RASCard. If you are concerned about its condition, call Technical Support for instructions.
2. The RASCard must be installed in slot 1, 5, 9, or 13 of the CC9600 chassis, or in slot 1 of the CC2400 chassis (counting left to right). Remove a blank RASCard panel or previous RASCard from that slot.
3. Replace the back cover plate with one that has openings for the RASCard.
4. Make sure the power switch on the RASCard is off.

5. Supporting the RASCard by the front panel and the bottom edge of the card, place it into the open slot. Make sure the edges of the RASCard card mate properly with the metal guides in the CommPlete chassis.
6. Slide the RASCard into the CommPlete chassis until you feel the RASCard's connectors mate with the chassis's bus connectors.
7. Tighten the RASCard's retaining screws.
8. If the RASCard has an E1 daughter card installed, connect the daughter card to the E1 line.

Note: Any cable connected to the RASCard should be shielded to reduce interference.

9. Connect a monitor to the video connector, and a keyboard to the keyboard connector.
10. Turn on the PS9600 power supplies, if they are off.
11. Turn on the RASCard by pressing the switch on the front panel.
12. Run the BIOS Setup Utility to check the configuration (see Chapter 4).

Note: A self-test runs each time the CommPlete Communications Server is turned on. Refer to the MultiCommManager User Guide for more details about the power-on self-test.

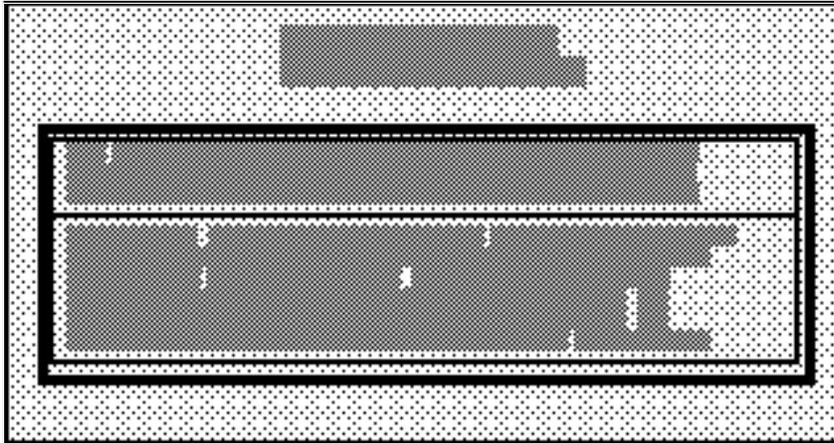
4 BIOS Setup Utility

Introduction

This chapter describes the Award Setup utility, which is built into the RASCard's BIOS. The Setup utility allows users to modify the basic system configuration. This special information is then stored in battery-backed CMOS RAM that retains the setup information when the power is turned off.

The Award BIOS installed in your computer system's read-only memory (ROM) is a custom version of the standard Award BIOS. This means that it supports Intel Pentium processors in a standard ISA/PCI input/output system. The BIOS provides critical low-level support for standard devices such as disk drives and serial and parallel ports.

The Award BIOS has been customized by adding special support for fine-tuning the 430FX Triton chipset that controls the system.



Starting Setup

When you turn on the RASCard, the BIOS reads the system information contained in the CMOS and begins the process of checking out and configuring the system. When it finishes, the BIOS looks for an operating system on the hard disk, then launches and turns control over to the operating system.

To run Setup, press the DELETE key when the following message appears during the power-on self-test (POST).

TO ENTER SETUP BEFORE BOOT PRESS DEL KEY

If the message disappears before you respond, and you still wish to enter Setup, restart the system to try again by turning it off and on or pressing the recessed reset button on the front panel. If you do not press the key at the correct time and the system does not boot, an error message will be displayed and you will be asked to...

PRESS F1 TO CONTINUE OR DEL TO ENTER SETUP

Using Setup

In general, use the arrow keys to highlight items, press ENTER to select, use the PAGE UP and PAGE DOWN keys to change entries, press F1 for help, and press ESC to quit. The following table lists the keys that can be used to navigate the Setup utility.

| | |
|----------------------|-------------------------------------------------------------------------------------------------------------------|
| Up arrow | Move to previous item. |
| Down arrow | Move to next item. |
| Left arrow | Move to the item on the left. |
| Right arrow | Move to the item on the right. |
| Esc key | Main Menu—Quit without saving changes. Submenu—Exit current page and return to Main Menu. |
| Page Up key | Increase the numeric value or make changes. |
| Page Down key | Decrease the numeric value or make changes. |
| + key | Increase the numeric value or make changes. |
| - key | Decrease the numeric value or make changes. |
| F1 key | General help. |
| F2, Shift+F2 | Change color from a total of 16 colors. Press F2 to select the next color, SHIFT+F2 to select the previous color. |
| F4 key | Reserved. |
| F5 key | Restore the previous CMOS value from CMOS. |
| F6 key | Load the default CMOS value from BIOS default table. |
| F7 key | Load the default. |
| F8 key | Reserved. |
| F9 key | Reserved. |
| F10 key | Save all the CMOS changes, only for Main Menu. |

Getting Help

For help in making a selection, press F1. A small help window opens that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help window, press ESC or the F1 key again.

In Case of Problems

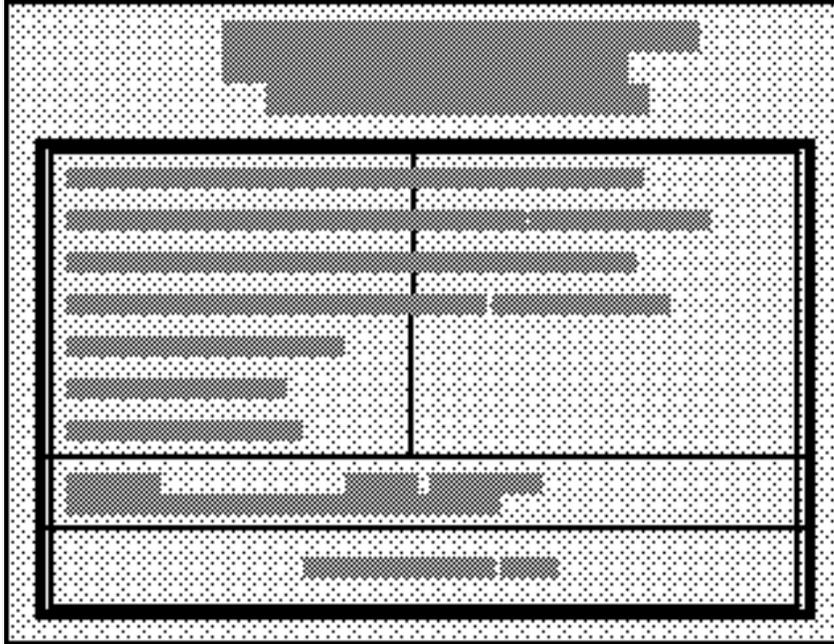
The Award BIOS supports an override that loads default CMOS settings, should you discover that your RASCard is no longer able to boot after you change Setup.

You can restart by using the power switch, the reset button, or by pressing CTRL, ALT, and DELETE at the same time.

Only change settings that you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both Award and your systems manufacturer to provide the absolute maximum performance and reliability. Even a seemingly small change to the chipset setup may require you to use the override.

Main Menu

When you run the Award BIOS CMOS Setup Utility, the main menu appears first on the screen. The main menu allows you to select from several setup pages and two exit choices. Use the arrow keys to select among the items, then press ENTER to go to the selected page.



Note that a brief description of each highlighted selection appears at the bottom of the screen.

The main menu includes the following setup categories.

Standard CMOS Setup

This setup page includes all the items in a standard BIOS setup. See page 24.

BIOS Features Setup

This setup page includes all the Award special features. See page 27.

Chipset Features Setup

This setup page includes all chipset special features. See page 31.

Power Management Setup

This setup page supports Green PC power management standards. See page 34.

PCI Configuration Setup

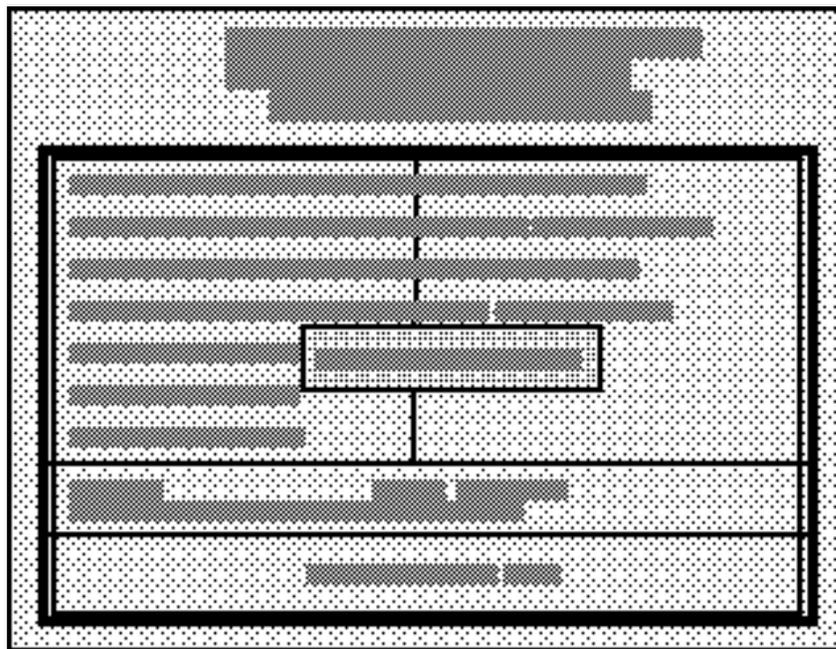
This setup page allows you to set up your computer for efficient energy levels. See page 37.

Password Setting

Change, set, or disable the password. The password allows you to limit access to the system and the Setup Utility, or just to the Setup Utility. See page 39.

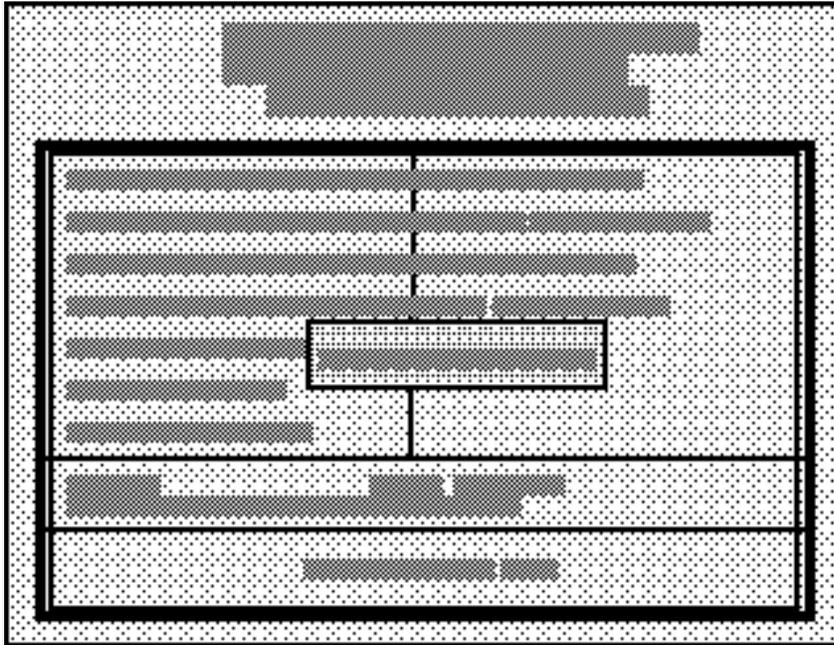
Load BIOS Defaults

The BIOS defaults have been set by the manufacturer. They provide settings that provide the minimum requirements for your system to operate.



