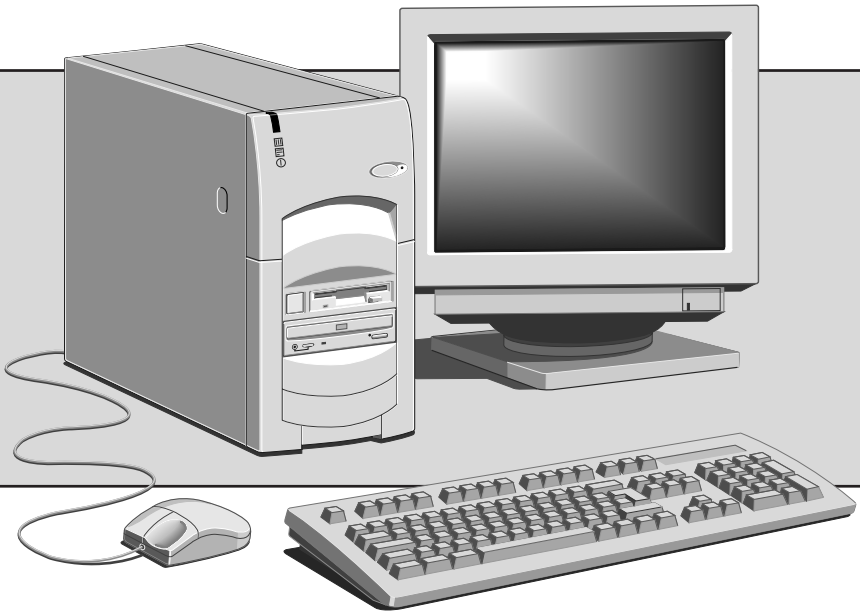




APRICOT PCs & SERVERS

Apricot LS SERIES

Owner's Handbook



Certificate No.'s:

FM 1716 FS 21715 FS 30305

APRICOT LS SERIES OWNER'S HANDBOOK

MINITOWER (LH) EDITION

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B37 7YS

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Safety and Regulatory Notices

Electrical

The computer uses a safety ground and must be earthed.

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

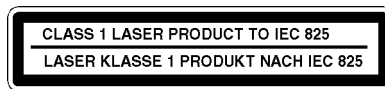
This product contains a lithium battery.

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.



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.

Safety & Regulatory Notices

Anti-static precautions

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.

Anyone can generate static electricity by moving on a chair, brushing against desks or walls, or simply walking across an ordinary carpet. Items handed from one person to another, or being wrapped or unwrapped, can acquire a static charge. Air conditioning systems can also result in ambient static. Clothing made of synthetic fibres is particularly likely to generate static electricity; this static electricity is often completely unnoticed by the wearer, but can be sufficient to cripple or impair an electronic component.

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 other 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.

Safety & Regulatory Notices

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.

Don't try to move the computer while it is plugged into the AC power supply or with any other cables, including network cables, still attached.

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

Maintenance

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.

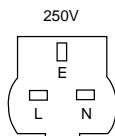
Occasionally wipe over the air vents on the rear and sides of the system unit. Dust and fluff can block the vents and limit the airflow.

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.

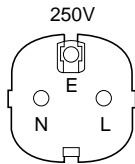
Power Connection

Typical AC plugs



BS1363A

U. K.



SHUCO

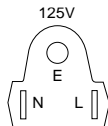
Austria Belgium

Finland France

Italy Germany

Sweden Norway

Holland



NEMA 5-15P

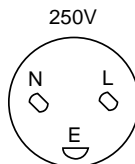
Taiwan

Thailand

Japan

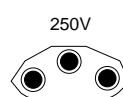
USA

Canada



SRAF 1962/DB16/87

Denmark



ASE 1011

Switzerland

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	200 - 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.

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

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.

Safety & Regulatory Notices

Standards

Safety

This product complies with the International safety standard IEC950 and the European safety standard EN60950 which will, when applicable, include the national deviations for the country in which it is first sold.

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 standard:

VCCI Level 1 (Japan)

Notes

All interconnecting cables (for example, microphone, headphones or external speakers) 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 the system unit top cover, or any other metal part, is removed and then replaced, all parts must be correctly re-assembled and all screws tightened.

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 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 to ensure continued compliance.

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Equipment Log

1 WELCOME

This chapter gives you a quick tour of your new Apricot LS Series 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 Microsoft Windows 95 or Windows NT 4.x, unless otherwise stated.

Warning

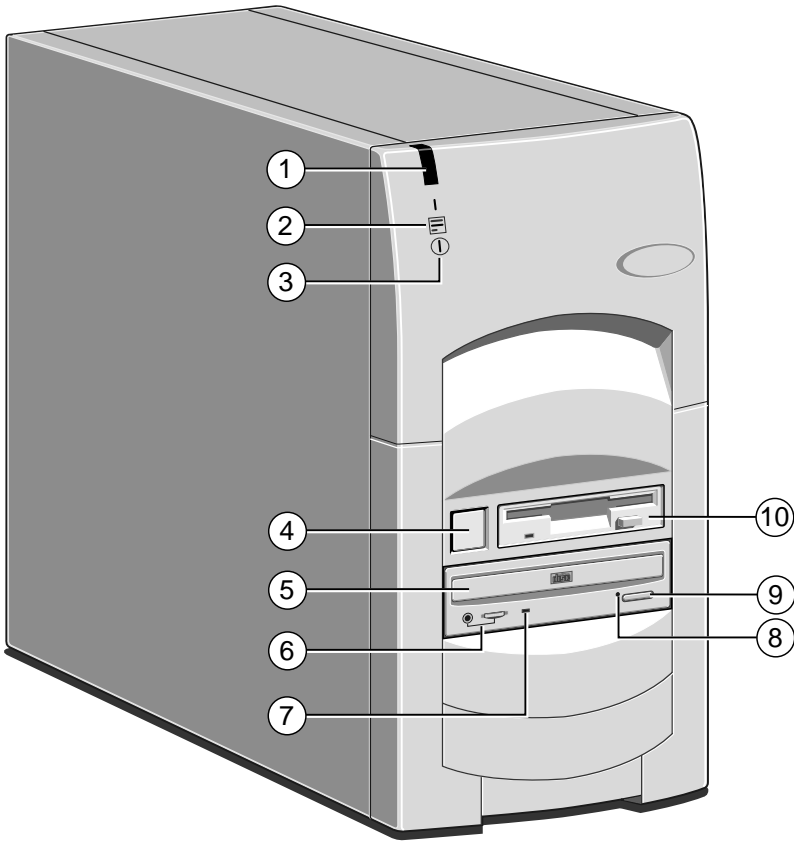
Read the Safety & Regulatory Notices section at the start of this manual before using the computer for the first time.

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.

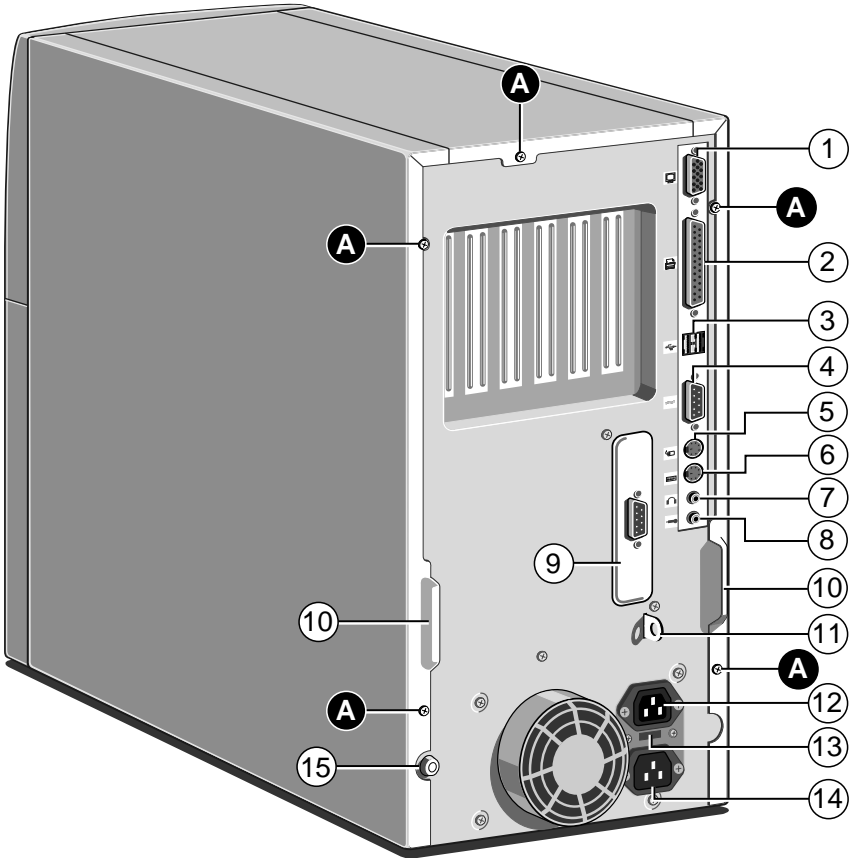
Use the page at the end of this manual to make a note of the manufacturer's data recorded on the various components (product codes, serial numbers, etc.). A service engineer may need this information if the computer develops a fault.

