

Apricot

FT SERIES

FT1400 Handbook



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FM 1716 FS 21715 FS 30305

APRICOT FT SERIES

With dual Pentium®II processors

FT1400 HANDBOOK

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SAFETY AND REGULATORY NOTICES

General

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

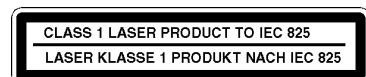
This product contains a lithium battery.

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.

Anti-static precautions

WARNING

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

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

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

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

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

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

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

Thermalcote bonding compound

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

Maintenance

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

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

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

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

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

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

Transporting

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

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

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

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

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

NOTE

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

Standards

Safety

This product complies with the European safety standard EN60950 which will, when applicable, include the national deviations for the country in which it is 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 standards:

VCCI Class 1 (Japan)

Notes

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

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

Legalities

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

Low Voltage Directive 73/23/EEC

EMC Directive 89/336/EEC

Telecommunications Directive 91/263/EEC

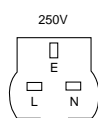
CE Marking Directive 93/68/EEC

IMPORTANT

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

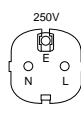
Power Connection

Typical AC plugs



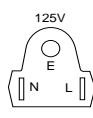
BS1363A

U. K.



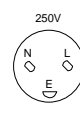
SHUCO

Austria Belgium
Finland France
Italy Germany
Sweden Norway
Holland



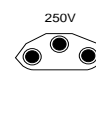
NEMA 5-15P

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.

SAFETY & REGULATORY NOTICES

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.

CAUTION

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

Connecting to the AC power supply

IMPORTANT

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

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

1. Before connecting any components, ensure that the AC power supply is switched off or disconnected, and that the system unit, the monitor, and any peripherals are turned off.
2. Connect the component signal cables to their respective ports on the system unit: keyboard, mouse, monitor, audio (where appropriate) and any other peripherals.

◇ Where appropriate, connect the computer to the network.
3. Connect the component power cords: system unit, monitor to system, plus any other peripherals to nearby, grounded AC power outlets. (Never substitute a power cord from any other appliance). Then switch on or connect the AC power supply.
4. Turn on the system unit first, then the monitor, then other peripherals.

WARNING

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

Power Cable Connections - UK ONLY

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

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

External Speakers (where supplied)

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

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

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

1

WELCOME

This chapter gives you a quick tour of your new FT Server, the main features, plus some of the components it may contain.

Throughout this manual 'Windows' means Microsoft Windows NT 4.x or higher, unless otherwise stated.

WARNING

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

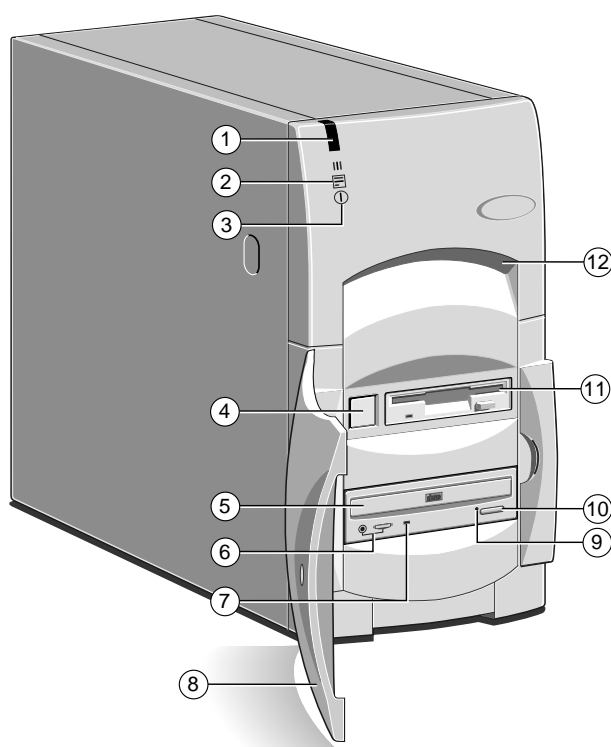
Unpacking

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

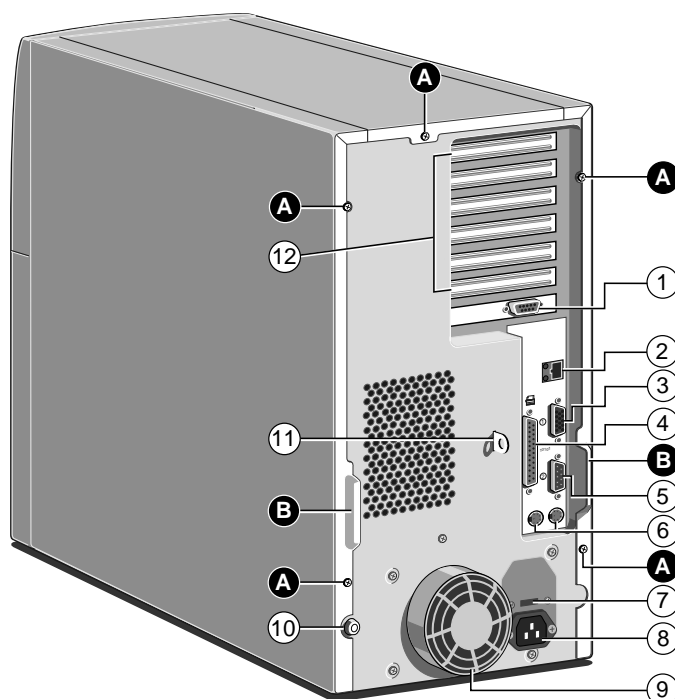
Use the page at the end of this manual to make a note of the manufacturer's data recorded on the various components (product codes, serial numbers, etc.). A service engineer may need this information if the computer develops a fault. It would also be very useful for identification if the computer should be stolen.

There is also an area to note down other important information such as supplier details, authorised maintenance phone number, date of installation etc.

Pictorial guide to the system unit



- | | | | |
|---|------------------------------------|----|-------------------------|
| 1 | Reserved for future options | 7 | CD activity indicator |
| 2 | Hard disk activity indicator | 8 | Lockable front door |
| 3 | Power Mode indicator | 9 | CD emergency eject hole |
| 4 | POWER button | 10 | CD EJECT button |
| 5 | CD-ROM disc drawer (platter) | 11 | Diskette drive |
| 6 | CD headphone jack & volume control | 12 | Front lifting point |



B	Handles to assist side panel removal	A	Side panel fixing screws
1	Serial port (COM 2)	7	Voltage selector switch
2	Network connector (LEDs, see below)	8	AC power inlet from AC supply
3	Monitor connector	9	Fan cover (do not use to lift)
4	Parallel (printer) port	10	Caselock
5	Serial port (COM 1)	11	Security loop (cable or padlock)
6	Mouse and keyboard ports	12	System expansion slots

Network connector LEDs

LED Color	ON	Flashing	Off
Orange	100 Mbps network connection.	NA	10 Mbps network connection.
Green	Linked to network no network traffic	Linked to network sending or receiving data.	Not linked to network.

Use the POWER button to turn on the computer and change power modes. This switch can be secured by closing and locking the front door. This will also prevent unauthorised access to the removable media drives.

There is an option available for intrusion detection in the event of the caselock being opened. This can be monitored via the network from a supervisor's PC.

Removing panels

For normal access to the interior of the system unit, only the right side panel needs to be removed. The top panel will need to be removed to fit expansion cards while the left side panel only has to be removed in order to install additional removable media or hard disk drives in the forward drive bay.

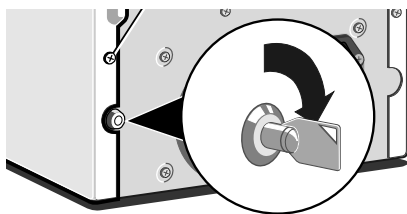
WARNING

The front panel power button does not remove power from the system. Unplug or disconnect the AC supply.

Never carry out any work inside the computer with AC power applied. Always shut down the computer and unplug all power cords before removing any of the covers. Take effective anti-static precautions at all times while any 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.

See the following chapters for more information:

- ◆ Motherboard: features and upgrades
- ◆ Expansion cards
- ◆ SCSI drives

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.

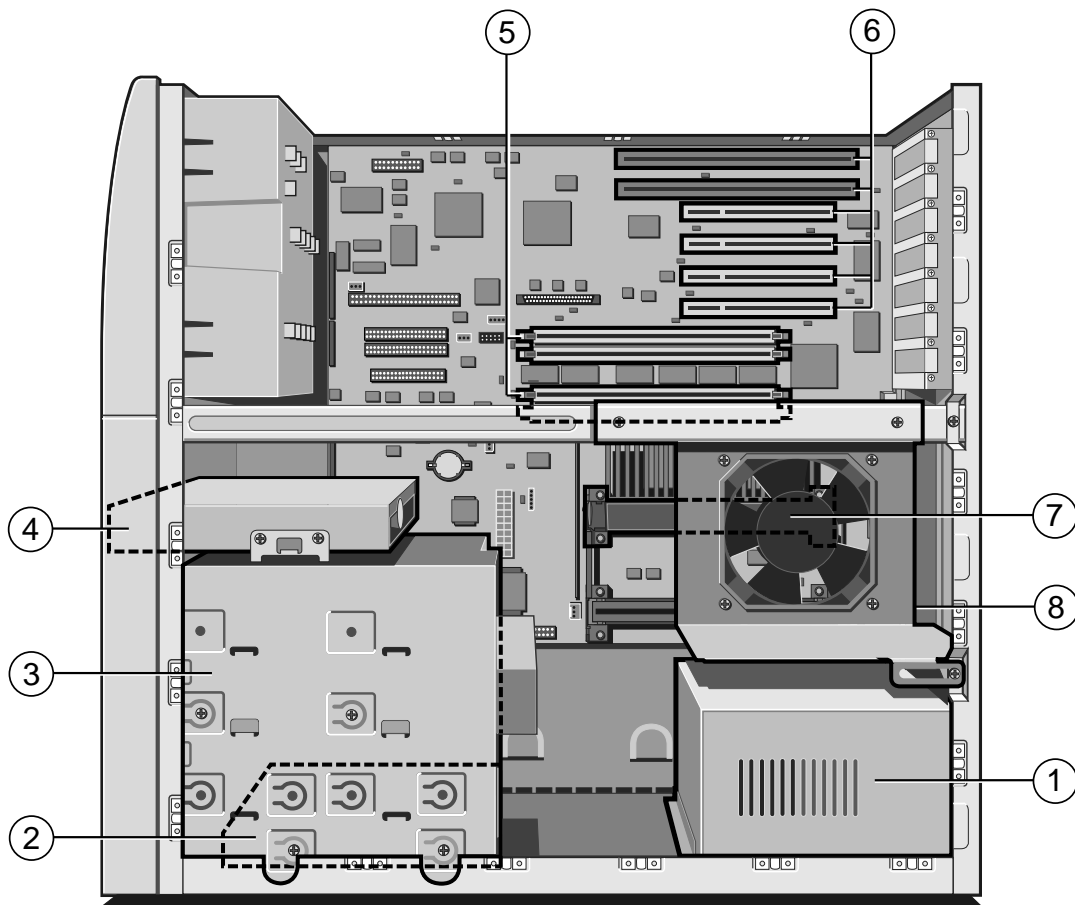
Left side panel

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 loose panels when you have removed them, as there are metal fixings and hooks on the inside that may scratch delicate surfaces such as desks or work surfaces.



