MITSUBISHI
ELECTRIC

CX SERIES
Owner's Handbook

CX SERIES
OWNER'S HANDBOOK

DESKTOP (KL) EDITION

SAFETY AND REGULATORY NOTICES

General

Electrical

The system employs a safety ground
Das System benötigt aus Sicherheitsgründen einen Masseanschluß
Le système doit être mis à la terre
Dette system bruger en sikkerhedsjordforbindelse
Apparaten skall anslutas till jordat uttag när den anslutas till ett nätverk

The system unit AC power cord is its 'disconnect device'. Ensure that the system unit is positioned close to the AC power outlet and that the plug is easily accessible.

The power cord packed with the computer complies with the safety standards applicable in the country in which it is first sold. Use only this power cord. Do not substitute a power cord from any other equipment.

To prevent fire and electric shock, do not expose any part of the computer to rain or moisture. Turn off the computer and unplug all power cords before moving or cleaning the system unit, or removing the system unit top cover.
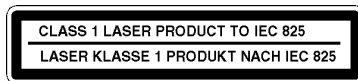
Battery

This product contains a lithium battery.

Do not use a metal or other conductive implement to remove the battery. If a short-circuit is made between its positive and negative terminals the battery may explode.

Replace a discharged battery with one of the same type; another type may explode or ignite. Follow the instructions contained in the *Owner's Handbook* to replace the battery. Dispose of a discharged battery promptly and in accordance with the battery manufacturer's recommended instructions. Do not recharge, disassemble or incinerate the discharged battery. Keep away from children.

Laser products

Any CD-ROM drive fitted in this system is classified as a CLASS 1 LASER PRODUCT according to IEC825 *Radiation Safety of Laser Products (Equipment Classification: Requirements and User's Guide)*. The CLASS 1 LASER PRODUCT label is located on the underside of the system unit.

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┌─────────────────────────────────────────┐
│  CLASS 1 LASER PRODUCT TO IEC 825        │
│  ─────────────────────────────────────   │
│  LASER KLASSE 1 PRODUKT NACH IEC 825     │
└─────────────────────────────────────────┘
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The CD-ROM drive contains a laser system which is harmful to the eyes if exposed. Do not attempt to disassemble the CD-ROM drive; if a fault occurs, call an authorised maintainer.

Use the CD-ROM drive only as described in this manual. Failure to do so may result in exposure to hazardous radiation.

Ergonomic

When positioning the system unit, monitor and keyboard, take into account any local or national regulations relating to ergonomic requirements.

Anti-static precautions

Warning

Static electricity can cause permanent damage to electronic components. You should be aware of this risk, and take precautions against the discharge of static electricity into the computer.

The computer is at risk from static discharge while the top cover is off. This is because the electronic components of the motherboard are exposed. Memory modules, expansion cards and replacement processors are examples of electrostatic sensitive devices (ESSDs).

All work that involves removing the cover must be done in an area completely free of static electricity. We recommend using a Special Handling Area (SHA) as defined by EN 100015-1: 1992. This means that working surfaces, floor coverings and chairs must be connected to a common earth reference point, and you should wear an earthed wrist strap and anti-static clothing. It is also a good idea to use an ionizer or humidifier to remove static from the air.

When installing any upgrade, be sure you understand what the installation procedure involves before you start. This will enable you to plan your work, and so minimise the amount of time that sensitive components are exposed.

Do not remove the system unit cover, nor the anti-static bag or wrapping of any upgrade, until you need to.

Handle static-sensitive items with extreme care. Hold expansion cards and add-on components only by their edges, avoiding their electrical contacts. Never touch the components or electrical contacts on the motherboard or on expansion cards. In general, do not handle static-sensitive items unnecessarily.

Keep all conductive material, and food and drink, away from your work area and the open computer.

Thermalcote bonding compound

The thermal bonding compound used between the system processor and its heat sink can cause skin irritation and stain clothing. Avoid prolonged or repeated contact with skin. Wash thoroughly with soap and water after handling. Avoid contact with eyes and inhalation of fumes. Do not ingest.

Maintenance

Switch off and disconnect all cables before attempting to clean the computer.

Do not use sprays, solvents or abrasives that might damage the system unit surface. Do not use cleaning fluids or sprays near air vents, ports, or the diskette and CD-ROM drives.

Occasionally wipe the system unit with a soft, slightly damp, lint-free cloth.

Occasionally wipe over the air vents on the rear and sides of the system unit. Dust and fluff can block the vents and limit the airflow.

Occasionally clean the diskette and CD-ROM drives using a proprietary head cleaner.

Occasionally wipe the monitor with a soft, slightly damp, lint-free cloth. It is best to use anti-static glass cleaner on the monitor screen, but do not spray glass cleaner directly onto the screen; it could run down inside the case and damage the circuitry.

Transporting

Use common sense when handling the computer; hard disks in particular can be damaged if the computer is dropped or handled roughly. As a precaution, back up the contents of the hard disks to tape or diskettes before moving the computer.

Switch off and disconnect all cables before attempting to move the computer, particularly do not try to move the computer while it is plugged into the AC power supply.

When lifting and carrying the computer, use the metal sides of the system unit and never attempt to lift the system unit with a monitor still on top.

If you need to transport the computer any great distance, use the original packing materials.

If you are planning to use the computer in another country, it may not be suitable, check with your supplier, particularly on the availability of the correct AC power cords.

Note
Any existing maintenance or warranty agreement may not be supportable in another country. The system may have to be returned to the supplier.

Legalities

This equipment complies with the relevant clauses of the following European Directives (and all subsequent amendments):

Low Voltage Directive	**73/23/EEC**
EMC Directive	**89/336/EEC**
Telecommunications Directive	**91/263/EEC**
CE Marking Directive	**93/68/EEC**

Important
This system, when supplied, complies with the CE Marking Directive and its strict legal requirements. Use only parts tested and approved by Mitsubishi Electric PC Division. All expansion cards, drives and peripherals should carry the CE mark.

Standards

Safety

This product complies with the International Safety Standard **IEC950** and additional requirements thereto to comply with European Safety Standard **EN60950**.

Electro-magnetic Compatibility (EMC)

This product complies with the following European EMC standards:

Emissions EN50022 Class B

Immunity EN50082-1

This product also complies with the following International EMC standards:

VCCI (Japan) Class B

Notes

All interconnecting cables (for example, signal and communication cables) should be less than 2 metres in length. If cable extensions are used, ensure adequate earth connections are provided and screened cables are used.

If any metal casework components are removed, during upgrade work for example, ensure that all metal parts are correctly re-assembled and all internal and external screws are re-fitted and correctly tightened.

This system has an on-board network connection. If you add an additional network card, any attempt to use two network connections simultaneously may result in the product no longer being compliant with the CE Marking Directive. Consult your Mitsubishi Electric PC dealer for up to date information.

Power Connection

Typical AC plugs
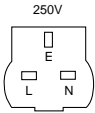
250V	250V	125V	250V	250V
BS1363A	**SHUCO**	**NEMA 5-15P**	**SRAF 1962/DB16/87**	**ASE 1011**
U. K.	Austria Belgium	Taiwan	Denmark	Switzerland
	Finland France	Thailand		
	Italy Germany	Japan		
	Sweden Norway	USA		
	Holland	Canada		

Checking the AC power supply

When this product is delivered, it is ready for the commercial AC power supply generally available in the country in which it is first sold. It has been set for the correct voltage range, and is supplied with an AC power cord and plug which comply with the relevant safety standards.

Before using the product in a country other than that in which it was originally sold, you must check the voltage and frequency of that country's AC power supply, and the type of power cord required there. Check the power rating labels on the rear of the computer's system unit and its monitor to ensure that they are compatible with the AC power supply.

The computer can function within two alternative AC power supply ranges, according to the position of the voltage selection switch on the rear of the system unit:

Switch setting	*AC power supply (voltage and frequency)*
115	100 - 120 volt AC, 50 - 60 Hz
230	220 - 240 volt AC, 50 - 60 Hz

The voltage setting of the monitor must always be the same as the voltage setting of the system unit. See the *User's Guide* that accompanies the monitor or consult your supplier to find out how to change the voltage setting.

Caution

It is imperative that the computer is set to the correct voltage range before use. If not, the machine may be irreparably damaged.

Connecting to the AC power supply

Important
Any peripheral equipment that requires an AC power cord must be earthed.

Use the following guidance to connect the components together. It is important that you take each step in the order indicated.

1. Before connecting any components, ensure that the AC power supply is switched off or disconnected, and that the system unit, the monitor, and any peripherals are turned off.

2. Connect the component signal cables to their respective ports on the system unit: keyboard, mouse, monitor, audio (where appropriate) and any other peripherals.

    ◊   Where appropriate, connect the computer to the network.

3. Connect the component power cords: system unit, monitor to system, plus any other peripherals to nearby, grounded AC power outlets. (Never substitute a power cord from any other appliance). Then switch on or connect the AC power supply.

4. Turn on the system unit first, then the monitor, then other peripherals.

Warning
*The Owners Handbook contains procedures which require opening of the system unit. Ensure **all** cables (including modem and network cables) are disconnected before the system unit is opened.*

Power Cable Connections - UK ONLY

This equipment is supplied with an AC power cord that has a non-removable moulded plug.

Always replace the fuse with one of the same type and rating which is BSI or ASTA approved to BS1362. Always refit the fuse cover, never use the plug with the fuse cover omitted.

External Speakers (where supplied)

Always switch off or disconnect the AC supply before disconnecting any of the speaker leads, whether audio or power. Disconnect the AC supply from the speaker power unit when not in use for any period of time.

To prevent the risk of electric shock, do not remove speaker covers.

Connecting the speaker power cord to any other cords or joining cords together can cause fire and risk of electric shock.

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Equipment Log

1   WELCOME

This chapter gives you a quick tour of your new CX Personal Computer. As soon as you've unpacked the components and assembled them, you should progress to the next chapter, *Getting Started*.

Throughout this manual 'Windows' means your pre-installed copy of one of Microsoft's Windows family of operating systems, unless otherwise stated. The family currently comprises Windows for Workgroups 3.11, Windows 95, Windows 98, and Windows NT.

Warning
Read the Safety & Regulatory Notices section at the start of this manual before using the computer for the first time.

Unpacking

After unpacking your computer, keep all the cartons, boxes and packaging materials; you will need them again if you have to transport the computer elsewhere.

Use the page at the end of this manual to make a note of the manufacturer's data recorded on the various components (product codes, serial numbers, etc.). A service engineer may need this information if the computer develops a fault.

Pictorial guide to the system unit
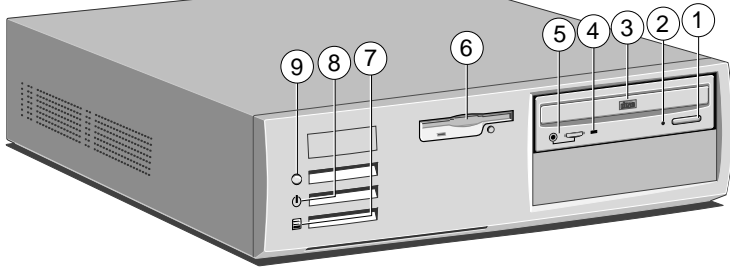
1	**CD EJECT button**	**6**	**Diskette drive**
2	**CD emergency eject hole**	7	**Hard disk activity indicator**
3	**CD-ROM disc drawer** (platter)	**8**	**Power Mode indicator**
4	**CD activity indicator**	9	**POWER button**
5	**CD phono jack & volume control**		

Use the POWER button to turn on the computer and change power modes. The Power Mode light on the button changes colour to show the current mode. See the *Getting Started* chapter for more information.

Not all systems are fitted with a CD-ROM drive.
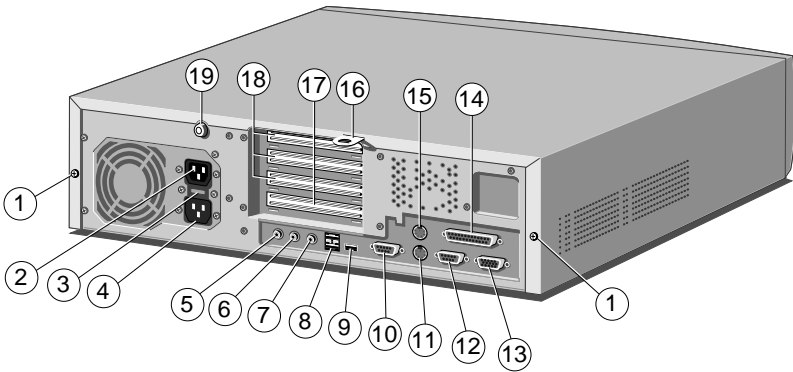
1   **Casing screws for the top cover**
2   **AC power outlet for monitor**
3   **Voltage selection switch**
4   **AC power inlet from AC supply**
5   **Audio input socket**
6   **Microphone socket**
7   **Audio output socket** for
     headphones or 'active' speakers
     (ones which connect to mains
     power) only. Do not connect
     'passive' (non-amplified) speakers,
     as damage to the motherboard
     may occur.