Pictorial guide to the system unit



- 1 Infra-red sensor (optional)
- 2 Hard disk activity indicator
- 3 Power Mode indicator
- 4 POWER button
- 5 CD-ROM disc drawer (platter)
- 6 CD headphone jack
& volume control

- 7 CD activity indicator
- 8 CD emergency eject hole
- 9 CD EJECT button
- 10 Diskette drive



- | | | | |
|---|-------------------------|----------|--------------------------------------|
| 1 | Monitor port | 9 | Serial port 2 (optional) |
| 2 | Parallel (printer) port | 10 | Handles to assist side panel removal |
| 3 | Dual USB port | 11 | Security loop for cable or padlock |
| 4 | Serial (modem) port 1 | 12 | AC power outlet for monitor |
| 5 | Mouse port | 13 | Voltage selection switch |
| 6 | Keyboard port | 14 | AC power inlet from AC supply |
| 7 | Audio output socket | 15 | Caselock |
| 8 | Audio input socket | A | Side panel fixing screws |

Welcome

Use the POWER button to turn on the computer and change power modes. The Power Mode indicator 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. See the *Diskettes & CDs* chapter for more information.

The infra-red sensor is present only on models fitted with a LOC Technology system in the form of an Apricot LS Security Card. See the *LOC Technology Master User's Guide* for more information.

The audio input socket is mainly intended for a microphone. Alternatively, you could attach a personal stereo (tape or CD). The socket provides “phantom power” for electret condenser type microphones.

The audio output socket is intended for headphones or a pair of external self-powered loudspeakers.

Removing panels

For normal access to the interior of the system unit, only the right side panel, and possibly the top panel, need to be removed. The left side panel must be removed in order to install additional removable-media or hard disk drives in the forward drive bay.

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. Take effective anti-static precautions while the covers are off, as explained in the Safety & Regulatory Notices at the start of this manual.

Right side panel

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. Remove the panel's two fixing screws.
5. Turn the caselock key to the unlocked position.
6. Slide the panel carefully towards the rear of the system using the handle provided. After about 2 to 3 cm of movement it is possible to lift the panel vertically, clear of the system.

Some Apricot LS models incorporate a security feature, controlled in BIOS Setup, that can detect if the caselock has been unlocked while the computer was turned off. See the on-line help in BIOS Setup for more information.

See the chapter on *Motherboard Features & Upgrades* for more information about the motherboard.

Top panel

1. Remove the right side panel as described above.
2. Remove the top panel's fixing screw.
3. Slide the panel rearwards, then lift it off.

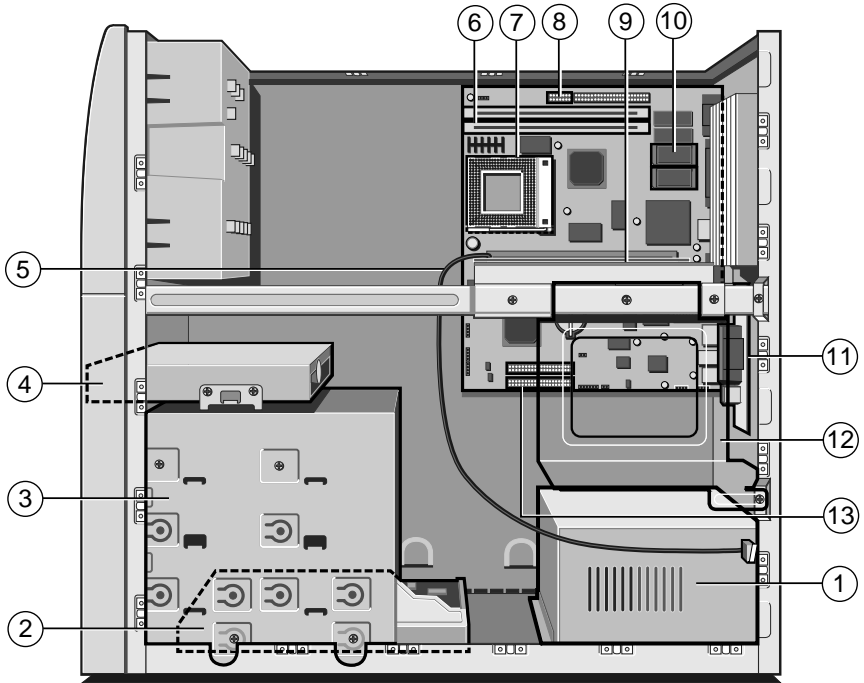
Left side panel

1. Remove the right side and top panels as described above.
2. Slide the panel carefully towards the rear of the system using the handle provided. After about 2 to 3 cm of movement it is possible to lift the panel vertically, clear of the system.

In each case, refitting is the reverse of removal.

Caution

Exercise care with the removed panels as there are metal fixings and hooks on the inside that may scratch delicate surfaces.



- 1 Power supply unit (PSU)
- 2 First or "master" hard disk drive (HDD)
- 3 Forward drive bay for removable media drives and/or a second HDD
- 4 Diskette drive
- 5 Cable for side panel lock sensor
- 6 DIMM sockets for system memory upgrades
- 7 Processor socket Zero Insertion Force (ZIF) "Socket 7"
- 8 Main jumper block
- 9 Expansion card riser
- 10 Video memory upgrade sockets (optional)
- 11 Second serial port (optional)
- 12 Rear drive bay for SCSI hard disk drives (optional)
- 13 Primary and secondary E-IDE connectors

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 expelled through the circular 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 [*red*] mode. See the *Getting Started* chapter for more information about power modes.

Some Apricot LS models incorporate a feature, controlled in BIOS Setup, that automatically boots the PC to On [*green*] mode if AC power is restored, for example, after a power failure. See the on-line help in BIOS Setup 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 Apricot PC safely and efficiently.

Turning on the PC

To turn on the computer, simply press the POWER button. The colour of the Power Mode indicator turns from [red] to [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'.

Apricot PCs are typically supplied with either Windows 95, Windows NT or MS-DOS/Windows for Workgroups 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 saving

Use the POWER button to turn the computer on and change power modes. The colour of the Power Mode indicator shows the current power mode:

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

[yellow] **Suspend.** Your computer is “sleeping” to conserve electricity. The processor stops, the hard disk stops spinning and the monitor goes blank. Briefly pressing the POWER button wakes it up again. (This mode is not available with Windows NT 4.x.)

[green] **On or Standby.** Your computer is awake and working. During periods of inactivity the PC automatically reduces the power consumption of idle components (Standby mode). For example, the monitor screen may go blank. Move the mouse or press any keyboard key to wake up the PC again.

In Suspend mode your computer complies with the requirements of the “Energy Star” programme for energy-saving systems. In Standby mode your computer does its best to minimise 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 Suspend or Off mode 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.

Manual power saving

If you press the POWER button while the PC is On [green] and running either Windows 95 or Windows for Workgroups, the PC goes into Suspend [yellow] mode.