- 1 Power supply unit (PSU)
- 2 First or "master" hard disk drive (HDD)
- 3 Forward drive bays (default position for CD-ROM)
- 4 Diskette drive
- 5 Memory 'DIMM' sockets
- 6 ISA and PCI card expansion sockets
- 7 'Slot 1' processor slots (Primary processor uppermost)
- 8 Rear drive bay (for two SCSI hard disk drives)

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 both the front and the rear, and expelled through the circular vents on the back. Ensure that these 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 various power cords: monitor, system unit and any other peripherals to nearby, grounded AC power outlets. Then switch on or connect the AC power supply.

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'.

Mitsubishi server PCs are typically supplied with either Windows NT, or MS-DOS/Netware (or equivalent), 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.

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 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 Netware or similar, exit or shutdown the software according to the information given in your user guide, which returns you to a DOS prompt. You can then safely press the POWER button to turn off the computer.

After you have shut down, 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 the operating system.

To do this, press and hold down the POWER button for *at least four seconds*. This should be only a last resort, as some operating systems create temporary files as part of their procedure and these are deleted during a normal shutdown. They would remain on your hard drive in an emergency shut down and will require manual deletion. They can sometimes use up considerable drive space.

CAUTION

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

Using the computer for the first time

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 also offers you the opportunity to install a printer.

Backing-up the pre-installed software

Mitsubishi PCs arrive with a pre-installed operating system or 'Software'. 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 or the Disk Maker utility (Windows NT) 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 in Windows. You could also use other software backup utilities supplied with optional hardware you may have chosen, such as a DAT tape drive.

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.

Apart from any possible infringement of copyright, the software may be configured for unique features built into your computer. They may not work or may cause serious problems on another system.

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 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.

If your hard disk is larger than 2 gigabytes

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.

CAUTION

Take great care when creating and formatting new partitions not to damage, delete or format your existing 'boot' partition.

2 REMOVABLE MEDIA DRIVES

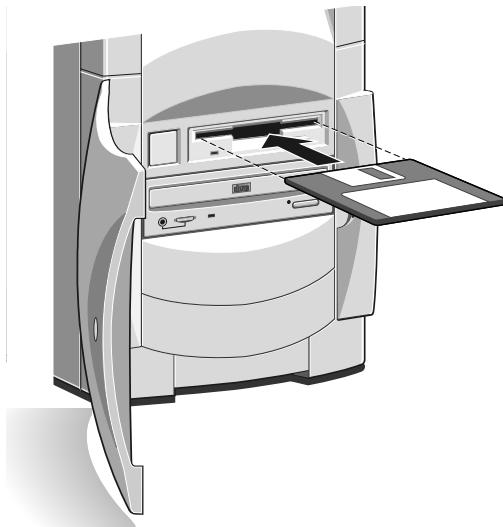
Diskette drive

Your FT Server 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.

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.

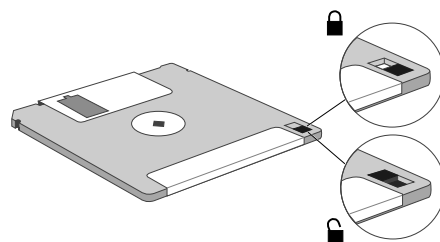
Ejecting a diskette

- ◆ 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.

Diskette care

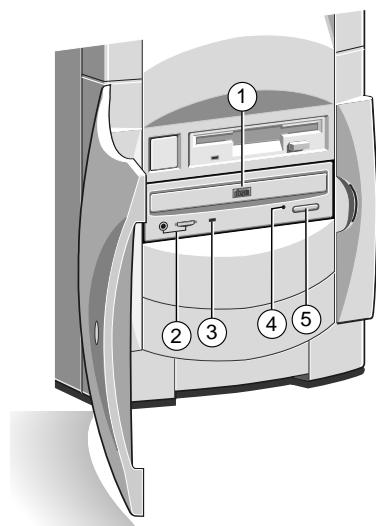
Keep diskettes away from dust, moisture, magnetic objects, and equipment that generates magnetic fields. Also, avoid extremes of temperature and exposure to direct sunlight. Otherwise, data recorded on the diskette may become corrupted.

Always check that labels are firmly fixed before you use the diskette and do not leave them in the drive for prolonged periods.

CD-ROM drive

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). Note that in some models of server the CD-ROM drive may be fitted in a lower slot.

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



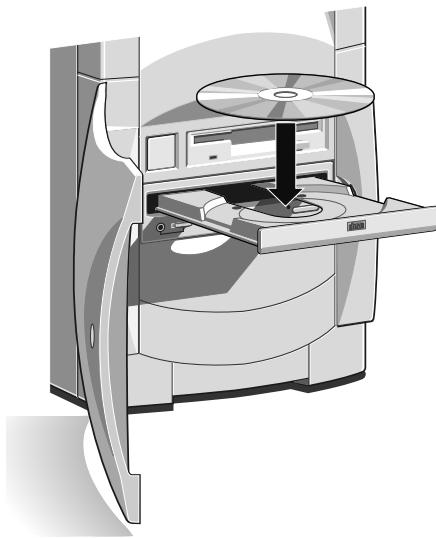
- 1 CD-ROM disc drawer (platter)
- 2 Headphone jack & volume control
- 3 Activity indicator (amber = busy)
- 4 CD emergency eject hole
- 5 EJECT button (doesn't work while PC is turned off)

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.

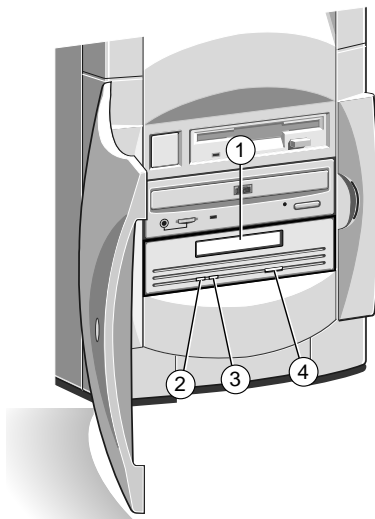
Care of CDs

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 disk to warp. Always store them in their original container.

DAT tape drive (option)

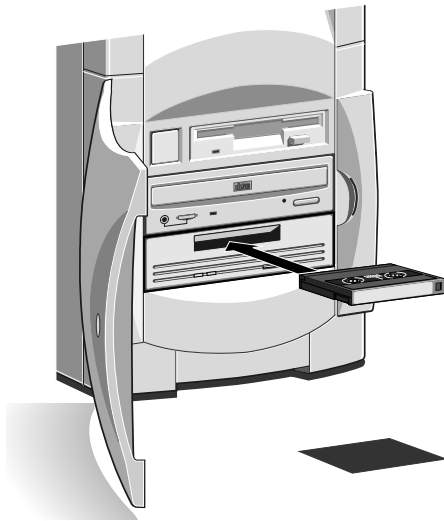
It is recommended to regularly make a backup of the software on the system hard drives. A DAT tape drive is one of the simplest and most convenient methods. The drive can be obtained from your supplier as an upgrade kit. A brief installation guide is given in the chapter, *'Drive upgrades'*. The drive should be fitted in a vacant slot, which may actually be above the CD-ROM drive in some server models.

Operating system software can be easily reinstalled from the master software disks or CD-ROMs, but created data from a multitude of server users can not be easily replaced. The common backup method is to use two or three tapes in rotation, either weekly, daily or even twice daily.



- 1 Tape cassette entry slot
- 2 Cassette engaged (green)
- 3 Drive active (amber)
- 4 Cassette eject button

Inserting a DAT tape



Hold the cassette with its metal plate downward and the open tape edge towards the computer. Without using undue force, press the cassette against the drive tape slot. The dust cover will swing open allowing the tape cassette to enter. Push firmly home. With some models of drive, the cassette does not enter the drive completely. The 'Cassette engaged' green light should come on.

The LEDs may show different colours dependent on the drive activity. For full information see the separate 'User's Guide' for the drive.

Removing a DAT tape

Wait until the drive active light goes out and all activity has ceased, then press the Eject button. The cassette will move outwards and is easily lifted clear.

Care of DAT cassettes

Always store cassettes in their original dust tight cases. Keep them away from dust, moisture, magnetic objects, and equipment that generates magnetic fields (such as telephones or monitors). Avoid extremes of temperature and exposure to direct sunlight. Regularly check your backup tapes for wear or damage.

