356/357

80386DX / 486DLC
Mainboard
User's Manual

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Chapter 1
Introduction

The 356/357 ISA mainboard is a high-performance mainboard based on an 80386/486DLC microprocessor, and the MXIC chip. The mainboard offers a high degree of flexibility in configuration and is fully IBM PC/AT compatible.

Key Features

The advanced features of the 356/357 ISA mainboard include:

- Support for the following CPUs:

  80386 DX running at 33/40 MHz

  486DLC running at 25/33/40 MHz (356 ISA mainboard only)

- Built-in cache controller and cache memory that supports:

  — Built-in 8K two-way Associate or Direct-map cache

  — Hidden DRAM refresh to boost system performance

  — Fast Gate A20 to optimize OS/2 operations

  — Shadow RAM for BIOS and Video ROM

- Sophisticated Page DRAM controller that supports:

  — Two banks of CPU speed DRAM with memory size up to 32 MB

  — Mixable 256K x 9, 1M x 9, 4M x 9 modules

  — 256KB or 384KB(A to F segment of first 1 MB relocation to the top of DRAM memory

- Seven 16-bit I/O slots and one 8-bit I/O slot. (356 ISA mainboard)

- Six 16-bit I/O slots. (357 ISA mainboard)

- 4 layer PCB with dimensions of 22cm x 22cm. (356 ISA mainboard)

- 4 layer PCB with dimensions of 22cm x 17cm. (357 ISA mainboard)

Chapter 2

Hardware Configuration

Before you install the 356/357 ISA mainboard into the system chassis, you may find it convenient to first configure the mainboard's hardware. This chapter describes how to install a math coprocessor and memory modules, and where to attach components.

Power Precautions

Before you begin configuration, make sure you are working with an unplugged mainboard. Many components are powered by low-voltage current, but there still may be a dangerous electric current coming from the leads and power supply. You should take the following precautions:

- Turn off the mainboard, and unplug the power cord before you begin

- Unplug all cables that connect the mainboard to any external devices.

356 ISA Mainboard Component Locations
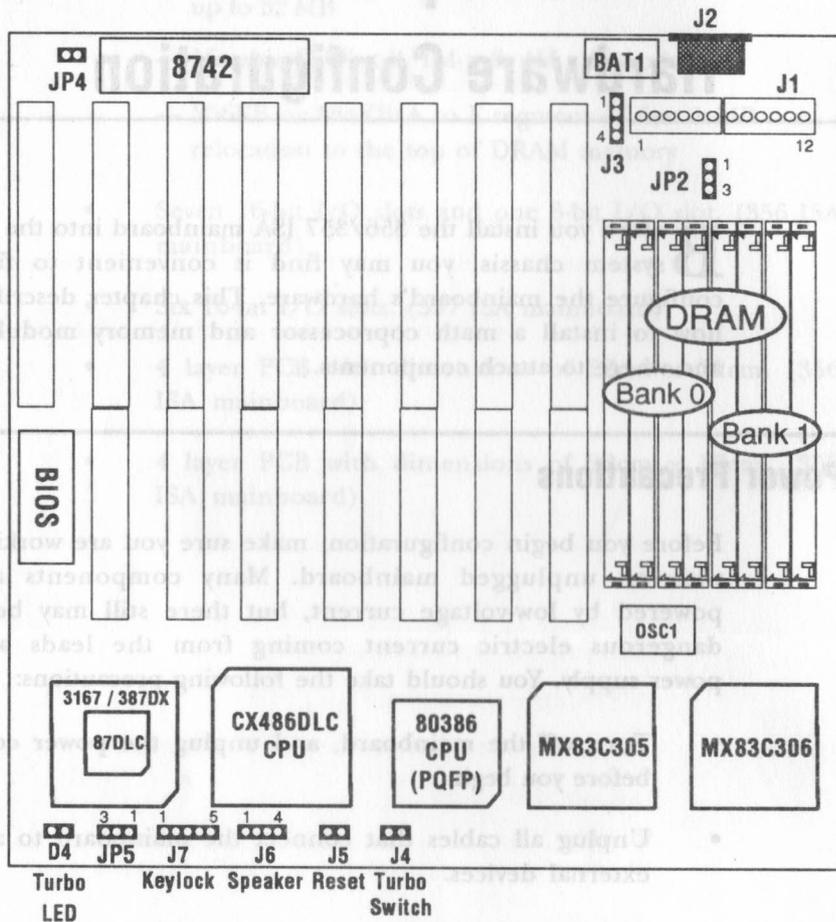
Figure 2–1. 356 ISA Mainboard Component Locations

357 ISA Mainboard Component Locations
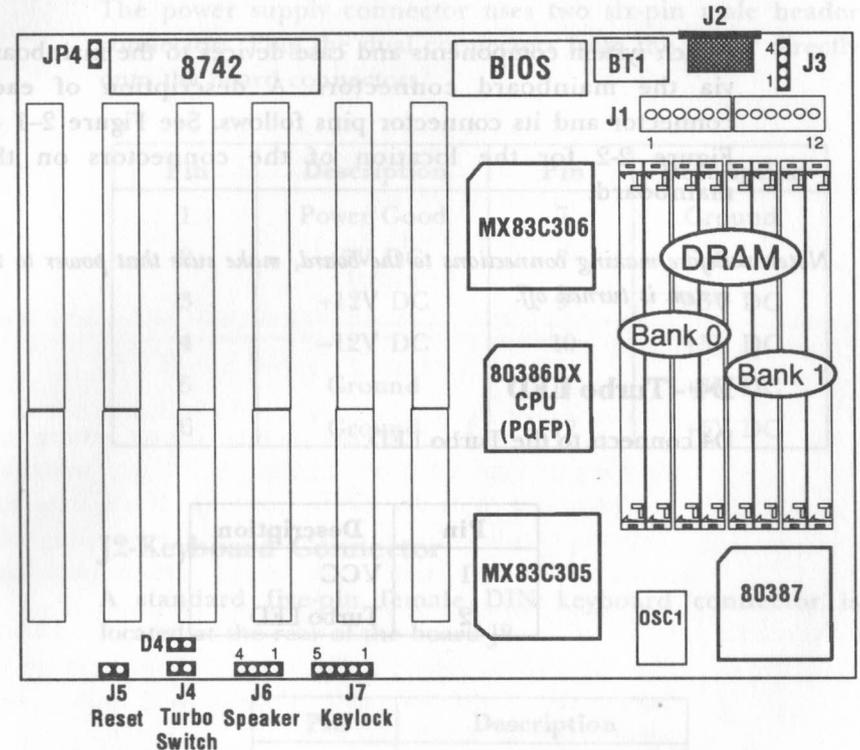
Figure 2–2. 357 ISA Mainboard Component Locations

Connectors

Attach system components and case devices to the mainboard via the mainboard connectors. A description of each connector and its connector pins follows. See Figure 2–1 or Figure 2-2 for the location of the connectors on the mainboard.

Note: Before making connections to the board, make sure that power to the system is turned off.

D4 - Turbo LED

D4 connects to the Turbo LED.

Pin	Description
1	VCC
2	Turbo LED

J1 - Power Supply Connector

The power supply connector uses two six-pin male header connectors. Plug the dual connectors from the power directly onto the board connectors.

Pin	Description	Pin	Description
1	Power Good	7	Ground
2	+5V DC	8	Ground
3	+12V DC	9	–5V DC
4	–12V DC	10	+5V DC
5	Ground	11	+5V DC
6	Ground	12	+5V DC

J2-Keyboard Connector

A standard five-pin female DIN keyboard connector is located at the rear of the board J2.

Pin	Description
1	Clock
2	Data
3	N.C.
4	Ground
5	+5V

J3 - External Battery

The 356/357 ISA mainboard has a battery on-board; however, you can also attach an external battery to connector J3.