Alternatively, in Windows 95 (or later) you can click the **Start** button in the taskbar, then click **Suspend**.

You have to press the POWER button to return to On [green] mode – just moving the mouse or using the keyboard won't work.

Note

Future versions of Windows will allow you to redefine the POWER button so that when you press it the operating system shuts down and the PC goes directly into Off mode.

Automatic power saving

If you leave your PC running Windows 95 or Windows for Workgroups without doing anything, it moves automatically through Standby [green] to Suspend [yellow] mode. Press the POWER button to wake it up again.

You can turn off Automatic Power Saving in the BIOS Setup utility; see the *BIOS Setup & POST* chapter for more information.

Caution

The monitor supplied with your computer is designed to recognise these energy-saving modes. If you want to use another monitor, make sure that it supports the VESA standard for "Display Power Management Signalling"; if it doesn't, it may be permanently damaged.

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.
3. According to your operating system:
 - ◇ In Windows 95 or Windows NT 5.x, 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.
 - ◇ In Windows NT 4.x, 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.
 - ◇ In Windows for Workgroups, click the **File** menu in Program Manager, then click **Exit Windows**. Once back in MS-DOS, press the POWER button.
 - ◇ In MS-DOS, or during POST, press the POWER button.

After you shut down the PC, 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

In exceptional circumstances, you can put your PC into Off [*red*] mode 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 PC is running MS-DOS or performing the power-on self-test (POST), the PC *always* goes directly into Off [*red*] mode.

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 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 also offers you the opportunity to install a printer.

First time with Windows for Workgroups

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.

Electronic Fingerprinting for Windows 95

Electronic Fingerprinting allows you to ‘brand’ your computer by storing personal information in its permanent memory. If you include your name, address and phone number this will aid the police if your computer is stolen.

The Apricot Electronic Fingerprinting program appears every time you start Windows until you have branded the computer. If you don’t brand your computer promptly, someone else might do it first.

After you have entered your details you are required to set a ‘branding password’. This password will be requested if you ever need to run the Electronic Fingerprinting program again to change the branding information (for example, if you change address). Optionally, for extra security, you can decide that this same password is requested every time the computer is turned on, or every time the AC power supply is interrupted.

If you forget your branding password, you can use a special ‘fall-back password’ instead. The fall-back password is a 12-digit number that is unique to your computer. It is displayed once, the first time you set a branding password.

If you decide to use the branding password to control access to your computer, don’t set up “password on boot” in the BIOS Setup utility as well, or both passwords will be requested every time the computer is turned on (branding password first, then the supervisor password).

Caution

Do not turn off the computer while using the Electronic Fingerprinting program. It might corrupt your computer’s BIOS.

Important

The fall-back password is displayed only once. You must make a note of the password immediately, because you will never see it again. There is a page at the end of this manual where you can write it down.

Backing-up the pre-installed software

Apricot PCs arrive with a pre-installed copy of Windows 95, Windows NT or Windows for Workgroups. Additional software may be pre-installed at the factory or by your Mitsubishi Electric PC supplier.

We *strongly* recommend that you copy or 'back-up' 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 utility (Windows 95) or the Apricot Disk Maker utility (Windows NT or Windows for Workgroups) 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 and Windows NT) or Backup for Windows (Windows for Workgroups).

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 16 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 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 for Workgroups

The monitor setting is changed by using the ATI Desktop utility in the Apricot group. Open ATI Desktop, choose Screen Adjustment, then choose Select Monitor. This offers a list of all current Apricot 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 Apricot PC is pre-installed with Windows 95, the entire hard disk is initially formatted as one partition.

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

If you have 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

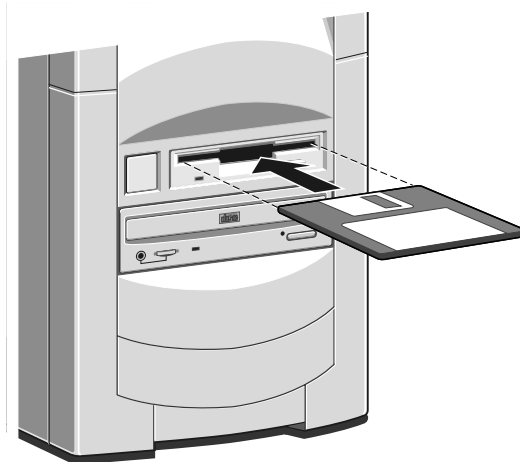
Your Apricot PC is fitted with a 1.44 Mbyte diskette drive. This accepts either 1.44 Mbyte (HD) or 720 Kbyte (DD) diskettes.

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.

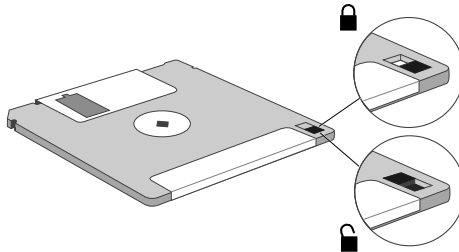
Ejecting a diskette

- ◆ 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).

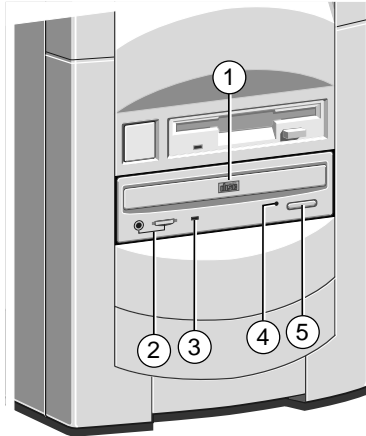


You can read, copy or print the files on a write-protected diskette, but you cannot create, rename or delete any files.

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)

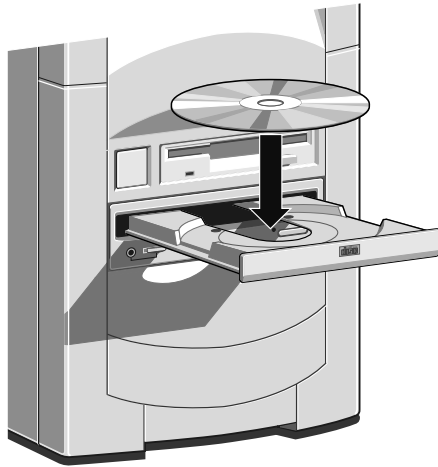
Do not attempt to move the computer while a CD is in the drive, especially if the CD is being played at the time.

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

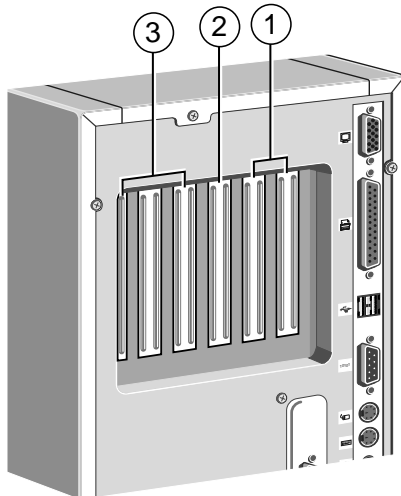
Expansion cards (also known as expansion boards, controllers or adapters) are small self-contained circuit boards which extend the capabilities of the computer. For example, a graphics card could provide more specialised video functions than those offered by the on-board video system, or a modem card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



- 1 Two PCI slots, full-length
- 2 PCI/ISA slot, full-length
- 3 Three ISA slots, full-length

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 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 though 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 Features & Upgrades* 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 Features & Upgrades* 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.

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.

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 to ensure continued compliance.