8   **RJ-45 network port**
9   **USB port**
10   **Serial port 2**
11   **Keyboard port**
12   **Serial (modem) port 1**
13   **Monitor port**
14   **Parallel (printer) port**
15   **Mouse port**
16   **Security loop** for cable or padlock
17   **ISA or PCI slot**
18   **3 PCI slots**
19   **Caselock**

To remove the system unit cover

1. Shut down the computer and turn off the monitor.

2. If your AC power outlets have switches, set them to their off positions.

3. Unplug all power cords from the rear of the system unit.

4. Turn the caselock key to the unlocked position.

5. Unfasten the two casing screws.

6. Slide the top cover rearwards slightly, then lift it off.

Refitting is the reverse of removal. Take effective anti-static precautions while the top cover is off, as explained in the *Safety & Regulatory Notices* at the start of this manual.

Some models incorporate a security feature that can detect if the top cover has been removed while the computer was turned off. Optional DMI software such as Intel's LANDesk Client Manager is required to operate this feature. Contact your Mitsubishi Electric supplier for more details.

See the *Motherboard* chapter for more information about the system's motherboard.
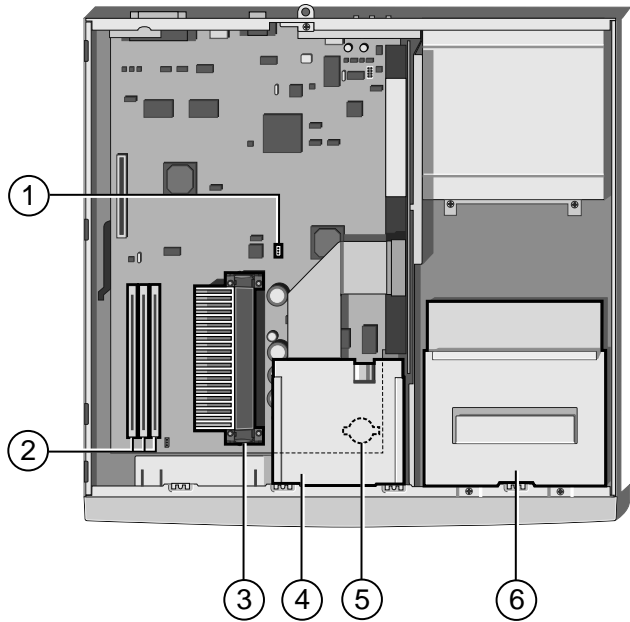
1 **Configuration jumper**
2 **DIMM sockets** for system memory upgrades
3 **Processor socket;** Slot 1.
4 **Diskette drive**
5 **Battery**
6 **Drive assembly,** with optional CD-ROM drive.

General advice

This computer is designed to be used in a normal home or office environment. Here are a few hints for choosing a suitable site:

♦   Place the system unit flat on a sturdy, level surface, free from vibration.

♦   Site the computer away from moisture, direct sunlight, and extremes of heat and cold. Avoid situations in which the surrounding temperature or humidity may change rapidly. When the computer is in use, the temperature should be between 10 and 35 °C and humidity between 20% and 80% (with no condensation).

♦   When positioning the system unit, monitor and keyboard, take into account any local or national regulations relating to ergonomic requirements. For example, you should ensure that little or no light is reflected off the monitor screen as glare, and that the keyboard is placed in a comfortable position for typing.

♦   Give the computer plenty of room so that air can circulate on all sides. Air is drawn into the system unit through vents at the front and on the left-hand side, and expelled through the vent on the back. Ensure that these vents are never obstructed.

Do not allow any cables, particularly power cords, to trail across the floor where people walking past can snag them.

Warning
The computer uses the system unit AC power cord as its 'disconnect device'. Ensure that the system unit is positioned close to the AC power outlet, and that the plug is easily accessible.

To prevent fire and electric shock, do not expose any part of the system unit to rain or moisture.

Connecting the components

Use the following guidance to connect the components together. It is important that you take each step in the order indicated.

1. Before connecting any components, ensure that the AC power supply is switched off or disconnected, and that the system unit, the monitor, and any peripherals are turned off.

2. Connect the components' signal cables to their respective ports on the system unit: keyboard, mouse, monitor, audio (where appropriate) and any other peripherals. Where appropriate, connect the computer to the network.

3. Connect the components' power cords: monitor to system unit, and system unit and any other peripherals to nearby, grounded AC power outlets. Then switch on or connect the AC power supply.

With AC power applied, the system unit is usually in Off mode [*LED unlit*]. See the *Getting Started* chapter for more information about power modes.

Some models incorporate a feature, controlled in BIOS Setup, that automatically boots the PC to Power Controlled [*green*] mode if AC power is restored, for example, after a power failure. The PC can also be set to wake up from Power Minimised [*amber*] in the event of incoming information from a modem or from the network. See the *BIOS Setup and POST* chapter for more information.

2 GETTING STARTED

You should read this chapter even if you do not read any other. It provides important information to help you to use your Mitsubishi Electric CX Series computer safely and efficiently.

Turning on the PC

To turn on the computer, simply press the POWER button. The Power Mode indicator lights up [*green*]. Remember that the monitor has its own power button or switch; see the monitor's *User Guide* for details.

Power-on self-test (POST)

Whenever the computer is turned on, a power-on self-test (POST) routine tests various hardware components, and compares the actual configuration of the computer with that recorded in its permanent memory. During this time, BIOS sign-on and POST messages may be displayed. These messages are not significant unless they report errors – see the *BIOS Setup & POST* chapter.

Booting the operating system

Provided that POST succeeds without discovering any serious errors or configuration discrepancies, the computer attempts to find an operating system; that is, it attempts to 'boot'.

Mitsubishi Electric PCs are typically supplied with either Windows 3.11 (Windows for Workgroups), Windows 95, Windows 98, or Windows NT 4.0 already in place or 'pre-installed' on the hard disk, so that the operating system is ready for you when you turn on the computer.

Note
If a diskette is in the diskette drive when the computer is turned on, the computer will attempt to boot using that diskette. This will succeed only if the diskette is a 'system diskette'; that is, one bearing at least the rudiments of an operating system.

Power management

The overall power state of the computer is signalled by the colour of the Power Mode light on the front:

[*unlit*] **Off**. The computer is turned off, but while still connected to the AC power supply it is ready to be turned on (or turn itself on) when needed.

[*amber*] **Power Minimised**. The computer's processor stops, the hard disk stops spinning and the monitor goes blank, but your files are unaffected.

[*green*] **Power Controlled.** The computer is awake and working. However, during periods of inactivity it can automatically reduce power consumption to idle components. For example, the monitor screen may go blank.

In its Power Minimised state your computer complies with the requirements of the "Energy Star" programme for energy-saving systems. In its Power Controlled state your computer does its best to reduce power usage but may not always reach Energy Star levels.

If a suitable modem is installed, you can tell the computer to wake itself up from the Power Minimised or Off state when an incoming call is received. A networked computer can also be woken up by remote control, if it is fitted with a network card that supports IBM's "Wake On LAN" technology.

Power management and Windows

Mitsubishi Electric CX Series computers support the two types of power management that may be used by Windows operating systems: Advanced Power Management (APM) and Advanced Configuration & Power Interface (ACPI).

Windows 3.11 and Windows NT 4.0

Windows 3.11 (Windows for Workgroups) and Windows NT 4.0 support neither APM nor ACPI. The POWER button acts as a simple on/off control.

Windows 95 and Windows 98

Power Minimised states

In Windows 95/98, the POWER button becomes a suspend/resume button. In other words you can enter a Power Minimised state just by briefly pressing the POWER button.

You can also enter a Power Minimised state from the Windows **Start** menu:

♦   In Windows 95, click the **Start** button in the Windows taskbar, then click **Suspend**.

♦   In Windows 98, click the **Start** button, click **Shut Down**, select **Stand by** and then click **Yes.**

In each case, you must press the POWER button to resume from a Power Minimised [*amber*] state.

Power Controlled states

You can also configure the Control Panel Display applet to suppress or shut off power to the monitor after specified periods of inactivity.

In Windows 98 only, you can configure the Control Panel Power applet to suppress power to the hard disk drives after a specified period of inactivity.

Outside Windows, you can use the BIOS Setup utility to configure the computer to enter a Power Minimised Standby mode after a specified period of inactivity. You can also set separate Power Controlled hard disk and video (screen blanking) inactivity timeouts.

The computer arrives with these features turned off. In each case, you must move the mouse or press any keyboard key to resume from a Power Controlled state.

Note
Hard disk or display timeouts set with Windows' Control Panel applets overrule any hard disk and video timeouts set in BIOS Setup.

Shutting down the PC

To shut down the computer safely, do the following:

1. Wait until all the activity indicators on the front bezel show 'not busy'.

2. Turn off any attached peripherals, except for the monitor and other peripherals that are designed to be kept on permanently.

3a. In Windows 95/98, click the **Start** button in the taskbar, then click **Shut Down.** Select **Shutdown the computer** and click **Yes.** You do *not* have to press the POWER button.

3b. In Windows NT 4.0, click the **Start** button in the taskbar, then click **Shut Down.** Select **Shutdown the computer** and click **Yes.** When told that it is safe to do so, press the POWER button to turn off the computer.

3c. In Windows 3.11 (Windows for Workgroups), click the **File** menu in Program Manager, then click **Exit Windows**. Once back in MS-DOS, press the POWER button.

3d. In MS-DOS, or during POST, press the POWER button.

After you shut down the computer, wait at least 5 seconds before turning it on again. The computer may not initialise itself properly if you turn it off then on again in quick succession.

Emergency shut down for Windows 95/98

In exceptional circumstances, you can turn off the computer without shutting down Windows first. To do this, press and hold down the POWER button for at least four seconds.

(If you press the POWER button while the computer is running Windows 3.11, Windows NT or MS-DOS or while it is performing the power-on self-test, the computer turns itself off directly.)

Caution
In an emergency shut down, you may lose any recent changes made to the files you are currently working on.

Using the computer for the first time

First time with Windows 95/98 or Windows NT

The first time you turn on your computer you must tell Windows your name (and the name of the company for which you work, if applicable) and agree to the legal terms and conditions of the Windows Licence Agreement. Windows then spends a few minutes analysing your computer and configuring itself to take full advantage of your computer's components. Windows 95 and Windows 98 also offer you the opportunity to install a printer.

First time with Windows 3.11

The first time you turn on your computer a message appears explaining the legal terms and conditions that govern the use of the software pre-installed on the computer's hard disk. Once you have read this message, you can press the <F3> key to continue. By doing so you are acknowledging that you have read, understood and accepted the terms and conditions.

Backing-up the pre-installed software

We *strongly* recommend that you copy or 'back-up' the operating system and any pre-installed software soon after setting up the system. This is particularly important for systems that are supplied without installation diskettes for the software on the hard disk. A back up copy will safeguard the pre-installed software against loss if the hard disk fails or if you accidentally overwrite or delete files.

♦   The Microsoft Create System Disks tool (Windows 95/98) or the Disk Maker utility (Windows NT or Windows 3.11) allows you to create installation diskettes from disk images pre-installed on the hard disk.

♦   To back up other pre-installed software (and your own files) use the Backup tool (Windows 95/98 and Windows NT) or Backup for Windows (Windows 3.11).

In general, any copy you make of pre-installed software must be used only as a back-up copy, in case the pre-installed version is lost.

You are **not** allowed to use installation diskettes created from disk images to install the software onto another computer.

Improving your display settings

Your pre-installed copy of Windows is configured for a standard monitor setting (640 x 480 pixels in a maximum of 256 different colours), so that Windows is sure to display correctly whatever monitor you have.

Most modern monitors, including Mitsubishi Electric monitors, can display higher resolutions than standard VGA. You can change the setting to one that more closely matches your own monitor, to get the best performance from it.

Display settings in Windows 95/98 or Windows NT

The monitor setting is changed by using the Settings tab of the Display Properties dialog. See Windows' Help for instructions on changing display settings.

Tip

To view the Display Properties dialog, right-click with the mouse while pointing at the background area of the Windows desktop, then select Properties from the pop-up menu.

Display settings in Windows 3.11

The monitor setting is changed by using the ATI Desktop utility in the Mitsubishi Electric group. Open ATI Desktop, choose Screen Adjustment, then choose Select Monitor. This offers a list of all current Mitsubishi Electric monitors. Once you have selected the correct monitor, you can select the required resolution. See ATI Desktop's on-line help for more information.

If your hard disk is larger than 2 gigabytes

If your Mitsubishi Electric PC is pre-installed with Windows 95 or Windows 98, the entire hard disk is initially formatted as one partition.

If you have Windows NT 4.0, the first 2 Gbytes are formatted (using FAT) as a primary partition. The rest of the disk is untouched. You can re-partition and reformat the disk using the Disk Administrator tool in the Administrative Tools (Common) folder.

If you have Windows 3.11 (Windows for Workgroups), the first 2 Gbytes are formatted as the primary partition. The remainder of the disk is divided into formatted partitions of no more than 2 Gbytes and no less than 512 Mbytes.

3 DISKETTES and CDs

Diskette drive

Your PC is fitted with a 1.44 Mbyte diskette drive. This accepts either 1.44 Mbyte (HD) or 720 Kbyte (DD) diskettes.

Each diskette has a rigid plastic cover, with a metal shutter that guards the disk surface. Never touch the exposed surface under the shutter – you could deform the disk or leave a fingerprint that might make the diskette difficult to read.

Keep diskettes away from dust, moisture, magnetic objects, and equipment that generates magnetic fields. Also, avoid extremes of temperature and exposure to direct sunlight. Otherwise, data recorded on the diskette may become corrupted.