Pin	Description
1	Power
2	N.C.
3	Ground
4	Ground

Notes:

1. For the **357** mainboard, the factory default setting has a jumper cap on pins 2 and 3 for an installed rechargeable battery. When you install an external battery, remove this jumper cap and then plug the external battery connector in J3. Disconnect the Internal battery with a soldering iron.

2. For the **357** mainboard, discharge CMOS memory by taking the connector cable off of pins 2 and 3, and attaching it to pins 3 and 4.

3. For the **356** mainboard the CMOS discharge function is controlled by jumper JP2. See jumper JP2 on page

J4 - Turbo Switch

J4 connects to the Turbo Switch, which is used to select the mainboard's clock speed.

Pin	Description
1	Turbo Switch
2	GND

J5 - Reset Switch Connector

Attach the Reset switch cable to this connector.

Pin	Description
1	Ground
2	Reset

J6 - Speaker Connector

Attach the system speaker to connector J6.

Pin	Description
1	Speaker
2	NC
3	GND
4	VCC

J7 - Keylock & Power LED Connector

J7 is a keylock connector that enables and disables the keyboard and the Power-LED on the case.

Pin	Description
1	LED Power
2	NC
3	Ground
4	Keyboard Inhibit
5	Ground

Jumper Switch Settings

You can configure hardware options by setting jumper switches on the mainboard. See Figure 2-1 or Figure 2-2 for jumper locations.

Set a jumper switch as follows:

- *Short* a jumper by placing the plastic jumper cap over two pins of the jumper.

- *Open* the pins of a jumper by removing the jumper cap.

Note: *When you open the jumper, attach the plastic jumper cap to one of the pins so you won't lose it.*

Symbols:

For setting 3-pin jumpers, the symbols below are used:
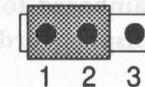
Pins 1 and 2 are Shorted with a jumper cap.
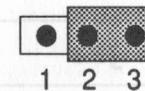
Pins 2 and 3 are Shorted with a jumper cap.

For setting 2-pin jumpers, the following symbols are used:

The jumper is Shorted when the jumper cap is placed over the two pins of the jumper.

The jumper is Open when the jumper cap is removed from the jumper.

JP2 - Battery Charge/Discharge Selector (356 only)

Set JP2, to charge/discharge the Internal/External battery. You can use this jumper to discharge the mainboard's CMOS memory. The factory default setting has a jumper cap on pins 1 and 2 for the **Charge** state of Internal/External battery. Set the jumper as below.

Description	JP2
Charge	● ● ○ 1 2 3
Discharge	○ ● ● 1 2 3
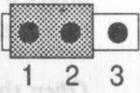
JP4 - Mono/Color Selector

Set the jumper, JP4, to configure the mainboard for either a color display card or a monochrome display card. Set the jumper as below.

Display Adapter	JP4
Color Display	● ●
Mono Display	● ●

JP5 – CPU Type Selectors (356 Only)

Set JP5 to configure the mainboard to recognize the type of CPU installed.

CPU Type	JP5
386DX	● ● ● 1 2 3
486DLC	● ● ● 1 2 3
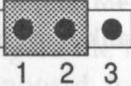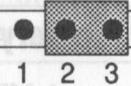
Memory Installation

The mainboard lets you add system memory via SIMM sockets on the mainboard. On-board memory is located in two banks: Bank 0 and Bank 1. Four SIMM sockets are provided in each bank. You can install either a 256K, 1M, or 4M SIMM in each socket. Note that all SIMM modules in a bank must be the same capacity.

The mainboard supports the following configurations:

Memory Size	Bank 0	Bank 1
1 MB	256K	—
2 MB	256K	256K
4 MB	1M	—
5 MB	256K	1M
8 MB	1M	1M
16 MB	4M	—
20 MB	1M	4M
32 MB	4M	4M

Chapter 3
BIOS Setup

This chapter explains how to configure the mainboard's BIOS setup program. The mainboard has either the **AMI** BIOS, which is described in the first part of this chapter, or the **MR** BIOS, which is explained in the latter part of this chapter.

After you have configured the mainboard, and have assembled the components, you can turn on the completed system. At this point, run the software setup to ensure that the system information is correct.

The software setup of the system board is achieved through Basic Input-Output System (BIOS) programming. You use the BIOS setup program to tell the operating system what type of devices are connected to your system board.

The system setup is also called CMOS setup. Normally, you need to run system setup if either the hardware is not identical with information contained in the CMOS RAM, or if the CMOS RAM has lost power.

AMI BIOS Setup

The setup program provided with the 356/357 ISA mainboard is the AMI BIOS from American Megatrends Inc. Enter the AMI Setup program's Main Menu as follows:

1. Turn on or reboot the system. After a series of diagnostic checks, the following message appears:

    "Hit <DEL> if you want to run SETUP"

2. Press the <DEL> key to enter the AMI BIOS setup program and the following screen appears:

    STANDARD CMOS SETUP
    ADVANCED CMOS SETUP
    AUTO CONFIGURATION WITH BIOS DEFAULTS
    AUTO CONFIGURATION WITH POWER-ON DEFAULTS
    CHANGE PASSWORD
    AUTO DETECT HARD DISK
    HARD DISK UTILITY
    WRITE TO CMOS AND EXIT
    DO NOT WRITE TO CMOS AND EXIT

3. Choose an option and press <Enter>. Modify the system parameters to reflect the options installed in the system. (See the following sections for more information.)

4. Press <ESC> at anytime to return to the Main Menu.

5. In the Main Menu, choose "WRITE TO CMOS AND EXIT" to save your changes and reboot the system. Choosing "DO NOT WRITE TO CMOS AND EXIT" ignores your changes and exits the program.

Main Menu Options

The Main Menu options of the AMI BIOS are as below.

STANDARD CMOS SETUP

Run the Standard CMOS Setup as follows.

1. Choose "STANDARD CMOS SETUP" from the Main Menu and a screen with a list of items appears.

```
          BIOS SETUP PROGRAM - STANDARD CMOS SETUP
        (C) 1991 American Megatrends Inc., All Rights Reserved

Date (mn/date/year) : Tue, Aug 15 1992      Base memory size : 640 KB
Time (hour/min/sec) : 12 : 24 : 38          Ext. memory size : 3072 KB
                                        Cyln  Head  WPcom  LZone  Sec  Size
Hard disk C: type    : Not Installed
Hard disk D: type    : Not Installed
Floppy drive A:      : Not Installed     Sun Mon Tue Wed Thu Fri Sat
Floppy drive B:      : Not Installed
Primary display      : Not Installed     30  31   1   2   3   4   5
Keyboard             : Not Installed      6   7   8   9  10  11  12

                                         13  14  15  16  17  18  19
 Month :    Jan, Feb,.....Dec            20  21  22  23  24  25  26
 Date  :    01, 02, 03,..31
 Year  :    1901, 1902,...2099           27  28  29  30  31   1   2

                                          3   4   5   6   7   8   9
|ESC:Exit ↓→↑←:Select F2/F3:Color PU/PD:Modify|
```

2. Use the arrow keys to move between items and to select values. Modify the selected fields using the PgUp/PgDn keys. Some fields let you enter numeric values directly.

Date (mn/date/year)	Type the current date	
Time (hour:min:sec)	Type the current time	
Hard disk C & D	Choose from the standard hard disk types 1 to 46. See Appendix A. Type 47 is user definable. If a hard disk is not installed choose "Not installed."	
Floppy drive A & B	Choose	360KB 5 1/4"
		1.2MB 5 1/4"
		720KB 3 1/2"
		1.44MB 3 1/2"
		2.88MB 3 1/2"or
		Not installed
Primary display	Choose	Monochrome,
		Color 40x25,
		VGA/PGA/EGA,
		Color 80x25, or
		Not installed
Keyboard	Choose Installed or Not installed	

3.   After you have finished with the Standard CMOS Setup program, press the <ESC> key. The following appears:

"Write to CMOS and Exit (Y/N)?"