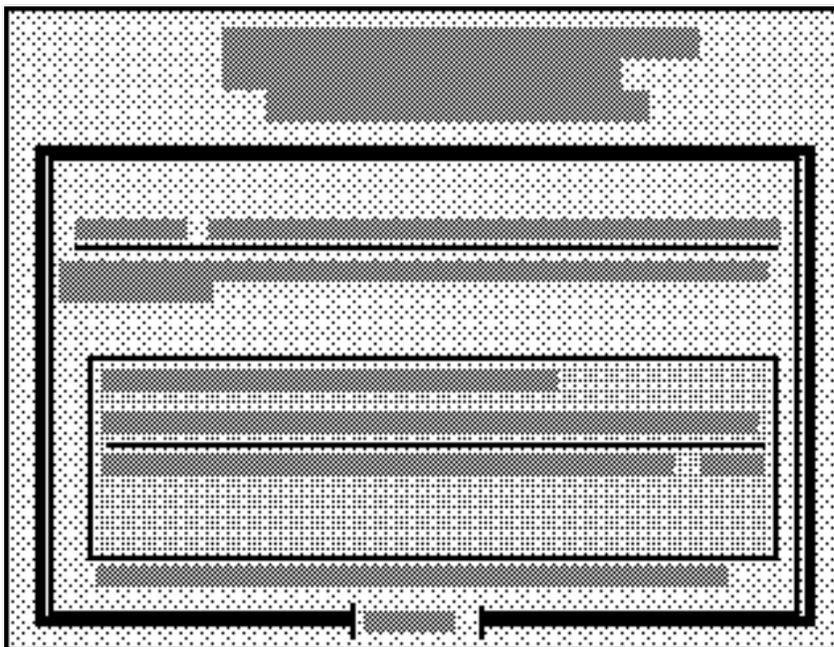
Load Setup Defaults

The chipset defaults are optimized settings for regular use.



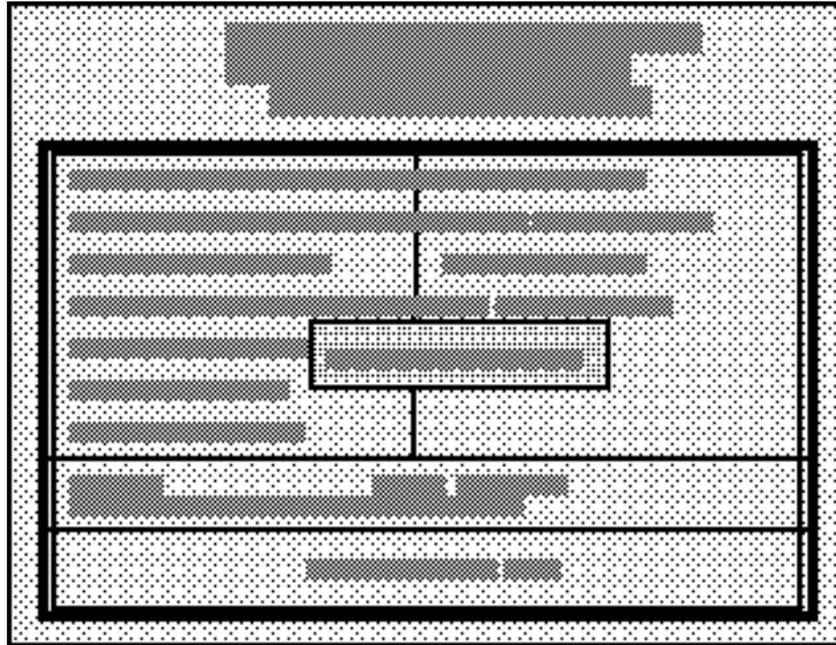
IDE HDD Auto Detection

Automatically detects and configures hard disk parameters. The Award BIOS includes this ability in case you are uncertain of your hard disk's parameters. See also "Standard CMOS Setup."



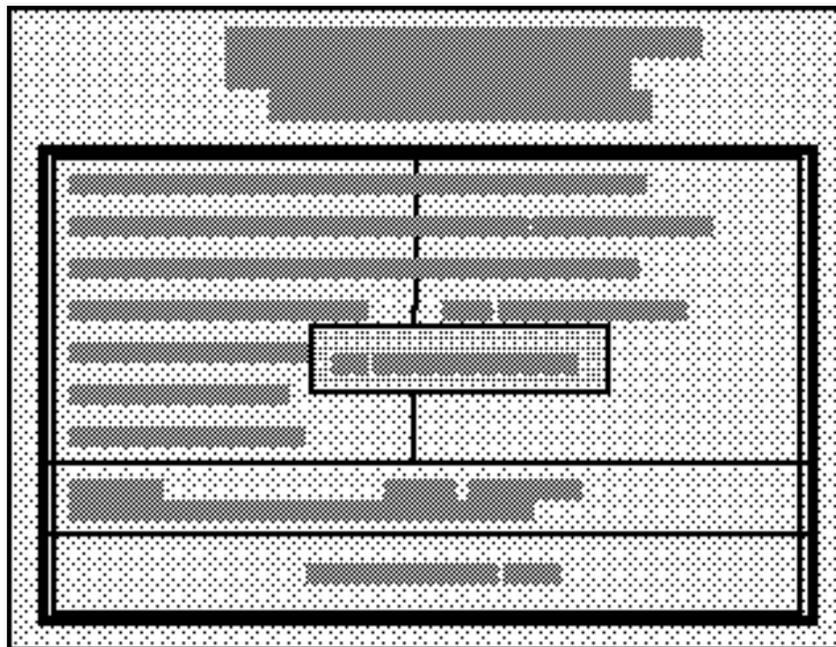
Save and Exit Setup

Save changes to CMOS and exit Setup.



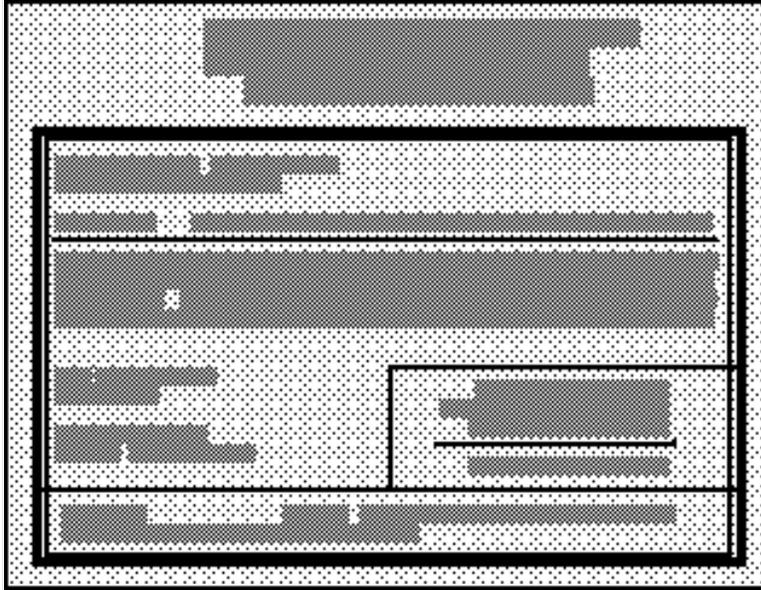
Exit Without Saving

Abandon all CMOS changes and exit Setup.



Standard CMOS Setup

The items in the Standard CMOS Setup menu are divided into several categories. Use the arrow keys to highlight the item you want to change, then use the PAGE UP or PAGE DOWN key to select the value you want for the item.



Date

The date format is day, month, date, and year.

Day The day of the week, determined by the BIOS, is display-only.

Month The month, Jan. through Dec. Valid values are 1 through 12.

Date The day of the month. Valid values are 1 through 31.

Year The year. Valid values are 1900 through 2099.

Time

The time format is hour, minute, and second. Hours are entered and displayed in a 24-hour format. For example, 1:00 p.m. is entered and displayed as 13:00:00.

Hard Disks

The fields in this category contain specifications for the hard disk drives that have been installed in the computer. In the TYPE field you can select from 46 predefined drive types, **User**, **Auto**, and **None**. All the predefined types are obsolete. The **User** option allows you to enter drive specifications manually. Selecting **Auto** in both the TYPE and the MODE fields enables automatic detection of IDE hard drives during boot-up (the default selection). This feature allows you to change hard drives (with the power off) and reboot without having to reconfigure your hard drive type. Secondary master and slave categories are not available; there is no connector for secondary drives.

You can use the IDE HDD Auto Detection option in the main menu to automatically enter the specifications for your hard disk. If you wish to configure your drive manually, press PAGE UP or PAGE DOWN to select **User**. Enter your drive's specifications in the drive table. The hard disk will not work properly if you enter improper information.

If you select **User**, you will need to know the following information. Enter the information directly from the keyboard and press ENTER. This information should be included in the documentation from your hard disk vendor or the system manufacturer.

| | |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CYLS | Number of cylinders. |
| HEAD | Number of heads. |
| PRECOMP | Write precompensation. |
| LANDZ | Landing zone. |
| SECTORS | Number of sectors. |
| MODE | IDE mode: Normal , for drives under 528 MN; LBA , for larger drives that support Logical Block Addressing (most IDE drives over 528 MB); Large , for drives over 528 MB that do not support LBA (uncommon); and Auto , for autoselection on boot-up (default). |

If a hard disk has not been installed, select **None** and press ENTER.

Drive A Type / Drive B Type

This category identifies the types of floppy disk drives that have been installed in the computer.

| | |
|----------------------|--------------------------------------------------------------|
| None | No floppy drive installed. |
| 360K, 5.25 in | 5.25-inch PC-type standard drive, 360-kilobyte capacity. |
| 1.2M, 5.25 in | 5.25-inch AT-type high-density drive, 1.2-megabyte capacity. |
| 720K, 3.5 in | 3.5-inch drive, 720-kilobyte capacity. |
| 1.44M, 3.5 in | 3.5-inch drive, 1.44-megabyte capacity (default – drive A). |
| 2.88M, 3.5 in | 3.5-inch drive, 2.88-megabyte capacity. |

Video

The category selects the type of video adapter used for the primary system monitor. Although secondary monitors are supported, you do not have to select the type in Setup.

| | |
|----------------|--------------------------------------------------------------------------------------------------------------|
| EGA/VGA | Enhanced Graphics Adapter/ Video Graphics Array. For EGA, VGA, SEGA, SVGA or PGA monitor adapters (default). |
| CGA 40 | Color Graphics Adapter, power-up in 40 column mode. |
| CGA 80 | Color Graphics Adapter, power-up in 80 column mode. |
| MONO | Monochrome adapter, includes high resolution monochrome adapters. |

Halt On

The category determines whether the computer will stop if an error is detected during power up.

- All errors** Whenever the BIOS detects a non-fatal error, the system will be stopped and you will be prompted.
- No errors** The system boot will not be stopped for any error that may be detected.
- All, But Keyboard** The system boot will not stop for a keyboard error; it will stop for all other errors.
- All, But Diskette** The system boot will not stop for a disk error; it will stop for all other errors.
- All, But Disk/Key** The system boot will not stop for a keyboard or disk error; it will stop for all other errors (Default).

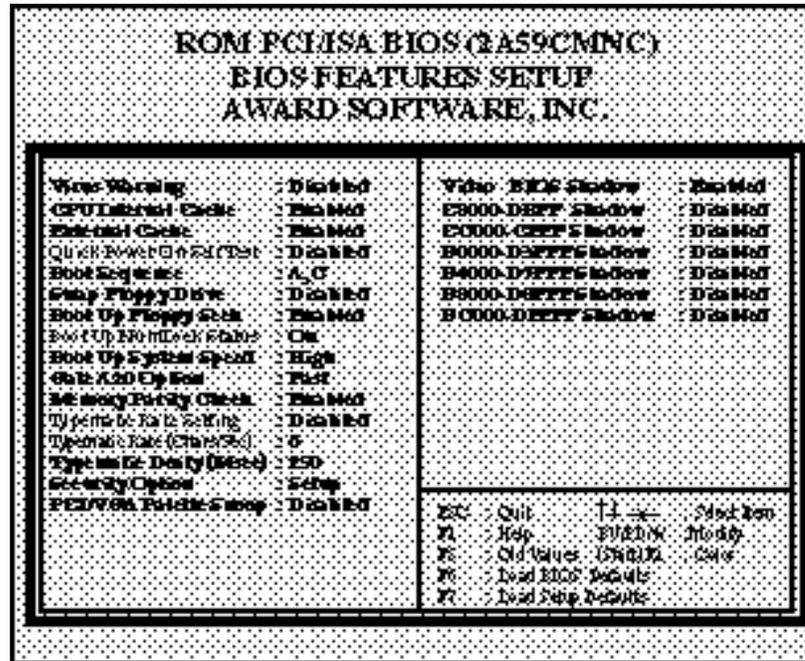
Memory

The category is display-only. Values are determined by the BIOS power-on self-test (POST).