Inserting a diskette

1. Insert the diskette with the metal shutter foremost, and with the label side facing upwards.
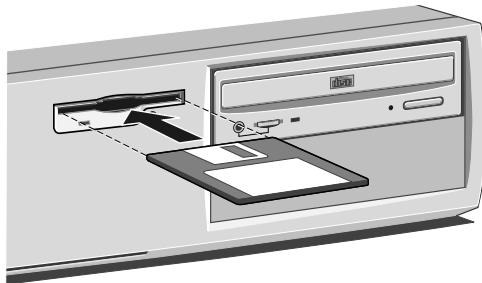
2. Push the diskette all the way in until it 'clicks' into place. The drive's EJECT button pops out slightly. The drive flap stays open, leaving the diskette just visible.

Ejecting a diskette

♦   Wait until the drive's activity indicator is unlit, then press the EJECT button.

If a diskette becomes stuck in the drive, perhaps because its label has peeled back, do not attempt to remove it with tweezers or any similar implement; you risk damaging the drive. Call an authorised maintainer.

Write-protecting a diskette

♦   A diskette can be write-protected by sliding a tab towards the edge of the diskette to expose the small hole beneath it (see illustration).
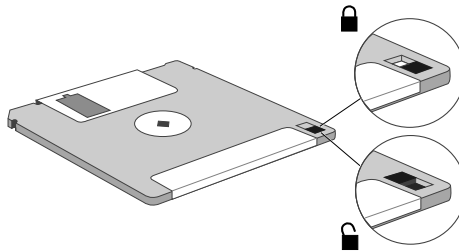
You can read, copy or print the files on a write-protected diskette, but you cannot create, rename or delete any files.

CD-ROM drive (optional)

The CD-ROM drive can retrieve multimedia data from CD-ROM discs and multi-session Photo-CD discs. It can also play normal music CDs (the drive has its own headphone jack and associated volume control).

Keep CDs well away from dust and moisture, and avoid touching the surface of the CD. Avoid extremes of temperature and exposure to direct sunlight as these may cause the disc to warp.
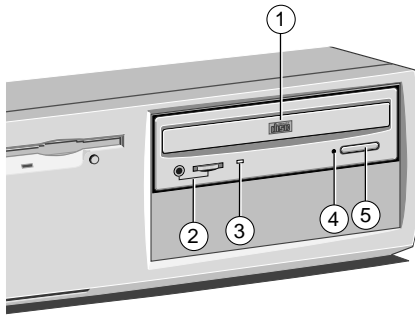
1. **CD-ROM disc drawer** (platter)
2. **Headphone jack & volume control**
3. **Activity indicator** (amber = busy)
4. **CD emergency eject hole**
5. **EJECT button** (doesn't work while PC is turned off)

Do not attempt to move the computer while a CD is in the drive, especially if the CD is being played at the time.

Warning
The laser beam inside the CD-ROM drive is harmful to the eyes if looked at directly. Do not attempt to disassemble the CD-ROM drive. If a fault occurs, call an authorised maintainer.

Inserting a compact disc

1.   Press the EJECT button on the front of drive.

2.   Place the CD centrally, printed side up, on the platter.

3.   Push the EJECT button again, or gently push the front of the platter to draw it back into the drive.
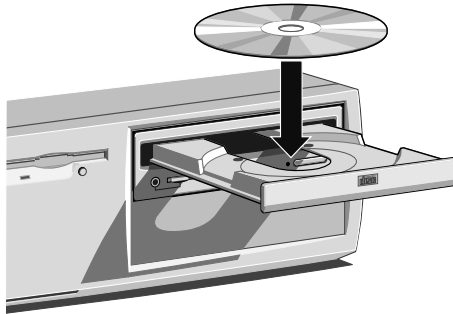
Ejecting a compact disc

♦   Ensure that the drive's activity indicator is not showing 'busy', then press the EJECT button.

To eject the platter manually (for example, during a power failure) you must first ensure that the computer is completely off (the Power Mode indicator will be unlit). Insert a thin metal rod (such as an unwound paper clip) into the emergency eject hole. Push carefully and firmly.

4 EXPANSION CARDS

Expansion cards (also known as expansion boards, controllers or adapters) are small self-contained circuit boards which extend the capabilities of the computer. For example, a graphics card could provide more specialised video functions than those offered by the on-board video system, or a modem card could provide a connection to the Internet via a telephone line.

Your computer can accept two basic types of expansion card:

♦ **ISA** or Industry Standard Architecture cards

♦ **PCI** or Peripheral Component Interconnect cards

You don't need to understand what these terms mean, but before adding a card to your computer you will need to know whether it is ISA or PCI and possibly its physical dimensions.

The following diagram shows the layout of the expansion slots in your PC (as viewed from the rear).

| PCI (half length) | *1* |

| PCI (half length) | *2* |

| PCI (full length) | *3* |

| Shared, PCI or ISA (full length) | *4* |
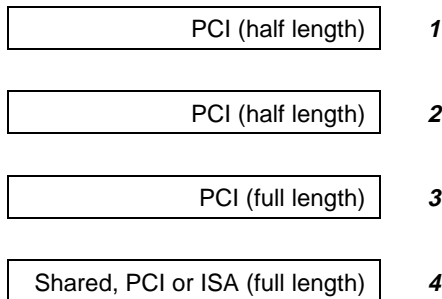
Important
This system complies with the CE Marking Directive and its strict legal requirements. Use only parts tested and approved by Mitsubishi Electric PC Division. Failure to do so may result in invalidating both the compliance and your warranty. All expansion cards, drives and peripherals must carry the CE mark.

Configuring the card

Part of the installation procedure for an expansion card involves setting up or 'configuring' the card so it will work correctly in the computer.

Most modern PCI cards employ a feature called 'Plug and Play' (PnP). This allows Windows 95 – and other PnP-aware operating systems – to configure the card automatically the first time you turn on the computer after installing the card.

However, many ISA cards (and some PCI cards) require manual configuration. If manual configuration is required, you will probably need to specify at least two of the following:

♦   Interrupt request level (IRQ)

♦   Direct memory access (DMA) channel

♦   Base input/output (I/O) port address

♦   Base memory address

The important thing to understand is that the settings of the card you are installing must be different from the settings used by other cards already in the computer or by components on the computer's motherboard. In other words, the settings must not 'conflict'.

The documentation accompanying the card should tell you whether the card supports Plug and Play, or if not, how to configure it. Remember to check any diskettes supplied with the card for README or other help files.

Some cards require you to move jumpers or set switches on the card to configure them. This is best done before installing the card in the computer. Other cards can be configured by running a configuration program after installing the card. Some cards use a mixture of both methods.

Cards often come with pre-configured or default settings. It is best to rely on these settings as much as possible and change them only if they conflict with other devices.

ISA Interrupt request level (IRQ)

The 'interrupt request level' or 'IRQ' is the means by which the expansion card sends a signal to get the attention of, or interrupt, the processor. Your PC has interrupt levels numbered IRQ0 to IRQ15, many of which are needed for components on the computer's motherboard. There are two ways round this.

♦   You can disable certain motherboard components either by means of the BIOS Setup utility or else by changing jumper settings on the motherboard. This frees the resources used by those components.

♦   The audio system, USB controller and standard input/output controller (e.g., for serial and parallel ports) are Plug and Play (PnP) devices. If you use BIOS Setup or the Windows 95 Control Panel to exclude or reserve an interrupt that is usually assigned to one of these devices, an alternative interrupt will be assigned through Plug and Play and the original interrupt can instead be used by the expansion card.

See the '*BIOS Setup & POST*' chapter for more information about BIOS Setup. See the '*Motherboard*' chapter for more information about jumper settings and the usual assignment of interrupts to motherboard components.

Direct memory access (DMA) channel

Some hardware devices can use a 'DMA channel' to access system memory without directly burdening the processor. Your PC has DMA channels numbered DMA0 to DMA7. As with interrupts, you can use vacant channels or re-assign existing ones.

See the '*Motherboard*' chapter for more information about the usual assignment of DMA channels.

Base input/output (I/O) port address

I/O ports are used by the processor to communicate with hardware devices. Each port appears to the processor as an address low down in its address space. Some expansion cards are also controlled by I/O ports. The 'base I/O port address' specifies where the card's ports begin.

Expansion cards

Base memory address

Some expansion cards are fitted with memory of their own, usually read-only memory (ROM) containing functional extensions to the computer's BIOS (basic input/output system) ROM. Some cards also have random-access memory (RAM).

In order that this memory can be recognised by the system processor, it must be mapped somewhere within the computer's own address space. By setting the 'base memory address' you specify where the card's memory begins within the address space.

Typically, an expansion card's memory must be mapped onto the addresses between C8000h and DFFFFh – an area known as the upper memory block or UMB. You can exclude or reserve UMB regions with the BIOS Setup utility.

The card's documentation should list its possible base memory addresses. You may also need to know how much memory the card has, so that you can leave the right gap between this card's base address and the next.

More about memory addresses

Memory *addresses* are always written in base 16 or 'hexadecimal' notation. Unlike the ten digits of the decimal system (0-9), hexadecimal uses sixteen digits (0-9 and A-F, where A=10, B=11, C=12 and so on up to F=15).

Hexadecimal numbers are denoted either by the suffix 'h' or by the prefix '0x'. The final digit of a five-digit memory address is often omitted, so C8000h may be written as C800h.

Because *amounts* of memory are usually stated as kilobytes (Kbytes) rather than in hexadecimal notation, the following conversion table may be helpful:

4 Kbytes = 1000h	32 Kbytes = 8000h
8 Kbytes = 2000h	64 Kbytes = 10000h
16 Kbytes = 4000h	128 Kbytes = 20000h

Installing the card

Read all these instructions through before attempting to install any expansion card.

Warning
Never carry out any work inside the computer with AC power applied. Always shut down the computer and unplug all power cords before removing the top cover.

The only tool required is a small cross-head screwdriver.

1. Observe the precautions detailed in the 'Safety and Regulatory notices' at the front of this handbook.

2. Turn off and disconnect all peripheral devices connected to the computer. Then turn off the computer and remove the power cord.

3. Decide in which of the available slots you wish to install the card. In general it is easiest, where possible, to start with the lowest slot and work upwards.
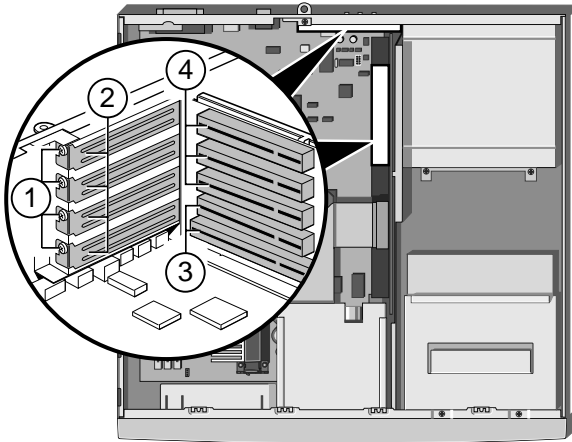
1	**Retaining screws**	3	**Shared PCI/ISA card slot**
2	**Slot covers**	4	**PCI card slots**

4. Remove the slot blanking plate by removing its securing screw (marked 1 and 2 in the illustration). Keep the screw; it will be needed later to secure the card.

   ◊ Put the slot cover in a safe place, it will need to be replaced if you remove the card in the future.

5. If the card you are installing is configured by the means of jumpers or switches, check that it is correctly configured before proceeding.

6. Position the expansion card alongside the slot in which you wish to install it. Align the rear of the card with the slot in the rear of the system unit, and, if the card is full length, align the front of the card with the card guide.

   ◊ Access to the bottom two slots may require the temporary removal of the processor, see the *'Motherboard'* chapter for details.

7. Slide the card into the slot ensuring that the card edge connector engages correctly with the socket on the NLX riser board. Do not use excessive force.

8. Secure the card by replacing the screw that you removed in Step 4.

9. Connect any necessary signal cables to the card.

10. Ensure no other cables or connectors have become dislodged before replacing the system unit cover and reconnecting the external cables.

Reserving ISA legacy resources

If you have just installed an ISA card, you may also need to reserve or exclude the legacy resources (that is, the interrupts and UMB regions) used by the card. This is necessary so that any Plug and Play components can be configured automatically and won't try to use the same settings. See the '*BIOS Setup & POST'* chapter for more information.

If you have Windows, 95/98, NT4.x (or higher), you can use the 'Control Panel' to change the resource settings used by devices:

1. Click the **Start** button in the taskbar, then **Settings**, then **Control Panel**.

2. Double-click on **System**, then click the Device Manager tab of the System Properties dialog.

3. Select the device whose resources you want to change, then click **Properties**.

4. Click the Resources tab of the device's Properties dialog.

5. If your device does not have a Resources tab, either you cannot change its resources or it isn't using any resource settings.

6. Click the resource you want to change, un-check the **Use Automatic Settings** box, then click **Change Setting**.

Tip
*In some cases, you may see a **Set Configuration Manually** button on the Resources tab. You may have to click this button before you can change resource settings.*

Telling Windows about the new hardware

Windows 95/98 should automatically detect and configure cards that support 'Plug and Play'. In other cases you may have to tell Windows that you have installed new hardware, as follows:

1. Click the **Start** button in the taskbar, then **Settings**, then **Control Panel**.

2. Double-click on **Add New Hardware**.

3. Follow the instructions in the Add New Hardware Wizard.

5 MOTHERBOARD

This chapter describes the principal features of the motherboard and how to carry out basic upgrades.

The '*Welcome*' chapter tells you how to remove the system unit cover. See also the section on 'Anti-static precautions' in the *Safety & Regulatory Notices* at the beginning of this manual, for important advice on how to avoid damaging this motherboard and its components with static electricity.