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

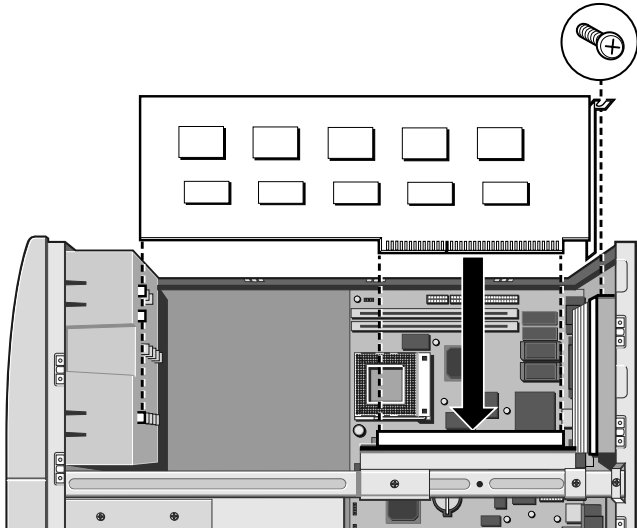
1. Turn off the computer and unplug all power cords.
2. Take suitable anti-static precautions and remove the right-hand side and top panels. For more information see “Anti-static precautions” in the *Safety & Regulatory Notices* at the start of this manual.
3. Decide in which of the available slots you wish to install the card, according to its type and size. In general it is easiest, where possible, to start with the farthest slot and work forwards.
4. Remove the slot’s blanking plate by removing the securing screw. Keep the screw; it will be needed later to secure the card.
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. When installing a card that uses the VESA/AMC video feature connector on the motherboard, it is best to plug the video feature cable into the motherboard before you install the card; otherwise, the card may get in the way of the connector. See

Expansion Cards

the *Motherboard Features & Upgrades* chapter to locate the VESA/AMC connector.

Caution

Be careful how you use this connector. Some pins carry +5 V power which could damage the expansion card if it is incorrectly attached.



7. 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.
8. Slide the card into the slot ensuring that the card edge connector engages correctly with the socket on the riser board. Do not use excessive force.
9. Secure the card by replacing the screw that you removed in Step 4.
10. Connect any necessary signal cables to the card.
11. Ensure no other cables or connectors have become dislodged, then replace the side and top panels.

Reserving ISA legacy resources

If the computer does not automatically detect the new expansion card the first time you turn it on, start the BIOS Setup utility, go to the Advanced menu and change the Reset Configuration Data item to “Yes”.

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.

Alternatively, you can use the Windows 95 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.

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

5. 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 and Windows NT 4.x (or later) 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 FEATURES AND UPGRADES

This chapter describes the features of the computer motherboard and gives step-by-step instructions for adding more system or video memory, upgrading the processor, and replacing the configuration battery. Details of all relevant motherboard connectors and jumper settings are included.

The *Welcome* chapter tells you how to remove the system unit panels. See the section on “Anti-static precautions” in the *Safety & Regulatory Notices* at the beginning of this manual for advice on how to avoid damaging your computer with static electricity.

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.

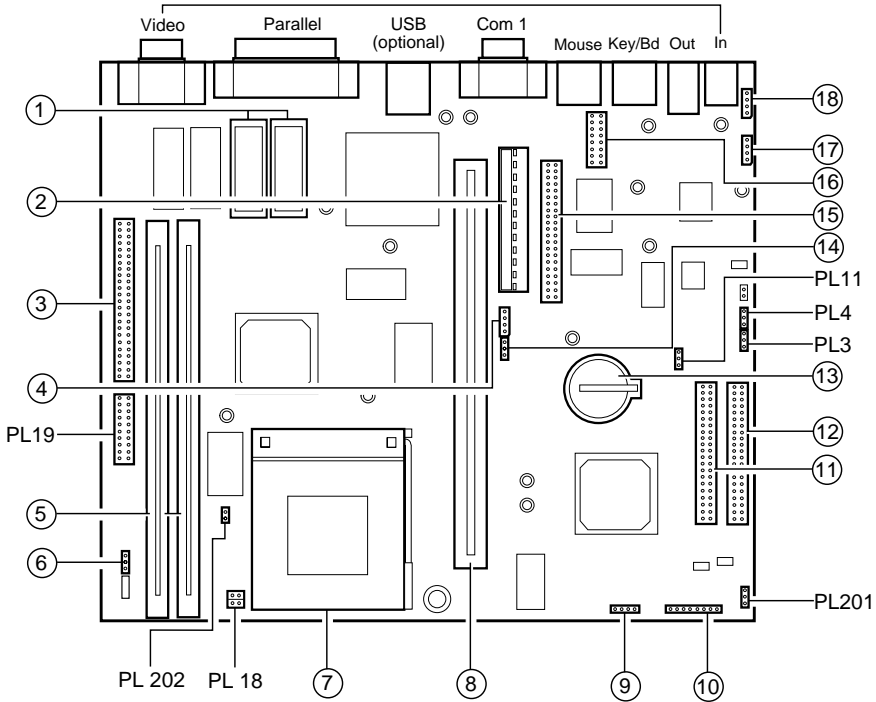
Caution

Do not alter any jumpers or switch settings other than those identified here, unless told to by your Mitsubishi Electric PC supplier or an authorised maintainer. Otherwise, you may damage the system processor, the motherboard, or both.

Note

After you have upgraded the computer, it may not at first recognise the new configuration. Start the BIOS Setup utility, go to the Advanced menu and change the Reset Configuration Data item to “Yes”, then restart the computer.

Motherboard features



- | | |
|---|--|
| <ul style="list-style-type: none"> 1 Video memory sockets 2 Motherboard power connector 3 VESA/AMC feature connector 4 PSU logic connector 5 DIMM sockets 6 Processor fan-sink connector 7 Processor ZIF socket 8 Riser board connector 9 Internal speaker connector 10 Front panel connector <ul style="list-style-type: none"> Pins 1-2 Power button Pins 3-4 HD indicator light Pins 5-6 Unused Pins 7-8 Power Mode light | <ul style="list-style-type: none"> 11 Secondary E-IDE connector 12 Primary E-IDE connector 13 CMOS battery 14 "Wake on LAN" connector 15 1.44 Mb diskette drive connector 16 Second serial port connector 17 Modem audio connector 18 CD audio connector |
|---|--|

Motherboard jumper settings

There are only a few jumpers on the motherboard that you may need to alter. All others are set at the factory and should not be changed.

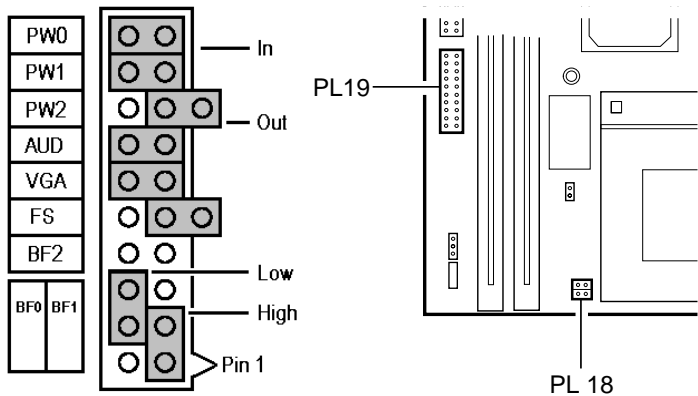
On the motherboard, pin 1 of each jumper block is indicated by a small triangular marking.

Processor voltage and bus speed (PL19, PL18)

Caution

Do not change these jumpers unless you have upgraded the processor. If they are set incorrectly the processor and other vital motherboard components could be destroyed.

The BF0 and BF1 jumpers on jumper block PL19 may be fitted in the High (“1”) or Low (“0”) position; the FS, PW2, PW1 and PW0 jumpers may simply be either fitted across both pins (“In”) or not (“Out”). See the table on the next page for the correct configurations.



For Pentium processors only, two jumpers must also be fitted on PL18. These jumpers must *not* be fitted for Pentium/MMX processors.