- Base Memory** The POST determines the amount of base (or conventional) memory installed in the system. The value of the base memory is typically 640K for systems with 640K or more memory installed on the motherboard.
- Extended Memory** The BIOS determines how much extended memory is present during the POST. This is the amount of memory located above 1MB in the CPU's memory address map.
- Expanded Memory** Expanded Memory is memory defined by the Lotus/Intel/Microsoft (LIM) standard as Expanded Memory Specification (EMS). While most standard DOS applications cannot access memory above 640K, EMS provides an interface allowing access to all system memory. Though still in use by some DOS applications, EMS is rapidly declining in importance, since new processors and operating systems prefer extended memory. A special, expanded memory device driver is required to use memory as Expanded Memory.
- Other Memory** This refers to the memory located in the 640K to 1024K address space. This is memory that can be used for different applications. DOS uses this area to load device drivers in an effort to keep as much base memory free for application programs. The BIOS is the most frequent user of this RAM area, since this is where it shadows RAM.

BIOS Features Setup

This menu allows you to configure your system for basic operation. You have the opportunity to select the system's default speed, boot-up sequence, keyboard operation, shadowing and security.



Virus Warning

When this item is enabled, the Award BIOS will monitor the boot sector and partition table of the hard disk drive for any attempt at modification. If an attempt is made, the BIOS will halt the system and the following error message will appear. Afterwards, if necessary, you will be able to run an anti-virus program to locate and remove the problem before any damage is done.

```
! WARNING !
Disk boot sector is to be modified
Type Y to accept write or N to abort write
Award Software, Inc.
```

Enabled Activates automatically when the system boots up, causing a warning message to appear when anything attempts to access the boot sector or hard disk partition table.

Disabled No warning message will appear when anything attempts to access the boot sector or hard disk partition table (Default).

Note: Many disk diagnostic programs that attempt to access the boot sector table can cause the above warning message. If you will be running such a program, we recommend that you first disable Virus Protection beforehand. This feature when enabled can cause problems when installing Windows 95.

CPU Internal Cache/External Cache

These two categories speed up memory access when enabled.

Enabled Enable cache (Default).

Disabled Disable cache.

Quick Power On Self Test

This category speeds up the power-on self-test (POST) after you power up the computer. If it is set to **Enable**, BIOS will shorten or skip some check items during POST.

Enabled Enable quick POST.

Disabled Normal POST (Default).

Boot Sequence

This category determines which drive to search first for the disk operating system (i.e., DOS). Default value is **A, C**.

C, A System will first search for hard disk drive, then floppy disk drive.

A, C System will first search for floppy disk drive, then hard disk drive.

Boot Up Floppy Seek

During POST, BIOS will determine if the floppy disk drive installed is 40 or 80 tracks. 360K type is 40 tracks, while 760K, 1.2M and 1.44M are all 80 tracks.

Enabled BIOS searches the floppy disk drive to determine if it is 40 or 80 tracks. Note that BIOS cannot differentiate the 720K, 1.2M and 1.44M drive types, as they are all 80 tracks (Default).

Disabled BIOS will not search for the type of floppy disk drive by track number. Note that there will not be any warning message if the drive installed is 360K.

Boot Up NumLock Status

This allows you to determine the default state of the numeric keypad. By default, the system boots up with Num Lock on.

On Keypad is number keys.

Off Keypad is arrow keys.

Boot Up System Speed

Selects the default system speed—the normal operating speed at power-up. This category no longer has a function and should be left at the default setting of **High**.

High Set the speed to High (Default).

Low Set the speed to Low.

Gate A20 Option

This entry allows you to select how the gate A20 is handled. The gate A20 is a device used to address memory above 1 MB. Initially, the gate A20 was handled via a pin on the keyboard. Today, though keyboards still provide this support, it is more common, and much faster, for the system chipset to provide support for gate A20.

- Normal** Keyboard.
- Fast** Chipset (Default).

Memory Parity Check

Parity is a method of checking for errors in system memory. There are both parity and non-parity memory types. At boot, the Award BIOS both sizes and tests all memory. Normally, when a parity error is detected, the BIOS will display a message describing the problem as well as the problem's location, if possible. The boot process will then terminate and you will not be able to continue until the bad SIMM is located and replaced.

Disabling the Memory Parity Check allows the system to bypass the test and allow your system to boot. You then have a choice of continuing to operate your system or attempting to remedy the problem.

- Enabled** Normal memory parity check (Default).
- Disabled** Ignore memory parity check.

Typematic Rate Setting

This determines if the typematic rate is to be used. When it is disabled, continually holding down a key on your keyboard will generate only one character. In other words, the BIOS will only report that the key is down. When the typematic rate is enabled, the BIOS will report as before, but it will then wait a moment and, if the key is still down, it will begin to report that the key has been depressed repeatedly. For example, you would use such a feature to accelerate cursor movements with the arrow keys.

- Enabled** Enable typematic rate.
- Disabled** Disable typematic rate (Default).

Typematic Rate (Chars/Sec)

When the typematic rate is enabled, this item allows you select the rate at which the system registers repeated keystrokes.

- 6** 6 characters per second.
- 8** 8 characters per second.
- 10** 10 characters per second.
- 12** 12 characters per second.
- 15** 15 characters per second.
- 20** 20 characters per second.
- 24** 24 characters per second.
- 30** 30 characters per second.

Typematic Delay (Msec)

When the typematic rate is enabled, this selection allows you to select the delay between the first and second characters.

| | |
|-------------|-------------------|
| 250 | 250 ms (Default). |
| 500 | 500 ms. |
| 750 | 750 ms. |
| 1000 | 1000 ms. |

Security Option

This category allows you to limit access to the system and to Setup, or just to Setup.

| | |
|---------------|--------------------------------------------------------------------------------------------------------------------------|
| System | The system will not boot and access to Setup will be denied if the correct password is not entered at the prompt. |
| Setup | The system will boot, but access to Setup will be denied if the correct password is not entered at the prompt (Default). |

Note: To disable security, select PASSWORD SETTING from the main menu. You will be asked to enter a password. Do not type anything; just press ENTER to disable security. Once security is disabled, the system will boot and you can enter Setup freely.

Video BIOS Shadow

Determines whether video BIOS will be copied to RAM. However, it is optional, depending on chipset design. Video Shadow will increase the video speed.

| | |
|-----------------|------------------------------------|
| Enabled | Video shadow is enabled (Default). |
| Disabled | Video shadow is disabled. |

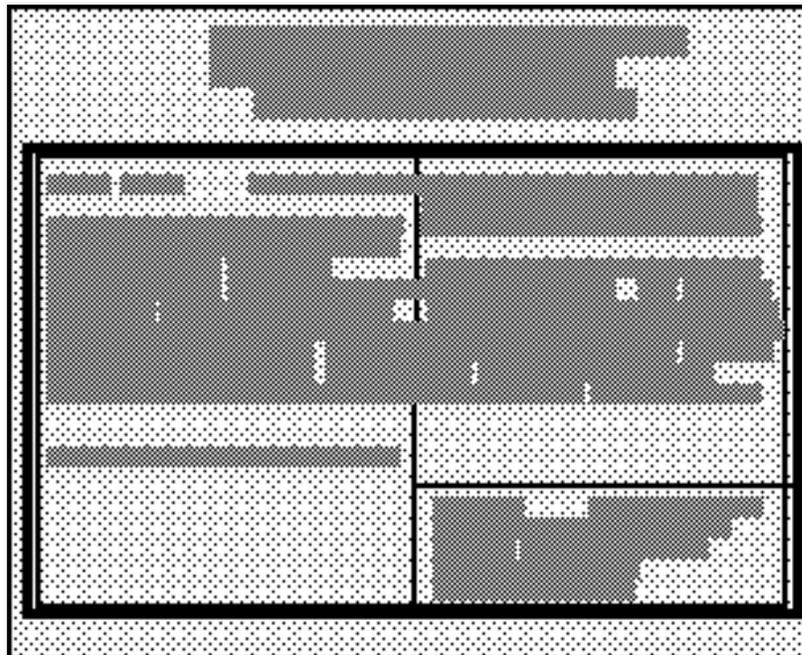
C8000 - CFFFF Shadow/DC000 - DFFFF Shadow

These categories determine whether option ROMs will be copied to RAM. An example of such an option ROM would be support of on-board SCSI.

| | |
|-----------------|----------------------------------------|
| Enabled | Optional shadow is enabled. |
| Disabled | Optional shadow is disabled (Default). |

Chipset Features Setup

This section allows you to configure the system based on the specific features of the installed chipset. The chipset manages bus speeds and access to system memory resources, such as DRAM and the L2 external cache. It also coordinates communications between the conventional ISA bus and the PCI bus. These items should never need to be altered. The default settings have been chosen because they provide the best operating conditions for your system. The only time you might consider making any changes would be if you discovered that data was being lost while using your system.



DRAM Timing

The first chipset settings deal with CPU access to dynamic random access memory (DRAM). The DRAM timing should match the speed of the slowest installed memory. For instance, if 60 ns SIMMs are installed on the RASCard, you should set this item to 60 ns. But if you install both 60 ns and 70 ns SIMMs, you should change it to 70 ns.

System BIOS Cacheable

When this item is enabled, accesses to the system BIOS ROM addressed at F0000H-FFFFFH are cached, provided that the cache controller is enabled.

| | |
|-----------------|-----------------------------------|
| Enabled | BIOS access cached. |
| Disabled | BIOS access not cached (Default). |

Video BIOS Cacheable

As with caching the System BIOS above, enabling the Video BIOS cache will cause access to video BIOS addressed at C0000H to C7FFFH to be cached, if the cache controller is also enabled.

- Enabled** Video BIOS access cached.
Disabled Video BIOS access not cached (Default).

8-Bit I/O Recovery Time

The recovery time is the length of time, measured in CPU clocks, which the system will delay after the completion of an input/output (I/O) request. This delay takes place because the CPU is operating so much faster than the I/O bus that the CPU must be delayed to allow for the completion of the I/O.

This item allows you to determine the recovery time allowed for 8-bit I/O. Choices are from 1 through 8 CPU clocks. The default is 1 clock.

16-Bit I/O Recovery Time

This item allows you to determine the recovery time allowed for 16 bit I/O. Choices are from 1 through 4 CPU clocks. The default is 1 clock.

Memory Hole At 15M-16M

In order to improve performance, certain memory space can be reserved for ISA cards. This memory must be mapped into the memory space below 16 MB.

- Enabled** Memory hole supported.
Disabled Memory hole not supported (Default).

IDE HDD Block Mode

This allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive (HDD).

- Enabled** IDE controller uses block mode (Default).
Disabled IDE controller uses standard mode.

IDE Primary Master PIO / IDE Primary Slave PIO

IDE hard disk controllers can support two separate hard disks. These drives have a master/slave relationship which are determined by jumpers on the hard disk drives. Your system supports one IDE controller, so you have the ability to install up to two separate hard disks. The secondary IDE controller has been disabled.

PIO means Programmed Input/Output. Rather than have the BIOS issue a series of commands to effect a transfer to or from the disk drive, PIO allows the BIOS to tell the controller what it wants and then let the controller and the CPU perform the complete task by themselves. This is simpler, more efficient, and faster.

Your system supports five modes, numbered from **0** (default) through **4**, which differ primarily in timing. When **Auto** is selected, the BIOS will select the best available mode.

On-Chip Primary PCI IDE

As stated above, your system includes a built-in primary IDE controller, which operates on the PCI bus. This setup item allows you to either enable or disable the primary controller.

- Enabled** Primary IDE controller used (Default).
Disabled Only one PCI device can be active at a time.

PCI Concurrency

PCI concurrency means that more than one PCI device can be active at a time.

- Enabled** Multiple PCI devices can be active (Default).
Disabled Only one PCI device can be active at a time.

PCI Streaming

Data is typically moved to and from memory and between devices in discrete chunks of limited sizes. This is because the CPU is being used in the exchange. On the PCI bus, data can be streamed, that is, much larger chunks can be moved without the use or intervention of the CPU.

- Enabled** Streaming allowed on the PCI bus (Default).
Disabled Streaming off for the PCI bus.