3 EXPANSION CARDS

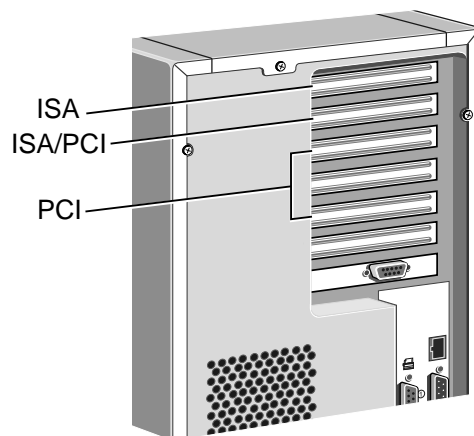
Expansion cards (also known as expansion boards, controllers or adapters) are small self-contained circuit boards which extend the capabilities of the computer. For example, a graphics card could provide more specialised video functions than those offered by the on-board video system, or a modem card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



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

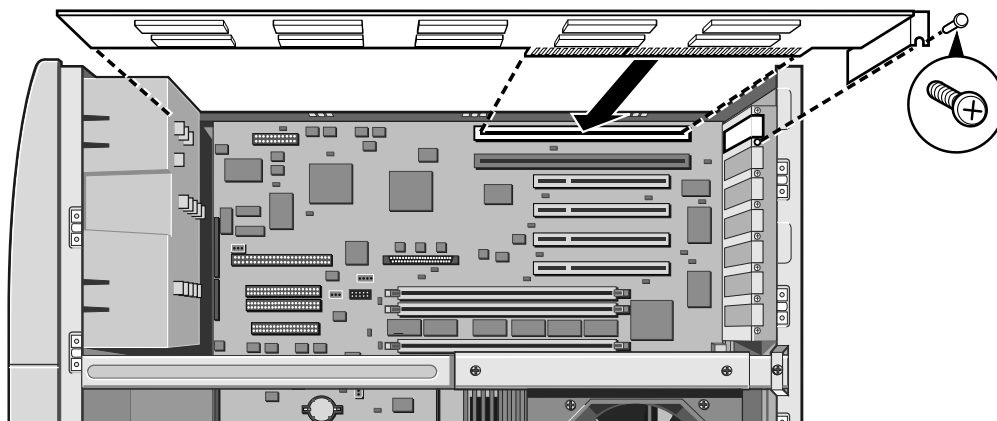
This system complies with the CE Marking Directive and its strict legal requirements. Use only parts tested and approved by Mitsubishi Electric PC Division. Failure to do so may result in invalidating both the compliance and your warranty. All expansion cards, drives and peripherals must carry the CE 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 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 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.

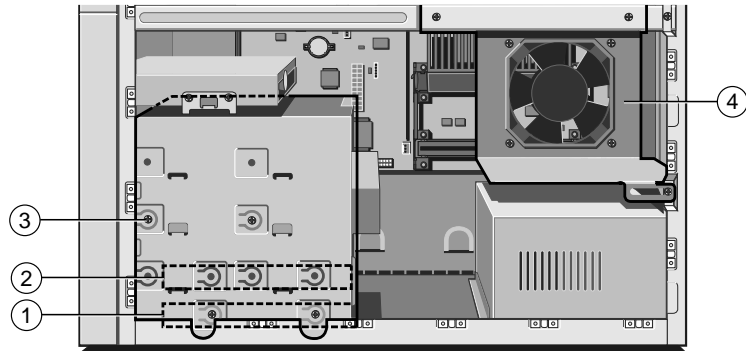
If your device does not have a Resources tab, either you cannot change its resources or it isn't using any resource settings.

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.*

4 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
(CD-ROM default) with spare bay above
- 4 Rear drive bay for two SCSI hard disk drives

SCSI Device Support

Full details about the SCSI controller can be found in the *‘Motherboard’* chapter. The chip has two controllers. Controller A has a 68-pin 16-bit (wide) SCSI connector and controller B has a 50-pin 8-bit (narrow) connector. Each controller has its own set of PCI configuration registers and SCSI I/O registers

Drive bays

- ◆ The forward drive bay can accommodate two hard disk drives. Either drive may be 3.5 or 5.25 width, but only up to 1 inch high.
- ◆ The spare drive bay can accommodate any full-width, half-height peripheral drive, such as the optional DAT drive shown in the chapter, *‘Removable media drives’*.
 - ◇ Note that in some server models, this spare bay may be **above** the CD-ROM.
- ◆ The rear drive bay above the power supply is designed to take one or two 3.5 x 1 inch high, SCSI drives.

Termination rules

When attaching internal SCSI devices, a terminated device must be attached to the last connector on the data cable. Other unterminated devices can then be attached to the data cable. See the SCSI device’s documentation for instructions on termination. The motherboard is connected to the other end of the cable, and it is terminated by default.

More details about this and other drive jumpers can be found on pages 2 and 3 of this chapter.

Hard disk configurations

When using the on-board SCSI controller, up to 4 hard disk drives may be connected to controller A (68 pin), with the final drive having the termination. A DAT drive would connect to the second (50 pin) connector.

Hard Disk Drive types and links

The hard disk sub-system can consist of up to four 4Gb or 9Gb, 68 pin Ultra II-Wide SCSI drives. The drive locations are as above at the beginning of this chapter, the front bays will be filled first.

NOTE

The rear drive carrier framework is fitted with a processor cooling fan, which must be reconnected when the carrier is replaced after installing further drives.

HDD jumpers – I.B.M. hard drives

Jumper	Function I.B.M. DCAS-xxxxx	Function I.B.M. DDRS-xxxxx
1	ID Bit 3 (MSB)	ID Bit 3 (MSB)
2	ID Bit 2	ID Bit 2
3	ID Bit 1	ID Bit 1
4	ID Bit 0 (LSB)	ID Bit 0 (LSB)
5	Disable Auto Spin up	Enable Auto Spin up
6	Enable Bus Term	Enable Bus Term
7	Disable Unit	Disable Unit
8	Enable TI-SDTR/WDTR	Enable TI-SDTR/WDTR
9	Auto Start Delay	Auto Start Delay
10	Delay Start 6/12	Delay Start 6/12
11	Disable Parity	Disable Parity
12	LED Cathode	LED Cathode

Jumper	Function	DDRS-xxxxx ID:				DCAS-xxxxx ID:			
		0	1	2	3	0	1	2	3
1	ID Bit 3	0	0	0	0	0	0	0	0
2	ID Bit 2	0	0	0	0	0	0	0	0
3	ID Bit 1	0	0	0	0	0	0	0	0
4	ID Bit 0	0	1	0	1	0	1	0	1
5	Auto Spin up	1	0	0	0	0	1	1	1
6	Bus Term	1	0	1	0	1	0	1	0
7	Disable Unit	0	0	0	0	0	0	0	0
8	TI-SDTR	0	0	0	0	0	0	0	0
9	Start Delay	0	0	0	0	0	0	0	0
10	Delay 6/12	0	0	0	0	0	0	0	0
11	Disable Parity	0	0	0	0	0	0	0	0
12	LED	0	0	0	0	0	0	0	0

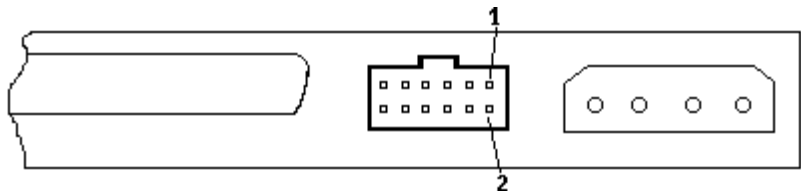
1 = jumper fitted

0 = no jumper

HDD jumpers – Seagate hard drives

Drive ID

J1, next to the power connector at the rear of the drive. Pins 1 and 2 are nearest the power connector.



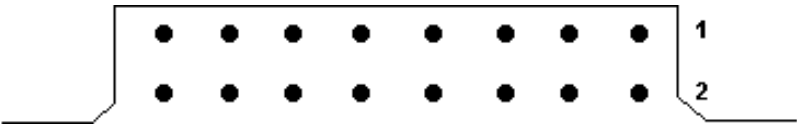
J1 - Set ID	Jumper on:			
SCSI ID = 0	0	0	0	0
SCSI ID = 1	0	0	0	1-2
SCSI ID = 2	0	0	3-4	0
SCSI ID = 3	0	0	3-4	1-2

Functions – J2

Mid position on one side of the drive board.

CAUTION

Do not use links from any other jumper pad on the drive. These are a special size of link and others may cause permanent damage.



	TE	DS	ME	WP	PD	RES	TP2	TP1	Note:
Terminator Enable	I	O	O	O	O	O	O	O	Drive ID=0 only
Delay motor start	O	I	O	O	O	O	O	O	
Enable motor start	O	O	I	O	O	O	O	O	Drive ID=1 to 3 only
Reserved	O	O	O	O	O	O	O	O	
Parity disable	O	O	O	O	I	O	O	O	
Term. Power from drive	O	O	O	O	O	O	I	O	Always fitted
I = jumper fitted O = no jumper									

Installing in the forward drive bay

To install a second 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.
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 drive mounting plate (it is secured by two screws on each side).
7. If you are fitting a 3.5 HDD, attach it to the 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.
8. Attach a spare power cable to the new drive (it does not matter greatly which of the available power cables you choose).
9. Attach a spare connector on the SCSI ribbon (signal) cable to the new drive.
 - ◇ Remember to check 'Termination rules' on the first page of this chapter.
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 has a cooling fan for the processors mounted on the rear. This has a power connection to the motherboard.

1. Turn off the computer and unplug all power cords.
2. Take suitable anti-static precautions and remove the system side panel.
3. If the rear drive bay already contains a SCSI drive, unplug the SCSI ribbon (signal) cable and power cable from that drive.
4. Remove the five screws that secure the rear drive bay to the chassis and take the bay out of the system unit.

WARNING

*The drive bay has a processor cooling fan mounted at the back which is connected to the motherboard. This **must** be reconnected when you refit the drive bay.*

5. Mount the new drive within the bay *using the special screws provided with the drive*.
6. Return the rear drive bay to the system unit, reconnecting the fan power connector to the motherboard and secure it in place using the screws you removed at Step 4.
7. Attach SCSI ribbon cables and spare power cables to the drives (it does not matter greatly which of the available power cables you choose).
 - ◇ Remember to check 'Termination rules' on the first page of this chapter along with the drive jumper settings on page 3 of this chapter.
8. Check to ensure that no other cables or connections have become dislodged or trapped during the work, then refit the system unit panel.

Partitioning and formatting the drive

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

CAUTION

Take great care when creating and formatting new partitions not to damage, delete or format your existing 'boot' partition.

Windows NT

Use the Disk Administrator tool in the Administrative Tools (Common) folder. This tool can create partitions and format them.

In older versions of Windows, it will require exiting to a DOS prompt and using the FDISK program.

Installation of a removable media drive

Removable-media drives sometimes require configuration, by altering jumpers on the drive itself, prior to installation. Configuration details vary from drive to drive: a SCSI drive requires that its device ID number be set (the boot SCSI drive is usually drive '0'). Most drives are supplied with documentation describing how to configure the drive. If you are uncertain about configuring the drive consult your supplier.