4.   Typing "N" and <Enter> returns you to the Main Menu. Typing "Y" and <Enter> saves the system parameters and the system reboots.

ADVANCED CMOS SETUP

Run the Advanced CMOS Setup as follows.

1.   Choose "ADVANCED CMOS SETUP" from the Main Menu and a screen with a list of items appears.

```
            BIOS SETUP PROGRAM - ADVANCED CMOS SETUP
        (C) 1991 American Megatrends Inc.,  All Rights Reserved

Typematic Rate Programming  : Disabled   Adaptor ROM Shadow C800, 32K: Disabled
Typematic Rate Delay (msec) : 500        Adaptor ROM Shadow D000, 32K: Disabled
Typematic Rate (Chars/Sec)  : 15         Adaptor ROM Shadow D800, 32K: Disabled
Above 1 MB Memory Test      : Disabled   Adaptor ROM Shadow E000, 32K: Disabled
Memory Test Tick Sound      : Enabled    Adaptor ROM Shadow E800, 32K: Disabled
Hit <DEL> Message Display   : Enabled    System  ROM Shadow F000, 64K: Enabled
Hard Disk Type 47 RAM Area  : 0:300      Two Way or Direct Map       : Two Way
Wait For <F1> If Any Error  : Enabled    Hidden Refresh              : Enabled
System Boot Up Num Lock     : On
Numeric Processor Test      : Enabled
Weitek Processor            : Absent
Floppy Drive Seek At Boot   : Enabled
System Boot Up Sequence     : A:, C:
External Cache Memory       : Enabled
Cyrix Internal Cache        : Enabled
Fast Gate A20 Option        : Enabled
Password Checking Option    : Setup
Video  ROM Shadow C000, 32K: Enabled

ESC:Exit ↑ ← ↓ → :Sel <CTRL>PU/PD:Modify F1:Help F2/F3:Color
F5: Old Values F6: BIOS Setup Defaults F7:Power-On Defaults
```

2.   Use the arrow keys to move between items and to select values. Modify the selected fields using the PgUp/PgDn keys. An explanation of <F> keys follows:

     <F1>:   "Help" gives options available for each item.

     <F2/F3>:   Change color

     <F5> :   Get the old values. The user started the current session with these values.

<F6>:   Load all options in the Advanced CMOS Setup / Advanced Chipset Setup with the BIOS Setup default values.

<F7>:   Load all options in the Advanced CMOS Setup / Advanced Chipset Setup with the Power-On default values.

A short description of the screen items follows:

Typematic Rate Programming   Choose Enabled or Disabled. Enable this option to adjust the keystroke repeat rate.

Typematic Rate Delay   Choose how long after you press a key that a character begins repeating.

Typematic Rate   Choose the rate a character keeps repeating.

Above 1 MB Memory Test   Choose Enabled or Disabled. Enable this option to invoke the POST memory routines on the RAM above 1MB. Disable and BIOS only checks the first 1MB of RAM.

Memory Test Tick Sound   Choose Enabled or Disabled. Enable this option to turn on the "ticking" sound during the memory test.

Hit <DEL> Message Display   Choose Enabled or Disabled. Disable this option to prevent "Hit <DEL>..." message from appearing when system boots-up.

Hard Disk Type 47 Data Area   Data for user-definable disk types are stored at 0:300 lower system RAM. If software problems occur with this location, setting option "DOS 1 KB" relocates the data to the upper DOS shell.

Wait for F1 if any Error   Choose Enabled or Disabled. Enable this option to display "Press <F1> to continue" when a POST non-fatal error occurs. Disable this message to eliminate the need for a response to a non-fatal error message.

System Boot Up Num Lock   Choose On or Off. On puts numeric keypad in Num Lock mode at boot-up. Off puts this keypad in arrow key mode at boot-up.

Numeric Processor Test   Choose Enabled or Disabled. If you insert an 80387DX or 87DLC math coprocessor, you must choose "Enabled." If you do not insert an 80387DX or 87DLC math coprocessor, choose "Disabled." The default setting is "Enabled."

Weitek Processor   Choose Present or Absent. If you insert a Weitek math coprocessor, you must choose "Present." If you do not insert a Weitek math coprocessor, choose "Absent." The default setting is "Absent."

Floppy Drive Seek at Boot   Choose Enabled or Disabled. "Disabled" provides a fast boot and reduces the possibility of damage to the heads.

System Boot Up Sequence   The default setting first attempts to boot from drive A: and then from hard disk C:. You can reverse this sequence with "C: A:", but then drive A: cannot boot directly.

External Cache Memory   Choose Enabled or Disabled. This option lets you enable the 8K cache memory inside the MXIC chipset. For better performance, make sure you always choose "Enabled."

Cyrix Internal Cache   Choose Enabled or Disabled. If you use a Cyrix 486DLC CPU, you must choose "Enabled." If you use an 80386DX CPU, you must choose "Disabled."

Fast Gate A20 Option   Choose Enabled or Disabled. This item lets you use the GA20 from the chipset or the keyboard controller (8742).

Password Checking Option   Choose Disabled, Setup, or Always. Use this feature to prevent unauthorized system boot-up or unauthorized use of BIOS Setup.

"Disabled"–   (Default) Password prompt does not appear when re-booting the system.

"Always"–   Each time the system boots the password prompt appears.

"Setup"–   Password prompt only appears if you attempt to enter the Setup program.

Video or Adaptor ROM Shadow   ROM shadow copies BIOS code from slower ROM to faster RAM. BIOS can then execute from RAM. These 32K segments can be shadowed from ROM to RAM. BIOS is shadowed in a 32K segment if it is enabled and it has BIOS present.

System ROM Shadow   If enabled and BIOS is present in this segment, then system BIOS (64K) is shadowed.

Two Way or Direct Map   The internal 8K cache can operate under either "Two Way Associate" or "Direct map" cache methods. The default setting is "Two Way" for better performance.

Hidden Refresh   Choose Enabled or Disabled. Enable this option to speed performance, for the CPU does not often halt during the refresh cycle.

3. After you have finished with the Advance CMOS Setup program, press the <ESC> key and then follow screen instructions to save or disregard your settings.

AUTO CONFIGURATION WITH BIOS DEFAULTS

This Main Menu item loads the default system values for the 386DX/486DLC CPU. If the CMOS is corrupted the defaults are loaded automatically. Choose this item and the following message appears:

"Load BIOS Setup Default Values from ROM Table (Y/N)? N"

To use the BIOS defaults, change the prompt to "Y" and press <Enter>. The following message appears:

"Default values loaded. Press any key to continue."

AUTO CONFIGURATION WITH POWER-ON DEFAULTS

Use this option as a diagnostic aid if your system behaves erratically. Choose this item and the following message appears:

"Load Power-On Default Values (Y/N)? N"

To use the Power-On defaults, change the prompt to "Y" and press <Enter>. The following message appears:

"Default values loaded. Press any key to continue."

CHANGE PASSWORD

This Main Menu item lets you configure the system so that a password is required every time the system boots or an attempt is made to enter the Setup program. The password cannot be longer than 8 characters.

To use this option, check that the "Password Checking Option" in the Advanced CMOS Setup is enabled.

Important: Keep a safe record of the new password. If you forget or lose the password, the only way to access the system is to discharge CMOS memory using connector J3 on the 357 ISA mainboard, or jumper JP2 on the 356 ISA mainboard, and then using the default password <AMI>.

AUTO DETECT HARD DISK

WARNING: *Do not use this function.*

HARD DISK UTILITY

This Main Menu item gives you three options for analyzing and formatting a hard disk. The three options are:

- **Hard Disk Format** – performs a "low level" format of the hard disk. Check with the hard drive manufacturer to see if this option is required.

- **Auto Interleave** – determines optimum interleave factor before formatting the hard disk.

- **Media Analysis** - analyzes each track of the hard drive. Marks unusable tracks as "bad" to prevent future data storage on those tracks.