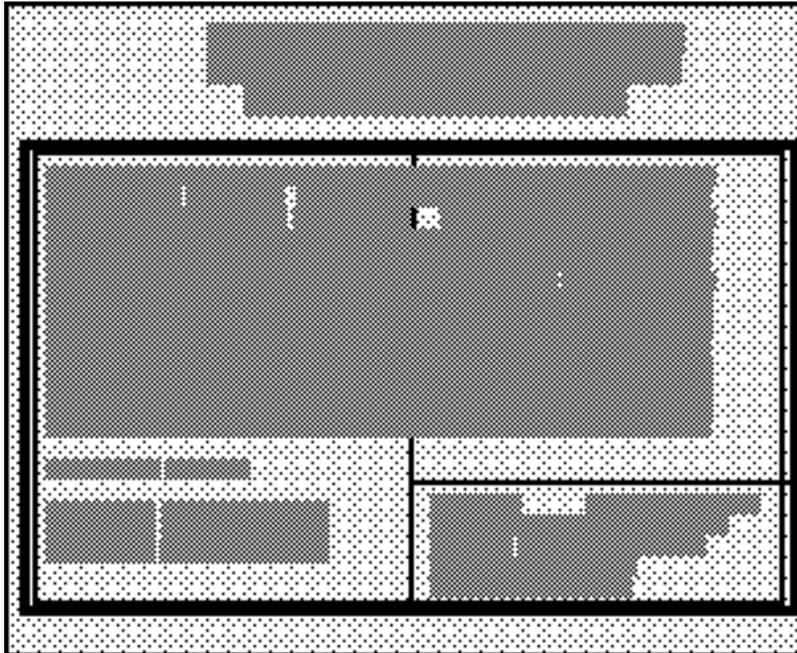
PCI Bursting

The PCI bus supports a mode by which large amounts of data is moved in short intense bursts. This item allows you to turn this feature on or off.

- Enabled** Bursting allowed on the PCI bus (Default).
Disabled Bursting off for the PCI bus.

Power Management Setup

The Power Management Setup allows you to configure your system to most effectively save energy while operating in a manner consistent with your own style of computer use.



Power Management

This option allows you to select the type (or degree) of power saving and is directly related to the following modes:

- Doze Mode
- Standby Mode
- Suspend Mode
- HDD Power Down

There are four selections for Power Management, three of which have fixed mode settings.

| | |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Disabled | No power management. Disables all four modes (Default). |
| Min Power Saving | Minimum power management. Doze Mode = 1 hour, Standby Mode = 1 hour, Suspend Mode = 1 hour, and HDD Power Down = 15 minutes. |
| Max Power Saving | Maximum power management – only available for SL CPUs. Doze Mode = 1 minute, Standby Mode = 1 minute, Suspend Mode = 1 minute, and HDD Power Down = 1 minute. |
| User Define | Allows you to set each mode individually. Each mode can be disabled. When not disabled, each mode can be set from 1 minute |

through 1 hour, except for HDD Power Down, which can be set from 1 minute through 15 minutes.

PM Control by APM

When this item is enabled, Advanced Power Management device will keep the system time updated when the computer enters suspend mode activated by the BIOS power management.

If Max Power Saving is not enabled, this will be preset to **No**.

Yes APM enabled.

No APM disabled.

Video Off Method

This determines the manner in which the monitor is blanked.

V/H SYNC + Blank The system turns off the vertical and horizontal synchronization ports and writes blanks to the video buffer.

Blank Screen The system only writes blanks to the video buffer. Use for monitors that do not have a power management feature.

Doze Mode

When enabled, and after the set time of system inactivity, the CPU clock runs at a slower speed while all other devices still operate at full speed. This mode can be disabled or set from 1 minute through 1 hour. Configurable only when User Defined Power Management has been selected.

Standby Mode

When enabled, and after the set time of system inactivity, the fixed disk drive and the video are shut off while all other devices still operate at full speed. This mode can be disabled or set from 1 minute through 1 hour. Configurable only when User Defined Power Management has been selected.

Suspend Mode

When enabled, and after the set time of system inactivity, all devices except the CPU are shut off. This mode can be disabled or set from 1 minute through 1 hour. Configurable only when User Defined Power Management has been selected.

HDD Power Down

When enabled, and after the set time of system inactivity, the hard disk drive is powered down while all other devices remain active. This mode can be disabled or set from 1 minute through 15 minutes. Configurable only when User Defined Power Management has been selected.

Power Down Activities

Power Down Activities events are I/O events whose occurrence can prevent the system from entering a power saving mode or can awaken the system from such a mode. In effect, the system remains alert for anything that occurs to a device that is configured as **ON**, even when the system is in a power down mode.

COM Ports Accessed

When set to **ON** (default), any event occurring at a COM (serial) port awakens a system that has been powered down. This includes mouse activity if a mouse is connected to COM1.

LPT Ports Accessed

When set to **ON** (default), any event occurring at an LPT (printer) port awakens a system that has been powered down.

Drive Ports Accessed

When set to **ON** (default), any event occurring at a hard or floppy drive port awakens a system that has been powered down.

IRQs

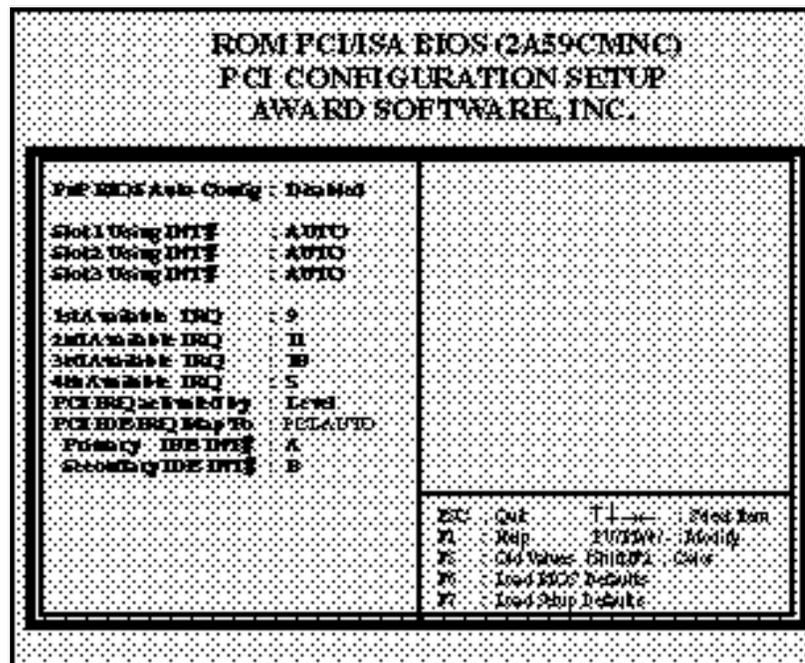
The following interrupt requests (IRQs) can be used to waken a system much as the COM ports and LPT ports can. When an I/O device wants to gain the attention of the operating system, it signals this by causing an IRQ to occur. When the operating system is ready to respond to the request, it interrupts itself and performs the service.

The choices are **ON** and **OFF**. **OFF** is the default. When an IRQ is set to **ON**, activity will neither prevent the system from going into a power management mode nor awaken it. IRQ8 (Real Time Clock Alarm) should always be set to **OFF** so that any software alarm or event calendar can awaken the system.

| | | |
|--------------------|--------------------|--------------------|
| IRQ3 (COM 2) | IRQ8 (RTC Alarm) | IRQ13 (Coprocesor) |
| IRQ4 (COM 1) | IRQ9 (IRQ2 Redir) | IRQ14 (Hard Disk) |
| IRQ5 (LPT 2) | IRQ10 (Reserved) | IRQ15 (Reserved) |
| IRQ6 (Floppy Disk) | IRQ11 (Reserved) | |
| IRQ7 (LPT 1) | IRQ12 (PS/2 Mouse) | |

PCI Configuration Setup

This section describes how to configure the PCI bus system. The PCI bus allows I/O devices to operate at speeds near the speed the CPU itself uses to communicate with its own special components. It is strongly recommended that only experienced users should make any changes to the default settings.



Slot (x) Using INT#

Some PCI devices use interrupts to signal that they need to use the PCI bus. Some devices, notably most graphics adapters, may not need an interrupt service at all. Each PCI slot is capable of activating up to four interrupts, INT# A, INT# B, INT# C, and INT# D.

- INT# A** Assign if the device in the slot requires one interrupt service.
- INT# B** Assign only if the device in the slot requires two interrupt services rather than just one.
- INT# C** Assign only if the device in the slot requires three interrupt services.
- INT# D** Assign only if the device in the slot requires four interrupt services.
- AUTO** Allows the PCI controller to automatically allocate the interrupts (Default).

1st/2nd/3rd/4th Available IRQ

An INT# is an interrupt request that is signaled to and handled by the PCI bus. However, since the operating system usually has the final responsibility for handling I/O, an INT# can be mapped to an IRQ if the device occupying a given slot requires an IRQ service. By default, IRQs 9 and 10 are mapped to PCI devices, but any unused IRQ can be used.

You can select which INT# is associated with each PCI slot and which conventional IRQ is associated with one of the two available INT#s.

A setting of **NA** means the IRQ has been assigned to the ISA bus and is not available to any PCI slot.

PCI IRQ Activated by

This item sets the method by which the PCI bus recognizes that an IRQ service is being requested by a device. Under all circumstances, you should retain the default configuration unless advised otherwise by Multi-Tech.

Choices are **Level** (default) and **Edge**.

PCI IDE IRQ Map to

This allows you to configure your system to the type of IDE disk controller in use. By default, Setup assumes that your controller is an ISA (Industry Standard Architecture) device rather than a PCI controller.

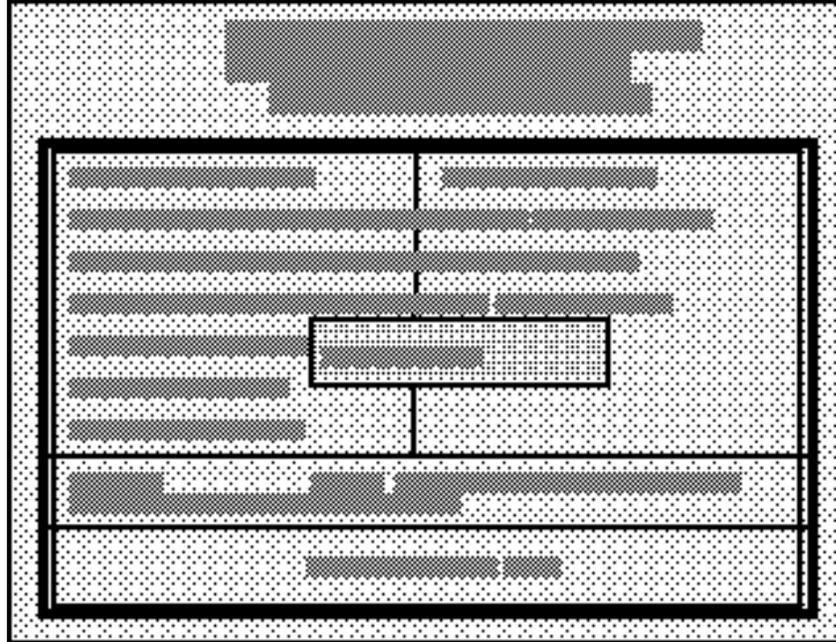
If you have equipped your system with a PCI controller, changing this allows you to specify which slot has the controller and which PCI interrupt (A, B, C, or D) is associated with the connected hard disks.

Remember that this setting refers to the hard disk drive itself, rather than individual partitions. Since each IDE controller supports two separate hard disks, you can select the INT# for each. Again, you will note that the primary has a lower interrupt than the secondary as described in Slot x Using INT# above.

Selecting **PCI-AUTO** allows the system to automatically determine how your IDE disk system is configured.

Password Setting

When you select this item, the following message will appear at the center of the screen to assist you in creating a password.



ENTER PASSWORD:

Type the password, up to eight characters in length, and press ENTER. The password that you type now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press ENTER. You may also press ESC to abort the selection and not enter a password.

To disable a password, just press ENTER when you are prompted to enter the password. A message will confirm that the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

PASSWORD DISABLED

When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is booted, to prevent unauthorized use of the RASCard.

You determine when the password is required by the Security option in the BIOS Features Setup menu. If the Security option is set to **System**, the password will be required both at boot and at entry to Setup. If set to **Setup**, prompting only occurs when trying to enter Setup.