Motherboard Features & Upgrades

Processor	Speed	Jumper block PL19					
		BF1	BF0	FS	PW2	PW1	PW0
Pentium	90 MHz	High	High	In	In	In	In
Pentium	100 MHz	High	High	Out	In	In	In
Pentium	120 MHz	High	Low	In	In	In	In
Pentium	133 MHz	High	Low	Out	In	In	In
Pentium	150 MHz	Low	Low	In	In	In	In
Pentium	166 MHz	Low	Low	Out	In	In	In
Pentium	200 MHz	Low	High	Out	In	In	In
Pentium/MMX	166 MHz	Low	Low	Out	Out	Out	Out
Pentium/MMX	200 MHz	Low	High	Out	Out	Out	Out
Pentium/MMX	233 MHz	High	High	Out	Out	Out	Out

On-board video disabling (PL19)

If you install a video adapter expansion card, the computer should automatically detect this and disable the on-board video adapter. If for some reason this does not happen, and you experience problems with a newly-fitted card, you can manually disable the on-board video adapter by removing the **VGA** jumper from jumper block **PL19**.

Audio disabling (PL19)

The on-board audio system can be disabled by removing the **AUD** jumper from jumper block **PL19**. Disabling the audio system frees the interrupt and DMA channel used by that system (normally **IRQ5** and **DMA1**).

BIOS upgrade and recovery (PL11, PL3)

These jumpers should not normally be changed except by a service engineer or at the direction of a service engineer.

CMOS is cleared by moving the PL11 jumper to the 2-3 position for a few moments while the system is turned off, then returning it to the normal 1-2 position.

You must ensure that BIOS reprogramming is enabled if you want to use Electronic Fingerprinting or the optional Apricot LS Security Card (LOC Technology).

<u>Clearing CMOS</u>	<u>PL11</u>
CMOS battery connected (default)	1-2
CMOS battery disconnected	2-3
<u>BIOS reprogramming</u>	<u>PL3</u>
Enabled (default)	1-2 (PROG)
Disabled	2-3 (DIS)

Power Mode light colour (PL201)

Normally, the Power Mode light is [*red*] when the system is in Off mode. If you move the jumper on block PL201 to pins 2-3 (OFF) the light is extinguished in Off mode.

Motherboard IRQs and DMA channels

Components	Interrupts (IRQs)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
System timer	Fixed															
Keyboard controller		Fixed														
PIC daisy chain			Fixed													
Serial port 2	BS			Usual	Usual	Usual	Usual	Usual		BIOS alt	BIOS alt	BIOS alt	BIOS alt			BIOS alt
Serial port 1	BS			Usual	Usual					BIOS alt	BIOS alt	BIOS alt	BIOS alt			BIOS alt
Audio	JS					Usual				BIOS alt	BIOS alt	BIOS alt	BIOS alt			BIOS alt
Diskette controller	BS						Usual									
Parallel port	BS					BIOS alt		Usual								
Real time clock									Fixed							
On-board video	JS									Fixed						
USB	BS			BIOS alt	BIOS alt	BIOS alt	BIOS alt	BIOS alt		BIOS alt	Usual	BIOS alt	BIOS alt			
Mouse													Fixed			
Co-processor														Fixed		
Primary E-IDE	BS														Fixed	
Secondary E-IDE	BS															Fixed

Components	DMA channels							
	0	1	2	3	4	5	6	7
Audio	BIOS alt	Usual		BIOS alt				
Diskette controller			Fixed					
Parallel port (ECP)		BIOS alt		BIOS alt				
DMAC daisy chain					Fixed			

Fixed assignment
 Usual assignment
 BIOS alternative
 PnP alternative

BS = Can be disabled by BIOS Setup JS = Can be disabled by moving a jumper

Adding more memory

You can give your PC more memory by adding or replacing memory modules called “DIMMs”.

The motherboard’s two DIMM sockets accept DIMMs of up to 128 Mbytes in any combination (giving a maximum memory capacity of 256 Mbytes).

Important

The DIMMs you use must have the following specification: gold contacts, 3.3V, 64-bit, unbuffered, either SDRAM-type with Serial Presence Detect (SPD) and a CAS latency of 2 at 66 MHz or else EDO-type with 60 ns timing. If you use any other type of DIMM you risk damaging the motherboard.

Fitting and removing DIMMs

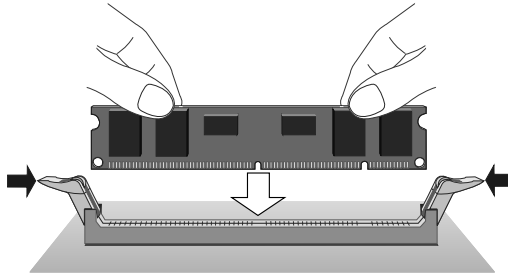
Before you begin

1. Turn off the computer and unplug all power cords.
2. Take suitable anti-static precautions and remove the right-hand side and top panels. For more information see the section on “Anti-static precautions” in the *Safety & Regulatory Notices* at the start of this manual.
3. Remove any expansion cards that impede access to the DIMM sockets.
4. Lay the system unit on its side.

To install a DIMM

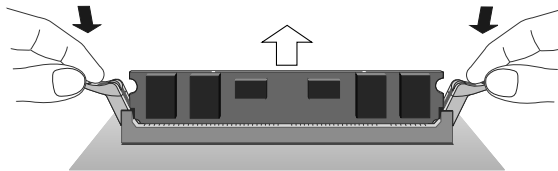
1. Take the DIMM out of its anti-static packaging. Hold it by its ends and avoid touching the metal contacts.
2. Align the DIMM with the chosen socket, ensuring that the socket end clips are not obstructing.

The indents along the connector edge are asymmetrical to prevent the DIMM being fitted into the socket the wrong way round.



3. Pushing gently on its top corners, press the DIMM into the socket and make sure the two end clips snap into place. Do not use excessive force. If the module will not fit easily, remove it and start again.

To remove a DIMM



1. Press the tabs on both of the socket's end clips at the same time. This will release the DIMM and lift it partly out of the socket.
2. Pull the DIMM clear of the socket. Hold the DIMM by its ends and avoid touching the metal contacts.
3. Place the DIMM in suitable anti-static packaging.

When you have finished, replace any expansion cards you needed to remove, then refit the system unit panels.

If the computer does not automatically detect the new memory the first time you turn it on, start the BIOS Setup utility, go to the Advanced menu and change the Reset Configuration Data item to "Yes", then restart the computer. If an error message appears, check that the DIMMs are of the correct type and are seated correctly in their sockets.

Adding more video memory

Video memory is memory reserved for use by the on-board video controller. More video memory can provide more colours or higher resolutions to an extent determined by the capabilities of your monitor.

If your computer has 1 Mbyte of video memory, you can upgrade it to the maximum of 2 Mbytes.

To add video memory

1. Turn off the computer and unplug all power cords.
2. Take suitable anti-static precautions and remove the right-hand side and top panels. For more information see the “Anti-static precautions” section in the *Safety & Regulatory Notices* at the start of this manual.
3. Remove any expansion cards that impede access to the video memory upgrade sockets (see the diagram at the start of this chapter).
4. Lay the system unit on its side.
5. Unpack the upgrade kit and lay the memory chips out on an anti-static surface. Hold each chip by its edges and be careful not to touch the metal pins.
6. One by one, insert the chips in the sockets.

It is important that the chips are fitted the right way round. Some chips have a single bevelled edge at one end. Others have a small semicircular notch at one end and a bevel at one corner. In either case, the bevelled or notched end must be aligned with the bevelled corner on the socket itself.

7. Replace any expansion cards you removed earlier and refit the system unit panels.

If the computer does not automatically detect the new memory the first time you turn it on, start the BIOS Setup utility, go to the Advanced menu and change the Reset Configuration Data item to “Yes”, then restart the computer.

Upgrading the processor

The ZIF (zero insertion force) “Socket 7” processor socket on the motherboard is designed to accept a variety of processors (see the table earlier in this chapter). You may wish to upgrade your processor by replacing it with one of higher performance.

Read the following instructions carefully before starting work.

Changing the processor

1. Turn off the computer and unplug all power cords.
2. Take suitable anti-static precautions and remove the right-hand side and top panels. For more information see the “Anti-static precautions” section in the *Safety & Regulatory Notices* at the start of this manual.
3. Remove any expansion cards that impede access to the processor.
4. Lay the system unit on its side.
5. If the system was in use immediately before starting this procedure, the processor will be hot; wait at least 15 minutes for it to cool down.