Features summary

- ♦ NLX form factor of 33 x 22.8 cm with four mounting screw holes
- ♦ Support for a single Pentium II processor
  - ◊ 66 MHz and 100 MHz host bus speeds
  - ◊ Slot 1 connector
  - ◊ Integrated 512 KB second-level cache
- ♦ Three DIMM sockets
  - ◊ Supports up to 384 MB of synchronous DRAM (SDRAM) memory
- ♦ Intel 82440BX AGPset
  - ◊ PCI/A.G.P. controller (PAC)
  - ◊ PCI ISA IDE Xcelerator (PIIX4E)
- ♦ I/O controller
- ♦ Two USB ports (only one used in this system casing)
- ♦ Intel/Phoenix Basic Input/Output System (BIOS)
- ♦ Single-jumper configuration
- ♦ Onboard Accelerated Graphics Port (A.G.P.) connector
- ♦ Optional audio subsystem
- ♦ Hardware monitor

Components
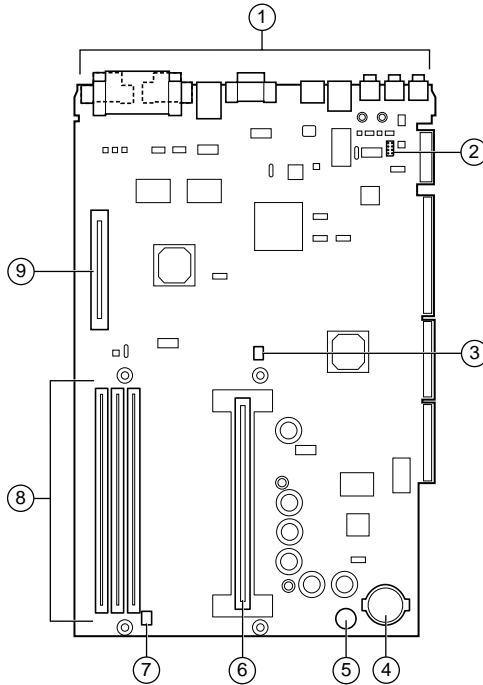
1	**Back panel I/O connectors** (see Chapter 1)	**6**	**Slot 1 connector**
2	**CD-ROM audio connector**	**7**	**Processor fan connector**
3	**Configuration jumper** (J5G1)	**8**	**DIMM sockets**
4	**CMOS battery**	**9**	**A.G.P. connector**
5	**Piezoelectric speaker** (optional)		

Caution

Care must be taken in the purchase of upgrade parts to ensure both compatibility with the system and the compliance with appropriate approvals and certification, e.g. CE marking within Europe. Using non-approved parts may invalidate your warranty and system approvals. It may also cause damage to other components.

Microprocessor

The motherboard supports a single Pentium II processor operating at any of the Pentium II processor speeds, voltages, and bus frequencies. The processor is packaged in a Single Edge Contact (S.E.C.) cartridge. The cartridge includes the processor core, second-level cache subsystem, thermal plate, and back cover.

Second level cache memory

The second-level cache is located in the S.E.C. cartridge. The cache includes synchronous pipelined burst static RAM (PBSRAM) and tag RAM. There can be two or four PBSRAM components totalling 512 KB or 1024 KB in size. All supported onboard memory is cacheable.

PCI enhanced IDE interface

The PCI enhanced IDE interface handles the exchange of information between the processor and peripheral devices like hard disks and add-in boards inside the computer. The interface supports:

♦ Up to four IDE devices such as hard drives

♦ ATAPI devices

♦ PIO mode 3 and PIO mode 4 devices

♦ Logical block addressing (LBA) of hard drives larger than 528 MB and extended cylinder head sector (ECHS) translation modes

♦ Support for laser servo (LS-120) drives

Input/Output (I/O) controller

The I/O controller handles the exchange of information between the processor and external devices like the mouse and keyboard or a printer that are connected to the computer. The controller features the following:

♦ Integrated keyboard and mouse controller

♦ Industry standard diskette drive controller

♦ Two serial ports

♦ One multimode bi-directional parallel port

◊ Standard mode: Centronics-compatible operation

◊ High speed mode: support for enhanced capabilities port (ECP) and enhanced parallel port (EPP)

♦ Flexible IRQ and DMA mapping for Windows 95

Real-Time clock

The motherboard has a time-of-day clock and 100-year calendar that will rollover to 2000 at the turn of the century. A battery on the motherboard keeps the clock current when the computer is turned off.

Note

The recommended method of accessing the date in systems is indirectly from the Real-Time Clock (RTC) via the BIOS. The BIOS on this motherboard contains a century checking and maintenance feature that checks the least two significant digits of the year stored in the RTC during each BIOS request (INT 1Ah) to read the date and, if less than 80 (i.e., 1980 is the first year supported by the PC), updates the century byte to 20. This feature enables operating systems and applications using the BIOS date/time services to reliably manipulate the year as a four-digit value.

Universal Serial Bus (USB) support

The motherboard can support two USB ports; however, it is shipped with only one port installed. If you need to connect more than one USB device, you can connect an external hub to the USB port. The motherboard fully supports the universal host controller interface (UHCI) and uses UHCI-compatible software drivers. USB features include:

♦ Self-identifying peripherals that can be plugged in while the computer is running

♦ Automatic mapping of function to driver and configuration

♦ Supports isochronous and asynchronous transfer types over the same set of wires

♦ Bandwidth and low latencies appropriate for telephony, audio, and other applications

♦ Error-handling and fault-recovery mechanisms built into the protocol

Note

Computer systems that have an unshielded cable attached to a USB port may not meet current international RFI/emissions requirements, even if no device or a low-speed USB device is attached to the cable. Use a shielded cable that meets the requirements for a full-speed USB device. If in doubt, consult your supplier or the device manufacturer.

On-board video graphics controller

The on-board ATI Rage Pro 2x graphics controller provides these features:

♦ 1x (66MHz) and 2x (133MHz) fully pipelined operation and sideband support

♦ Full bus mastering support

♦ Triple 8-bit palette DAC with gamma correction (pixel rates up to 230MHz)

♦ Supports DDC1 and DDC2B+ for plug and play monitors

♦ Game acceleration including support for: Microsoft DirectDraw, double buffering, virtual sprites, transparent blit, masked blit, and context chaining

♦ 4KB on chip texture caching

♦ Direct3D texture lighting

♦ 4MB of 100MHz SGRAM on board

Motion video acceleration

The ATI Rage Pro when in 2x mode supports motion video acceleration by providing:

♦ Multistream video for video conferencing

♦ DVD/MPEG-2 decode assist

♦ Filtered horizontal/vertical, up/down, scaling enhances playback quality

♦ Enhanced line buffer allows vertical filtering of native MPEG-2 size (720 x 480) images

♦ Filter circuitry that eliminates video artefacts caused by displaying interlaced video on non-interlaced displays

♦ Hardware mirroring for flipping video images in video conferencing systems

♦ Bi-directional bus mastering engine with planar YUV-to-packed format converter

♦ YUV to RGB colour space converter with support for both packed and planar YUV:

    ◊ YUV 4:2:2, YUV 4:1:0 and YUV 4:2:0

    ◊ RGB 32, RGB 16/15, RGB 8 and monochrome

Additional A.G.P. support

The A.G.P. is a high-performance interconnect for graphics-intensive applications, such as 3D graphics. A.G.P. is independent of the PCI bus and is intended for exclusive use with graphical display devices.

The on-board A.G.P. slot can be fitted with a suitable A.G.P. video adapter card. Doing so will disable the on-board ATI Rage Pro graphics controller. Only half-length NLX A.G.P. cards can be used.

BIOS

The system BIOS is contained in a flash memory device on the motherboard. The BIOS provides the power-on self test (POST), the BIOS Setup program, and the PCI and IDE auto-configuration utilities.

The BIOS is always shadowed. Shadowing allows BIOS routines to be executed from fast 64-bit onboard DRAM instead of from the slower 8-bit flash memory device.

PCI auto configuration

If you install a PCI add-in board in your computer, the PCI auto-configuration utility in the BIOS automatically detects and configures the resources (IRQs, DMA channels, and I/O space) for that add-in board. You do not need to run the BIOS Setup program after you install a PCI add-in board.

However, PCI add-in boards use the same IRQ resources as ISA add-in boards. If you install both a PCI and an ISA add-in board, you must specify the IRQ used by the ISA card. The PCI auto configuration program complies with version 2.1 of the PCI BIOS specification.

IDE auto configuration

If you install an IDE device (e.g., a hard drive) in your computer, the IDE auto-configuration utility in the BIOS automatically detects and configures the device for your computer. You do not need to run the BIOS Setup program after installing an IDE device.

ISA plug and play capability

The motherboard provides auto configuration of Plug and Play ISA cards and resource management for legacy (non-Plug and Play) ISA cards when used with the ISA Configuration Utility (ICU) or a Plug and Play compatible operating system like Windows 95. To obtain the ICU, contact your computer supplier.

Security passwords

The BIOS includes security features that restrict whether the BIOS Setup program can be accessed and who can boot the computer. A supervisor password and a user password can be set for the Setup program and for booting the computer, with the following restrictions:

♦ The supervisor password gives unrestricted access to view and change all the Setup options in the Setup program. This is supervisor mode.

♦ The user password gives restricted access to view and change Setup options in the Setup program. This is user mode.

♦ If only the supervisor password is set, pressing the <Enter> key at the password prompt of the Setup program gives the user restricted access to Setup.

♦ If both the supervisor and user passwords are set, you must enter either the supervisor password or the user password to access Setup.

♦ Setting a user password restricts who can boot the computer. The password prompt is displayed before the computer is booted. If only the supervisor password is set, the computer boots without asking for a password. If both passwords are set, you can enter either password to boot the computer.

Power management

The motherboard supports two types of power management; Advanced Power Management (APM) and Advanced Configuration and Power Interface (ACPI).

Advanced Power Management (APM)

APM's energy saving standby mode can be initiated in the following ways:

♦ Specify a time-out period in Setup

♦ Use an operating system option, such as the Suspend menu item in Windows 98

In standby mode, the motherboard can reduce power consumption by spinning down hard drives, and reducing power to or turning off VESA DPMS-compliant monitors. Power-management mode can be enabled or disabled in Setup.

While in standby mode, the system retains the ability to respond to external interrupts and service requests, such as incoming faxes or network messages. Any keyboard or mouse activity brings the system out of standby mode and immediately restores power to the monitor.

The BIOS enables APM by default; but the operating system must support an APM driver for the power-management features to work. For example, Windows 95 supports the power-management features upon detecting that APM is enabled in the BIOS.

Advanced Configuration and Power Interface (ACPI)

ACPI gives the operating system direct control over the power management and Plug and Play functions of a computer. ACPI requires an ACPI-aware operating system. ACPI features include:

♦   Plug and Play (including bus and device enumeration) and APM functionality normally contained in the BIOS

♦   Power management control of individual devices, add-in boards (some add-in boards may require an ACPI-aware driver), video monitor, and hard disk drives

♦   Methods for achieving less than 30-watt system operation in the Power On Suspend sleeping state, and less than 5-watt system operation in the Suspend to Disk sleeping state

♦   A Soft-off feature that enables the operating system to power off the computer

♦   Support for multiple wake up events

Hardware monitor

The hardware monitor subsystem provides low-cost instrumentation capabilities. The features of the hardware monitor subsystem include:

♦ Support for chassis intrusion (a switch is fitted to the NLX riser, which can be reported to appropriate software).

♦ An integrated ambient temperature sensor

♦ Speed sensors that monitor the fan speed

♦ Power supply voltage monitoring to detect levels above or below acceptable values

When suggested ratings for temperature, fan speed, or voltage are exceeded, an interrupt is activated. The hardware monitor component connects to the system management (SM) bus.

Audio subsystem (Optional)

The optional audio subsystem consists of the following:

♦ Crystal Semiconductor CS4235 audio codec

♦ Back panel and onboard audio connectors

Crystal Semiconductor CS4235 audio codec

The CS4235 audio codec's features include:

♦ Compatibility with Sound Blaster, Sound Blaster Pro, and Windows Sound System

♦ MPU-401 compatible MIDI and joystick interfaces

♦ Advanced MPC3-compliant input and output mixer

Audio connectors

The audio connectors include the following:

♦ Back panel connectors: stereo line-level output (Line Out), stereo line-level input (Line In), and Mic In

♦ CD-ROM audio connector (2 mm)

Speaker (Optional)

A piezoelectric speaker can be mounted on the motherboard. The speaker provides audible error code (beep code) information during the POST.

Upgrading components

Read through all the instructions before you start. The procedure is not difficult, but if you do not feel confident, you may wish to have your supplier carry out the upgrade.

The processor

Remove the installed processor

1. Observe the precautions detailed in the 'Safety and Regulatory Notices' at the front of this handbook.

2. Turn off and disconnect all peripheral devices connected to the computer. Then turn off the computer and remove the power cord.