5 E1 Daughter Cards

Introduction

The E1 Daughter Card mounts on the RAS96 RASCard to provide an E1 interface for up to two MT5634HD16 sixteen-modem cards. This chapter documents the operating characteristics of the E1 card.

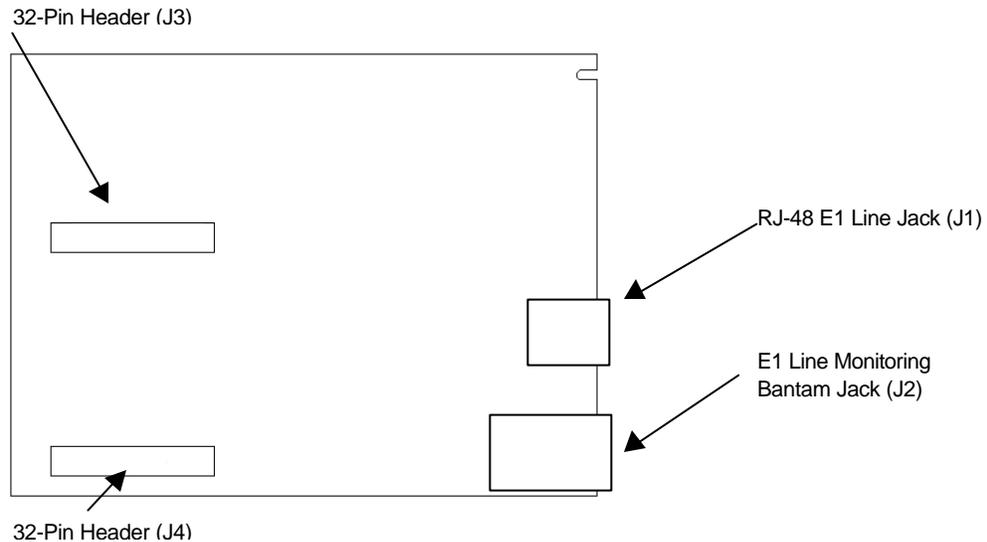


Figure 4. E1 Daughter Card.

Specifications

The E1 Daughter Card was designed to meet the following specifications:

- Frames to CRC4 or FAS Q.400 formats
- 5V supply; low power CMOS
- Flash-upgradeable 128Kx8 FEPR0M
- AMI or HDB3 line coding

E1 Overview

This section provides introductory E1 information, including a short glossary of terms and acronyms, and general information on E1 voice and data transmission concepts, and E1 frame format, line coding, and signaling. If you are familiar with E1 installations, you may want to skip to the section on E1 Daughter Card configuration and control (page 47). If you are somewhat familiar with E1 in general, you may want to briefly review this section before proceeding to configuration and control. If you are unfamiliar with E1, you can use this section by itself or with an off-the-shelf E1 networking book, video tutorial, or off-site training class.

E1 Glossary

RAI: Remote Alarm Indication; a field of all ones (1) used as a “keep-alive” signal.

AMI: Alternate Mark Inversion; a type of line coding for E1 spans.

HDB3: High Density Bipolar Order 3 Encoding.

CAS: Channel Associated Signaling. A form of circuit state signaling in which the circuit state is indicated by one or more bits of signaling status sent repetitively and associated with that specific circuit.

bps: Bits per second; the serial digital stream’s data rate (e.g., 2.048M bps equals 2,048,000 bits per second).

BPV: Bipolar Violation (two pulses of the same polarity in a row).

CEPT: Conference on European Posts and Telecommunications (a body that sets telecommunications service and interface policies).

CFA: Carrier Failure Alarm; detection of a red (local) or yellow (remote) alarm.

CO: Central office (the telephone company switch; the other end of a local loop from the CP).

CP: Customer premises (user or customer-related operations, as opposed to telephone company-related operations).

CPE: Customer premises equipment (user’s communications equipment, as opposed to telephone company-related equipment).

CSU: A communications device that terminates the local loop and provides a digital interface to the E1 line.

DNIS digits: Dialed Number Identification Service. DNIS is a feature of R2MF E1 lines that provides the number the caller dialed to reach the attached computer telephony system (manual or automatic).

DS-0: Digital Signal, level 0 (the 64K bps worldwide standard speed for PCM digitized voice channels).

DS-1: Digital Signal, level 1 (the standard speed for PCM digitized voice channels; 1.544M bps in North America; 2.048M bps in ITU standards).

DS-2: Digital Signal, level 2 (the standard speed of four E1s used in Japan).

DS-3: Digital Signal, level 2 (the standard speed of 28 E1s; 44.736M bps).

DSL: Digital Subscriber Line (an ISDN BRI line).

DSU: The digital communications device used to convert an RS-232 to DSX-1 interface.

E-1: The European digital signal level 1; 2.048M bps.

ESS: Electronic Switching System (a CO switch).

Frame: A method of error control where bits are inserted into the data stream for the receiving device to identify the time slots allocated to each sub-channel.

FXO: Foreign Exchange, Office; an interface at the end of a private line connected to a switch that, along with FXS, allows the phones to act as if connected locally to the main PBX, but without the cost.

FXS: Foreign Exchange, Subscriber; the customer premises interface that, along with FXO, allows the phones to act as if connected locally to the main PBX, but without the cost.

G.704: A series of ITU standards for E1 frame formatting. (e.g., section 2.1.3.1).

ITU: (International Telecommunications Union) a United Nations standards agency.

IXC: Interexchange Carrier; a long-distance phone carrier, such as AT&T, MCI, or Sprint.

LBO: Line Build Out; the insertion of loss in a short transmission to make it act like a longer line.

PBX: A small, privately-owned switch within a company.

POP: Point of Presence; the inter-exchange carrier's central office (CO).

Yellow Alarm: a type of carrier failure indicating a remote alarm condition.

E1 Basics

E1 service provides a two-way digital telecommunications connection at 2.048M bps. The local PTT (a country's national Postal, Telephone and Telegraph agency) provides the entire circuit within a country, and interconnects with one or more other circuits for international network connections.

E1's higher equipment and leased line costs are more than offset by its inherent advantages: reduced phone bills (payback in months), increased control of the network, improved reliability, quick and cheap change implementation, vastly increased speed and improved voice quality due to the nature of digital vs. analog lines.

The CEPT E1 speed of 2.048M bps is derived from 30 channels at 64K bps each, plus 8K bps for synchronization. To be transmitted effectively, the normally incompatible voice and data must be "mixed" for compatibility. When digitizing the analog voice signal, there is a question of the number of bits that can be transmitted economically, and how to best represent the "smooth variation" in loudness. "Best" typically implies maximum voice quality, but there can also be tradeoffs for cost, circuit availability, bandwidth, and reliability. The current world-wide standard for digital voice is PCM (Pulse Coded Modulation). A "codec" (coder-decoder) selects the value closest to the true analog signal, minimizing the distortion, and making the voice transmission acceptable to the human ear. Technologies like aliasing (voice signal filtering) and non-linear sampling are used to overcome problems in performing PCM voice compression. The method of non-linear sampling used in Europe, Mexico and the U.K. is called A-law. Similar technology is used at the sending and receiving ends (i.e., analog-to-digital conversion at one end, and then digital-to-analog conversion at the other end).

The frequencies around 1000 Hz convey most of the information in a person's voice. Several methods of non-linear sampling are available, including Pulse Code Modulation (PCM), Differential PCM (DPCM), Adaptive DPCM (ADPCM), CVSD, VQC, and HCV. Each has its own associated data transfer rate, cost, and quality factors.

E1 Frame Formats

Framing is the way E1 equipment formats bits on the E1 line for encoding digital voice. Selecting the method of framing is a major E1 network design issue. There are two options for E1 frame formatting:

- CRC4 (16 Frame)
- FAS (2 Frame)

E1 Line Coding

Line coding is the method the E1 Daughter Card uses to maintain a sufficient density of ones in the bit stream, which is required for clock synchronization. HDB3 is the line coding method used for E1 transmission.

- AMI (Alternate Mark Inversion) inverts, or changes the polarity of, successive ones (marks) to maintain ones density.
- HDB3 (High Density Bipolar Order 3) is transparent (not confused with data). It relies on the transmission of both positive and negative pulses. It is based on AMI, but extends this method by inserting violation codes whenever 4 or more 0s occur consecutively. This and similar (more complex) codes have replaced AMI in modern distribution networks.

Signaling Options

The signaling option defines how the E1 Daughter Card signals the telco switch when starting (“seizing”) the phone line or trunk line.

- R2 Digital
- R2 MF

R2 MF signaling is used outside the United States, mostly in Europe and the Far East. A sequence of tones initiated at the central office (PTT) is exchanged back and forth between the PTT and the subscriber, generally at an R2 MF of 4 to 4.5 tones per second. Although this tone rate work successfully in most instances, some countries require tone exchange rates of up to 8 transactions per second. If the central office sends a tone and is not answered fast enough with a return tone, the call is terminated. The delay introduced by asking the application for each new tone limits the rate of signaling.

DNIS digits

The DNIS (Dialed Number Identification Service) digits option describes the number of DNIS digits to be received from the CO. For example, when you dial a number, you generally dial seven digits. Therefore, seven is the number of DNIS digits you would receive from the switch. In general, this option should be left at the default value of 0 to use automatic mode. You need to enter a DNIS digits value only if your telco switch does not support automatic mode.

Country Selection

Country Selection identifies your country. You may select China, Hungary, India or Mexico. Select ITU for all other locations.

E1 Facility Termination

The E1 facility termination typically enters the customer's premises as two wire pairs for data. Figure 5 shows the RJ-48C connector, and Table 2 shows its pin configuration.

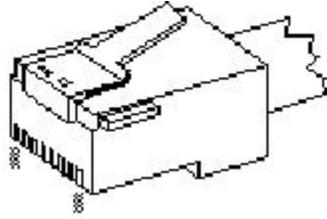


Figure 5. RJ-48C connector.

Table 2. RJ-48C Pin Configuration

| Pin | Signal |
|------|-------------------------------|
| 1 | Tip 1 (Receive from network) |
| 2 | Ring 1 (Receive from network) |
| 3, 6 | No Connection |
| 4 | (Transmit to network) |
| 5 | (Transmit to network) |
| 7, 8 | No connection |

PCB Description

The E1 Daughter Card has two external jacks: an RJ-48 E1 line jack, and an E1 line monitoring Bantam jack. Connection to the RAS96 RASCard is via two 32-pin headers (J3 and J4 in Figure 4).

RJ-11 Alarm Jack

The RJ-11 Alarm jack, located on the RASCard, is for connection to an external alarm system, such as a relay, warning light or bell. It contains two wire pairs: one normally closed pair, pins 4 and 6, that opens in an alarm condition, and one normally open pair, pins 5 and 6, that closes in an alarm condition. If an error condition occurs, contact your local service provider.

E1 Line Monitoring Jack

The E1 Line Monitoring jack is for phone company testing purposes, and should only be used by a telco service representative using telco test equipment.

Test Modes

E1 Daughter Card test modes are controlled by the MultiCommManager software; refer to the *MultiCommManager User Guide* for more information.

Configuration of the E1 Daughter Card

The E1 Daughter Card is configured through the MR9600 Controller. Before you configure it, you should know how your E1 line was set up by the telephone company when you ordered it.

Ordering an E1 Line

There are many choices to make when ordering an E1 line. The following list shows options that are supported by the CommPlete Communications Server. Factory defaults for the CommPlete Communications Server are marked by a check mark. For definitions of the options, see the E1 overview starting on page 40.

- Channelized E1 line with 30 DS-0 channels**
- E1 Frame Format**
 - CRC4 (16 Frame)
 - FAS (2 Frame)
- Line Coding**
 - AMI (Alternate Mark Inversion)
 - HDB3 (High Density Bipolar Order 3 Encoding)
- FOS Signaling**
 - R2 Digital
 - R2MF

To Configure the E1 Daughter Card

1. Turn on power to the segment containing the E1 Card to be configured.
2. Log in to the controller as **supervisor, supervisor** and type the command **E1status 1b (5b, 9b, or 13b)** for E1-1 at the A:# prompt. The E1 Card Status screen is displayed.
3. If the line settings do not match the line settings of your E1 line, type the command **E1setup 1b (5b, 9b, or 13b)** at the A:# prompt.
4. The E1 setup will take you through a series of menus where you will enter the information that was gathered in the Installation Overview.