Warning

The processor, its fan-sink (combined fan and heat sink), and some of its neighbouring components can get very hot. You may burn your fingers if you attempt to remove the processor before it has cooled down.

6. Unplug the power cable of the processor’s fan-sink from the motherboard. Note where the cable plugs in because you will need to re-attach it later.
7. Unclip the fan-sink’s retention clip from the ZIF socket at the front and the back.
8. Release the lever from the side of the ZIF socket and raise it to the upright position (at right-angles to the motherboard). There may be a little stiffness at the beginning and end of the lever’s movement; be careful not to use excessive force.

Motherboard Features & Upgrades

9. Lift the processor (with fan-sink) clear of the system unit and place it on an anti-static surface. Hold the processor by its edges and avoid touching any of the metal pins.
10. Separate the fan-sink from the processor by twisting the fan-sink from side to side to loosen the grip of the thermal bonding compound, then slide the fan-sink off to one side of the processor.

Warning

When you remove the fan-sink there will be a residual deposit of thermal bonding compound on the bottom of the fan-sink and the top of the processor. This compound can cause skin irritation and stain clothing. Avoid prolonged or repeated contact with skin. Wash your hands thoroughly with soap and water after handling. Avoid contact with eyes and inhalation of fumes. Do not ingest.

11. If you are replacing a Pentium processor with a Pentium/MMX processor, you **must** remove the two jumpers from jumper block **PL18** (next to the socket). Use the illustration at the start of this chapter to locate this jumper block.
12. Ensure that the securing lever on the ZIF socket is still in the upright position.
13. Take the upgrade processor out of its anti-static packaging. Hold the processor by its edges and avoid touching the metal pins.

The upgrade processor and the ZIF socket are keyed to ensure that the processor is installed in the correct orientation. (The pin pattern is totally different at one corner.) It will only fit into the socket one way.

14. Place the processor in the socket, making sure that it is correctly aligned and that you do not bend or otherwise damage the pins.

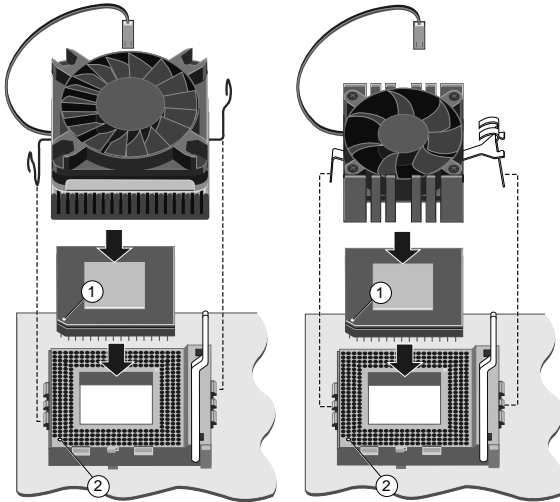
If the processor is not big enough to occupy the entire socket it should be positioned centrally.

Caution

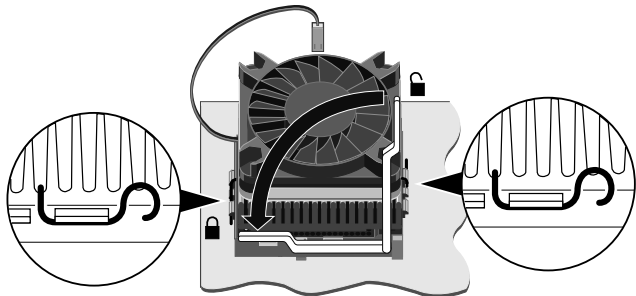
If the processor is misaligned it will not go into the socket, and any attempt to force it will damage the processor, the socket or both.

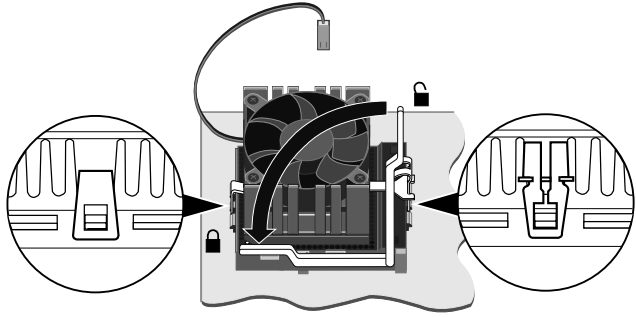
15. Move the securing lever to the locked position. Apply just enough pressure to overcome the resistance offered by the lever.
16. Reposition the fan-sink on top of the new processor.

You may have either of two different types of fan-sink. Note that the larger fan-sink overhangs the socket at one side.

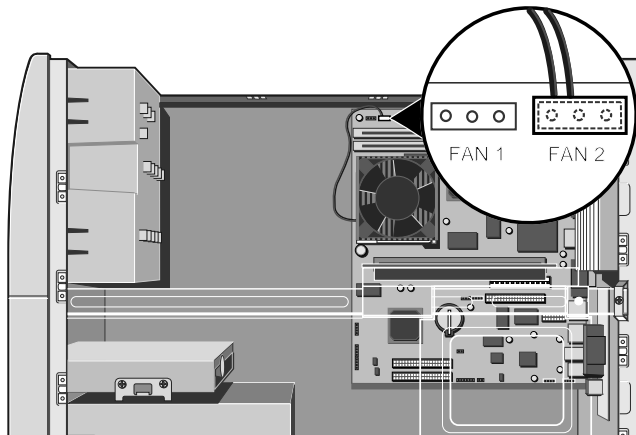


17. Re-fasten the fan-sink's retention clip to the front and back of the ZIF socket.





18. Reconnect the fan-sink's power cable to the motherboard. It goes on the connector labelled FAN 2 or PL200.



Caution

If the fan-sink power cable is not reconnected properly the processor may overheat and be permanently damaged.

19. Adjust the processor voltage and bus speed selection jumpers in block PL19 as described at the start of this chapter.

When you have finished, replace any expansion cards you needed to remove, then refit the system unit panels.

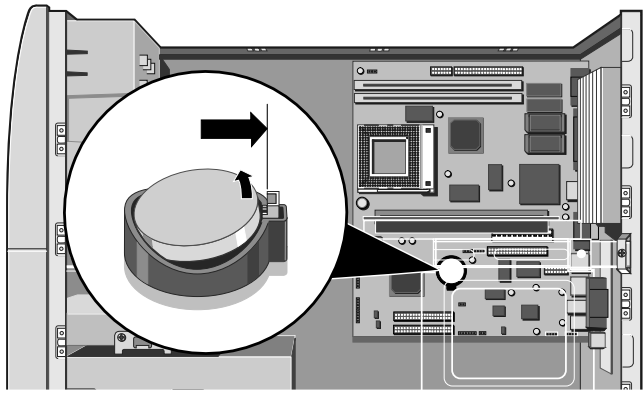
Replacing the configuration battery

The computer keeps a record of its current hardware configuration in a CMOS memory chip which is sustained by a small battery. This battery has a life of up to 5 years. If you find that you have to reconfigure the computer every time you turn it on, the battery is probably failing and needs to be replaced.

The battery is a 3 volt lithium type (CR2032 or equivalent) typically used in calculators and other small, battery-powered electronic items.

To replace the battery

1. Turn off the computer and unplug all power cords.
2. Take suitable anti-static precautions and remove the right-hand side and top panels. For more information see the section on “Anti-static precautions” in the *Safety & Regulatory Notices* at the start of this manual.
3. Lay the system unit on its side.
4. Remove the two screws that secure the rear drive bay to the chassis and take the bay out of the system unit.
5. Using a non-conductive implement, release the latch that holds the battery in place. The battery will pop up allowing you to lift it out of the holder.



Warning

You must not use a metal or other conductive implement to remove the battery. If a short-circuit is accidentally made between the battery's positive and negative terminals, the battery may explode.

6. Check that the replacement battery looks the same as the battery you have removed.
7. Taking care not to touch the top or bottom surface of the battery, pick up the replacement with the positive (+) terminal upwards. Press the battery into the holder using a non-conductive implement.
8. Refit the rear drive bay and the system unit panels.
9. Dispose of the discharged battery in accordance with the battery manufacturer's instructions.