WARNING!   *Performing any one of these options destroys all data on the hard disk. You must back-up the hard disk before performing any of these tests.*

MR BIOS

When the setup program provided with the 486 ISA mainboard is the MR BIOS from Microid Research, Enter the Setup program as follows:

Summary Screen

1. Boot the system, and press <Esc> during the memory test, *or* press <Ctrl+Alt+Esc> anytime while the computer is running. The Summary screen appears:

```
MR BIOS (tm) Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

┌─────────────────────────────────────────────────────────────────────┐
│ Summary  Clock  Keyboard  Floppy  Fixed-Disk  Boot-Seq  More--->      │
├─────────────────────────────────────────────────────────────────────┤
│ CPU Type ................ 386DX    │ Floppy 0 ........... 1.2M[5.25]  │
│ CPU Rev ................... 0308    │ Floppy 1 ............. 1.4M[3.5] │
│ CPU MHz ..................... 40    │ Floppy 2 ................ None   │
│ Math Unit.................. n/a    │ Floppy 3 ................ None   │
│                                     │ Fixed 80 ........... 121.4M [47] │
│ RAM Cache ................... 8K    │ Fixed 81 ................ None   │
│ Shadow RAM .............. Enable    │ Boot Sequence .......... A: 1st  │
│                                     │                                  │
│ Memory-Base .............. 640K    │ Anti-Virus............. Disable  │
│ Memory-Extended ......... 3200K    │ Security ............. Disable  │
│ Memory-System ............ 256K    │                                  │
│ Memory-Total ............ 4096K    │ Keyboard ............... PC/AT   │
│                                     │ NumLock .................. Off   │
│ COM1 ...... 3F8 │ LPT1 ...... 378   │ Typematic ............... 30.0  │
│ COM2 ...... 2F8 │ LPT2 ...... n/a   │                                  │
│ COM3 ...... n/a │ LPT3 ...... n/a   │ Video-Primary ....... V/EGA-Color│
│ COM4 ...... n/a │ LPT4 ...... n/a   │ Video-Secondary ........... n/a │
├─────────────────────────────────────────────────────────────────────┤
│ F10 to Record and Exit  ⏎ to Select  Home End  ←↓→ Moves Cursor       │
└─────────────────────────────────────────────────────────────────────┘
```

2. The Summary screen is for viewing only. Nothing can be changed here. To make configuration changes or explore other Setup Utility screens, press the **<Right Arrow>** key to move the cursor rightward on the menu-line.

3. To exit Setup and boot the computer press **<F10>**. All configuration changes are recorded into CMOS memory. To *bail-out* without storing any changes, (1) press <Ctrl+Alt+Del>, or (2) turn off the computer.

The following is a description of each field found on the Summary Screen.

CPU Type	The system's CPU type.
CPU MHz	Fastest operating frequency of the computer.
CPU Rev	Model and revision code of the CPU
Math Unit	Type of numeric coprocessor.
RAM Cache	Configured state of the cache at boot time.
Shadow RAM	Indicates if any Shadow RAM is enabled.
Memory Base	Amount of Base Memory in working order.
Memory Extended	Amount of Extended Memory in working order.
Memory System	Amount of memory for system use.
Memory Total	Total amount of memory in system.
COM1 (2,3,4)	I/O addresses of serial ports in working order.
LPT1 (2,3,4)	I/O addresses of parallel ports in working order.
Floppy 0 (1,2,3)	Floppy drives configured in system.
Fixed 80 and 81	Size and Type set for fixed disk drives C: and D:
Boot Sequence	1st choice from which operating system boots.
Anti-Virus	State of the Anti-Virus feature that write protects the Boot-Sector of the fixed disk.
Security	State of the Password Security feature.
Keyboard	Type of keyboard identified during boot-up.
Numlock	State of Numlock key at boot-up.
Typematic	Keyboard character repeat rate in characters per second.
Video Primary	Video Display Adapter in use when control is passed to an Operating System at boot-time.
Video Secondary	Indicates the presence of a second Video Adapter.

Clock Setup

The system board contains a battery powered Real time Clock (RTC) that maintains the time and date when the computer is shut off.

```
MR BIOS (tm)  Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

 Summary  Clock  Keyboard  Floppy  Fixed-Disk  Boot-Seq  More--->



              Display Format ....... United States

              Time  hh:mm:ss t ........ 11:45:00 p

              Date  mm/dd/yyyy ....... 02/20/1993

              Daylight Savings .......... Enable




   F10 to Record and Exit  ⏎ to Select   Home End ←↓→Moves Cursor
```

Display Format	Choose United States or International format for displaying clock settings.
Time	Use the cursor to set the time.
Date	Use the cursor to set the date.
Daylight Savings	Enable this option to automatically adjust the computer to daylight savings time twice a year.

Keyboard Setup

Power up settings for the NumLock key and keyboard Typematic functions are set in this screen.

```
MR BIOS (tm)  Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

  Summary  Clock  [Keyboard]  Floppy  Fixed-Disk  Boot-Seq  More--->

       Powerup NumLock ................. Disable

       Typematic Repeat Rate ......... 30.0 cps

       Delay Before Repeat ........... 0.50 sec




   F10 to Record and Exit   ⌐ to Select   Home End ←↓→ Moves Cursor
```

Powerup NumLock Choose Off for cursor control or On for numeric entry.

Typematic Repeat Rate Choose the rate a key repeats after holding it down.

Delay Before Repeat Choose a delay that lets you release a key before it begins to repeat.

Floppy Setup

Configure the system for up to four diskette drives.

```
MR BIOS (tm)  Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

  Summary  Clock  Keyboard  [Floppy]  Fixed-Disk  Boot-Seq  More--->


              ┌─────────────────────────┐
              │  Floppy Drive Configuration │
              │                             │
              │  Floppy 0 ........ 5.25 1.2M │
              │  Floppy 1 ........ 3.5  1.4M │
              │  Floppy 2 ............. None │
              │  Floppy 3 ............. None │
              │                             │
              │  Step-Rate ........... Fast │
              └─────────────────────────┘


   F10 to Record and Exit   ⌐ to Select   Home End ←↓→ Moves Cursor
```

Floppy 0 (1,2,3) Specify each drive from the following list:

360K 5.25-inch low density

720K 3.5-inch low density

1.2M 5.25-inch high density

1.4M 3.5-inch high density

2.8M 3.5-inch extra density

Step Rate Choose a track-to-track speed of the recording heads — **Fast** for improved performance on modern equipment, — **Slow** for backward compatibility with original PC standards.

Fixed Disk Setup

This screen provides two utilities: the Drive Definition utility and the Low-Level Format utility.

```
MR BIOS (tm)  Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

  Summary  Clock  Keyboard  Floppy  Fixed-Disk  Boot-Seq  More--->

  ┌─────────────────────────────┐        ┌─────────────────────────┐
  │ Fixed Disk 80 (C:)          │        │ Fixed Disk 81 (D:)      │
  └─────────────────────────────┘        └─────────────────────────┘
                          (Low Level) Format     Size ......... None
  Size ....... 42.5M
                          Drive (C/D) .... *     Type ......... None
  Type .......... 17      Start Cyl ...... *     Cylinders ..... n/a
  Cylinders .... 977      Final Cyl ...... *     Heads ......... n/a
  Heads .......... 5      Interleave ..... *     Precomp ....... n/a
  Precomp ...... 300      Ready (y/n) .... *     Landing ....... n/a
  Landing ...... 977                             Sectors ....... n/a
  Sectors ....... 17
                                                 Translate ..... n/a
  Translate ..... No
  Anti-Virus ... Yes


    F10 to Record and Exit  ⏎ to Select  Home End ←↓→ Moves Cursor
```

Fixed Disk 80 (C:) Specify the parameters for each drive. Refer to
Fixed Disk 81 (D:) the documentation furnished with the drive.
See Appendix D for drive types with built-in parameter table. Drive types 46 & 47 let you manually enter custom parameters to describe any drive you may have now or in the future.