3. Remove the computer cover.

4. Remove the heatsink support, if one is fitted, from the base as shown in the following illustration. Then press in on the latches to release the top bar.
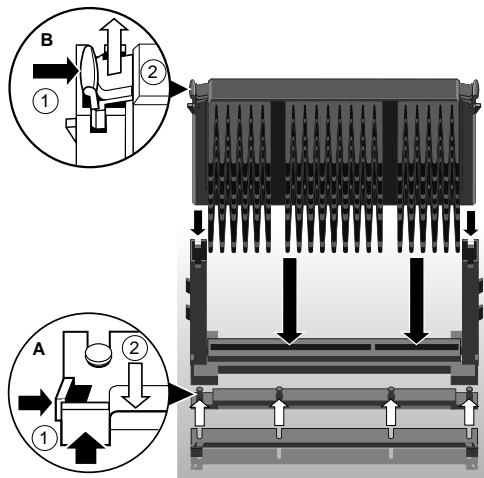
A	Heatsink support	B	Processor mounting
1	Locking tab	1	Locking tab
2	Fit/remove support	2	Fit/remove processor

1. Remove the processor by pressing in on the latches and pulling the processor straight up as shown.

2. Place the processor into an antistatic container.

Install the processor

1. Insert the processor in the retention mechanism.

2. Press down on the processor until it is firmly seated in the Slot 1 connector and the latches on the processor lock into place.

3. Slide the heatsink support bar onto the retaining pins of the support base, if you removed it earlier. Make sure it locks into place.

    ◊   Your upgrade processor may have a fan fitted, in which case connect the fan lead to the fan connector.

4. Set the processor speed in the BIOS Setup as detailed in the following procedure.

How to set the processor speed

Set the processor speed immediately after you have installed or upgraded the processor. You can perform the first steps while you still have the system open.

1. Locate the configuration jumper from the illustration on page 2 of this chapter.

2. Place the jumper on pins 2-3 as shown below.

    J5G1

    1 □ ●● 3

3. Replace the cover, turn on the computer, and allow it to boot.

4. The computer starts the Setup program. Setup displays the Maintenance menu.

5. Use the arrow keys to select the Processor Speed feature and press <Enter>. Setup displays a popup screen with the available processor speeds.

6. Use the arrow keys to select the processor speed. For example, select 266 for a 266 MHz Pentium II processor. Press <Enter> to confirm the speed. This Maintenance menu reappears again.

7. Press <F10> to save the current values and exit Setup.

8. Turn off the computer and remove the power cord.

9. Remove the computer cover.

10. To restore normal operation, place the jumper on pins 1-2 as shown below.

J5G1

11. Replace the cover and turn on the computer.

12. Verify the processor speed during POST.

How to install memory

You can install from 8 MB to 384 MB of memory in the motherboard DIMM sockets. The board has DIMM sockets arranged as banks 0, 1, and 2. The motherboard supports the following memory features:

♦   168-pin DIMMs with gold-plated contacts

♦   66 or 100 MHz SDRAM

♦   Non-ECC (64-bit) and ECC (72-bit) memory

♦   3.3 V memory only

♦   Single- or double-sided DIMMs in the following sizes:

DIMM Size	Non-ECC Configuration	ECC Configuration
8 MB	1 Mbit x 64	1 Mbit x 72
16 MB	2 Mbit x 64	2 Mbit x 72
32 MB	4 Mbit x 64	4 Mbit x 72
64 MB	8 Mbit x 64	8 Mbit x 72
128 MB	16 Mbit x 64	16 Mbit x 72

When adding memory, follow these guidelines:

♦   You can install DIMMs in any of the three banks.

♦   You can use different sizes of DIMMs in different banks.

♦   The BIOS detects the size and type of installed memory.

Notes
For ECC operation to be available, all installed memory must be ECC and you must enable the ECC Configuration feature in the Setup program.
If the processor uses the 100MHz bus, (i.e. 350MHz or above), the DIMMs should conform to the PC100 specification or system performance could be affected.

To install memory

To install DIMMs, follow these steps:

1. Observe the precautions detailed in the 'Safety and Regulatory Notices' at the front of this handbook.

2. Turn off and disconnect all peripheral devices connected to the computer. Then turn off the computer and remove the power cord.

3. Remove the computer cover and locate the DIMM sockets, using the illustration on page 2 of this chapter.

4. Holding the DIMM by the edges, remove it from its antistatic package.

5. Make sure the clips at either end of the socket are pushed away from the socket.

6. Position the DIMM above the socket. Align the two small notches in the bottom edge of the DIMM with the keys in the socket.
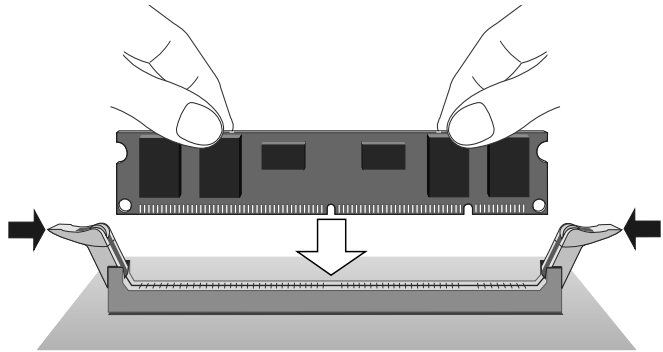
7. Insert the bottom edge of the DIMM into the socket.

8. When the DIMM is seated, push down on the top edge of the DIMM until the retaining clips snap into place. Make sure the clips are firmly in place.

9. Replace the computer cover.

To remove memory

To remove a DIMM, follow these steps:

1. Observe the precautions detailed in the 'Safety and regulatory notices' at the front of this handbook.

2. Turn off and disconnect all peripheral devices connected to the computer. Then turn off the computer and remove the power cord.

3. Remove the computer cover.

4. Gently spread the retaining clips at each end of the socket. The DIMM pops out of the socket.
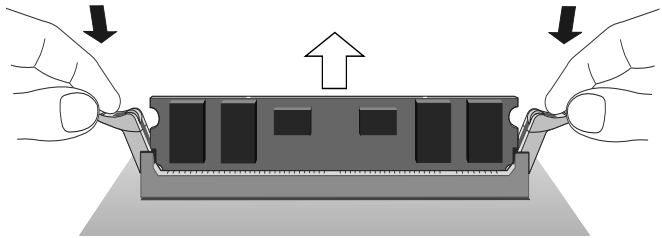
5. Hold the DIMM by the edges, lift it away from the socket, and store it in an antistatic package.

How to replace the CMOS battery

When your computer is turned off, a lithium battery maintains the current time-of-day clock and the values in CMOS RAM.

The battery should last about seven years. When the battery voltage drops below a certain level, the Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent one.

Warning

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

To replace the battery, follow these steps:

1. Observe the precautions detailed in the 'Safety and Regulatory Notices' at the front of this handbook.

2. Turn off and disconnect all peripheral devices connected to the computer. Then turn off the computer and remove the power cord.

3. Remove the computer cover. To get clear access to the battery, you may have to remove the system processor, or have an approved service engineer temporarily jack the motherboard out of the casing.

    Caution

    The motherboard must only be removed from the system case by an approved service engineer. The user should not attempt this procedure.

    ---

4. Locate the battery on the motherboard using the illustration on page 2 of this chapter.

5. With a small non-metallic tool, gently pry the battery free from its socket. Note the orientation of the "+" and "-" on the battery.

6. Install the new battery in the socket, orienting the "+" and "-" correctly.

7. Replace the computer cover.

How to clear the passwords

1. Observe the precautions detailed in the 'Safety and Regulatory Notices' at the front of this handbook.

2. Turn off and disconnect all peripheral devices connected to the computer. Then turn off the computer and remove the power cord.

3. Remove the computer cover.

4. Locate the configuration jumper block using the illustration on page 2 of this chapter.

5. Place the jumper on pins 2-3 as shown below.

    J5G1

    1 □ ■ ■ 3

6. Replace the cover, turn on the computer, and allow it to boot.

7. The computer starts the Setup program. Setup displays the Maintenance menu.

8. Use the arrow keys to select Clear Passwords. Press <Enter> and Setup displays a pop-up screen requesting that you confirm clearing the password. Select Yes and press <Enter>. Setup displays the Maintenance menu again.

9. Press <F10> to save the current values and exit Setup.

10. Turn off the computer.

11. Remove the computer cover.

12. To restore normal operation, place the jumper on pins 1-2 as shown below.

    J5G1

    1 ■ ■ ○ 3

13. Replace the cover and turn on the computer.

Motherboard resources

Memory map

Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 393216 K	100000 - 18000000	383 MB	Extended memory
928 K - 1024 K	E8000 - FFFFF	96 KB	System BIOS
896 K - 928 K	E0000 - E7FFF	32 KB	System BIOS (available as UMB)
800 K - 896 K	C8000 - DFFFF	96 KB	Available high DOS memory (open to ISA and PCI buses)
640 K - 800 K	A0000 - C7FFF	160 KB	Video memory and BIOS
0 K - 640 K	00000 - 9FFFF	640 KB	Conventional memory

DMA channels

DMA Channel Number	Data Width	System Resource
0	8- or 16-bits	Audio
1	8- or 16-bits	Audio/parallel port
2	8- or 16-bits	Diskette drive
3	8- or 16-bits	Parallel port (for ECP)/audio
4		Reserved - cascade channel
5	16-bits	Open
6	16-bits	Open
7	16-bits	Open

I/O map

Address (hex)	Size	Description
0000 - 000F	16 bytes	DMA controller 1
0020 - 0021	2 bytes	Interrupt controller 1
002E - 002F	2 bytes	Super I/O controller configuration registers
0040 - 0043	4 bytes	Counter/Timer 1
0048 - 004B	4 bytes	Counter/Timer 2
0060	1 byte	Keyboard controller
0061	1 byte	NMI, speaker control
0064	1 byte	Keyboard controller
0070 - 0071	2 bytes	Real time clock controller

Address (hex)	Size	Description
0080 - 008F	16 bytes	DMA page registers
00A0 - 00A1	2 bytes	Interrupt controller 2
00B2 - 00B3	2 bytes	APM control
00C0 - 00DE	31 bytes	DMA controller 2
00F0 - 00FF	16 bytes	Numeric processor
0170 - 0177	8 bytes	Secondary IDE controller
01F0 - 01F7	8 bytes	Primary IDE controller
0200 - 0207	8 bytes	Audio / game port / joy stick
0220 - 022F	16 bytes	Audio (Sound Blaster compatible)
0228 - 022F	8 bytes	LPT3
0278 - 027F	8 bytes	LPT2
02E8 - 02EF	8 bytes	COM4/Video (8514A)
02F8 - 02FF	8 bytes	COM2
0330 - 0331	2 bytes	MPU-401 (MIDI)
0376 - 0377	2 bytes	Secondary IDE controller
0120 - 0127	8 bytes	Audio controller
0274 - 0277	4 bytes	I/O read data port for ISA Plug and Play enumerator
0378 - 037F	8 bytes	LPT1
0388 - 038D	6 bytes	AdLib (FM synthesizer)
03B0 - 03BB	12 bytes	Video (monochrome)
03C0 - 03DF	32 bytes	Video (VGA)
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5, 03F7	7 bytes	Diskette controller
03F6	1 byte	Primary IDE controller
03F8 - 03FF	8 bytes	COM1
04D0 - 04D1	2 bytes	Edge/level triggered PIC
0530 - 0537	8 bytes	Windows Sound System
LPT*n* + 400h	8 bytes	ECP port, LPT*n* base address + 400h
0CF8 - 0CFF *	8 bytes	PCI configuration registers
0CF9 **	1 byte	Turbo and reset control register

* DWORD access only

** Byte access only

Motherboard

PCI configuration space map (figures in hex)

Bus No.	Device No.	Function No.	Description
00	00	00	Intel 82443BX (PAC)
00	01	00	Intel 82443BX (PAC) A.G.P. bus
00	07	00	Intel 82371EB (PIIX4E) PCI/ISA bridge
00	07	01	Intel 82371EB (PIIX4E) IDE bus master
00	07	02	Intel 82371EB (PIIX4E) USB
00	07	03	Intel 82371EB (PIIX4E) power management
00	0B	00	Audio/multimedia controller
00	0D	00	PCI expansion slot 1 (on the riser)
00	0E	00	PCI expansion slot 2 (on the riser)
00	0F	00	PCI expansion slot 3 (on the riser)
00	10	00	PCI expansion slot 4 (on the riser)

Interrupts

IRQ	System Resource
NMI	I/O channel check
0	Reserved, interval timer
1	Reserved, keyboard buffer full
2	Reserved, cascade interrupt from slave PIC
3	COM2*
4	COM1*
5	LPT2 (Plug and Play option)/audio/user available
6	Diskette drive controller
7	LPT1*
8	Real time clock
9	Reserved
10	USB/User available
11	Windows Sound System*/user available
12	Onboard mouse port (if present, else user available)
13	Reserved, math coprocessor
14	Primary IDE (if present, else user available)
15	Secondary IDE (if present, else user available)

* Default, but can be changed to another IRQ

6   DRIVE UPGRADES

This chapter describes how to add an E-IDE hard disk or removable media drive to your computer.

Warning
Never carry out any work inside the computer with AC power applied. Always shut down the computer and unplug all power cords before removing the top cover.

Configuring an E-IDE drive

Your computer can accommodate a total of three E-IDE drives. The first drive, which contains the operating system, is always configured as the 'master' drive. Other drives must be configured as 'slave' devices.

Drives are normally configured as master or slave by using jumpers on the drive itself. Configuration details vary from drive to drive. Most drives are supplied with documentation describing how to configure the drive. If you are uncertain about configuring the drive consult your supplier.