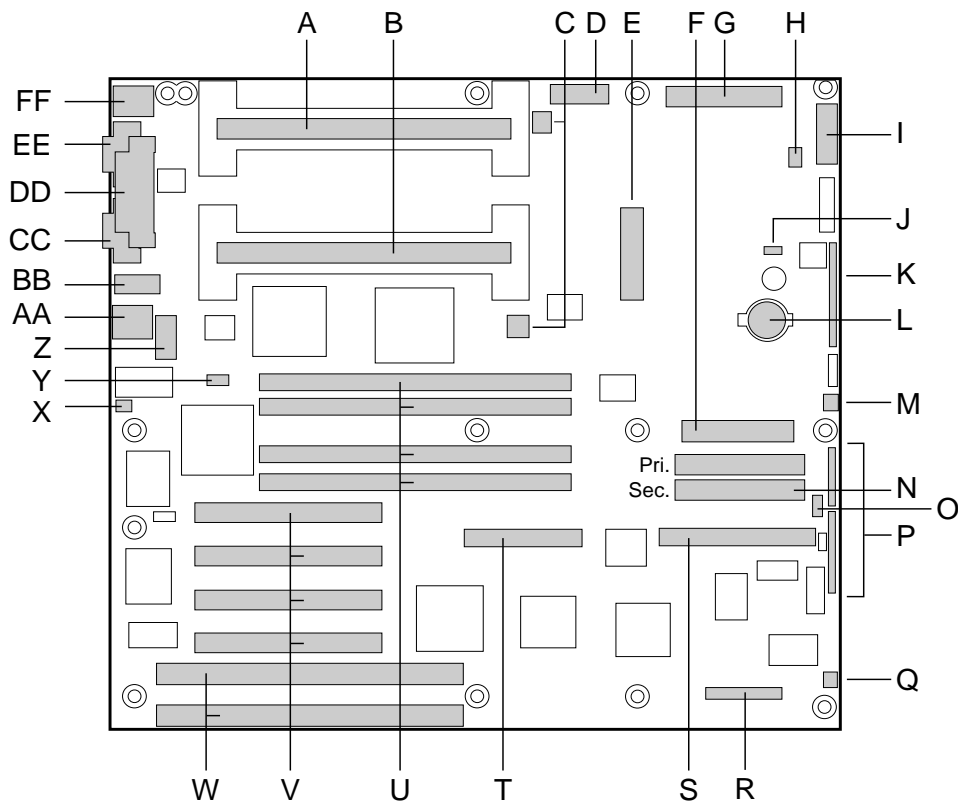
Installing the drive

1. Turn off the computer and unplug all power cords.
2. Take suitable anti-static precautions and remove all the system panels.
3. 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.
4. Pull out the metal blanking plate from the front of the internal drive bay metalwork.
5. 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*.
6. Attach a spare power cable to the drive (it does not matter greatly which of the available power cables you choose).
7. If you are fitting a SCSI device that has a 50-pin connection, connect using a 50-68 pin adapter to the existing SCSI cable.
 - ◇ Remember to check 'Termination rules' on the first page of this chapter.
8. Attach any other signal cables as instructed in the documentation supplied with the removable-media drive.
9. 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, installing and configuring software).

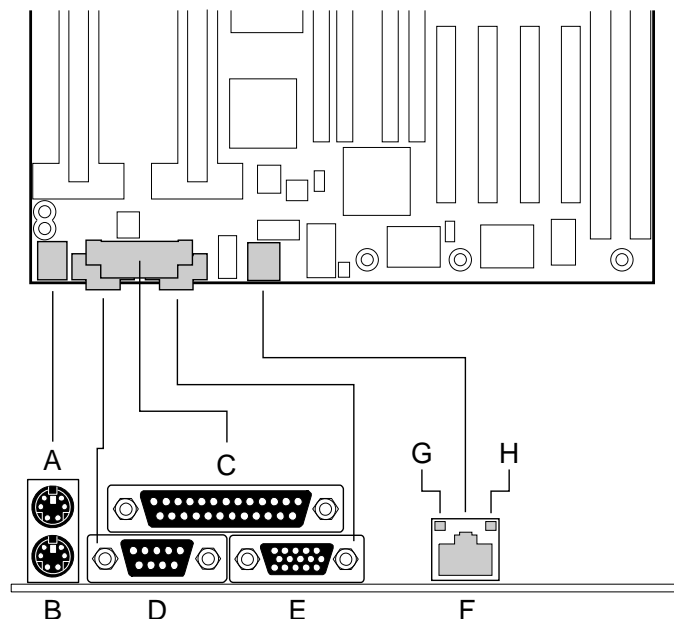
5 MOTHERBOARD

General features



- | | |
|--------------------------------------|--|
| A. Secondary processor connector | Q. System fan connector (fan2) |
| B. Primary processor connector | R. Server monitor module (SMM) connector |
| C. Processor Heatsink fan connectors | S. Narrow SCSI connector |
| D. Aux power connector | T. Wide SCSI connector |
| E. ATX power connector | U. Memory sockets for four DIMMs |
| F. Diskette drive connector | V. PCI slots for add-in boards |
| G. Main power connector | W. ISA slots for add-in boards |
| H. Hard drive LED connector | X. Chassis intrusion connector |
| I. Front panel connector, 16 pin | Y. WOL enable jumper |
| J. Speaker connector | Z. USB header |
| K. AT front panel connector | AA. RJ-45 network connector |
| L. Lithium backup battery | BB. Serial port 2 header |
| M. System fan connector (fan1) | CC. VGA monitor port |
| N. IDE connectors | DD. Parallel port connector |
| O. External IMB connector | EE. Serial port 1 connector |
| P. Configuration jumper blocks | FF. Keyboard and Mouse connectors |

Back Panel Connectors



- | | | | |
|---|-------------------------|---|-------------------|
| A | Mouse Connector | E | VGA Connector |
| B | Keyboard Connector | F | Network Connector |
| C | Parallel Port Connector | G | Green NIC LED |
| D | Serial Port Connector | H | Orange NIC LED |

Network connector LEDs

LED Color	On	Flashing	Off
Orange	100 Mbps network connection.	NA	10 Mbps network connection.
Green	Linked to network, no network traffic	Linked to network, sending or receiving data.	Not linked to network.

Peripheral connections

Serial ports

Both serial ports can be relocated. By default, port A appears at the onboard 9-pin connector, port B on the 10-pin header, which is ribbon cabled to the back panel. Each port can be set to one of four different COMx ports and can be enabled separately. When enabled, each port can be programmed to generate edge- or level- sensitive interrupts. When disabled, the serial port interrupts are available to add-in boards.

Parallel port

There is one IEEE 1284-compatible 25-pin bi-directional EPP (supporting levels 1.7 and 1.9). BIOS programming of the registers enable the parallel port and determine the port address and interrupt. When disabled, the interrupt is available to add-in boards.

Board features

Add-in board slots

The motherboard has two full-length ISA connectors, one of which shares an chassis expansion slot with a PCI connector. Features:

- ◆ Bus speed up to 8.33MHz
- ◆ 16-bit memory addressing
- ◆ Type A transfers at 5.33 Mb/s
- ◆ Type B transfers at 8 Mb/s
- ◆ 8- or 16- bit data transfers
- ◆ Plug and Play ready

There are also four full-length PCI connectors. One of the connectors shares a chassis expansion slot an ISA connector. Features:

- ◆ Bus speed up to 33MHz
- ◆ 32-bit memory addressing
- ◆ 5V signalling environment
- ◆ Burst transfers of up to 133 Mb/s
- ◆ 8-, 16-, or 32-bit data transfers
- ◆ Plug and Play ready
- ◆ Parity enabled

Video

On-board integrated Cirrus Logic CL-5480 64-bit chip compatible with most popular video standards. There is 2Mb of 10ns video memory, providing resolutions of up to 1600 x 1200 and up to 16.7M colours.

The controller supports analogue monitors (single and multiple frequency, interlaced and non-interlaced) with a maximum vertical non-interlaced frequency of 100Hz.

SCSI controller

On-board Symbios Logic SYM53C876 dual function PCI SCSI host adapter, with two independent controllers that share a single PCI bus interface as a multi-function device. Each controller is identical, capable of 8- or 16-bit SCSI operations providing either;

- ◆ 10 Mb/s (Fast-10) or 20 Mb/s (Fast-20) throughput
- ◆ 20 Mb/s (Ultra) or 40 Mb/s (Ultra-wide) throughput

Controller A has a 68-pin 16-bit (wide) SCSI connector and controller B has a 50-pin 8-bit (narrow) connector. Each controller has its own set of PCI configuration registers and SCSI i/o registers. As a PCI 2.1 bus master the adapter supports data transfers on PCI up to the maximum rate of 132 Mb/s using on-chip buffers.

No logic, termination, or resistor loads are required to connect devices on the SCSI controller, other than termination in the device at the end of the cable. The bus is terminated on the motherboard with active terminators that cannot be disabled. The on-board device must always be at one end of the bus.

IDE controller

There is an on-board PIIX4 accelerator, which is a multi-function device that acts as a PCI-based fast IDE controller. It controls:

- ◆ PIO and IDE DMA/bus master operations
- ◆ Mode 4 timings
- ◆ Transfer rates of up to 22 Mb/s

- ◆ Buffering for PCI/IDE burst transfers
- ◆ Master/slave IDE mode
- ◆ Up to two drives per channel; two channels; IDE0 and IDE1

Network controller

On-board 10BASE-T/100BASE-TX, based on the Intel 82558 Fast Ethernet bus controller. As a bus master, the controller can burst data at up to 132 Mb/s. There are two receive and transmit FIFO buffers that can prevent data over-runs or under-runs while waiting for PCI bus access. It has the following features:

- ◆ 32-bit PCI bus master interface
- ◆ Chained memory structure with improved dynamic transmit chaining for enhanced performance
- ◆ Programmable transmit threshold for improved bus utilisation
- ◆ Early receive interrupt for concurrent processing of received data
- ◆ On-chip counters for network management
- ◆ Autodetect and autoswitch for 10 or 100 Mb/s network speed
- ◆ Capable of full or half duplex, with back-to-back transmit at 100 Mb/s

Front Panel Connectors

The motherboard has connectors for controls and indicators typically located on the front panel of the computer. The following are shown as 'I' and 'K' respectively in the illustration at the beginning of this chapter.