Low-Level Format **Warning:** This utility can erase the entire contents of your fixed disk. This procedure is usually performed in the factory and you generally need not be concerned with it. Unless you are absolutely certain that your fixed disk lacks this format, you should never use this utility.

Boot Sequence Setup

This screen provides three system startup functions: Boot Sequence, Memory Priming, and Cold-Boot Delay.

```
MR BIOS (tm)  Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

  Summary  Clock  Keyboard  Floppy  Fixed-Disk  Boot-Seq  More--->

            Boot Sequence .............. C: 1st, A: 2nd
            Memory Priming ................... Full Test
            Cold-Boot Delay ..................... 3 Sec

  ┌─────────────────────────────────────────────────────────┐
  │ Cold-Boot Key Sequence                                  │
  │ ⏎ .................... Boot to Screen Prompt             │
  │ ESC .................. Boot to Setup Utility             │
  │                                                         │
  │ Warm-Boot Key Sequence                                  │
  │ CTRL ALT DEL ........ Standard Warm Restart             │
  │ CTRL ALT ⏎ .......... Boot to Screen Prompt             │
  │ CTRL ALT ESC ........ Boot to Setup Utility             │
  └─────────────────────────────────────────────────────────┘


    F10 to Record and Exit  ⏎ to Select  Home End ←↓→ Moves Cursor
```

Boot Sequence Specify the order your disk drives are accessed when loading the Operating System.

Memory Priming Specify the memory test that executes during power-up, either normal or fast mode. The **Full Test** should normally be selected.

Cold-Boot Delay Provides additional power-up time required by some slow mechanical devices. Unless you have this type of problem, disable the delay by selecting **None**.

Security Setup

This utility lets you: arm security and establish a password, Disarm Security (eliminate password), change the Security option, and change the password.

```
MR BIOS (tm)  Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

   <---More  Security  First-Aid  Speed  Cache  Shadow  Chipset




              Security ................Disable










    F10 to Record and Exit  ⌐ to Select  Home End ←↓→Moves Cursor
```
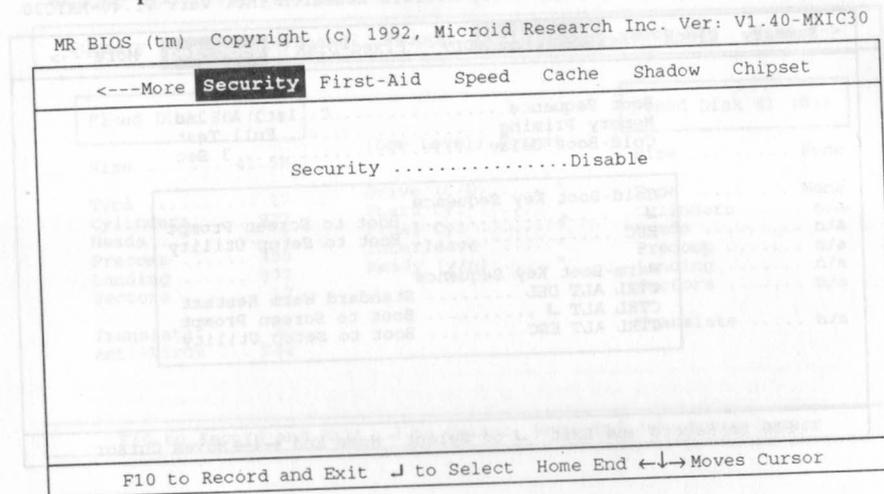
Setup Only Prevents unauthorized access to the Setup Utility. Access to other Setup menus is denied unless a valid Security code is entered at this prompt.

Power-up/Setup Restricts Setup utility access as well as unauthorized entry to the computer after power-up. Access is denied unless a valid Security code is entered at this prompt.

First-Aid Setup

The options in this screen enhance or correct the operation of certain software applications.

```
MR BIOS (tm)  Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

   <---More  Security  First-Aid  Speed  Cache  Shadow  Chipset

  Certain PC design advances may reveal/cause difficulties with existing
  software. These special options may correct/enhance system operation.


              Novell Keyboard Management .......... No

              Prevent Math Unit Access ............ No







    F10 to Record and Exit  ⌐ to Select  Home End ←↓→Moves Cursor
```
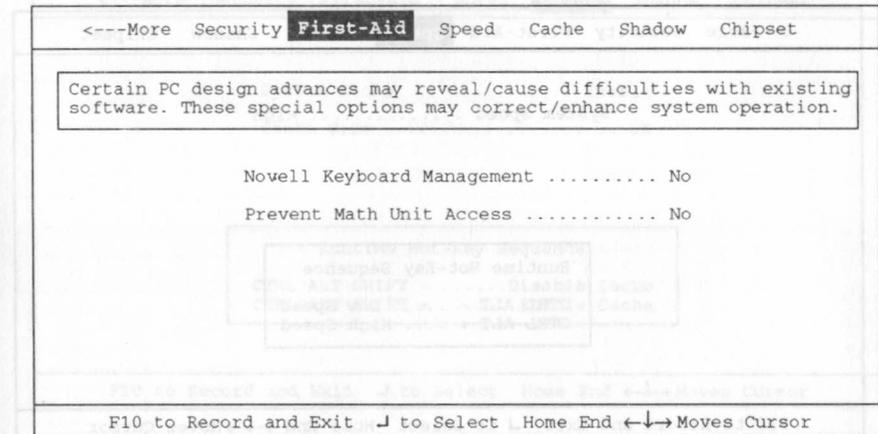
Novell Keyboard Management If the keyboard is sluggish while using a Novell product, set this field to a non-zero value from 1 to **30**. Use the smallest number that results in satisfactory performance. Otherwise select **No**.

Prevent Math Unit Access Set this field to the default value **No**. Note that if you choose **Yes**, you must not use a math coprocessor.

Speed Setup

Configure the operating speed of the CPU with this screen. Your selection is put into effect each time the system boots.

```
MR BIOS (tm) Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

   <---More  Security  First-Aid  [Speed]  Cache  Shadow  Chipset


              System Speed ............. High



              +-------------------------------------+
              |      Runtime Hot-Key Sequence       |
              |                                     |
              |  CTRL ALT - ..... Low Speed         |
              |  CTRL ALT + .... High Speed         |
              +-------------------------------------+


    F10 to Record and Exit  ⌐ to Select  Home End ←↓→ Moves Cursor
```
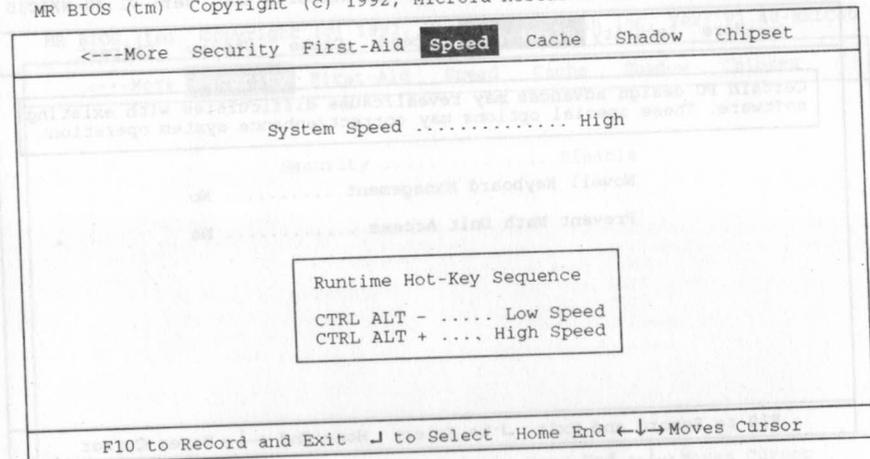
High   This maximizes system performance, and is the usual choice.

Low   This reduces performance to simulate original slower PCs.