Factory Defaults:

Framing: CRC4

Line Coding: HDB3

Signaling Options: R2 digital

5. When you save the changes at the end, the E1 parameters are then sent to the E1 card for configuration.

E1 Commands

Three E1 commands are available (some that result in a displayed menu) for displaying and changing E1 provisioning parameters.

The screen below displays the MultiComm Manager software interface:

Command Example

Examples of using the **E1STATUS**, **E1SETUP**, **E1CFG** commands with the MR9600 Controller are provided below. Note that you can use the hyphen key to back up to change a selection, or use the 'Q' key to quit at any time.

1. Enter the **E1STATUS xy** command (where xy is equal to the slot number of the E1 Daughter card) to check on the status and settings for displaying and changing E1 provisioning parameters. An example of using the E1STATUS, E1SETUP, and E1CFG commands to correct an E1 problem is provided below. Note that you can use the hyphen key to back up to change a selection, or use the 'Q' key to quit at any time.

```
A:\#e1status 9b
E1 Card Status:

Channel Polling Interval (Sec):20
    Error Threshold:10
Disconnect Timeout (sec):11
    Framing Format:CRC4
        Line Coding:Alternate Mark Inversion (AMI)
    Signal Options:R2 MF
DNIS-digits (1-64 or 0 for auto):0
    Country Selection:ITU
        Line Buildout:120 Ohm
    LED Information:Red Alarm, Sync Loss
        Model:RAS9600-E1
        Version:2.00c/1.06
```

2. Enter the **E1SETUP** command to change the configuration information. At the A:# prompt type **E1setup xy** and hit Enter (**xy** is the CC9600 slot number. For example, type **E1setup 9b** to re-provision the E1-1 card.

```
A:\#elsetup 9b
Use Settings from:

1. Use Active Settings (pre-configured card)
2. User System Defaults (new card)
3. Use Stored Settings (swapping cards)

Enter Selection (q(uit), <1>): 1
```

```
Getting E1 Card Info..
1. Channel Polling Interval (Sec):20
2. Error Threshold :10
3. Disconnect Timeout (sec):11
4. Framing Format : CRC4
5. Line Coding: Alternate Mark Inversion (AMI)
6. Signal Options : R2 MF
7. DNIS-digits(1-64 or 0 for auto) : 0
8. Country Selection : ITU
9. Line Buildout : 120 Ohm

Enter Selection (-(previous), q(uit), d(one), <1>): -
```

```
A:\#elsetup 9b

Use settings from:

1. Use Active Settings (pre-configured card)
2. User System Defaults (new card)
3. User Stored Settings (swapping cards)

Enter Selection (q(uit), <1>): 2

1. Channel Polling Interval (Sec) : 20
2. Error Threshold : 10
3. Disconnect Timeout (sec) : 11
4. Framing Format: CRC4
5. Line Coding: Alternate Mark Inversion (AMI)
6. Signal Options : R2 Digital
7. DNIS-digits (1-64 or 0 for auto): 0
8. Country Selection : ITU
9. Line Buildout : 120 Ohm

Enter Selection (-(previous), q(uit), d(one), <1>): -
```

```
A:\# elsetup 9b
Use settings from:

1. Use Active Settings (pre-configured card)
2. User System Defaults (new card)
3. User Stored Settings (swapping cards)

Enter Selection (q(uit), <1>): 3

1. Channel Polling Interval (Sec) : 20
2. Error Threshold : 10
3. Disconnect Timeout (sec) : 11
4. Framing Format: CRC4
5. Line Coding: Alternate Mark Inversion (AMI)
6. Signal Options : R2 MF
7. DNIS-digits (1-64 or 0 for auto): 0
8. Country Selection : ITU
9. Line Buildout : 120 Ohm

Enter Selection (-(previous), q(uit), d(one), <1>): 6
```

```
Signal Options

1. R2 Digital
2. R2 MF

Enter Selection (-(previous), <2>): -
```

```
1. Channel Polling Interval (Sec): 20
2. Error Threshold : 10
3. Disconnect Timeout (sec) : 11
4. Framing Format : CRC4
5. Line Coding : Alternate Mark Inversion (AMI)
6. Signal Options : R2 MF
7. DNIS - digits (1-64 or 0 for auto) : 0
8. Country Selection : ITU
9. Line Buildout : 120 Ohm

Enter Selection (-(previous), q(uit), d(one), <1>): 7

DNIS - digits (1-64 or 0 for auto) (-(previous), <0>): -
1. Channel Polling Interval (Sec) : 20
2. Error Threshold : 10
3. Disconnect Timeout (sec) : 11
4. Framing Format : CRC4
5. Line Coding : Alternate Mark Inversion (AMI)
6. Signal Options : R2 MF
7. DNIS-digits (1-64 or 0 for auto) : 0
8. Country Selection : ITU
9. Line Buildout : 120 Ohm

Enter Selection (-(previous), q(uit), d(one), <1>): 8
```

```
Country Selection

1. ITU
2. India
3. Mexico
4. Hungary
5. China

Enter Selection (-(previous), q(uit), d(one), <1>): -
```

```
1. Channel Polling Interval (Sec) : 20
2. Error Threshold : 10
3. Disconnect timeout (sec) : 11
4. Framing Format : CRC4
5. Line Coding : Alternate Mark Inversion (AMI)
6. Signal Options : R2 MF
7. DNIS - digits (1-64 or 0 for auto) : 0
8. Country Selection : ITU
9. Line Buildout : 120 Ohm

Enter Selection (-(previous), q(uit), d(one), <1>): q
```

3. Use the **E1CFG** command to send the new configuration information to the E1 Daughter Card.
4. Enter the **E1STATUS** command again to check the status of the E1 Daughter card.

```
A:\#e1status 9b

E1 Card Status:

Channel Polling Interval (Sec) : 20
Error Threshold : 10
Disconnect Timeout (sec) : 11
Framing Format : CRC4
Line Coding : Alternate Mark Inversion (AMI)
Signal Options : R2 MF
DNIS-digits (1-64 or 0 for auto):0
Country Selection: ITU
Line Buildout : 120 Ohm
LED Information : Online
Model : RAS9600-E1
Version : 2.00c/1.06
```

Note that the LED Information line now indicates that the E1 card is online with no faults registered. The A:\ # prompt is displayed. You can select **q** to quit re-provisioning, or enter another E1 command.

E1 Command Messages

The system can display the following E1 command messages:

Message: **E1 Settings have not been changed**

Meaning: Either the **E1SETUP** command parameters were not changed, or the **E1CFG** command was not entered.

Recovery: Start over at step 1 of the command example, re-provision the appropriate menu(s), and enter the **E1CFG** command to implement the changes to the E1 Daughter Card configuration.

Message: **ERROR: Illegal command.**

Meaning: The command was typed incorrectly, or an unsupported command was entered.

Recovery: Re-check the command syntax and start over at step 1 of the command example.

Message: **Missing device specifier (e.g., 1A) or missing devices.**

Meaning: The slot number entered in the **E1STATUS xy** command was incorrect.

Recovery: Re-check the slot number of the E1 Daughter Card and start over at step 1 of the command example.

E1 Status LEDs

The RASCard front panel contains fourteen indicators (seven for each optional port) that show the status of the RASCard's optional E1 port.

| LED Indicator | Color | Indication |
|----------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ONLINE | Green | On indicates that the E1 card is online and no errors are detected. Off indicates that the E1 card is offline due to one of the following e |
| RED ALARM | Red | On indicates that a loss of E1 signal has been detected. Off indicates that the E1 card is detecting an incoming E1 signal. |
| YELLOW ALARM | Red | On indicates that the remote E1 channel bank or network is in red ; transmitting a yellow frame pattern. Off indicates that the remote channel bank or network is not transr yellow alarm. |
| SYNC LOSS | Red | On indicates that the E1 card has lost synchronization with the fran boundaries on the receive E1 line. Off indicates that the E1 card is synchronized with the receive E1 l |
| BPV VIOLATION | Red | On indicates that a received bipolar violation (BPV) is being detect Off indicates that no BPV is being detected. |
| RAI ALARM | Red | REMOTE ALARM INDICATION On indicates that the E1 card is receiving unframed all 1s, indicatin disconnection or attached device failure. Off indicates that the attached device is operating correctly. |
| TEST MODE | Red | On indicates that the E1 card is in one of several possible test mod Off indicates that the E1 card is not in a test mode. |

Functional Description

The on-board Single-Chip Transceiver (SCT) provides the connection to E1 lines (DS-1 long haul or DSX-1 short haul). The clock recovery circuitry automatically adjusts to E1 lines from 0 feet to over 6000 feet in length. The framer locates the frame and multiframe boundaries and monitors the data stream for alarms.

6 Solving Problems

Introduction

This chapter describes steps you can take in the event of a RASCard failure. As with any microcomputer product, start with simple hardware and software tests, and work toward more complex tests or operating system/application software tests.

Be sure to check the cable connections to the RASCard. Also, check the Setup utility configuration settings for your particular site (Chapter 4).

Troubleshooting

The following troubleshooting procedures address typical problems and recommend some basic solutions. If a problem arises while you are in an application, refer to the software documentation.

The RASCard has no video

- Verify that the monitor is plugged in and turned on, and that video cable is connected to the video connector on the RASCard.
- Verify that the RASCard is turned on.
- Verify that system power is on.
- Verify that the RASCard is seated properly in its slot. Note: Make sure to turn power off before reseating cards.
- Verify that the memory SIMMs are seated properly on the RASCard. If two or four SIMMs are installed, they must be the same brand, size and speed. Fill Bank 1 first.
- Remove any other device cards from the segment and turn on the RASCard. If the RASCard has video now, then there is a conflict with one of the device cards. Check the configuration of each device card.
- Remove all connectors from the RASCard except the video connector, then turn on the RASCard. If the RASCard now has video, then there is a problem with one of the cables or one of the peripherals. Try each cable, one at a time, to isolate the bad cable or peripheral.
- Try the RASCard in a different segment (if CC9600) or CommPlete chassis. If this works, there is a problem with the segment or chassis previously used.
- If the problem persists, contact Multi-Tech's Technical Support Department.

The RASCard does not boot correctly, or hangs after the video appears

- Run the BIOS Setup utility to verify that you have the correct configuration for the system and drives (press DEL as system boots).
- Verify that the RASCard and device cards are seated properly in the CC9600 chassis. Note: Make sure to turn power off before reseating cards.
- Verify that the fan on the CPU heat sink is working. The CPU may be overheating.

- The hard disk or floppy drive cables are not connected properly, or their parameters are not set properly in Setup.
- Verify that enough memory is installed to load the intended applications.
- Verify that the memory SIMMs are seated properly on the RASCard. If two or four SIMMs are installed, they must be the same brand, size and speed. Fill Bank 1 first.
- If the problem persists, contact Multi-Tech's Technical Support Department.

The COM1 port does not respond correctly

- Check the Setup configuration to verify that the ports are enabled.
- Check that cables are connected properly and peripherals are turned on and configured properly.
- If the problem persists, contact Multi-Tech's Technical Support Department.

The keyboard does not respond to key strokes

- Connect the keyboard cable to bottom round connector on the RASCard.
- If a cable converter is used to connect a large 5-pin DIN connector to the small 6-PIN PS/2 DIN connector on the RASCard, the converter could be bad or of the wrong type.
- Verify that the keyboard works on a different system.
- If the problem persists, contact Multi-Tech's Technical Support Department.

Invalid time, date or setup

- The battery is failing.
- The last system boot was incomplete. Verify in Setup that the configuration is correct, and reboot the system.
- If the problem persists, contact Multi-Tech's Technical Support Department.

Memory Upgrade

Two memory banks (Bank 1 and Bank 2) with two SIMM sockets per bank (M1 through M4) are provided on the RASCard. The standard configuration has 16 MB of EDO DRAM in Bank 1. The RASCard supports four 72-pin SIMMs of 4 MB, 8 MB, 16 MB, or 32 MB DRAM to form a memory size from 8 MB to 128 MB. The DRAM can be 60 ns or 70 ns, fast page mode or EDO, 32-bit non-parity or 36-bit parity. For a list of approved SIMMs, see Appendix D.

Note: Each bank must have the same size memory installed in pairs. Always fill Bank 1 first.