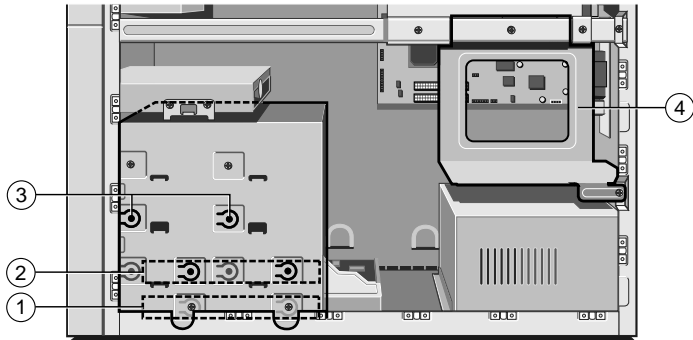
The next time you turn on the computer you will have to run the BIOS Setup utility to reset the hardware configuration.

6 HARD DISK UPGRADES

This chapter describes how to add another hard disk drive to your computer.

- ◆ The forward drive bay can accommodate two hard disk drives. Either drive may be of 3.5-inch or 5.25-inch form factor. Typically, these are E-IDE drives, but SCSI drives are also acceptable if you have a SCSI host bus adaptor expansion card.
- ◆ The rear drive bay is designed to accommodate one or two more 3.5-inch SCSI drives.

Although it is theoretically possible to mix E-IDE and SCSI drives within the same system, in practice this is deprecated. The maximum configurations are therefore two E-IDE drives or four SCSI drives.



- 1 First or “master” hard disk drive (HDD)
- 2 Slot for a second hard disk drive
- 3 Slot for a removable-media drive
- 4 Rear drive bay for two SCSI hard disk drives

Warning

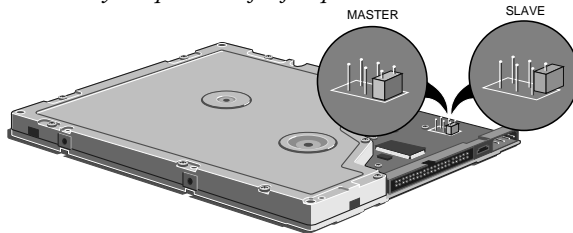
Never carry out any work inside the computer with AC power applied. Always shut down the computer and unplug all power cords before removing the top cover.

Configuring the drive

Hard disk drives typically require configuration, perhaps by altering jumpers on the drive itself, prior to installation. Configuration details vary from drive to drive: a second E-IDE hard disk drive needs to be configured as the slave drive; a SCSI drive must be configured with a device ID number, indicating its logical position on the SCSI bus. 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 5.25-inch E-IDE drive shown below is configured as master or slave by the position of a jumper on the drive.



Installing in the forward drive bay

To install a second (slave) hard disk drive in the forward drive bay:

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 all the system panels. For more information see “Anti-static precautions” in the *Safety & Regulatory Notices* at the start of this manual.
4. Carefully remove the plastic bezel blanking insert from the lowest front drive slot by pushing it out from the rear with a blunt instrument (for example, the end of a rubber-tipped pencil). A hole for this is provided inside the system unit, alongside the drive bay.

5. Pull out the metal blanking plate from the front of the internal drive bay metalwork.
6. Remove the 3.5-inch drive mounting plate (it is secured by two screws on each side).
- 7a. If you are fitting a 3.25-inch hard disk drive, attach it to the 3.5-inch drive mounting plate *using the special screws provided with the drive*. Carefully slide the mounting tray (with drive) back into the drive bay *from the front*, then secure it on both sides using the screws you removed at Step 6.
- 7b. If you are fitting a 5.25-inch hard disk drive, carefully slide the drive into the drive bay *from the front*, and secure it on both sides *using the special screws provided with the drive*.
8. Attach a spare power cable to the new drive (it does not matter greatly which of the available power cables you choose).
- 9a. If you are fitting an E-IDE drive, attach the spare connector on the HDD ribbon (signal) cable to the slave drive. (The HDD ribbon cable has two connectors on it; one for the master drive and one for the slave drive.)
- 9b. If you are fitting a SCSI drive, attach a spare connector on the SCSI ribbon (signal) cable to the slave drive.
10. Check to ensure that no other cables or connections have become dislodged or trapped during the work, then refit the internal metal blanking plate, the plastic front bezel and the system unit panels.

Installing in the rear drive bay

The rear drive bay is intended for 3.5-inch SCSI hard disk drives.

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 all the system panels. For more information see “Anti-static precautions” in the *Safety & Regulatory Notices* at the start of this manual.

Hard Disk Upgrades

4. If the rear drive bay already contains a SCSI drive, unplug the SCSI ribbon (signal) cable and power cable from that drive.
5. Remove the two screws that secure the rear drive bay to the chassis and take the bay out of the system unit.
6. Mount the new drive within the bay *using the special screws provided with the drive*. The first drive in the bay must be secured by its base, the second drive must be secured by its sides.
7. Return the rear drive bay to the system unit and secure it in place using the screws you removed at Step 5.
8. Attach SCSI ribbon cables and spare power cables to the drives (it does not matter greatly which of the available power cables you choose).
9. Check to ensure that no other cables or connections have become dislodged or trapped during the work, then refit the system unit panels.

Partitioning and formatting the drive

If the computer does not automatically detect the new hard disk drive the first time you turn it on, start the BIOS Setup utility, go to the Advanced menu and change the Reset Configuration Data item to “Yes”, then restart the computer.

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

Windows 95

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.

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.*

7 REMOVABLE-MEDIA DRIVE UPGRADES

This chapter describes how to add a removable-media drive, such as a tape drive, to your computer. The drive is assumed to be of 5.25-inch form factor.

The forward drive bay of your computer can accommodate up to three removable-media drives (or two if a second hard disk drive is also fitted). A CD-ROM drive is often fitted as standard in Apricot LS models, occupying the topmost slot in the drive bay.

Removable-media drives are typically either ATA devices which can use the secondary E-IDE connector on the motherboard, or SCSI devices which require a separate SCSI host bus adapter expansion card.

The secondary E-IDE connector can accommodate up to two devices “daisy-chained” in series. A SCSI host adapter can usually accommodate several devices in series.

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.

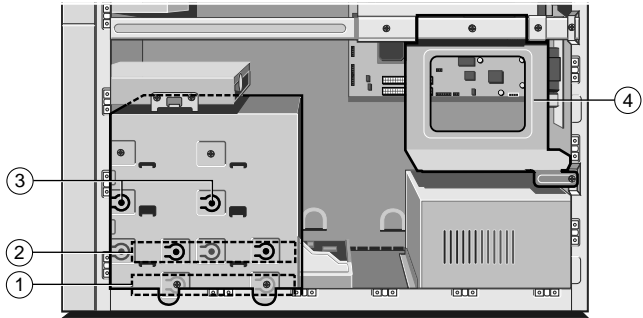
Configuring the drive

Removable-media drives sometimes require configuration, perhaps by altering jumpers on the drive itself, prior to installation. Configuration details vary from drive to drive: a second ATA drive needs to be configured as a slave drive, and a SCSI drive requires that its device ID number be set. Most drives are supplied with documentation describing how to configure the drive. If you are uncertain about configuring the drive consult your supplier.

Installing the drive

To install a removable-media drive:

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 all the system panels. For more information see “Anti-static precautions” in the *Safety & Regulatory Notices* at the start of this manual.



- 1 First or “master” hard disk drive (HDD)
 - 2 Slot for a second HDD or a removable-media drive
 - 3 Slot for a removable-media drive
 - 4 Rear drive bay for two SCSI hard disk drives
4. Carefully remove the plastic bezel blanking insert from the selected drive slot by pushing it out from the rear with a blunt instrument (for example, the end of a rubber-tipped pencil). A hole for this is provided inside the system unit, alongside the drive bay.
 5. Pull out the metal blanking plate from the front of the internal drive bay metalwork.
 6. Carefully slide the new drive into the bay *from the front* and secure it on both sides *using the special screws provided with the drive*.
 7. Attach a spare power cable to the drive (it does not matter greatly which of the available power cables you choose).