Note: *You can change system speed during normal run time by pressing* **<Ctrl+Alt+Plus>** *for High speed, or* **<Ctrl+Alt+Minus>** *for Low speed.*

Cache Setup

This screen lets you enable/disable your system's cache.

```
MR BIOS (tm) Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

   <---More  Security  First-Aid  Speed  [Cache]  Shadow  Chipset


           System Cache ............... Enable

           Cache Size .................... 8K


              +-------------------------------------+
              |      Runtime Hot-Key Sequence       |
              |                                     |
              |  CTRL ALT SHIFT - ..... Disable Cache |
              |  CTRL ALT SHIFT + ...... Enable Cache |
              +-------------------------------------+


    F10 to Record and Exit  ⌐ to Select  Home End ←↓→ Moves Cursor
```
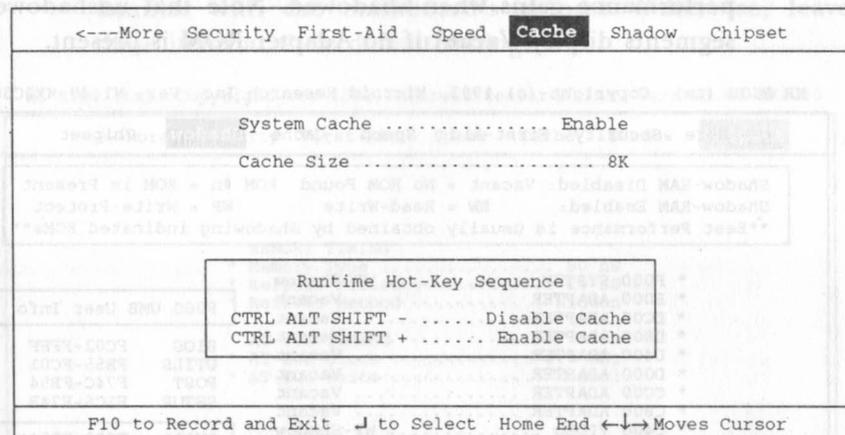
Note: *The values shown above are default values.*

System Cache   Choose Enable or Disable to enable/disable the chipset's internal cache controller. In general, you should use the default value **Enable**.

Cache Size   The BIOS automatically detects cache size.

Shadow RAM Setup

Shadow RAM copies ROM into faster main memory. BIOS and VGA adapter ROM demonstrates significant performance gains when shadowed. Note that unshadowed segments display **Vacant** if no Adapter ROM is present.

```
MR BIOS (tm)  Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

    <---More  Security  First-Aid  Speed  Cache  Shadow  Chipset

    Shadow-RAM Disabled: Vacant = No ROM Found  ROM #n = ROM is Present
    Shadow-RAM Enabled:      RW = Read-Write       WP = Write-Protect
    **Best Performance is usually obtained by Shadowing indicated ROMs**


        * F000 SYSTEM ............. WP-Shadow
        * E000 ADAPTER ............. Vacant
        * DC00 ADAPTER ............. Vacant     F000 UMB User Info
        * D800 ADAPTER .............Vacant
        * D400 ADAPTER ............. Vacant     BIOS    FC02-FFFF
        * D000 ADAPTER ............. Vacant     UTILS   FB55-FC01
        * CC00 ADAPTER ............. Vacant     POST    F74C-FB54
        * C800 ADAPTER ............. Vacant     SETUP   F1C6-F74B
        * C400 VIDEO  ............. WP-Shadow
        * C000 VIDEO  ............. WP-Shadow    AVAIL:  F000-FB54

    * Default

    F10 to Record and Exit   ⌐ to Select   Home End ←↓→ Moves Cursor
```

F000 system	The system BIOS occupies this 64K segment. For best results always enable WP-Shadow.
C800 ~ E000 Adapter	If present, adapter ROMs for non-video devices are present in these segments.
C000 & C400 Video	Video Adapter ROMs usually occupy both of these 16K segments. Enable for best performance.
F000 UMB User Info	This provides a view-only summary of the Upper Memory Block space. You need to furnish this information to your Memory Manager software to create a UMB in the F000 BIOS region.

Chipset Setup

Technical core-logic functions of the mainboard's chipset are managed here. Adjust these settings only if you are familiar with the mainboard's chipset. Otherwise, leave these items at their default settings.

```
MR BIOS (tm) Copyright (c) 1992, Microid Research Inc. Ver: V1.40-MXIC30

    <---More  Security  First-Aid  Speed  Cache  Shadow  Chipset




                    MEMORY TIMING
                  * Memory Type ................ 80 nS
                  * Refresh Period ............ 15 nS
                  * Refresh Method ............ Hidden

                    AT-BUS TIMING
                  * AT-Bus Clock ............. 8.0 MHz
                  * AT-Bus Waits ............. Normal




    F10 to Record and Exit  ⌐ to Select  Home End ←↓→ Moves Cursor
```

Important: For the 356/357 mainboard to operate normally, it is recommended that you always use the default values as shown above.

Appendix A
AMI BIOS Hard Disk Types

The AMI BIOS supports the following hard disk types.

Type	Cylinders	Heads	WPrec	LZone	Sect	Capacity (MB)
1	306	4	128	305	17	10
2	615	4	300	615	17	20
3	615	6	300	615	17	31
4	940	8	512	940	17	62
5	940	6	512	940	17	47
6	615	4	65535	615	17	20
7	462	8	256	511	17	31
8	733	5	65535	733	17	30
9	900	15	65535	901	17	112
10	820	3	65535	820	17	20
11	855	5	65535	855	17	35
12	855	7	65535	855	17	50
13	306	8	128	319	17	20
14	733	7	65535	733	17	43
16	612	4	0	663	17	20
17	977	5	300	977	17	41
18	977	7	65535	977	17	57
19	1024	7	512	1023	17	60
20	733	5	300	732	17	30

Type	Cylinders	Heads	WPrec	LZone	Sect	Capacity (MB)
21	733	7	300	732	17	43
22	733	5	300	733	17	30
23	306	4	0	336	17	10
24	925	7	0	925	17	54
25	925	9	65535	925	17	69
26	754	7	754	754	17	44
27	754	11	65535	754	17	69
28	699	7	756	699	17	41
29	823	10	65535	823	17	68
30	918	7	918	918	17	53
31	1024	11	65535	1024	17	94
32	1024	15	65535	1024	17	128
33	1024	5	1024	1024	17	43
34	612	2	128	612	17	10
35	1024	9	65535	1024	17	77
36	1024	8	512	1024	17	68
37	615	8	128	128	17	41
38	987	3	987	128	17	25
39	987	7	987	987	17	57
40	820	6	820	820	17	41
41	977	5	977	977	17	41
42	981	5	981	981	17	41
43	830	7	512	830	17	48
44	830	10	65535	830	17	69
45	917	15	65535	918	17	114
46	000	00	000	000	17	152

Appendix B
AMI BIOS Error Codes

This appendix describes the AMI BIOS POST Error Codes.

Every time you power on the system, the POST (Power On Self Test) diagnostic routines check to make sure your system is running properly. During boot-up, the POST communicate errors to you as either a series of beeps, or as messages on the display screen.

Fatal errors do not let the system complete boot-up, and are usually signaled as a series of beeps, since your display may not come on. Non-fatal errors allow boot-up to continue, and error messages appear on the screen.

BEEP ERROR CODES

These codes are emitted as a series of audible beeps. All Beep Error Codes, except for number 8, are fatal errors. If your system does not boot-up and starts beeping, write down the number of beeps you hear and consult an authorized repair person.