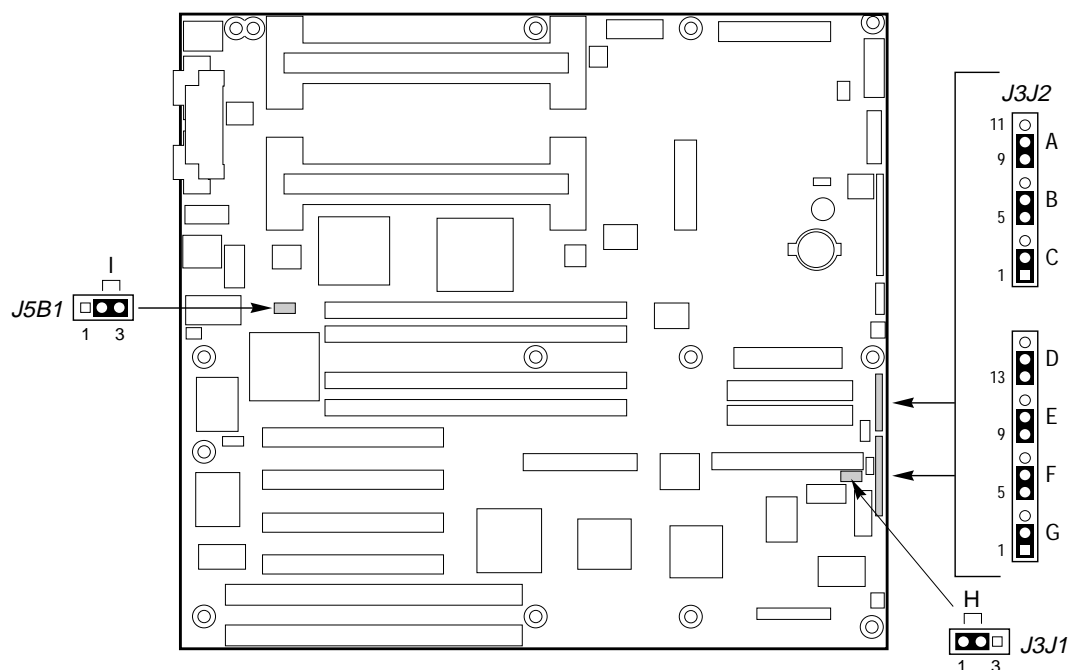
Front Panel Connector

<i>Pin</i>	<i>Signal</i>	<i>Pin</i>	<i>Signal</i>
1	GND	2	Hard disk activity LED
3	Front panel reset switch	4	Front panel power switch
5	+5V	6	NC
7	Front panel NMI switch	8	+5V
9	Fan failure indicator LED	10	Chassis intrusion switch
11	Power fault LED	12	+5v standby
13	I ² C Data line	14	GND
15	I ² C Clock line	16	GND

AT-Style Front Panel Connector

<i>Pin</i>	<i>Signal</i>
1	Power button
2	GND
3	+5V
4	Key
5	HD LED
6	+5V
7	+5V
8	NC
9	GND
10	GND
11	Reset button

Server Board Jumpers



Jumper Block	Pins (default-bold)	What it does at system reset
A BMC Forced Update Mode	9-10, Normal	System boots normally
	10-11, Program	System tries to update BMC firmware.
B Chassis Intrusion Detection	5-6, Enable	Switch installed on chassis indicates when cover has been removed.
	6-7, Disable	Chassis intrusion switch is bypassed.
C FRB Timer Enable	1-2, Enable	FRB operation is enabled (system boots from processor 1 if processor 0 fails).
	2-3, Disable	FRB is disabled.
D Boot Block Write Protect	13-14, Protect	BIOS boot block is write-protected.
	14-15 Erase/Program	BIOS boot block is erasable and programmable.
E Recovery Boot	9-10, Normal	System attempts to boot using the BIOS stored in flash memory.
	10-11, Recovery	BIOS attempts a recovery boot, loading BIOS code from a floppy diskette into the flash device. This is typically used when the BIOS code has been corrupted.
F Password clear	5-6, Protect	Maintains the current system password.
	6-7, Erase	Clears the password.
G CMOS clear	1-2, Protect	Preserves the contents of NVRAM.
	2-3, Erase	Replaces the contents of NVRAM with the manufacturing default settings.
H BMC boot block write protect	1-2, Protect	BMC boot block is wrote protected.
	2-3, Erase/Program	BMC boot block is erasable and programmable.
I WOL Enable	1-2, Disabled	Disables Wake On LAN. If your power supply does not provide 0.8 A of +5 V Standby current, you must move the WOL Enable jumper to this position.
	2-3, Enabled	Enables Wake On LAN

Interrupts

<i>Interrupt</i>	<i>I/O APIC level</i>	<i>Description</i>
INTR	INT0	Processor interrupt
NMI	N/A	NMI from BUD to processor
IRQ0	INT2	Timer interrupt from PIIX4
IRQ1	INT1	Keyboard interrupt
IRQ2		Interrupt signal from second 8259 in PIIX4
IRQ3	INT3	Serial port A or B interrupt from 87309VLJ device (user configure)
IRQ4	INT4	Serial port A or B interrupt from 87309VLJ device (user configure)
IRQ5	INT5	Open for use
IRQ6	INT6	Diskette
IRQ7	INT7	Parallel port
IRQ8_L	INT8	RTC interrupt
IRQ9	INT9	Open for use
IRQ10	INT10	Open for use
IRQ11	INT11	Open for use
IRQ12	INT12	Mouse interrupt
IRQ13	INT13	
IRQ14	INT14	Compatibility IDE interrupt from primary channel IDE devices 0 and 1
IRQ15	INT15	Secondary IDE interrupt
PCI_INTA_L	INT16	PCI Interrupt signal A
PCI_INTB_L	INT17	PCI Interrupt signal B
PCI_INTC_L	INT18	PCI Interrupt signal C
PCI_INTD_L	INT19	PCI Interrupt signal D
SMI_L		System management interrupt—general purpose error indicator from various sources (controlled by BUD)

Memory upgrades

Use only 100MHz PC/100 compliant SDRAM type 72 bit (64 bit + ECC) DIMMs. They can be either 'registered' or 'unbuffered' but it is important that the types *must not be mixed*. Non ECC memory maybe installed but is not recommended. Mixing Non-ECC memory and ECC memory causes all ECC features to be disabled.

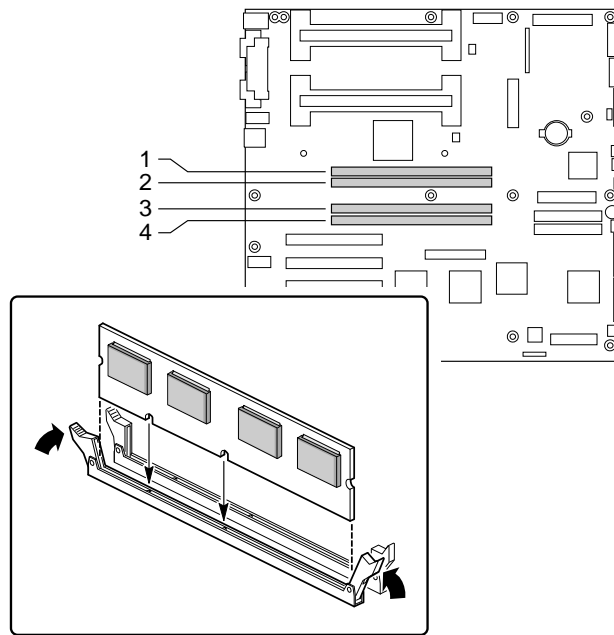
Unbuffered DIMMs range from 16Mb to 128Mb giving a possible total of 512Mb, while registered DIMMs range from 64Mb to 256Mb giving a possible total of up to 1Gb of main memory.

The controller will check and initialise the memory array depending on the type, size and speed of the installed DIMMs and will report it back to the system configuration registers.

NOTE

For signal integrity reasons the DIMMs should be installed in the DIMM 1 to DIMM 4 sockets in that order. Always use DIMMs that have been tested and approved, contact your Mitsubishi Electric PC supplier.

Dual address strobe (RAS) signals are provided for each DIMM. When single-banked DIMMs are used, one of the RAS lines is connected to both 36-bit 'halves' of the DIMM. When double-banked DIMMs are used (known as Dual RAS), both RAS lines are connected to two 36-bit 'quarters' of the DIMM.



To install memory:

1. Observe the precautions in *Safety and Regulatory Notices*.
2. Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
3. Remove the computer cover and locate the DIMM sockets as shown above.
4. Hold the DIMM by the edges and remove it from its antistatic package.
5. Make sure the clips at either end of the socket are pushed away from the socket.
6. Position the DIMM above the socket. Align the two small notches in the bottom edge of the DIMM with the keys in the socket.
7. Insert the bottom edge of the DIMM into the socket.
8. When the DIMM is seated, press down on the top edge of the DIMM until the retaining clips at the ends of the socket snap into place. Make sure the clips are firmly in place.
9. Replace the computer cover.

To remove memory:

1. Observe the precautions in *Safety and Regulatory Notices*.
2. Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
3. Remove the computer cover and locate the DIMM sockets.
4. Gently spread the retaining clips at each end of the socket. The DIMM pops out of the socket.
5. Hold the DIMM by the edges, lift it away from the socket, and store it in an antistatic package.

NOTE

When either removing or fitting new DIMMs it is necessary to enter the SSU on restarting your system so as to correctly allocate memory attributes for features such as ECC.

Processor Upgrades

If your motherboard has one processor, you can upgrade the computer by replacing this processor with a faster one, or by installing a secondary processor.

WARNING

If the system has been running, any installed processor and heat sink may be hot. Allow time for cooling. Be careful when removing or installing system board components that are located near processors.

If you install two processors, make sure they have:

- ◆ Identical speed, cache and operating voltage.
- ◆ The same stepping or a difference of no more than one stepping. Processor stepping is designated by a five-letter code, for example, **SL28R**, printed on the top of the Single Edge Contact (S.E.C.) cartridge.

If you do not observe these precautions there is a risk of permanent damage to either the processor or the system board. If you are at all unsure, contact your Mitsubishi dealer.

IMPORTANT

If there is only one processor on a motherboard, it must be fitted in the 'Primary' processor Slot 1 connector (see the illustration on the first page of this chapter). In a single-processor configuration, there must be a termination card in the empty 'Secondary' processor Slot 1 connector.