Removable-Media Drive Upgrades

- 8a. If you are fitting a SCSI device, install the SCSI host bus adapter card as described in the *Expansion Cards* chapter of this manual, then connect the ribbon cable supplied with the device (or the card) between the rear of the device and the card.
- 8b. If you are fitting a second ATA device, attach the spare connector on the CD-ROM ribbon (signal) cable to the new drive.

Hint

If your computer does not already have a CD-ROM drive, a suitable ribbon cable should have been supplied with the new drive. Connect this cable between the rear of the drive and the secondary E-IDE connector on the motherboard.

9. Attach any other signal cables as instructed in the documentation supplied with the removable-media drive.
10. Check to ensure that no other cables or connections have become dislodged or trapped during the work, then refit the system unit panels.

Finally, follow any further instructions supplied with the drive (for example, for installing software relating to the drive).

8**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 BIOS Setup utility.

BIOS Setup

To start the BIOS Setup utility:

1. Turn on or restart your computer.
2. Wait until the Mitsubishi Electric logo appears on the screen.



3. Press the F2 key.
4. 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.

Control keys

Use the keys listed in the legend bar at the bottom of the BIOS Setup screen to make your selections or exit the current menu.

Sub-menus are marked by a ► pointer. To display a sub-menu, use the arrow keys to move the cursor to the sub-menu you want, then press ENTER.

Changeable fields are enclosed in square brackets. To select an item, use the arrow keys to move the cursor to the field you want. Then use the PLUS (+) and MINUS (-) keys to select a value for that field.

Press	To
F1 or ALT-H	View a general help topic. Press ESC to close the help window.
ESC	Exit the current menu.
LEFT or RIGHT arrow	Select a different menu.
UP or DOWN arrow	Select fields in the current menu.
PLUS (+) or F6 or SPACEBAR	Select the next value for the current field.
MINUS (-) or F5	Select the previous value for the current field.
ENTER	Execute a command or enter a sub-menu.
HOME or END	Move the cursor to the top or bottom of the current menu.
PAGE UP or PAGE DOWN	Move the cursor to the next or previous page of the current menu.
F9	Restore the default settings for all menus.
F10	Save the changes you've made and exit from BIOS Setup.

Caution

The default BIOS settings may not be appropriate for your particular system. Make a note of the current settings before pressing F9 or using the Load Setup Defaults command of the Exit menu.

Getting help in BIOS Setup

You can at any time get general help about the control keys by pressing the F1 key.

The help window on the right-hand side of each menu displays help text for the currently-selected field. It changes as you move the cursor from one field to another.

Reserving ISA legacy resources

To reserve interrupts and upper memory block (UMB) regions for ISA expansion cards, go to the Advanced menu, select PCI Configuration, then select PCI/PNP ISA IRQ Resource Exclusion or PCI/PNP ISA UMB Region Exclusion as required.

Multi-boot facility

If you restart your computer and press the ESC key while the Mitsubishi Electric logo is on the screen, a diagnostics screen appears, followed by a menu similar to the following:

Boot Menu
1. Diskette Drive
2. Removable Devices
3. Hard Disk Drive
4. ATAPI CD-ROM Drive
5. Network Boot
< Enter Setup >

This menu can be used to temporarily use another drive or device to boot your system, for example a bootable CD-ROM, without having to enter BIOS Setup. Simply use the UP and DOWN arrows to make a selection. The change is not permanent; the boot device reverts to the normal setting the next time you turn on your computer.

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> to resume, <F2> to enter Setup or just Press <F2> to enter 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.

Diskette drive A error

Drive A: is present but fails the POST diskette tests. Check that the drive is defined correctly in BIOS Setup. If necessary, open the system unit and check that the drive's signal (ribbon) cable is connected.

System/Extended/Shadow RAM failed at offset: *xxxx*

Failing bits: *yyyy*

System, extended or shadow memory is not working, or not configured properly, at offset *xxxx*. The hexadecimal number *yyyy* is a map of the bits at the address which failed the memory test. Each "1" in the map represents a failed bit.

Failure fixed disk *X*

A fixed (hard) disk drive is not working or not configured properly. Check that the drive is defined correctly in BIOS Setup. If necessary, open the system unit and check that the drive's signal (ribbon) cable is connected.

Incorrect drive A type - run SETUP

The diskette drive is not correctly specified in BIOS Setup.

Missing or invalid NVRAM token

Problem with NVRAM (non-volatile random-access memory).

Keyboard error [nm] or Keyboard controller error

There is a problem with the keyboard or (less likely) the standard I/O controller on the motherboard. If POST discovers a stuck key it displays its scan code.

Operating system not found

An operating system cannot be located either on a system diskette or on a hard disk. Start BIOS Setup and check that the diskette and/or hard disk drives are specified correctly.

Parity check 1 xxxx or Parity check 2 xxxx

Parity error found on the system (1) or I/O (2) bus. The BIOS attempts to locate and display the address xxxx. If it cannot locate the address, it displays “????”.

Previous boot incomplete - default configuration used

The previous POST did not complete successfully. POST loads default values and offers to start BIOS Setup. If the failure was caused by incorrect values and they are not corrected, the next boot will likely fail too.

Real-time clock error

Start BIOS Setup and check the System Time and System Date settings on the Main menu.

System battery is dead - replace and run Setup

Replace the configuration battery as instructed in the *Motherboard Features & Upgrades* chapter, then use BIOS Setup to reconfigure the system.

System cache error - cache disabled

The RAM cache failed POST and BIOS disabled it.

System CMOS checksum bad - default configuration used

System CMOS has been corrupted or modified incorrectly, perhaps by an application program that changes data stored in CMOS. Run BIOS Setup and reconfigure the system either by confirming the default values or by making your own selections.

System timer error

A service engineer may need to replace your motherboard.

Terminal POST errors and beep codes

There are several POST routines that shut down the computer if they fail. If possible, the BIOS displays a two-digit hexadecimal code and/or 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.

Code	Beeps	Test which failed
16	1-2-2-3	BIOS ROM checksum
20	1-3-1-1	DRAM refresh.
22	1-3-1-3	8742 keyboard controller
2C <i>xxxx</i>	1-3-4-1	RAM failure on address line <i>xxxx</i> .
2E <i>xxxx</i>	1-3-4-3	RAM failure on data bits <i>xxxx</i> of low byte of memory bus.
30 <i>xxxx</i>	1-4-1-1	RAM failure on data bits <i>xxxx</i> of high byte of memory bus.
46	2-1-2-3	Check ROM copyright notice
58	2-2-3-1	Test for unexpected interrupts
98	1-2	Video configuration failure, or option ROM checksum failure. (One long, two short beeps.)

9 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. Try to discover the cause of the fault. If none is apparent, replace the blown fuse with one of the same rating, reconnect the system unit power cord and try to turn it on again.
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 authorised maintainer.

Common problems

If you encounter a problem with the computer the following sections suggest checks to make before you alert your supplier, authorised maintainer 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.

If you have fitted a new video controller expansion card and subsequently encounter problems try disabling the on-board video controller by removing a jumper from the motherboard. See the *Motherboard Features & Upgrades* chapter for more information.

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

Troubleshooting

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 an authorised maintainer.
- ◆ 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 an authorised maintainer.

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 Features & Upgrades* 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 equipment log to record pertinent information about your PC.

In particular, you must record the 12-digit fall-back password of the Electronic Fingerprinting security feature (see the *Getting Started* chapter for more information).

Record the password in the space provided below, then store this page (or the whole manual) in a safe place.

Fall-back password:

--	--	--	--

--	--	--	--

--	--	--	--

Manufacturer's data

You should record the model codes and serial numbers of the system components. You can update this with information about any expansion cards fitted.

	Model	Serial number
System unit		
Monitor		
Keyboard		
Mouse		
Speakers		
Sub-woofer		



Expansion cards

	Manufacturer	Description	Serial number
1			
2			
3			
4			
5			



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