Beep Error Codes and their meanings follow:

Number of Beeps	Error Message
1	Refresh Failure
2	Parity Error
3	Base 64 KB Memory Failure
4	Timer Not Operational
5	Processor Error
6	8042 – Gate A20 Failure
7	Processor Exception Interrupt Error
8	Display Memory Read/Write Error
9	ROM Checksum Error
10	CMOS Shutdown Register Read/Write Error

ERROR MESSAGES

Non-fatal Error Messages usually appear on the screen as follows:

ERROR Message Line 1
ERROR Message Line 2
Press <F1> to RESUME

After you note the Error Message, then press the <F1> key to allow the system to proceed with boot-up. A list of Error Messages follows:

Message	Action
CH-2 Timer Error	Consult an authorized repair person
INTR #1 Error	Consult an authorized repair person
INTR #2 Error	Consult an authorized repair person
CMOS Battery State Low	Replace the battery
CMOS Checksum Failure	Run the BIOS SETUP program
CMOS System Options Not Set	Run the BIOS SETUP program
CMOS Display Type Mismatch	Run the BIOS SETUP program
Display Switch Not Proper	Properly set the video switch on the mainboard to monochrome or color

Message	Action
Keyboard Is Locked...Unlock It	Unlock the keyboard lock to continue boot-up
Keyboard Error	Make sure you have the AMI keyboard BIOS installed, or set the Standard CMOS Setup's "Keyboard" option to "Not Installed."
KB/Interface Error	Consult an authorized repair person
CMOS Memory Size Mismatch	Run the BIOS SETUP program
FDD Controller Failure	Check all connections after the system is powered off
HDD Controller Failure	Check all connections after the system is powered off
C: Drive Error	Check Standard CMOS Setup to see if correct hard disk is selected
D: Drive Error	Check Standard CMOS Setup to see if correct hard disk is selected
C: Drive Failure	Consult an authorized repair person
D: Drive Failure	Consult an authorized repair person
CMOS Time & Date Not Set	Check Standard CMOS Setup to see if correct date and time are selected
Cache Memory Bad, Do Not Enable Cache!	Consult an authorized repair person
8042 Gate-A20 Error	Replace the 8042 chip
Address Line Short!	Consult an authorized repair person

Message	Action
DMA #2 Error	Consult an authorized repair person
DMA #1 Error	Consult an authorized repair person
DMA Error	Consult an authorized repair person
No ROM BASIC	Consult an authorized repair person
Diskette Boot Failure	Use another boot disk
Invalid Boot Diskette	Use another boot disk
On Board Parity Error	Use memory diagnostic software, such as AMIDIAG, to find and correct memory problems.
Off Board Parity Error	Use memory diagnostic software, such as AMIDIAG, to find and correct memory problems.
Parity Error ????	Use memory diagnostic software, such as AMIDIAG, to find and correct memory problems.

HARD DISK UTILITY ERROR MESSAGES

The following error messages may appear during the Hard Disk Utility routines of the BIOS Setup program. The first four messages may appear during initialization; the rest may appear during operations.

Message	Action
No Hard Disk Installed	Check if hard disk is on the system
FATAL ERROR Bad Hard Disk	Check all cables and power connections
Hard Disk Controller Failure	Check that the controller is properly inserted in the BUS slot
C: (D:) Hard Disk Failure	Check all cables and power connections
Undefined Error - Command Aborted	Consult an authorized repair person
Address Mark Not Found	Consult an authorized repair person
Requested Sector Not Found	Consult an authorized repair person
Reset Failed	Consult an authorized repair person
Drive Parameter Activity Failed	Check to see if the proper drive type is selected in the Standard CMOS Setup
Bad Sector Flag Detected	Consult an authorized repair person
Bad ECC on Disk Read	Consult an authorized repair person

Message	Action
ECC Corrected Data Error	Consult an authorized repair person
Controller Has Failed	Consult an authorized repair person
Seek Operation Failed	Consult an authorized repair person
Attachment Failed to Respond	Consult an authorized repair person
Drive Not Ready	Consult an authorized repair person
Write Fault on Selected Drive	Consult an authorized repair person

Appendix C
MR BIOS Fixed Disk Table

The MR BIOS supports the following fixed disk types.

Type	Capacity (MB)	Cylinders	Heads	WPrec	LZone	Sect
1	10.7	306	4	128	305	17
2	21.4	615	4	300	615	17
3	32.1	615	6	300	615	17
4	65.5	940	8	512	940	17
5	49.1	940	6	512	940	17
6	21.4	615	4	None	615	17
7	32.2	462	8	256	511	17
8	31.9	733	5	None	733	17
9	117.5	900	15	None	901	17
10	21.4	820	3	None	820	17
11	37.2	855	5	None	855	17
12	52.1	855	7	None	855	17
13	21.3	306	8	128	319	17
14	44.7	733	7	None	733	17
15	0.0	0	0	None	0	0
16	21.3	612	4	0	663	17
17	42.5	977	5	300	977	17
18	59.5	977	7	None	977	17
19	62.4	1024	7	512	1023	17
20	31.9	733	5	300	732	17

Type	Capacity (MB)	Cylinders	Heads	WPrec	LZone	Sect
21	44.7	733	7	300	732	17
22	21.9	733	5	300	733	17
23	10.7	306	4	0	336	17
24	42.9	805	4	None	805	26
25	72.5	925	9	None	925	17
26	104.9	776	8	None	776	17
27	44.6	1024	5	512	1024	17
28	71.3	1024	8	None	1023	17
29	71.6	823	10	None	823	17
30	159.8	1224	15	None	1223	17
31	98.0	1024	11	None	823	17
32	133.7	1024	15	None	1024	17
33	44.6	1024	5	None	1024	17
34	10.7	612	2	128	612	17
35	80.2	1024	9	None	1024	17
36	71.3	1024	8	512	1024	17
37	42.8	615	8	128	615	17
38	71.6	823	10	256	823	17
39	42.2	809	6	128	809	17
40	42.8	820	6	None	820	17
41	42.5	977	5	None	977	17
42	42.7	981	5	None	981	17
43	71.6	823	7	512	823	17
44	72.2	830	10	None	830	17
45	119.7	917	15	None	917	17
46	User programmable					
47	User programmable					

Appendix D
MR BIOS Error Codes

This appendix describes the MR BIOS Error Codes.

Diagnostic Port 80H POST-CODES

00/00H	Cold Boot Commences (Not seen with warm-boot).
01/01H	Hook 00. OEM specific, typically resets chipset to default.
02/02H	Disable critical I/O: 6845s, 8237s, 7675, and parity latches.
03/03H	BIOS checksum test.
04/04H	Page register test. (Ports 81-8F).
05/05H	8042 (Keyboard Controller) Self test.
06/06H	Gang Port Init: 8237 m/s, 8254 ch2/1, RTC REG F/A, 8259 m/s.
07/07H	HOOK 01. OEM specific, typically disables cache, shadow.
08/08H	Refresh toggle test (PORTB).
09/09H	Pattern test master/slave 8237s, eight 16-bit regs each.
10/0AH	Base 64K memory test.
11/0BH	Pattern test master/slave 8259 mask regs.
12/0CH	8259 / IRQ test, purge powerup ints.
13/0DH	8254 channel-0 test and initialization
14/0EH	8254 channel-2 toggle test, test speaker circuitry.
15/0FH	RTC tests/inits: Init REG-B, write/readback NVRAM, PIE test.
19/13H	HOOK 02. OEM specific, select 8MHz bus.
16/10H	Video initialization
17/11H	CMOs Checksum test.
18/12H	Signon msg. Accepts KB BAT, perform 1st try KB init, cold-boot delay.