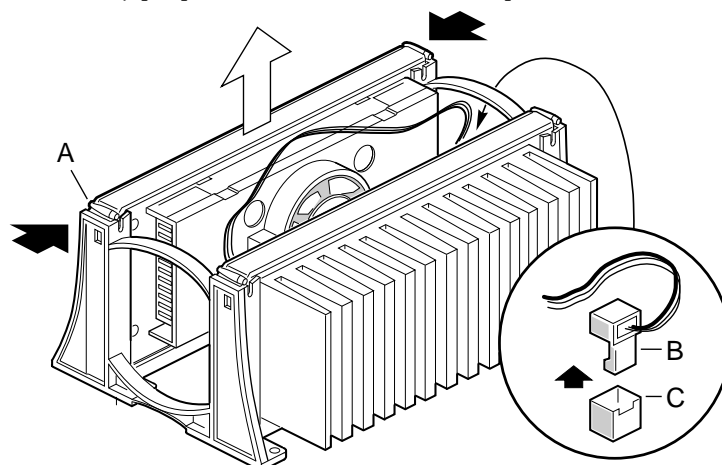
WARNING

In all instances you must remove the rear drive carrier and the main cross strut of the chassis to safely access the system processors. The rear drive carrier assembly has a large cooling fan fitted to the rear. It must be correctly refitted and reconnected after you have finished your work.

To remove either processor

If you are upgrading a single processor, you need to remove the existing processor, or you may need to remove the secondary processor:

1. Observe the precautions in *Safety and Regulatory Notices* at the beginning of this book.
2. Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
3. Remove any peripherals that block access to the processor.

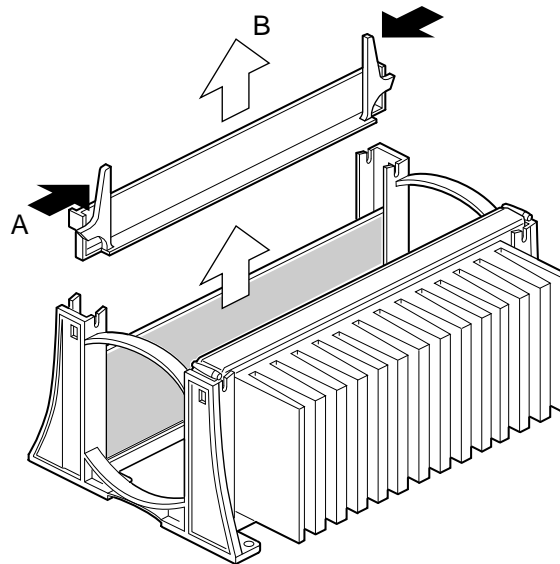


- Processors supplied to you by Mitsubishi will have a standard heatsink. However if your existing processor has a fitted fan, remove the fan heat sink power cable connector (B) from the motherboard fan connector (C).
- To remove the processor from the Slot 1 connector, press in on the latches (A) and pull the processor straight up as shown above.
- Store the processor in an antistatic package.
- If you are removing the secondary processor you must fit a termination board into the empty Slot 1 connector to be able to run the system with only the primary processor.

To Remove the Termination Card

If you are installing a secondary processor you must first remove the termination card:

- Observe the precautions in *Safety and Regulatory Notices*.
- Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
- Remove any peripherals that block access to the secondary processor Slot 1 connector.



- Press the latches on the termination card (A) inward to release it from the retention mechanism.
- Hold the termination card by its top edge and carefully rock it back and forth until the edge connector pulls free from the Slot 1 connector.

CAUTION

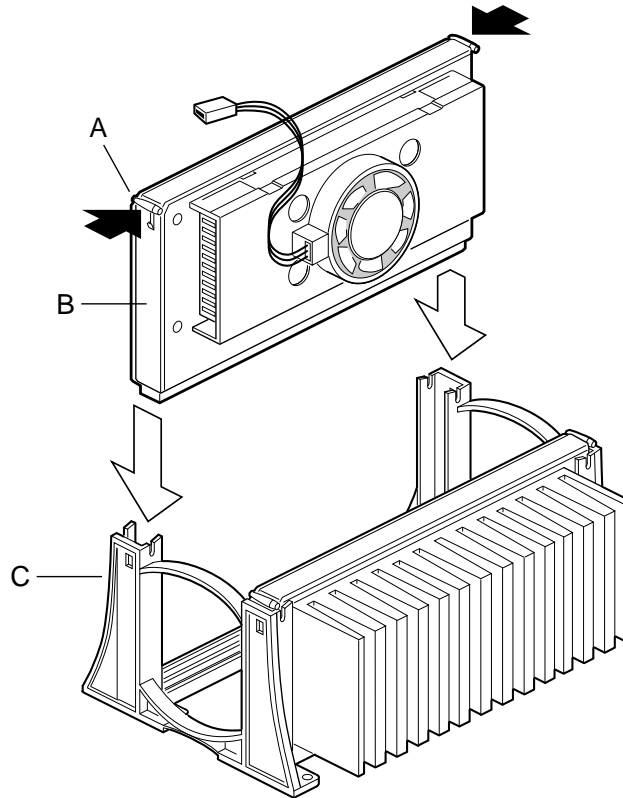
If you are going to permanently remove the secondary processor, you must replace this termination board before you can safely run the system again.

To Install a Processor

To install the processor:

- Observe the precautions in *Safety and Regulatory Notices*.
- Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
- Remove any peripherals that block access to the processor Slot 1 connectors.

4. Remove the new processor from its antistatic package.
 - ◇ If your system has one processor and you are fitting a secondary processor, then you must remove the termination board from the secondary processor Slot 1 connector as previously detailed.



5. Orient the processor (B) to fit into the slot, it will only fit one way. Slide the processor into the retention mechanism (C). Ensure that the alignment notch in the S.E.C. cartridge fits over the key in the Slot 1 connector.
6. Press down firmly on the processor until it is seated in the boot processor Slot 1 connector and the latches (A) on the processor lock into place.
7. Processors supplied to you by Mitsubishi will have a standard heatsink. However if your upgrade processor has a fan, attach the small end of the power cable to the fan connector on the S.E.C. cartridge, then attach the large end to the CPU 1 fan connector on the motherboard. The fan connectors are keyed so they will only connect one way.
8. Replace any peripherals that were removed in Step 3.
9. Set the processor speed. See the '*Configuration*' chapter, '*BIOS and setup*'.

How to Replace the Battery

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

The battery should last between five and seven years. Replace the battery only with a direct equivalent and ensure the correct polarity.

CAUTION

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

1. Observe the precautions in *Safety and Regulatory Notices*.
2. Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
3. Remove the computer cover.
4. Locate the battery on the motherboard using the diagram at the beginning of this chapter.
5. With a small **non-metallic** tool, gently pull the retaining clip from the battery, and it will pop up for easy removal. Note the orientation of the "+" and "-" on the battery.

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. Install the new battery in the socket, orienting the "+" and "-" correctly and press it home. Make sure the retaining clip is holding the battery in the socket correctly and firmly.
7. Replace the computer cover.

You will need to enter the BIOS and Setup utility to check your system settings. See the 'Configuration' chapter for details.

6

CONFIGURATION: SOFTWARE AND UTILITIES

This chapter describes the Power-on Self Test (POST) and system configuration utilities. The table below briefly describes the utilities.

<i>Utility</i>	<i>Description and brief procedure</i>
BIOS Setup	<p>If the system does not have a diskette drive, or the drive is disabled or misconfigured, use Setup to enable it.</p> <p>Or, you can move the CMOS jumper on the system board from the default setting (Protect CMOS memory) to the Clear setting; this will allow most system configurations to boot. For the procedure, see the section ‘<i>CMOS Jumper</i>’ in the ‘<i>Motherboard</i>’ chapter. Then run the SSU to configure the system.</p>
System Setup Utility (SSU)	<p>Use for extended system configuration of onboard resources and add-in boards, and for viewing the system event log, setting boot device priority, or setting system security options.</p> <p>The SSU may be run from either the Server Configuration CD or from a DOS-bootable diskette.</p> <p>Information entered via the SSU overrides information entered via Setup.</p>
EMP Console	Use to access and monitor the server remotely.
FRUSDR Load Utility	Use to update the Field Replacement Unit (FRU), Sensor Data Record (SDR), and Desktop Management Interface (DMI) flash components.
BIOS Update Utility	Use to update the BIOS or recover from a corrupted BIOS update.
Firmware Update Utility	Use to update BMC flash ROM.
Using the Symbios SCSI Utility	Use to configure or view the settings of the SCSI host adapters and onboard SCSI devices in the system.

Hot Keys

Use the keyboard’s numeric pad to enter numbers and symbols.

<i>To do this:</i>	<i>Press these keys</i>
Clear memory and reload the operating system	<Ctrl+Alt+Del>
This is a system reset.	
Secure your system immediately.	<Ctrl+Alt>+hotkey (Set your hot-key combination with the SSU or Setup.)

Power-on Self Test (POST)

Each time you turn on the system, POST starts running. POST checks the system board, processor, memory, keyboard, and most installed peripheral devices. During the memory test, POST displays the amount of memory that it is able to access and test. The length of time needed to test memory depends on the amount of memory installed. POST is stored in flash memory.

1. Turn on your video monitor and system. After a few seconds POST begins to run.
2. After the memory test, these screen prompts and messages appear:

Press <F2> key if you want to run SETUP

Keyboard.....Detected

Mouse.....Detected

3. If you do not press <F2> and do NOT have a device with an operating system loaded, the above message remains for a few seconds while the boot process continues, and the system beeps once. Then this message appears:

Insert bootable media in the appropriate drive

4. If you do not press <F2> and DO have an operating system loaded, the boot process continues, and this message appears:

Press <Ctrl><C> to enter SCSI Utility

5. Press <Ctrl+C> if there are SCSI devices installed. When the utility opens, follow the displayed instructions to configure the onboard SCSI host adapter settings and to run the SCSI utilities. Also see “Using the Symbios SCSI Utility” later in this chapter.

If you do not enter the SCSI utility, the boot process continues. After POST completes, the system beeps once.

What appears on the screen after this depends on whether you have an operating system loaded and if so, which one.

If the system halts before POST completes running, it emits a beep code indicating a fatal system error that requires immediate attention. If POST can display a message on the video display screen, it causes the speaker to beep twice as the message appears.

Note the screen display and write down the beep code you hear; this information is useful for your service representative.