Table 3. Memory Configurations.

| Bank 1 | Bank 2 | TOTAL |
|-----------|-----------|--------|
| None | None | 0 MB |
| 2 × 4 MB | None | 8 MB |
| 2 × 4 MB | 2 × 4 MB | 16 MB |
| 2 × 8 MB | None | 16 MB |
| 2 × 8 MB | 2 × 4 MB | 24 MB |
| 2 × 8 MB | 2 × 8 MB | 32 MB |
| 2 × 16 MB | None | 32 MB |
| 2 × 16 MB | 2 × 8 MB | 48 MB |
| 2 × 16 MB | 2 × 16 MB | 64 MB |
| 2 × 32 MB | None | 64 MB |
| 2 × 32 MB | 2 × 16 MB | 96 MB |
| 2 × 32 MB | 2 × 32 MB | 128 MB |

1. Turn the power off on the segment to be upgraded.
2. Remove the connectors on the back of the RASCard and loosen the screws that hold the RASCard in place.
3. Use the ejector lever to remove the RASCard from the CommPlete rack and set the card flat on a table.
4. The standard configuration has two 8 MB EDO DRAM SIMMs in bank 1. If you plan to leave this memory installed and add memory to Bank 2, jump to Step 8.
5. Remove the SIMMs in Bank 1 by bending the metal tab on each side of the SIMM socket until the SIMM falls sideways.
6. Place the new SIMMs into Bank 1 starting with the SIMM socket farthest from the board edge. Notice that each SIMM has a notch cut out on one edge next to the gold fingers. Place the SIMM into the SIMM socket so the notch in the SIMM is on the side closest to the front bracket of the RASCard. The SIMM will go into the socket at a 45 degree angle. Once the gold fingers of the SIMM are inside the pin

contacts of the sockets, use your fingers to bend the SIMM upright until it is held in place by the metal tabs.

7. Follow the same process for the second SIMM in Bank 1.
8. Select the memory SIMMs for Bank 2 and follow the same procedure as in Step 6.

Note: The front bracket of the RASCard may have to be removed to install SIMM 2 of Bank 2. When finished, replace the bracket.

9. Install the RASCard into the proper segment on the CommPlete and reconnect all cables.
10. Power-up the segment and verify that the memory count displayed is correct.
11. If the RASCard does not see the proper amount of memory, verify that the SIMMs are seated properly and call Multi-Tech's Technical Support Department. If you wish to upgrade the memory and use the two SIMMs that came with the RASCard you have three options:
 - a) Replace two 8 MB SIMMs in Bank 1 with two 4 MB SIMMs and add two 8 MB SIMMs to Bank 2 for 24 MB total.
 - b) Keep the 8 MB SIMMs in Bank 1 and add two 8 MB SIMMs to Bank 2 for 32 MB total.
 - c) Keep two 8 MB SIMMs in Bank 1 and add two 16 MB SIMMs to Bank 2 for 48 MB total.

Diagnostic Tests

The RASCard operates like a stand-alone PC, so it can run almost any off-the-shelf diagnostic program. These programs are available at any software reseller and can quickly help isolate component failures or adapter conflicts.

Calling Technical Support

For immediate help in finding and fixing RASCard problems, record the error condition and call Multi-Tech's Technical Support Department at (800) 972-2439.

Appendixes

Appendix A Connector Pinouts

Keyboard Connector (J11)

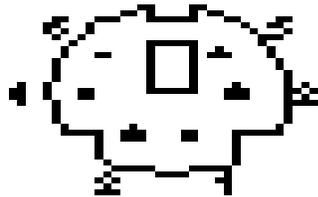


Figure A-1. 6-pin mini-DIN keyboard connector.

| Pin | Description | Pin | Description |
|-----|----------------|-----|------------------|
| | +Keyboard Data | | +5 VDC |
| | NC | | + Keyboard Clock |
| | GND | | NC |

Video Connector (J35)

This connector provides video analog data and horizontal and vertical synchronization signals for IBM PS/2 and VGA monitors.

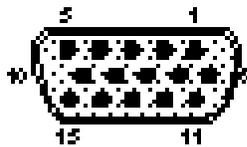


Figure A-2. DB-15 video connector.

| Pin | Description | Pin | Description |
|-----|---------------------------|-----|---------------------------|
| | Analog Red | | NC |
| | Analog Green | | Digital Ground |
| | Analog Blue | | VESA Monitor Status Bit 0 |
| | VESA Monitor Status Bit 2 | | VESA Monitor Status Bit 1 |
| | Digital Ground | | Horizontal Sync |
| | Digital Ground | | Vertical Sync |
| | Digital Ground | | NC |
| | Digital Ground | | |

COM1 Connector (J3)

This serial port connector can be used to configure the RASCard or to connect a mouse to the RASCard.

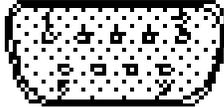


Figure A-3. DB-9 COM1 connector.

| Pin | Description | Pin | Description |
|-----|-------------|-----|-------------|
| | DCD | | DSR |
| | RX Data | | RTS |
| | TX Data | | CTS |
| | DTR | | RI |
| | Ground | | |

E1 Alarm Connector (J22)

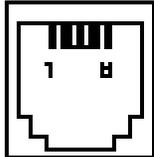


Figure A-5. E1 alarm connector.

| Pin | Description | Notes |
|-----|-------------|---------------------------------------------------|
| 1 | Close 2 | Alarm signals for second E1 card (future upgrade) |
| 2 | Open 2 | |
| 3 | Common 2 | |
| 4 | Close 1 | Alarm signals for first E1 card (default) |
| 5 | Open 1 | |
| 6 | Common 1 | |

34-Pin Floppy Disk Drive Connector (J27)

This connector provides signal and data connection between the floppy drive and the RASCard.

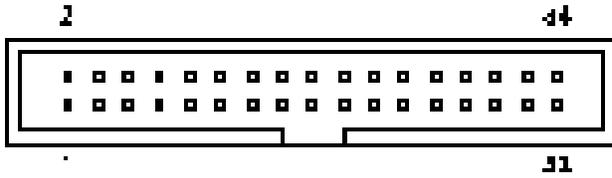


Figure A-4. Floppy disk connector.

| Pin | Description | Pin | Description | Pin | Description |
|-----|----------------|-----|---------------------------|-----|---------------|
| 1 | Ground | 13 | Ground | 25 | Ground |
| 2 | RPM/RWC | 14 | Drive Select 1 | 26 | Track 0 |
| 3 | Ground | 15 | Ground | 27 | Ground |
| 4 | Not Used | 16 | Motor Enable 2 | 28 | Write Protect |
| 5 | Ground | 17 | Ground | 29 | Ground |
| 6 | Not Used | 18 | Direction (Stepper Motor) | 30 | Read Data |
| 7 | Ground | 19 | Ground | 31 | Ground |
| 8 | Index | 20 | Step Pulse | 32 | Select Head |
| 9 | Ground | 21 | Ground | 33 | Ground |
| 10 | Motor Enable 1 | 22 | Write Data | 34 | /DCHNG |
| 11 | Ground | 23 | Ground | | |
| 12 | Drive Select 2 | 24 | Write Enable | | |

Drive Power Connector (J13)

This connector supplies power and ground for an optional disk drive or CD-ROM drive.

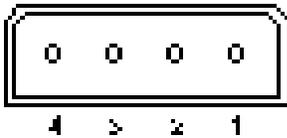


Figure A-5. Drive power connector.

| Pin | Description |
|-----|-------------|
| 1 | 12 VDC |
| 2 | Ground |
| 3 | Ground |
| 4 | 5 VDC |

Hard Disk Connector (J6)

This connector supplies IDE data and signals and power and ground for the RASCard's on-board hard disk drive.

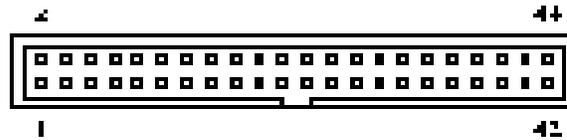


Figure A-6. IDE connector.

| Pin | Description | Pin | Description | Pin | Description |
|-----|--------------------|-----|--------------------|-----|----------------------|
| 1 | /Reset | 16 | Data Bit 14 (SD14) | 31 | IRQ14 |
| 2 | Ground (GND) | 17 | Data Bit 0 (SD0) | 32 | /IOCS16 |
| 3 | Data Bit 7 (SD7) | 18 | Data Bit 15 (SD15) | 33 | Address Bit 1 (SA1) |
| 4 | Data Bit 8 (SD8) | 19 | Ground (GND) | 34 | NC |
| 5 | Data Bit 6 (SD6) | 20 | NC | 35 | Address Bit 0 (SA0) |
| 6 | Data Bit 9 (SD9) | 21 | NC | 36 | Address Bit 2 (SA2) |
| 7 | Data Bit 5 (SD5) | 22 | Ground (GND) | 37 | Chip Select 0 (-CS0) |
| 8 | Data Bit 10 (SD10) | 23 | -/O Write (-IOW) | 38 | Chip Select 1 (-CS1) |
| 9 | Data Bit 4 (SD4) | 24 | Ground (GND) | 39 | /HDLED |
| 10 | Data Bit 11 (SD11) | 25 | -/O Read (-IOR) | 40 | Ground (GND) |
| 11 | Data Bit 3 (SD3) | 26 | Ground (GND) | 41 | +5 VDC |
| 12 | Data Bit 12 (SD12) | 27 | IOCHRDY | 42 | +5 VDC |
| 13 | Data Bit 2 (SD2) | 28 | ALE\ | 43 | Ground (GND) |
| 14 | Data Bit 13 (SD13) | 29 | NC | 44 | NC |
| 15 | Data Bit 1 (SD1) | 30 | Ground (GND) | | |

IDE Connector (J21)

This connector supplies IDE data and signals for an IDE CD-ROM drive or a second hard disk.

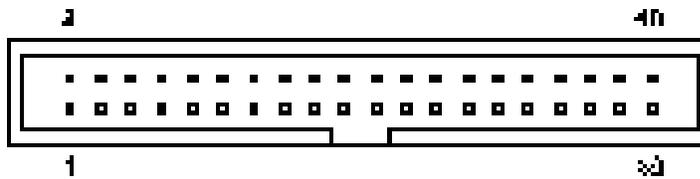


Figure A-7. IDE connector.

| Pin | Description | Pin | Description | Pin | Description |
|-----|--------------------|-----|--------------------|-----|----------------------|
| 1 | /Reset | 15 | Data Bit 1 (SD1) | 29 | NC |
| 2 | Ground (GND) | 16 | Data Bit 14 (SD14) | 30 | Ground (GND) |
| 3 | Data Bit 7 (SD7) | 17 | Data Bit 0 (SD0) | 31 | IRQ14 |
| 4 | Data Bit 8 (SD8) | 18 | Data Bit 15 (SD15) | 32 | /IOCS16 |
| 5 | Data Bit 6 (SD6) | 19 | Ground (GND) | 33 | Address Bit 1 (SA1) |
| 6 | Data Bit 9 (SD9) | 20 | NC | 34 | NC |
| 7 | Data Bit 5 (SD5) | 21 | NC | 35 | Address Bit 0 (SA0) |
| 8 | Data Bit 10 (SD10) | 22 | Ground (GND) | 36 | Address Bit 2 (SA2) |
| 9 | Data Bit 4 (SD4) | 23 | -/O Write (-IOW) | 37 | Chip Select 0 (-CS0) |
| 10 | Data Bit 11 (SD11) | 24 | Ground (GND) | 38 | Chip Select 1 (-CS1) |
| 11 | Data Bit 3 (SD3) | 25 | -/O Read (-IOR) | 39 | /HDLED |
| 12 | Data Bit 12 (SD12) | 26 | Ground (GND) | 40 | Ground (GND) |
| 13 | Data Bit 2 (SD2) | 27 | IOCHRDY | | |
| 14 | Data Bit 13 (SD13) | 28 | ALE\ | | |

Appendix B POST Messages

Introduction

During the power-on self-test (POST), if the BIOS detects an error, it will sound a beep code or display a message.

If a message is displayed, it will be accompanied by the following instruction:

PRESS F1 TO CONTINUE OR DEL TO ENTER SETUP

POST Beep

There is currently only one beep code in BIOS. It consists of a single long beep followed by two short beeps. This code indicates that a video error has occurred and that the BIOS cannot initialize the video screen to display additional information.