Example
The example drive shown below is configured as master or slave by the position of a jumper on the rear of the drive.
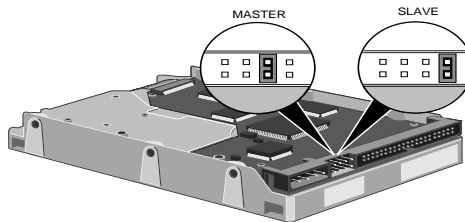
Installing a drive

Most systems have the master hard disk drive already installed in the lowest of the three drive bays, and a CD-ROM drive in the top bay. This section concentrates on fitting a drive into the spare, middle bay. Some models do not have a CD-ROM drive, so the top bay is spare as well. This handbook only describes fitting drives in the middle bay in detail, but the principle of fitting a drive into the top bay is the same as for the middle bay.

Caution
Try not to touch the electronics of the drives while handling them.

Removing the drive assembly

1. Turn off the computer and unplug all power cords.

2. If there is a diskette in the diskette drive, remove it.

3. Take suitable anti-static precautions and remove the system unit cover. For more information see "Anti-static precautions" in the *Safety & Regulatory Notices* at the start of this manual.

4. Disconnect the power and ribbon cables from the rear of all the drives fitted in the drive assembly. Take careful note of how and where they are connected – you will need to reconnect them later.

5. Now disconnect from the riser board any of the cables, whose connectors may get in the way when you slide the drive assembly back. As a minimum, this will include the ones with the large white power connectors.

6. Remove the two screws (labelled A) on the top of the drive assembly as shown. Slide the assembly 1cm towards the rear of the system to disengage it from its retaining clips, then lift it out of the system unit and place it on an anti-static surface.
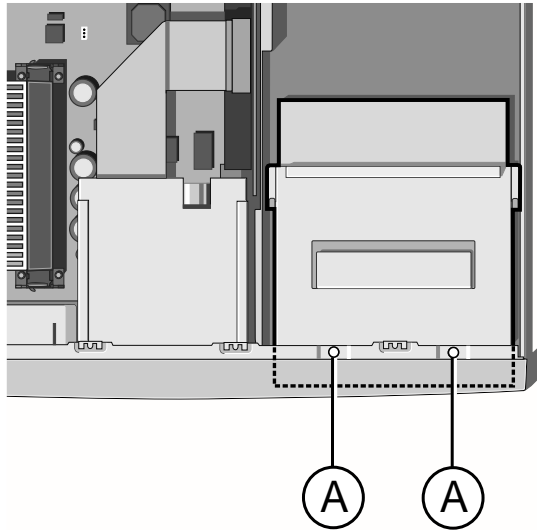
7. If the drive you intend to fit is a removable media drive such as a tape drive or CD writer, flex the plastic blanking plate fitted in the front bezel and remove it, then break off the metal blanking plate behind it.

Fitting a 3.5" drive

The drive bay is designed for 5.25" drives. If you intend to fit a 3.5" device such as a hard disk drive, you must first fit a 3.5" drive bay adapter such as the one shown below. These are generally available from PC hardware suppliers.

1. Fit the new drive into the adapter using the special screws provided. Do not overtighten the screws and put a strain on the drive casing.
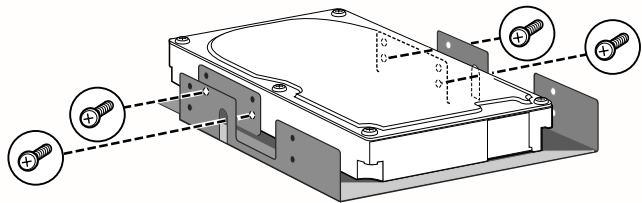
2.   Fit the adapter into the drive assembly.
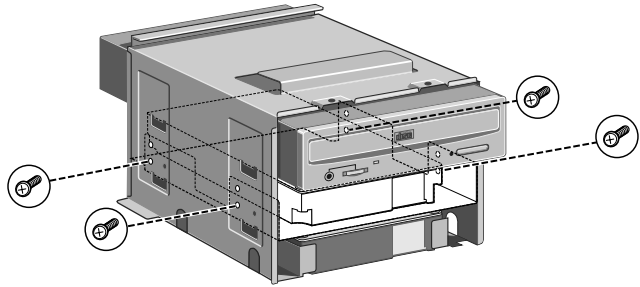
Fitting a 5.25" drive

Fit the new drive into the drive assembly using the special screws provided. Do not overtighten the screws and put a strain on the drive casing.
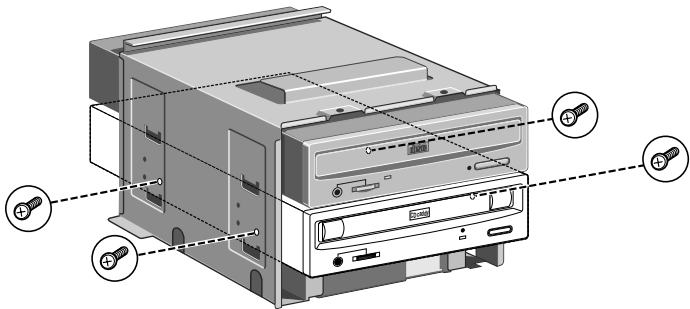
Reassembling the system

1.   Put the drive assembly back into the system unit and tighten the screws to secure it to the chassis.

2.   Re-attach the power and signal cables to the original drives and the riser board. Connect a spare power cable, and the spare connector on the ribbon cable, between the new drive and the riser board.

3. Check to ensure that no other cables or connections have become dislodged or trapped during the work, then replace the system unit cover.

Configuring new drives

You do not normally need to configure new drives using the BIOS Setup utility, as it will normally recognise new hardware when the PC is next powered up. However, you will need to reconfigure your Windows operating system to recognise the new drive before you can use it. See your Windows documentation and on-line help for more information on adding new hardware.

Partitioning and formatting hard disk drives

A new hard disk drive will initially be blank. Before you can use the drive, you must partition and format it.

Windows 95 / 98

Use the MS-DOS **Fdisk** program to create partitions on the disk. The **Fdisk** program can be run in an MS-DOS window within Windows. Type **Help Fdisk** at the MS-DOS command prompt to find out more. After using **Fdisk**, you are prompted to restart the computer. Once back in Windows, you can format the partitions by opening the My Computer folder, selecting the new Drive icon and choosing the **Format** command from the File menu.

Caution
*When you run **Fdisk**, it assumes that you want to work with the first, or master, drive (it says the* Current fixed disk drive *is* 1*). To switch attention to the slave drive, choose* Select next fixed disk drive *(option 5) from the main menu.*

Windows NT

Use the Disk Administrator tool in the Administrative Tools (Common) folder. This both creates partitions and formats them.

Windows for Workgroups

Use the MS-DOS **Fdisk** program to partition the disk followed by the MS-DOS **Format** command to format the partitions. Use the MS-DOS **Help** command to find out more about **Fdisk** and **Format**. See your MS-DOS documentation for instructions on using MS-DOS Help. A limitation of Windows for Workgroups is that each partition can be no more than 2 gigabytes in size.

Caution

*When you run **Fdisk**, it assumes that you want to work with the first, or master, drive (it says the* Current fixed disk drive *is* 1*). To switch attention to the slave drive, choose* Select next fixed disk drive *(option 5) from the main menu.*

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7 BIOS SETUP & POST

BIOS (pronounced "bye-oss") stands for 'basic input/output system'. The BIOS mediates between the computer's hardware – the processor, memory, and so on – and its software – the operating system and your programs. The BIOS program is kept in permanent, read-only memory or ROM (although if necessary it can be upgraded by an authorised maintainer).

BIOS Setup is a helpful utility that forms part of the BIOS program. It allows you to view and alter the computer's hardware configuration. It is also used to configure various security and power-saving options. Configuring the computer is necessary to ensure that the software you use can recognise and exploit the hardware's capabilities.

The current configuration is kept in a special area of memory, called CMOS memory, and maintained by a battery so that the configuration is preserved even while the computer is switched off.

Your computer arrives already configured, but may need to be configured again after you add or remove add-on options such as memory modules or expansion cards.

Whenever the computer is turned on, the BIOS power-on self-test (POST) routine tests various hardware components, including memory, and compares the actual configuration of the computer with that recorded in permanent (CMOS) memory.

A configuration discrepancy could arise if you have just installed or removed a hardware option (for example, if you have added or replaced memory). In this case you may be diverted directly into the Setup utility.

Using the Setup utility

This section provides an overview of the Setup utility. You can use the Setup utility to change the configuration information and boot sequence for the computer.

Note

For reference purposes, you should write down the current Setup settings. When you make changes to the settings, update this record.

Setup modes

The Setup utility has three modes of operation:

♦ Normal mode for normal operations.

♦ Configure mode for configuring the processor speed and clearing passwords (see the *Motherboard* chapter for how to do both tasks).

♦ Recovery mode for recovering the BIOS data.

The Setup utility operating mode is controlled by the setting of the configuration jumper block J5G1 (see page 1/5). The jumper is set to Normal mode at the factory.

The following table shows jumper settings for the different Setup modes.

Mode	Jumper	Description
Normal	1-2	BIOS uses current configuration and passwords for booting.
Configure	2-3	After the POST runs, Setup starts and displays the Maintenance menu. This menu displays options for setting the processor speed and clearing passwords.
Recovery	None	BIOS recovers data from a recovery diskette. Refer to the section on "Upgrading the BIOS" later in this chapter for information on recovering the BIOS data during an upgrade.

Starting Setup

To start the Setup utility:

1. Turn on or restart your computer.

2. Press the <F2> key when you see the message Press <F2> key if you want to run SETUP.

3. If you have previously defined a Supervisor password, you are prompted for it before BIOS Setup starts.

If BIOS Setup starts on its own

BIOS Setup might start on its own for three reasons:

♦   The power-on self-test (POST) detects a configuration error or fault. This may be signalled by one or more POST error messages. If a persistent fault is indicated, make a note of any error messages and the current configuration settings before calling an authorised maintainer.

♦   The CMOS battery may be running down. This may cause spurious POST error messages. If this happens every time you turn on the computer, you may have to change the battery.

♦   The computer's configuration may have changed, for example by the addition of more system memory or an expansion card. In this case you may have to define the new configuration.

Setup menus

Here is an overview of the menu screens in the Setup utility.

Setup Menu Screen	Description
Maintenance	Specifies the processor speed and clears the Setup passwords. This menu is only available in Configure mode.
Main	Allocates resources for hardware components.
Advanced	Specifies advanced features available through the chipset.
Security	Specifies passwords and security features.
Power	Specifies power management features.
Boot	Specifies boot options and power supply controls.
Exit	Saves or discards changes to the Setup utility options.

Function keys

The following table shows the function keys available for menu screens.

Setup Key	Description
<F1> or <Alt-H>	Brings up a help screen for the current item.
<Esc>	Exits the menu.
<←> or <→>	Selects a different menu screen.
<↑> or <↓>	Moves cursor up or down.
<Home> or <End>	Moves cursor to top or bottom of the window.
<PgUp> or <PgDn>	Moves cursor to top or bottom of the window.
<F5> or <->	Selects the previous value for a field.
<F6> or <+> or <Space>	Selects the next value for a field.
<F9>	Load the default configuration values for the current menu.
<F10>	Save the current values and exit Setup.
<Enter>	Executes command or selects the submenu.

Maintenance menu

This menu is for setting the processor speed and clearing the Setup passwords. Setup only displays this menu in Configure mode. See the section on "Setup modes" earlier in this chapter for information about setting Configure mode.

Feature	Options	Description
Processor Speed	233 266 300 333 350 400 450	Specifies the processor speed in megahertz. With a host bus operating at 66 MHz, the board supports processors at 233, 266, 300 and 333 MHz. With a host bus operating at 100 MHz, the board supports processors at 350, 400 and 450 MHz.
Clear All Passwords	No options	Clears the user and supervisor passwords.

Main menu

This menu reports processor and memory information and is for configuring the system date, system time, diskette options, and IDE devices.

Feature	Options	Description
BIOS Version	No options	Displays the version of the BIOS.
Processor Type	No options	Displays processor type.
Processor Speed	No options	Displays processor speed.
Cache RAM	No options	Displays size of second-level cache.
System Memory	No options	Displays the total amount of RAM on the motherboard.
Memory Bank 0 Memory Bank 1 Memory Bank 2	No options	Displays size and type of DIMM installed in each memory bank.
Language	**English** Francais Italiano Deutch Espanol	Selects the default language used by the BIOS.
ECC Configuration	**Non-ECC** ECC	Specifies ECC memory operation.
L2 Cache ECC Support	**Enabled** Disabled	If Enabled, allows error checking to occur on data accessed from L2 cache.
System Time	Hour, minute, and second	Specifies the current time.
System Date	Month, day, and year	Specifies the current date.

Advanced menu

This menu is for setting advanced features that are available through the chipset.

Feature	Options	Description
Plug & Play O/S	**No** Yes	Specifies if a Plug and Play operating system is being used. *No* lets the BIOS configure all devices. *Yes* lets the operating system configure Plug and Play devices. Not required with a Plug and Play operating system.
Reset Configuration Data	**No** Yes	Clears the BIOS configuration data on the next boot.
Numlock	**Auto** On Off	Specifies the power on state of the Num Lock feature on the numeric keypad of the keyboard.
Peripheral Configuration	Sub-menu	Configures peripheral ports and devices. When selected, displays the Peripheral Configuration submenu.
IDE Configuration	Sub-menu	Specifies type of connected IDE device.
Floppy Configuration	Sub-menu	When selected, displays the Floppy Options submenu.
DMI Events Logging	Sub-menu	Configures DMI Events Logging. When selected, displays the DMI Events Logging submenu.
Video Configuration	Sub-menu	Configures video features. When selected, displays the Video Configuration submenu.
Resource Configuration	Sub-menu	Configures memory blocks and IRQs for legacy ISA devices. When selected, displays the Resource Configuration submenu.