Using BIOS Setup

This section describes the BIOS Setup options. Use Setup to change the system configuration defaults. You can run Setup with or without an operating system being present. Setup stores most of the configuration values in battery-backed CMOS; the rest of the values are stored in flash memory. The values take effect when you boot the system. POST uses these values to configure the hardware; if the values and the actual hardware do not agree, POST generates an error message. You must then run Setup to specify the correct configuration.

Run Setup:

you may run Setup to modify any standard system board feature such as:

- ◆ Select diskette drive
- ◆ Select parallel port
- ◆ Select serial port
- ◆ Set time/date (to be stored in RTC)
- ◆ Configure IDE hard drive

- ◆ Specify boot device sequence
- ◆ Enable SCSI BIOS
- ◆ Specify processor speed

Run SSU, not Setup:

you must run the SSU instead of Setup to do the following:

- ◆ Add or remove any ISA board that is not Plug and Play-compatible
- ◆ Enter or change information about a board
- ◆ Alter system resources (such as interrupts, memory addresses, I/O assignments) to user-selected choices instead of choices selected by the BIOS resource manager

Record Your Setup Settings

If the default values ever need to be restored (after a CMOS-clear, for example), you must run Setup again.

If You Cannot Access Setup

If the diskette drive is misconfigured so that you cannot access it to run a utility from a diskette, you may need to clear CMOS memory. You will need to open the system, change a jumper setting, use Setup to check and set diskette drive options, and change the jumper back.

Starting Setup

You can enter and start Setup under several conditions:

- ◆ When you turn on the system, after POST completes the memory test
- ◆ When you reboot the system by pressing <Ctrl+Alt+Del> while at the DOS operating system prompt
- ◆ When you have moved the CMOS jumper on the system board to the “Clear CMOS” position (enabled).

In the three conditions listed above, after rebooting, you will see this prompt:

Press <F2> to enter SETUP

NOTE

If the <F2> prompt does not appear, the display of the prompt has been disabled in the SSU. You can enter Setup anyway by pressing <F2> right after the system memory size is shown.

In a fourth condition, when CMOS/NVRAM has been corrupted, you will see other prompts but not the <F2> prompt:

Warning: cmos checksum invalid

Warning: cmos time and date not set

In this condition, the BIOS will load default values for CMOS and attempt to boot.

Setup Menus

Setup has six major menus and several submenus:

1. Main Menu

- ◆ Primary IDE Master and Slave
- ◆ Secondary Master and Slave
- ◆ Keyboard Features

2. Advanced Menu

- ◆ PCI Configuration
 - ◇ PCI Device, Embedded SCSI
 - ◇ PCI Device, Slot 1 - Slot 4
- ◆ Integrated Peripheral Configuration
- ◆ Advanced Chipset Control

3. Security Menu

4. Server Menu

- ◆ System Management
 - ◇ Server Management Information
- ◆ Console Redirection

5. Boot Menu

- ◆ Boot Device Priority
- ◆ Hard Drive
- ◆ Removable Devices

6. Exit Menu

To:	Press
Get general help	<F1> or <Atl+H>
Move between menus	← →
Go to the previous item	↑
Go to the next Item	↓
Change the value of an item	+ or -
Select an item or display a submenu	<Enter>
Leave a submenu or exit Setup	<Esc>
Reset to Setup defaults	<F9>
Save and exit Setup	<F10>

When you see this:	What it means
On screen, an option is shown but you cannot select it or move to that field.	You cannot change or configure the option in that menu screen. Either the option is autoconfigured or autodetected, or you must use a different Setup screen, or you must use the SSU.
On screen, the phrase Press Enter appears next to the option.	Press <Enter> to display a submenu that is either a separate full-screen menu or a pop-up menu with one or more choices.

The rest of this section lists the features that display onscreen after you press <F2> to enter Setup. Not all of the option choices are described, because (1) a few are not user-selectable but are displayed for your information, and (2) many of the choices are relatively self-explanatory.

Exploring the BIOS menus

Main Menu

Default values are bold in the following tables.

You can make the following selections on the Main Menu itself. Use the submenus for other selections.

Feature	Choices	Description
System Time	HH:MM:SS	Sets the system time.
System Date	MM/DD/YYYY	Sets the system date.
Legacy Diskette A:	Disabled 360KB 1.2 MB 720KB 1.44/1.25 MB 2.88 MB	Selects the diskette type.
Legacy Diskette B:	Disabled 360KB 1.2 MB 720KB 1.44/1.25 MB 2.88 MB	
Primary IDE Master		Enters submenu.
Primary IDE Slave		Enters submenu.
Secondary IDE Master		Enters submenu.
Secondary IDE Slave		Enters submenu.
Keyboard Features		Enters submenu.
Memory Cache	Enabled Disabled	Enables processor cache.
CPU Speed Setting (for 100 MHz FSB processors. The BIOS will detect the FSB speed and display the appropriate values.)	200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz	Sets the speed for the installed processor(s).
<hr/> CAUTION <i>Setting this higher than the proper speed for the installed processor(s) may cause damage to the processor(s).</i> <hr/>		
CPU Speed Setting (for 66 MHz FSB processors. The BIOS will detect the FSB speed and display the appropriate values.)	133 MHz 166 MHz 200 MHz 233 MHz 266 MHz 300 MHz 333 MHz	Sets the speed for the installed processor(s).
<hr/> CAUTION <i>Setting this higher than the proper speed for the installed processor(s) may cause damage to the processor(s).</i> <hr/>		
Language	English (US) Français Español Deutsch Italiano	Selects which language BIOS displays.
<hr/> NOTE <i>This may not be available on all configurations.</i> <hr/>		

Primary/Secondary IDE Master and Slave Submenu

<i>Feature</i>	<i>Choices</i>	<i>Description</i>
Type	Auto None CD-ROM IDE Removable ATAPI Removable User	Auto forces the system to attempt auto-detection of the drive type. None informs the system to ignore this drive. CD ROM allows the manual entry of some fields described below. IDE Removable allows the manual entry of some fields described below. ATAPI Removable allows the manual entry of some fields described below. User allows the manual entry of all fields described below.
Cylinders	0 to 65535	Number of Cylinders on Drive. This field is changeable only for Type User.
Heads	1 to 16	Number of read/write heads on drive. This field is available only for Type User.
Sectors	0 to 63	Number of sectors per track. This field is available only for Type User.
Maximum Capacity	N/A	Computed size of drive from cylinders, heads, and sectors entered. This field is informational only for Type User.
Multi-Sector Transfer	Disabled 2, 4, 8, or 16 sectors	Determines the number of sectors per block for multi-sector transfers. This field is informational only for Type Auto.
LBA Mode Control	Disabled Enabled	Enabling LBA causes logical block addressing to be used in place of cylinders, heads, and sectors. This field is informational only for Type Auto.
32 Bit I/O	Disabled Enabled	Enabling allows 32 bit IDE data transfers.
Transfer Mode	Standard Fast PIO 1 Fast PIO 2 Fast PIO 3 Fast PIO 4 FPIO 3 / DMA 1 FPIO 4 / DMA 2	Selects the method for moving data to and from the drive. This field is informational only for Type Auto.
Ultra DMA Mode	Disabled Mode 0 Mode 1 Mode 2	Selects the Ultra DMA mode used for moving data to/from the drive.

Keyboard Submenu

<i>Feature</i>	<i>Choices</i>	<i>Description</i>
Num Lock	On Off	Selects the power-on state for Num Lock.
Key Click	Disabled Enabled	Enables or disables the audible key click.
Keyboard auto-repeat rate	30/sec 26.7/sec 21.8/sec 18.5/sec 13.3/sec 10/sec 6/sec 2/sec	Sets the numbers of time per second a key will repeat while it is held down.
Keyboard auto-repeat delay	1/4 sec 1/2 sec 3/4 sec 1 sec	Sets the delay before a key starts to repeat when it is held down.

Advanced Menu

<i>Feature</i>	<i>Choices</i>	<i>Description</i>
Plug and Play OS	No Yes	Select Yes if you are booting a Plug and Play capable operating system.
Reset Configuration Data	No Yes	Select Yes if you want to clear the system configuration data during next boot. System automatically resets to No in next boot.
Enable ACPI	No Yes	Select Yes if you want to turn on the Advanced Configuration and Power Interface (ACPI).
PCI Configuration		Enters submenu.
Integrated Peripherals Configuration		Enters submenu.
Advanced Chipset Control		Enters submenu.
Use Multiprocessor Specification	1.1 1.4	Selects the version of multiprocessor specification to use. Some operating systems do not support version 1.4.
Large Disk Access Mode	DOS Other	Select DOS if your OS is DOS, or Other for UNIX, Novell NetWare, or other OS. A large disk has more than 1024 cylinders, more than 16 heads, or more than 63 tracks per sector.
Delay on Option ROMs	Disabled Enabled	Forces a short delay at the end of each Option ROM scan.

PCI Configuration Submenu

The PCI Configuration Menu only contains selections that access other submenus.

PCI Device, Embedded SCSI Submenu

<i>Feature</i>	<i>Choices</i>	<i>Description</i>
Option ROM Scan	Enabled Disabled	Enables option ROM scan of the onboard Symbios SCSI chip. There are 2 SCSI channels that are controlled by the same option ROM.
Enable Master	Enabled Disabled	Enabled selects the device as a PCI bus master.
Latency Timer	Default 0020h 0040h 0060h 0080h 00A0h 00C0h 00E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device may be master on a PCI bus.
		CAUTION <i>Do not change this setting unless you fully understand the priority of this device on the PCI bus.</i>

PCI Device, Slot 1 - Slot 4 Submenus

<i>Feature</i>	<i>Choices</i>	<i>Description</i>
Enable Master	Enabled Disabled	Enables selected device as a PCI bus master.
Latency Timer	Default 020h 040h 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device may be master on a PCI bus.
		CAUTION <i>Do not change this setting unless you fully understand the priority of this device on the PCI bus.</i>

Integrated Peripheral Configuration Submenu

<i>Feature</i>	<i>Choices</i>	<i>Description</i>
Serial Port A	Disabled Enabled	
	Auto	Auto forces BIOS to configure the port.
	PnP OS	PnP OS forces OS configures the port.
Base I/O Address	3F8 2F8 3E8 2E8	Selects the base I/O address for COM port A.
Interrupt	IRQ 4 IRQ 3	Selects the IRQ for COM port A.
Serial Port B	Disabled Enabled	
	Auto	Auto forces BIOS to configure the port.
	PnP OS	PnP OS forces OS configures the port.
Base I/O Address	3F8 2F8 3E8 2E8	Selects the base I/O address for COM port B.
Interrupt	IRQ 4 IRQ 3	Selects the IRQ for COM port B
Parallel Port	Disabled Enabled	
	Auto	Auto forces BIOS to configure the port.
	PnP OS	PnP OS forces OS configures the port.
Mode	Output only Bi-directional EPP ECP	Selects parallel port mode.
Base I/O Address	378 278	Selects the base I/O address for LPT port.
Interrupt	IRQ 5 IRQ 7	Selects the IRQ for LPT port.
DMA channel	DMA 1 DMA 3	Selects the DMA for LPT port.
Floppy disk controller	Disabled Enabled	Enables onboard diskette controller.