Error Messages

One or more of the following messages may be displayed if the BIOS detects an error during the POST.

CMOS BATTERY HAS FAILED

CMOS battery is no longer functional. It should be replaced.

CMOS CHECKSUM ERROR

Checksum of CMOS is incorrect. This can indicate that CMOS has become corrupt. This error may have been caused by a weak battery. Check the battery and replace if necessary.

DISK BOOT FAILURE, INSERT SYSTEM DISK AND PRESS ENTER

No boot device was found. This could mean that either a boot drive was not detected or the drive does not contain proper system boot files. Insert a system disk into Drive A: and press ENTER. If the system should have booted from the hard disk, make sure that the controller is inserted correctly and all cables are properly attached. Also, make sure that the disk is formatted as a boot device. Then reboot the system.

DISKETTE DRIVES OR TYPES MISMATCH ERROR - RUN SETUP

The type of floppy drive installed in the system is different from the CMOS definition. Run Setup to reconfigure the drive type correctly.

DISPLAY TYPE HAS CHANGED SINCE LAST BOOT

The display adapter has been changed since the system was last turned off. You must configure the system for the new display type.

ERROR ENCOUNTERED INITIALIZING HARD DRIVE

The hard disk cannot be initialized. Make sure the adapter is installed correctly and all cables are correctly and firmly attached. Also, make sure the correct hard disk type is selected in Setup.

ERROR INITIALIZING HARD DISK CONTROLLER

Cannot initialize controller. Make sure that the correct hard disk type is selected in Setup. Also check to see if a jumper needs to be set correctly on the hard disk.

FLOPPY DISK CNTRLR ERROR OR NO CNTRLR PRESENT

Cannot find or initialize the floppy drive controller. If there are no floppy drives installed, be sure the Diskette Drive selection in Setup is set to NONE.

KEYBOARD ERROR OR NO KEYBOARD PRESENT

Cannot initialize the keyboard. Make sure the keyboard is attached correctly, and no keys are being pressed during the boot.

If you are purposely configuring the system without a keyboard, set the error halt condition in Setup to HALT ON ALL, BUT KEYBOARD. This will cause the BIOS to ignore the missing keyboard and continue the boot.

Memory Address Error at ...

Indicates a memory address error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.

Memory parity Error at ...

Indicates a memory parity error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.

MEMORY SIZE HAS CHANGED SINCE LAST BOOT

Memory has been added or removed since the last boot. Enter Setup and enter the new memory size in the memory fields.

Memory Verify Error at ...

Indicates an error verifying a value already written to memory. Use the location along with your system's memory map to locate the bad chip.

OFFENDING ADDRESS NOT FOUND

This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem cannot be isolated.

OFFENDING SEGMENT:

This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem has been isolated.

PRESS A KEY TO REBOOT

This will be displayed at the bottom screen when an error occurs that requires you to reboot. Press any key and the system will reboot.

PRESS F1 TO DISABLE NMI, F2 TO REBOOT

If BIOS detects a non-maskable interrupt (NMI) during boot, this will allow you to disable the NMI and continue to boot, or you can reboot the system with the NMI enabled.

RAM PARITY ERROR - CHECKING FOR SEGMENT ...

Indicates a parity error in random access memory.

Appendix C POST Codes

EISA power-on self-test (POST) codes are typically output to port address 300h. ISA POST codes are output to port address 80h.

| Code | Name | Description |
|------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C0 | Turn Off | Initialize standard devices with default values. |
| 1 | Processor Test 1 | Processor Status (1FLAGS) Verification. Tests the following processor status flags carry, zero, sign, and overflow. The BIOS will set each of these flags, verify that they are set, then turn each flag off and verify that it is off. |
| 2 | Processor Test 2 | Read/Write/Verify with data patterns FF and 00 all CPU registers except SS, SP, and BP. |
| 3 | Initialize Chips | Disable NMI, PIE, AIE, UEI, SQWV. Disable video, parity checking, and DMA. Reset math coprocessor. Clear all page registers, CMOS shutdown byte. Initialize timers 0, 1, and 2, and set EISA timer to a known state. Initialize DMA controllers 0 and 1. Initialize interrupt controllers 0 and 1. Initialize EISA extended registers. |
| 4 | Test Memory Refresh Toggle | RAM must be periodically refreshed to keep the memory from decaying. This function assures that the memory refresh function is working properly. |
| 5 | Blank Video, Initialize Keyboard | Keyboard controller initialization. |
| 6 | Reserved | |
| 7 | Test CMOS Interface and Battery Status | Verifies CMOS is working correctly, detects a bad battery. |
| BE | Chipset Default Initialization | Program chipset registers with power-on BIOS defaults. |
| C1 | Memory Presence Test | OEM-specific. Test to size on-board memory. |
| C5 | Early Shadow | OEM-specific. Early Shadow enable for fast boot. |
| C6 | Cache Presence | External cache size detection test |
| 8 | Setup Low Memory | Early chipset initialization, memory presence test, OEM chipset routines, clear low 64K of memory, test first 64K of memory. |
| 9 | Early Cache Initialization | Cache initialization. |
| A | Setup Interrupt Vector Table | Initialize first 120 interrupt vectors with SPURIOUS_INT_HDLR and initialize INT 00h-1Fh according to INT_TBL |
| B | Test CMOS RAM Checksum | Test CMOS RAM checksum; if bad, or if insert key pressed, load defaults. Verify real time clock. |
| C | Initialize keyboard | Detect type of keyboard controller (optional). Set NUM_LOCK status. |
| D | Initialize Video Interface | Detect CPU clock. Read CMOS location 14h to detect type of video in use. Detect and initialize video adapter. |
| E | Test Video Memory | Test video memory, write sign-on message to screen. Set up shadow RAM. Enable shadow according to Setup. |

| Code | Name | Description |
|-------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F | Test DMA Controller 0 | BIOS checksum test. Keyboard detect and initialization. |
| 10 | Test DMA Controller 1 | |
| 11 | Test DMA Page Registers | Test DMA page registers. |
| 12–13 | Reserved | |
| 14 | Test Timer Counter 2 | Test 8254 Timer 0 Counter 2. |
| 15 | Test 8259-1 Mask Bits | Verify 8259 Channel 1 masked interrupts by alternately turning the interrupt lines off and on. |
| 16 | Test 8259-2 Mask Bits | Verify 8259 Channel 2 masked interrupts by alternately turning the interrupt lines off and on. |
| 17 | Test Stuck 8259's Interrupt Bits | Turn off interrupts, then verify no interrupts mask register is on. |
| 18 | Test 8259 Interrupt Functionality | Force an interrupt and verify that the interrupt occurred. |
| 19 | Test Stuck NMI Bits (Parity/IO Check) | Verify NMI can be cleared. |
| 1A | Display CPU clock | |
| 1B–1E | Reserved | |
| 1F | Set EISA Mode | If EISA nonvolatile memory checksum is good, execute EISA initialization. If not, execute ISA tests and clear EISA mode flag. Test EISA Configuration Memory Integrity (checksum and communication interface). |
| 20 | Enable Slot 0 | Initialize slot 0 on the system board. |
| 21–2F | Enable Slots 1-15 | Initialize slots 1 through 15 on the system board. |
| 30 | Size Base and Extended Memory | Size base memory from 256K to 640K and extended memory above 1MB. |
| 31 | Test Base and Extended Memory | Test base memory from 256K to 640K and extended memory above 1MB using various patterns. Note: This will be skipped in EISA mode and can be skipped with the ESC key in ISA mode. |
| 32 | Test EISA Extended Memory | If EISA Mode flag is set, then test EISA memory found in slots initialization. Note: This will be skipped in ISA mode and can be skipped with the ESC key in EISA mode. |
| 33–3B | Reserved | |
| 3C | Setup Enabled | |
| 3D | Initialize and Install Mouse | Detect if mouse is present, initialize mouse, install interrupt vectors. |
| 3E | Set Up Cache Controller | Initialize cache controller. |
| 3F | Reserved | |
| BF | Chipset Initialization | Program chipset registers with Setup values. |
| 40 | | Display virus protect disable or enable |
| 41 | Initialize Floppy Drive Controller | Initialize floppy disk drive controller and any floppy drives. |
| 42 | Initialize Hard Disk and Controller | Initialize hard disk controller and any hard disks. |

| Code | Name | Description |
|-------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 43 | Detect and Initialize Serial and Parallel Ports | Initialize any serial and parallel ports (also game port). |
| 44 | Reserved | |
| 45 | Detect and Initialize Math Coprocessor | Initialize math coprocessor. |
| 46–4D | Reserved | |
| 4E | Manufacturing POST Loop or Display Messages | Reboot if Manufacturing POST Loop pin is set. Otherwise display any messages (i.e., any non-fatal errors that were detected during POST) and enter Setup. |
| 4F | Security Check | Ask password security (optional). |
| 50 | Write CMOS | Write all CMOS values back to RAM and clear screen. |
| 51 | Pre-Boot Enable | Enable parity checker. Enable NMI. Enable cache before boot. |
| 52 | Initialize Option ROMs | Initialize any option ROMs present from C8000h to EFFFFh. Note: When FSCAN option is enabled, will initialize from C8000h to F7FFFh. |
| 53 | Initialize Time Value | Initialize time value in 40h BIOS area. |
| 60 | Setup Virus Protect | Set up virus protect according to Setup |
| 61 | Set Boot Speed | Set system speed for boot |
| 62 | Setup NumLock | Set NumLock status according to Setup |
| 63 | Boot Attempt | Set low stack boot via INE19h. |
| B0 | Spurious | If interrupt occurs in protected mode. |
| B1 | Unclaimed NMI | If unmasked NMI occurs, display Press F1 to disable NMI, F2 reboot. |
| E1–EF | Setup Pages | E1, page 1; E2, page 2; etc. |
| FF | Boot | |

Appendix D Approved Memory

The following memory SIMMs have been tested with the RAS96 and are known to work with it. This is not to imply that other SIMMs may not work as well with the RAS96, only that they have not been tested with it.

| Capacity | Speed | Type | Manufacturer | Part Number | Usable MB |
|----------|-------|------|--------------|----------------|-----------|
| 1 x 32 | 60 ns | | Mitsubishi | MH1M32BNYJ-6 | 4 MB |
| 1 x 32 | 70 ns | | Mitsubishi | MH1M32BNYJ-7 | 4 MB |
| 1 x 36 | 70 ns | | Mitsubishi | MH1M36BNYJ-7 | 4 MB |
| 2 x 32 | 60 ns | | Mitsubishi | MH2M325CNYJ-6 | 8 MB |
| 2 x 32 | 60 ns | | Mitsubishi | MH2M32CNYJ-6 | 8 MB |
| 2 x 32 | 70 ns | | Mitsubishi | MH2M32CNYJ-7 | 8 MB |
| 2 x 32 | 60 ns | EDO | Mitsubishi | MH2M325BNXJ-6 | 8 MB |
| 2 x 32 | 70 ns | EDO | Mitsubishi | MH2M325BNXJ-7 | 8 MB |
| 2 x 36 | 70 ns | | Mitsubishi | MH2M36BNYJ-7 | 8 MB |
| 4 x 32 | 70 ns | | Mitsubishi | MH4M32BNYJ-7 | 16 MB |
| 4 x 36 | 70 ns | | Mitsubishi | MH4M36BNYJ-7 | 16 MB |
| 8 x 32 | 70 ns | | Mitsubishi | MH8M32BNJ-7 | 32 MB |
| 8 x 36 | 70 ns | | Mitsubishi | MH8M36BNJ-7 | 32 MB |
| 2 x 32 | 60 ns | | LGS | GM71C18160BJ6 | 8 MB |
| 4 x 32 | 60 ns | EDO | LGS | GM71C17403BJ6 | 16 MB |
| 2 x 32 | 60 ns | | Toshiba | TC5118160BJ-60 | 8 MB |
| 2 x 36 | 70 ns | | PNY | 36200070-18G | 8 MB |
| 1 x 36 | 70 ns | | PNY | 38541000 | 4 MB |

Appendix E Regulatory Information



EMC, Safety and Terminal Directive Compliance

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility.

and

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits:

and

Council Directive 98/13/EC of 12 March 1998 on the approximation of the laws of Member States concerning telecommunications terminal and Satellite earth station equipment.