Peripheral Configuration submenu

This submenu is for the configuring the computer peripherals.

Feature	Options	Description
Serial port A	♦ Disabled ♦ Enabled ♦ **Auto**	Configures serial port A. *Auto* assigns the first free COM port, normally COM1, the address 3F8h and the interrupt IRQ4. An * (asterisk) displayed next to an address indicates a conflict with another device.
Base I/O address	♦ 3F8 ♦ 2F8 ♦ 3E8 ♦ 2E8	Specifies the base I/O address for serial port A.
Interrupt	♦ IRQ 3 ♦ **IRQ 4**	Specifies the interrupt for serial port A.
Serial port B	♦ Disabled ♦ Enabled ♦ **Auto**	Configures serial port B. *Auto* assigns the first free COM port, normally COM2, the address 2F8h and the interrupt IRQ3. An * (asterisk) displayed next to an address indicates a conflict with another device. If either serial port address is set, that address will not appear in the list of options for the other serial port. If an *ATI mach32* or an *ATI mach64* video controller is active as an add-in card, the COM4, 2E8h address will not appear in the list of options for either serial port.

Feature	Options	Description
Mode	♦ **Normal** ♦ IrDA ♦ ASK-IR	Specifies the mode for serial port B for normal (COM 2) or infrared applications.
Base I/O address	♦ 3F8 ♦ **2F8** ♦ 3E8 ♦ 2E8	Specifies the base I/O address for serial port B.
Interrupt	♦ **IRQ 3** ♦ IRQ 4	Specifies the interrupt for serial port B.
Parallel port	♦ Disabled ♦ Enabled ♦ **Auto**	Configures the parallel port. *Auto* assigns LPT1 the address 378h and the interrupt IRQ7. An * (asterisk) displayed next to an address indicates a conflict with another device.
Mode	Output Only **Bi-directional** EPP ECP	Selects the mode for the parallel port. *Output Only* operates in AT compatible mode. *Bi-directional* operates in bi-directional PS/2-compatible mode. *EPP* is Extended Parallel Port mode, a high-speed bi-directional mode. *ECP* is Enhanced Capabilities Port mode, a high-speed bi-directional mode.
Base I/O address	378 278 228	Specifies the base I/O address for the parallel port.
Interrupt	IRQ 5 IRQ 7	Specifies the interrupt for the parallel port.

Feature	Options	Description
Audio	Disabled **Enabled**	Enables or disables the onboard audio subsystem.
LAN	Disabled **Enabled**	Enables or disables the configuration of the LAN device.
Embedded PXE Support	Disabled **Enabled**	Enables or disables LANDesk® service agent option.
Legacy USB Support	**Disabled** Enabled	Enables or disables USB legacy support.

IDE Configuration

Feature	Options	Description
IDE Controller	Disabled Primary Secondary **Both**	Specifies the integrated IDE controller. *Primary* enables only the Primary IDE Controller. *Secondary* enables only the Secondary IDE Controller. *Both* enables both IDE controllers.
Hard Disk Pre-Delay	**Disabled** 3 Seconds 6 Seconds 9 Seconds 12 Seconds 15 Seconds 21 Seconds 30 Seconds	Specifies the hard disk drive pre-delay.
Primary IDE Master	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Master submenu.
Primary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Slave submenu.
Secondary IDE Master	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Master submenu
Secondary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Slave submenu.

IDE Configuration submenus

This submenu is for configuring IDE devices, including:

♦ Primary IDE master

♦ Primary IDE slave

♦ Secondary IDE master

♦ Secondary IDE slave

Feature	Options	Description
Type	None ATAPI Removable Other ATAPI CD-ROM User IDE Removable **Auto**	Specifies the IDE configuration mode for IDE devices. *User* allows the cylinders, heads, and sectors fields to be changed. *Auto* automatically fills in the values for the cylinders, heads, and sectors fields.
Maximum Capacity	No options	Reports the maximum capacity for the hard disk.
Multi-Sector Transfers	**Disabled** 2 Sectors 4 Sectors 8 Sectors 16 Sectors	Specifies number of sectors per block for transfers from the hard drive to memory. Check the hard drive's specifications for optimum setting.
LBA Mode Control	Disabled **Enabled**	Enables or disables the LBA mode control.
Transfer Mode	Standard Fast PIO 1 Fast PIO 2 Fast PIO 3 Fast PIO 4 FPIO 3 / DMA 1 **FPIO 4 / DMA 2**	Specifies the method for moving data to/from the drive.

Feature	Options	Description
Ultra DMA	**Disabled**	Specifies the Ultra DMA mode for the drive.
	Mode 0	
	Mode 1	
	Mode 2	

Floppy Options

This submenu is for configuring diskette (floppy disk) drives.

Feature	Options	Description
Floppy Disk Controller	Disabled **Enabled**	Disables or enables the integrated floppy disk controller.
Diskette A:	Disabled	Specifies the capacity and physical size of diskette drive A.
	360 KB, 5¼″	
	1.2 MB, 5¼″	
	720 KB, 3½″	
	1.44/1.25 MB, 3½″	
	2.88 MB, 3½″	
Floppy Write Protect	**Disabled** Enabled	Disables or enables write protect for the diskette drive.

DMI Event Logging

This submenu is for configuring the DMI event logging features.

Feature	Options	Description
Event log capacity	No options	Indicates if there is space available in the event log.
Event log validity	No options	Indicates if the contents of the event log are valid.
View DMI event log	No options	Enables viewing of DMI event log.

Feature	Options	Description
Clear all DMI event logs	**No** Yes	Clears the DMI event log after rebooting.
Event Logging	Disabled **Enabled**	Enables logging of DMI events.
ECC Event Logging	Disabled **Enabled**	Enables logging of ECC events.
Mark DMI events as read	No options	Marks all DMI events as read.

Video Configuration submenu

This submenu is for configuring video features.

Feature	Options	Description
Palette Snooping	♦ **Disabled** ♦ Enabled	Controls the ability of a primary PCI graphics controller to share a common palette with an ISA add-in video card.
AGP Aperture Size	♦ **64 MB** ♦ 256 MB	Specifies the aperture size for the A.G.P. video controller.

Resource Configuration submenu

This submenu is for configuring the memory and interrupts.

Feature	Options	Description
Memory Reservation	◆ C800 - CBFF **Available** | Reserved ◆ CC00- CFFF **Available** | Reserved ◆ D000 - D3FF **Available** | Reserved ◆ D400 - D7FF **Available** | Reserved ◆ D800 - DBFF **Available** | Reserved ◆ DC00 - DFFF **Available** | Reserved	Reserves specific upper memory blocks for use by legacy ISA devices.
Memory hole	◆ **Disabled** ◆ Conventional ◆ Extended	Memory hole frees address space in RAM for a legacy ISA board.
IRQ Reservation	◆ IRQ3 **Available** | Reserved ◆ IRQ4 **Available** | Reserved ◆ IRQ5 **Available** | Reserved ◆ IRQ7 **Available** | Reserved ◆ IRQ10 **Available** | Reserved ◆ IRQ11 **Available** | Reserved	Reserves specific IRQs for use by legacy ISA devices. An * (asterisk) displayed next to an IRQ indicates an IRQ conflict.

Security menu

This menu is for setting passwords and security features.

Feature	Options	Description
User Password Is	No options	Reports if there is a user password set.
Supervisor Password Is	No options	Reports if there is a supervisor password set.
Set User Password	Password can be up to seven alphanumeric characters.	Specifies the user password.
Set Supervisor Password	Password can be up to seven alphanumeric characters.	Specifies the supervisor password.
Clear User	No Options	Clears the user password.
User Setup Access	♦ None ♦ **View Only** ♦ Limited Access ♦ Full	Enables or disables User Setup Access. *None* prevents the user from accessing Setup.
Unattended Start	♦ **Disabled** ♦ Enabled	Enables the unattended start feature. When enabled, the computer boots, but the keyboard is locked. The user must enter a password to unlock the computer or boot from a floppy diskette.

Power menu

This menu is for setting power management features.

Feature	Options	Description
Power Management	Disabled **Enabled**	Enables or disables the BIOS power management feature.
Inactivity Timer	**Off** 1 Minute 5 Minutes 10 Minutes 20 Minutes 30 Minutes 60 Minutes 120 Minutes	Specifies the amount of time before the computer enters Standby mode.
Hard Drive	Disabled **Enabled**	Enables power management for hard disks during Standby and Suspend modes.
VESA Video Power Down	Disabled **Standby** Suspend Sleep	Specifies power management for video during Standby and Suspend modes.

Boot menu

This menu is for setting the boot features and the boot sequence.

Feature	Options	Description
Quick Boot Mode	Disabled **Enabled**	Enables the computer to boot without running certain POST tests.
Scan User Flash Area	**Disabled** Enabled	Enables the BIOS to scan the flash memory for user binary files that are executed at boot time.
After Power Failure	Power On Stay Off **Last State**	Specifies the mode of operation if an AC/Power loss occurs. *Power On* restores power to the computer. *Stay Off* keeps the power off until the power button is pressed. *Last State* restores the previous power state before power loss occurred.
On Modem Ring	Stay Off **Power On**	Specifies how the computer responds to an incoming call on an installed modem when the power is off.
On LAN	Stay Off **Power On**	Specifies how the computer responds to a LAN wakeup event when the power is off.
On PME	**Stay Off** Power On	Specifies how the computer responds to a PME wakeup event when the power is off.

Feature	Options	Description
First Boot Device Second Boot Device Third Boot Device Fourth Boot Device Fifth Boot Device	Removable devices Hard Drive ATAPI CD-ROM Drive Network Boot LANDesk Service Agent	Specifies the boot sequence from the available devices. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <+> to move the device up the list or <-> to move the device down the list. The operating system assigns a drive letter to each boot device in the order listed. Changing the order of the devices changes the drive lettering.
Hard Drive	No options	Lists available hard drives. When selected, displays the Hard Drive submenu.
Removable Devices	No options	Lists available removable devices. When selected, displays the Removable Devices submenu.

Hard drive submenu

This submenu is for configuring the boot sequence for hard drives.

Options	Description
Bootable Add in Card	Specifies the boot sequence for the hard drives attached to the computer. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <+> to move the device up the list or <-> to move the device down the list. The operating system assigns a drive letter to each device in the order listed. Changing the order of the devices changes the drive lettering.

Removable Devices submenu

This submenu is for configuring the boot sequence for removable devices.

Options	Description
Legacy Floppy Drives	Specifies the boot sequence for the removable devices attached to the computer. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <+> to move the device up the list or <-> to move the device down the list. The operating system assigns a drive letter to each device in the order listed. Changing the order of the devices changes the drive lettering.

Exit menu

This menu is for exiting the Setup utility, saving changes, and loading and saving defaults.

Feature	Description
Exit Saving Changes	Exits and saves the changes in CMOS RAM.
Exit Discarding Changes	Exits without saving any changes made in Setup.
Load Setup Defaults	Loads the factory default values for all the Setup options.
Load Custom Defaults	Loads the custom defaults for Setup options.
Save Custom Defaults	Saves the current values as custom defaults. Normally, the BIOS reads the Setup values from flash memory. If this memory is corrupted, the BIOS reads the custom defaults. If no custom defaults are set, the BIOS reads the factory defaults.
Discard Changes	Discards changes without exiting Setup. The option values present when the computer was turned on are used.

Upgrading the BIOS

If necessary, a BIOS upgrade file can be obtained from your Mitsubishi Electric supplier. The upgrade file is in fact a self-extracting archive containing BIOS files, recovery files, text files and the Intel Flash Memory Update Utility. It will have a name such as, for example, 10006bi1.exe.

To upgrade the BIOS

1. Start BIOS Setup and make a careful note of the existing configuration settings. This step is essential because you will need to re-enter these settings manually at the end of the upgrade procedure.

2. Use Windows (or MS-DOS) to create a bootable 1.44 Mbyte diskette (that is, a formatted diskette containing MS-DOS system files).

3. Copy the BIOS upgrade file to an empty directory on the computer's hard disk

4. Open an MS-DOS window, change to the directory containing the BIOS upgrade file , and then execute it. The contents of the upgrade file are extracted, including license.txt, bioinstr.txt and bios.exe.

5. Read the software licence agreement contained in license.txt and the additional upgrade instructions contained in bioinstr.txt.

6. Insert the bootable diskette you created at Step 2 into the diskette drive.

7. In MS-DOS, change to the directory containing bios.exe and at the command prompt type bios a: and press <Enter>. The diskette now holds the new BIOS files, the recovery files, and the Intel Flash Memory Update utility.

8. Reboot the computer with the diskette still in the drive. The Intel Flash Memory Update utility screen appears.

9. Choose **Update Flash Memory From a File**.

10. Choose **Update System BIOS**.

11. Use the arrow keys to select the correct .bio file, and then press <Enter>.

12. When asked for confirmation, choose **Continue with Programming**.

13. When the Upgrade is Complete message appears, remove the diskette and press <Enter>.

14. As the computer reboots, check the BIOS identifier (version number) to make sure the upgrade has been successful.

15. Start BIOS Setup.

16. Press <F9> and then <Enter> to load the default settings. Use these settings as a starting point for re-entering the settings you noted at Step 1. When you are finished, press <F10> and <Enter> to save the settings, then turn off the computer and reboot.