Port 80H		
20/14H	Size/Test base memory (low 64K already done)	
21/15H	Perform 2nd try KB init, if necessary.	
22/16H	HOOK 03. OEM specific. Size/Test cache.	
23/17H	Test A20 gate, off then on.	
24/18H	Size/Test extended memory.	
25/19H	HOOK 04 and Size/Test system memory ("special" OEM memory).	
26/1AH	Test RTC Update-In-Progress and validate time.	
27/1BH	Serial port determination, off-board/on-board.	
28/1CH	Parallel port determination, off-board/on-board.	
29/1DH	Coprocessor determination/initialization	
30/1EH	Floppy controller test/determination, cmos validation.	
31/1FH	Fixed Disk controller test/determination, cmos validation.	
32/20H	Rigorous CMOS parameter validation display other config. changes	
33/21H	Front-Panel lock check, wait for user to acknowledge errors.	
34/22H	Set NumLock, Password Security Trap, dispatch to Setup-Utility.	
35/23H	HOOK 05. OEM specific.	
36/24H	Set typematic rate.	
40/28H	HOOK 06. OEM specific, typically enables shadow, cache, turbo.	
37/25H	Floppy subsystem initialization.	
38/26H	Fixed subsystem initialization.	
39/27H	ACK errors, set primary adapter video mode.	
41/29H	Disable A20-gate, set low stack, install C800-0E000 ROMs.	
42/2AH	ACK errors, set video mode, set DOS time variables from RTC.	
43/2BH	Enable parity checking and NMI.	
44/2CH	Install E000 ROM.	
45/2DH	ACK errors.	
46/2EH	HOOK 07. OEM specific. Log-in EMS (if built-in).	
47/2FH	Pass control to INT19 (boot disk).	

BEEP CODES and MESSAGES

Beep Codes - L = low tone and H = high tone

Port 80H	Beep Code	Error Message
03/03H	LH-LLL	ROM-BIOS Checksum Failure
04/04H	LH-HLL	DMA Page Register Failure
05/05H	LH-LHL	Keyboard Controller Self test Failure
07/07H	LH-HHL	Memory Refresh Circuitry Failure
08/08H	LH-LLH	Master (16 bit) DMA Controller Failure
08/08H	LH-HLH	Slave (8 bit) DMA Controller Failure
10/0AH	LH-LLLL	Memory Bank 0 Pattern Test Failure
10/0AH	LH-HLLL	Memory Bank 0 Parity Circuit Failure
10/0AH	LH-LHLL	Memory Bank 0 Parity Error
10/0AH	LH-HHLL	Memory Bank 0 Data Bus Failure
10/0AH	LH-LLHL	Memory Bank 0 Address Bus Failure
10/0AH	LH-HLHL	Memory Bank 0 Block Access Read Failure
10/0AH	LH-LHHL	Memory Bank 0 Block Access Read/Write Failure
11/0BH	LH-HHHL	Master 8259 (Port 21) Failure
11/0BH	LH-LLLH	Slave 8259 (Port 21) Failure
12/0CH	LH-HLLH	Master 8259 (Port 20) Interrupt Address Error
12/0CH	LH-LHLH	Slave 8259 (Port 20) Interrupt Address Error
12/0CH	LH-HHLH	8259 (Port 20/A0) Interrupt Address Error
12/0CH	LH-LLHH	Master 8259 (Port 20) Stuck Interrupt Error

Port 80H	Beep Code	Error Message
12/0CH	LH-HLHH	Slave 8259 (Port 20) Stuck Interrupt Error
12/0CH	LH-LHHH	System Timer 8254 CH0/IRQ0 Interrupt Failure
13/0DH	LH-HHHH	8254 Channel 0 (System Timer) Failure
14/0EH	LH-LLLLH	8254 Channel 2 (Speaker) Failure
14/0EH	LH-HLLLH	8254 OUT2 (Speaker Detect) Failure
15/0FH	LH-LHLLH	CMOS RAM Read/Write Test Failure
15/0FH	LH-HHLLH	RTC Periodic Interrupt/IRQ8 Failure
16/10H	LH-LLHLH	Video ROM Checksum Failure at Address xxxx
		Mono Card Memory Error At Address xxxx
		Mono Card Memory Address Line Error at Address xxxx
		Color Graphics Card Memory Error at Address xxxx
		Color Graphics Card Address Line Error at Address xxxx
17/11H	(None)	Real Time Clock (RTC) battery is Discharged
17/11H	(None)	Battery Backed Memory (CMOS) is Corrupt
18/12H	LH-HLHLH	Keyboard Controller Failure
20/14H 24/18H 25/19H	LH-LHHLH	Memory Parity Error
20/14H 24/18H 25/19H	LH-HHHLH	I/O Channel Error

Port 80H	Beep Code	Error Message
20/14H 24/18H 25/19H	(None)	RAM Pattern Test Failed at xxxx Parity Circuit Failure in Bank xxxx Data Bus Test Failed: Address xxxx Address Line Test Failed at xxxx Block Access Read Failure at Address xxxx Block Access Read/Write Failure: Address xxxx Banks Decode to Same Location: xxxx and yyyy
18/12H 21/15H	(None)	Keyboard Error - Stuck Key Keyboard Failure or no Keyboard Present
23/17H	LH-LLLHH	A20 Test Failure Due to 8042 Timeout
23/17H	LH-HLLHH	A20 Gate Stuck in Disabled State (A20=0)
23/17H	(None)	A20 Gate Stuck in Asserted State (A20 Follows CPU)
26/1AH	LH-LHLHH	Real Time Clock (RTC) is Not Updating
26/1AH	(None)	Real Time Clock (RTC) Settings are Invalid
30/1EH	(None)	Diskette CMOS Configuration is Invalid Diskette Controller Failure Diskette Drive A: Failure Diskette Drive B: Failure
31/1FH	(None)	Fixed Disk CMOS Configuration is Invalid Fixed Disk C: (80) Failure Fixed Disk D: (81) Failure Please Wait for Fixed Disk to Spin Up

Port 80H	Beep Code	Error Message
32/20H	(None)	Fixed Disk Configuration Change Diskette Configuration Change Serial Port Configuration Change Parallel Port Configuration Change Video Configuration Change Memory Configuration Change Numeric Coprocessor Configuration Change
33/21H	(None)	System Key is in Locked Position - Turn Key to Unlocked Position
41/29H	(None)	Adapter ROM Checksum Failure at Address xxxx

Appendix E
Technical Reference

This appendix offers technical information relevant to the 356/357 ISA mainboard.

I/O Address Map

The I/O Address Map is a map of the mainboard's memory.

Address	Device
00–1F	DMA Controller #1, DMA, 8237A-5, 8-bit devices
20–3F	Programmable Interrupt Controller #1, 8259A PIC
40–5F	Timer/Counter (8254)
60, 64	Keyboard Controller (8742)
61	On-board testing registers
70, 71	Clock/calendar (146818)
70 bit 7	NMI Mask
78	On-board test stimulus register
80–9F	DMA Page Register (74LS612)
A0–BF	Programmable Interrupt Controller #2, 8259A PIC
C0–DF	DMA Controller #2, DMA, 8237A-5, 16-bit pieces
F0	Clears the busy signal of the math coprocessor
F1	Reset the math coprocessor
F8–FF	Math coprocessor

Interrupt Controllers

The interrupt lines are shown in the table below:

Priority	Source	Destination
0	Time channel 0	Master PIC, Interrupt 0
1	Keyboard Controller	Master PIC, Interrupt 1
2	Slave PIC	Master PIC, Interrupt 2
3	Clock/calendar, IRQ8	Slave PIC, Interrupt 0
4	8-bit slot, IRQ9	Slave PIC, Interrupt 1
5	16-bit slot, IRQ10	Slave PIC, Interrupt 2
6	16-bit slot, IRQ11	Slave PIC, Interrupt 3
7	16-bit slot, IRQ12	Slave PIC, Interrupt 4
8	Math coprocessor error, IRQ13	Slave PIC, Interrupt 5
9	16-bit slot, IRQ14	Slave PIC, Interrupt 6
10	16-bit slot, IRQ15	Slave PIC, Interrupt 7
11	8-bit slot, IRQ3, serial port	Master PIC, Interrupt 3
12	8-bit slot, IRQ4, serial port	Master PIC, Interrupt 4
13	8-bit slot, IRQ5, printer port	Master PIC, Interrupt 5
14	8-bit slot, IRQ6, Flexible disk port	Master PIC, Interrupt 6
15	8-bit slot, IRQ3, printer port	Master PIC, Interrupt 7