To recover the BIOS (if damaged during an upgrade)

It is unlikely that anything will interrupt the BIOS upgrade; however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an upgrade fails. The following procedure uses Recovery mode for the Setup utility (Setup modes are described earlier in this chapter.

Note

Because of the small amount of code available in the non-erasable boot block area, there is no video support. You will not see anything on the screen during this procedure. Monitor the procedure by listening to the speaker and looking at the diskette drive activity light.

---

1. Turn off the computer and unplug all power cords.

2. Take suitable anti-static precautions and remove the system unit cover. For more information see "Anti-static precautions" in the *Safety & Regulatory Notices* at the start of this manual.

3. Remove the jumper from jumper block **J5G1** (see page 1/5 for help in locating this jumper block).

4. Insert the bootable BIOS upgrade diskette in drive A.

5. Replace the system unit cover and re-connect the power cord. Turn on the computer, and allow it to boot. The recovery process takes a few minutes.

6. Listen to the computer's speaker:

   ◊ Two beeps and the end of activity in the diskette drive signals a successful BIOS recovery.

   ◊ A series of continuous beeps signals a failed BIOS recovery.

7a. If recovery fails, return to Step 1 and repeat the recovery process.

7b. If recovery is successful, turn off the computer and unplug the power cord.

8. Remove the system unit cover.

9. Return the jumper to pins 1-2 of jumper block **J5G1** to set Normal mode for Setup.

   J5G1

   1 ▮■◯ 3

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10. Leave the upgrade diskette in drive A, replace the computer cover, and re-connect the power cord.

11. Turn on the computer and continue with the BIOS upgrade procedure.

To change the BIOS language

You can use the BIOS upgrade utility to change the language the BIOS uses for messages and the Setup program. Use a bootable diskette containing the Intel Flash Memory Update Utility and language files.

1. Boot the computer with the bootable diskette in drive A. The BIOS upgrade utility screen appears.

2. Select **Update Flash Memory From a File**.

3. Choose **Update Language Set**.

4.   Select drive A and use the arrow keys to select the correct .lng file and then press <Enter>.

5.   When the utility asks for confirmation that you want to flash the new language into memory, choose **Continue with Programming**.

6.   When the utility displays the message upgrade is complete, remove the diskette and then press <Enter>.

7.   The computer will reboot and the changes will take effect.

Power-on self-test

Recoverable POST errors

Whenever a recoverable (non-terminal) error occurs during POST, the BIOS displays an error message describing the problem (the most usual are described below). After some messages, you may be prompted to **Press <F1> key to resume, <F2> to run Setup** or just **Press <F2> key if you want to run Setup**.

In general, you should respond to these errors as follows:

♦   Shut down the computer, wait 20 to 30 seconds, and then turn it on again to see if the problem is still reported.

♦   Check that all external cables are securely connected.

♦   Try running the BIOS Setup utility to reconfigure the system. If the computer won't start after you make changes in BIOS Setup, try restoring the original values.

♦   Open up the system unit and check that all internal signal and power cables are securely connected.

♦   If the problem persists, contact your supplier or authorised maintainer.

Error Message	Explanation
Diskette drive A error	Drive A is present but fails the POST diskette tests. Check that the drive is defined with the proper diskette type in Setup and that the diskette drive is installed correctly.
Extended RAM Failed at offset: *nnnn**	Extended memory not working or not configured properly at offset *nnnn**.
Failing Bits: *nnnn**	*nnnn** is a map of the bits at the RAM address (System, Extended, or Shadow memory) that failed the memory test. Each 1 in the map indicates a failed bit.
Fixed Disk 0 Failure or Fixed Disk 1 Failure or Fixed Disk Controller Failure	Fixed disk is not working or not configured properly. Check to see if fixed disk is installed properly. Run Setup to be sure the fixed-disk type is correctly identified.
Incorrect Drive A type - run SETUP	Type of diskette drive for drive A not correctly identified in Setup.
Invalid NVRAM media type	Problem with NVRAM (CMOS) access.
Keyboard controller error	The keyboard controller failed test. Try replacing the keyboard.
Keyboard error	Keyboard not working.
Keyboard error nn	BIOS discovered a stuck key and displayed the scan code nn for the stuck key.
Keyboard locked - Unlock key switch	Unlock the system to proceed.
Monitor type does not match CMOS - Run SETUP	Monitor type not correctly identified in Setup.
Operating system not found	Operating system cannot be located on either drive A or drive C. Enter Setup and see if fixed disk and drive A are properly identified.

Error Message	Explanation
Parity Check 1	Parity error found in the system bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays ????.
Parity Check 2	Parity error found in the I/O bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays ????.
Press <F1> to resume, <F2> to Setup	Displayed after any recoverable error message. Press <F1> to start the boot process or <F2> to enter Setup and change any settings.
Real time clock error	Real-time clock fails BIOS test. May require motherboard repair.
Shadow RAM Failed at offset: *nnnn**	Shadow RAM failed at offset *nnnn** of the 64 KB block at which the error was detected.
System battery is dead - Replace and run SETUP	The CMOS clock battery indicator shows the battery is dead. Replace the battery and run Setup to reconfigure the system.
System cache error - Cache disabled	RAM cache failed the BIOS test. BIOS disabled the cache.
System CMOS checksum bad - run SETUP	System CMOS RAM has been corrupted or modified incorrectly, perhaps by an application program that changes data stored in CMOS. Run Setup and reconfigure the system either by getting the default values and/or making your own selections.
System RAM Failed at offset: *nnnn**	System RAM failed at offset *nnnn** of the 64 KB block at which the error was detected.
System timer error	The timer test failed. Requires repair of system motherboard.

*nnnn = hexadecimal number

Terminal POST errors and beep codes

There are several POST routines that shut down the computer if they fail. The BIOS sounds a sequence of beeps to identify the point at which POST failed. The most usual errors are listed below.

The BIOS also issues one long tone followed by two short tones if the video system is faulty or if an external ROM module (including video ROM) fails.

Turn off the computer for 30 seconds and then try again. If the fault persists, make a note of the error code (if any) and call your supplier or authorised maintainer.

Beeps	Port 80h Code	Explanation
1-2-2-3	16h	BIOS ROM checksum
1-3-1-1	20h	Test DRAM refresh
1-3-1-3	22h	Test Keyboard Controller
1-3-3-1	28h	Autosize DRAM
1-3-3-2	29h	Initialize POST Memory Manager
1-3-3-3	2Ah	Clear 512 KB base RAM
1-3-4-1	2Ch	RAM failure on address line xxxx
1-3-4-3	2Eh	RAM failure on data bits xxxx of low byte of memory bus
1-4-1-1	30h	RAM failure on data bits xxxx of high byte of memory bus
2-1-2-2	45h	POST device initialization
2-1-2-3	46h	Check ROM copyright notice
2-2-3-1	58h	Test for unexpected interrupts
2-2-4-1	5Ch	Test RAM between 512 and 640 KB
1-2	98h	Search for option ROMs. One long, two short beeps on checksum failure
1-2-2-3	16h	BIOS ROM checksum
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1-3-3-1	28h	Autosize DRAM
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1-4-1-1	30h	RAM failure on data bits xxxx of high byte of memory bus
2-1-2-2	45h	POST device initialization
2-1-2-3	46h	Check ROM copyright notice
2-2-3-1	58h	Test for unexpected interrupts
2-2-4-1	5Ch	Test RAM between 512 and 640 KB
1-2	98h	Search for option ROMs. One long, two short beeps on checksum failure

8   TROUBLESHOOTING

This chapter offers advice if you suspect a fault with your computer. It is concerned mainly with problems caused by the computer itself; problems more often arise from other sources such as your operating system or application software.

It must also be remembered that it can be very easy to leave off or dislodge cables inside the computer when fitting expansion cards, or upgrading the motherboard, or indeed anything that requires temporary removal of the system cover.

If you are apprehensive
Make a note of any of the symptoms, error codes, displayed messages and so on, then turn off the computer and unplug all power cords before consulting your supplier or maintenance provider.

Problems when starting

If you suspect a blown fuse

In the United Kingdom, and some other countries, AC plugs contain fuses. If the fuse in the system's unit AC plug blows when you turn on the computer, this may be caused by an AC power surge, but is more often a symptom of problems with the computer or its peripherals. Follow these steps:

1.   Turn off the computer and unplug all power cords.

2.   Unplug all peripherals.

3.   If you suspect the blown fuse is in the AC plug, replace it with a fuse of the same type and rating which is BSI or ASTA approved to BS1362. Always refit the fuse cover; never use the plug with the fuse cover omitted.

4.   If the replacement fuse blows, call your supplier or maintenance provider.

    If the replacement fuse does not blow, reconnect a peripheral and turn it on. Repeat this step for each peripheral in turn.

Power-on self-test (POST)

Whenever the computer is turned on, the BIOS POST routine tests various hardware components, including memory, and compares the actual configuration of the computer with that recorded in CMOS memory.

If POST detects a hardware fault, one or more POST error codes or messages may be displayed. See the *BIOS Setup & POST* chapter for more information and advice.

Failure to boot

On completion of POST, the computer attempts to boot from a system diskette or bootable hard disk partition. The table below lists some of the messages that might appear during the boot sequence.

Non-system disk or disk error

The diskette drive contains a non-system diskette. Either remove it, or replace it with a system diskette, and press <F1>.

Diskette read failure

The diskette is either not formatted or defective. Either remove it, or replace it with a system diskette, and press <F1>.

No boot sector on fixed disk

The hard disk has no active, bootable partition or is not formatted. If you are still using the original master hard disk drive supplied with your computer, this is a serious problem requiring the attention of a service engineer. If you have just replaced the master drive with an unformatted one, you must insert a system diskette, press <F1>, and format the new hard disk as described in your operating system manuals.

Fixed disk read failure

The hard disk may be defective. Press <F1> to retry. Make sure the drive is correctly specified in the BIOS setup utility. If the problem persists, insert a system diskette, press <F1>, backup the data held on the defective hard disk and try reformatting it.

No boot device available

> This may indicate a fault in the diskette or hard disk drive, or perhaps a damaged system diskette. Press <F1> to retry, using another system diskette, if possible. Make sure that a boot device is correctly specified with the BIOS Setup utility. If the problem persists contact your supplier or maintenance provider.

Common problems

If you encounter a problem with the computer the following sections suggest checks to make before you alert your supplier, maintenance provider or support organisation. The checks listed cover the causes of common problems.

Connections

Check that all power and signal cables are securely connected to the correct port on the computer.

The keyboard and mouse are particularly easy to connect into the wrong port. Although the connectors are identical, the keyboard will not work if plugged into the mouse port, and vice versa.

Power

Check that the AC power supply is switched on, and that the fuse in the AC plug (if any) has not blown. If the system still does not seem to be getting power, obtain another power cord from your supplier.

Monitor

If there is no display check that the monitor is turned on, and the brightness and contrast controls are not too low.

The system may be in a Power Controlled or Power Minimised state. Move the mouse or press any keyboard key. If this doesn't work, briefly press the POWER button.

Mouse

If the screen cursor moves jerkily, the ball inside the mouse may require cleaning. Open the base of the mouse can clean the ball in water mixed with a small amount of mild detergent. Clean any grease and dust from the rollers inside the mouse with a cotton swab moistened with a solvent cleaner.

Keyboard

If the keyboard response is poor, something may be trapped under the keys. Turn the keyboard upside down and shake it; do not probe between the keys as this may cause further damage.

If you spill something on the keyboard and it stops working:

♦ If the liquid is viscous, unplug the keyboard and call your supplier or maintenance provider.

♦ If the liquid is thin and clear, try unplugging the keyboard, turning it upside down to let the liquid drain out, and drying it for at least 24 hours at room temperature. If the keyboard still won't work, call your supplier or maintenance provider.

Expansion cards

If an expansion card does not work, check that all internal cables are securely connected, that the card is configured correctly, that its use of system resources does not conflict another card or motherboard component, and that legacy resources (if it is an ISA card) are properly declared in the BIOS Setup utility. Check also that the software which drives or uses the card is correctly configured.

System BIOS

Use the BIOS Setup utility to ensure that the settings are correct. If the settings appear to have altered, there may be a fault with the CMOS battery which may need to be replaced (see the *Motherboard* chapter for instructions).

Diskette drive

If you have problems accessing a diskette, check that it is inserted correctly, that it has been correctly formatted, that it is not write-protected, and that the diskette drive controller is enabled. Some application software also may not allow you to read or write to diskettes during certain other operations, or until you are about to exit the program.

CD-ROM drive

If you have problems accessing a CD, check that you have allowed a few seconds for the disk to spin up to full speed, that the disk is the correct way up in the drive (printed side upwards) and that it is a data CD. Remember that with a conventional CD-ROM drive you cannot write to a CD.

Hard disk drives

If you encounter problems accessing a hard disk drive, use the BIOS Setup utility to check that the drive is correctly specified, and that the drive's controller is enabled. Check also that the disk has been correctly formatted, and that the permissions assigned by the operating system allow the intended access.

EQUIPMENT LOG

Use this page to record pertinent information about your PC.

Passwords

Software	Password

Manufacturer's data

You should record the model codes and serial numbers of the system components.

	Model	Serial number
System unit		
Monitor		
Keyboard		
Mouse		
Expansion card 1		
Expansion card 2		
Expansion card 3		
Expansion card 4		

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