Advanced Chipset Control

<i>Feature</i>	<i>Choices</i>	<i>Description</i>
640-768K Memory Region	Enabled Disabled	Enabled forwards ISA Master and DMA cycles to the PCI bus. Disabled forwards these cycles to memory.
Delayed Transaction	Enabled Disabled	Enables the delayed transaction mechanism when the PIIX4 is the target of a PCI transaction.
Passive Release	Enabled Disabled	Enables the passive release mechanism on the PHOLD# signal when the PIIX4 is a PCI Master.

Security Menu

You can make the following selections on the Security Menu itself. Enabling the Supervisor Password field requires a password for entering Setup. The passwords are not case sensitive.

Feature	Choices	Description
User Password is	Clear Set	Status only; user cannot modify. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board.
Administrator Password is	Clear Set	Status only; user cannot modify.
Set User Password	Press Enter	When the <Enter> key is pressed, you are prompted for a password; press ESC key to abort. Once set, this can be cleared by setting it to a null string, or by clearing password jumper on system board (see Server Board Jumpers in Chapter 5).
Set Administrator Password	Press Enter	When the <Enter> key is pressed, you are prompted for a password; press ESC key to abort. Once set, this can be cleared by setting it to a null string, or by clearing password jumper on system board (see Server Board Jumpers in Chapter 5).
Password on Boot	Disabled Enabled	Requires password entry before boot. System will remain in secure mode until password is entered. Password on Boot takes precedence over Secure Mode Boot.
Diskette Access	Administrator User	Controls access to diskette drives.
Fixed Disk Boot Sector	Normal Write Protect	Write-protects boot sector on hard disk to protect against viruses.
Secure Mode Timer	Disabled 1 min 2 min 5 min 10 min 20 min 1 hr 2 hr	Period of key/PS/2 mouse inactivity specified for secure mode to activate. A password is required for secure mode to function. Cannot be enabled unless at least one password is enabled.
Secure Mode Hot Key (Ctrl-Alt-)	[] [A, B, ..., Z]	Key assigned to start the Quicklock feature. Cannot be enabled unless at least one password is enabled.
Secure Mode Boot	Disabled Enabled	System will boot in secure mode. You must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.
Video Blanking	Disabled Enabled	Blank video when secure mode is activated. You must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.
Floppy Write Protect	Disabled Enabled	When secure mode is activated, the diskette drive is write protected. You must enter a password to disable. Cannot be enabled unless at least one password is enabled.
Front Panel Lockout	Disabled Enabled	When secure mode is activated, the reset and power switches are locked. You must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.

Server Menu

You can make the following selections on the Server Menu itself.

Feature	Choices	Description
System Management		Enters submenu.
Console Redirection		Enters submenu.
PCI IRQs to IO-APIC mappings	Disabled	Enabled - BIOS can describe all 24 IO APIC pins in the MP table for PCI interrupts. Not all MP operating systems and drivers can understand this description of the interrupts in the MP table.
	Enabled	Disabled - BIOS will only use 16 IO APIC pins in the MP table for PCI interrupts. All PCI interrupts are routed to a standard ISA IRQ pins on IO APIC. All operating systems will work with standard ISA IRQ entries.
Processor Retest	Yes	Yes tells BIOS to clear the historical processor status and retest all processors on the next boot. BIOS automatically resets to No in next boot.
	No	

System Management Submenu

Feature	Choices	Description
Server Management Mode	Disabled Enabled	Enabled loads the embedded server management firmware.
System Event Logging	Disabled Enabled	When enabled, system events will be logged by BIOS and BMC in system event log.
Clear Event Log	No Yes	Yes clears the system event log (SEL) in BMC.
SMM Debug Mode	Disabled Enabled	If enabled, the BIOS will output to video and Port 80.
Server Management Info		Enters submenu.
EMP Password switch	disabled enabled	Sets the EMP password.
EMP Password	[A..Z, 0..9]	This field only shows up when the EMP password switch is enabled. Entering a password and pressing return will send the password immediately to the BMC. If a beep is heard the password was not accepted. If no password is entered, anyone has access to the server through the EMP Console.
EMP Escape sequence	+++	Sets the escape sequence for the modem being used for EMP. This will force the modem to command mode. This is only used if the EMP direct connect mode is set to modem.
EMP Hangup Line String	ATH	Sets the Hangup Line Sequence for the modem being used for EMP. Only used in EMP modem mode.
Modem Init String	AT&F0S0=1S14=0&D	Sets the initialization string for the modem being used for EMP. Only used in EMP modem mode. This field is only 16 characters long. High modem Init string field is a continuation of the Modem Init string to be able to enter in another 4 characters.
High Modem Init String	0	This is a continuation of the Modem Init string. When 16 characters are typed into the Modem Init string are entered this field will pop up to allow another 4 characters to be typed in.
EMP Access Mode	Pre-boot Only Always Active Disabled	Pre-boot Only - EMP is only enabled during power down through end of POST. Com 2 is returned to system use at the end of Post when operating system boots. Always Active - EMP is always enabled. Com 2 cannot be used by operating system. It is now dedicated for EMP use. Disabled - EMP is disabled. Com 2 is always available for system use by console redirection or operating system.
EMP Restricted Mode	Disabled	If set to Enabled, Power on/off and Reset server controls via EMP

Feature	Choices	Description
Access	Enabled	are no longer available.
EMP Direct Connect/Modem Mode	Direct Connect	Sets how EMP connects to the server. Direct Connect means a null modem serial cable directly connects COM 2 connector port to the EMP console machine.
	Modem Mode	Modem mode indicates that a modem is connected on COM 2 for EMP use.

Server Management Information Submenu

The following are for information only.

Feature	Choices	Description
Board Part Number	N/A	Information field only
Board Serial Number	N/A	Information field only
System Part Number	N/A	Information field only
System Serial Number	N/A	Information field only
Chassis Part Number	N/A	Information field only
Chassis Serial Number	N/A	Information field only
BMC Revision	N/A	Information field only
Primary HSBP Revision	N/A	Information field only

Console Redirection Submenu

Feature	Choices	Description
COM Port Address	Disabled	When enabled, console redirection uses the I/O port specified.
	3F8	3F8 - typically is COM 1
	2F8	2F8 - typically is COM 2
	3E8	All keyboard/mouse and video will be directed to this port. This is designed to be used only under DOS in text mode.
IRQ #	3 or 4	When console redirection is enabled, this displays the IRQ assigned per the address chosen in the COM Port Address field.
	None	COM port address is disabled None is automatically selected.
Baud Rate	9600	When console redirection is enabled, use the baud rate specified.
	19.2k	
	38.4k	
	115.2k	
Console Type	PC ANSI	Sets the terminal emulation protocol that the remote console will see.
Flow Control	No Flow Control	Disables flow control.
	CTS/RTS	CTS/RTS is hardware flow control.
	XON/XOFF	XON/XOFF is software flow control.
	CTS/RTS + CD	CTS/RTS +CD is hardware plus carrier-detect for modem use. When carrier detect is lost modem will drop phone connection.

Boot Menu

You can make the following selections on the Boot Menu itself.

Feature	Choices	Description
Floppy Check	Disabled	If Enabled, system verifies diskette type on boot. Disabled results in a faster boot.
	Enabled	
Boot Device Priority		Enters submenu.
Hard Drive		Enters submenu.
Removable Devices		Enters submenu.

Boot Device Priority

Use the up or down arrow keys to select a device, then press the <+> or <-> keys to move the device higher or lower in the boot priority list.

<i>Boot Priority</i>	<i>Device</i>	<i>Description</i>
1	Removable Devices	Attempts to boot from a removable media device.
2	Hard Drive	Attempts to boot from a hard drive device.
3	ATAPI CD-ROM Drive	Attempts to boot from an ATAPI CD-ROM drive.
4	LANDesk Service Agent II	Loads LANDesk service Agent and attempts to boot off of a remote agent on the embedded network interface card (Intel 82558).

Hard Drive

For options on this menu, use the up or down arrow keys to select a device, then press the <+> or <-> keys to move the device higher or lower in the boot priority list.

<i>Option</i>	<i>Description</i>
1. Hard Drive #1 (or actual drive string)	IDE drives will have a suffix attached to the drive ID string. PM - hard drive on Primary Master Channel PS - hard drive on Primary Slave Channel SM - hard drive on Secondary Master Channel SS - hard drive on Secondary Slave Channel SCSI CD-ROMs will be displayed here because the onboard Symbios SCSI bios treats CD-ROMs as hard drives. SCSI zip or removable drives will also appear here. Removable IDE zip drives will only show up if the removable media is formatted as a hard drive.
2. Other Bootable Device	Covers all the boot devices that are not reported to the system BIOS through the BIOS boot specification mechanism. This includes all PCI cards that are not bios boot compliant (legacy) as well as ISA cards that are not PnP compliant. ISA legacy cards will boot first before non bios boot compliant PCI cards (in scan order from lowest slot to highest).

Removable Devices

For options on this menu, use the up or down arrow keys to select a device, then press the <+> or <-> keys to move the device higher or lower in the boot priority list.

<i>Option</i>	<i>Description</i>
1. Legacy Floppy Drive	Refers to the onboard 3.5" floppy drive. Removable IDE media may also show up here if the removable media was formatted in floppy emulation.

Exit Menu

You can make the following selections on the Exit Menu. Select an option using the up or down arrow keys, then press <Enter> to execute the option. Pressing <Esc> does not exit this menu. You must select one of the items from the menu or menu bar to exit.

<i>Choices</i>	<i>Description</i>
Exit Saving Changes	Exits after writing all modified Setup item values to NVRAM.
Exit Discarding Changes	Exits leaving NVRAM unmodified.
Load Custom Defaults	Loads default values for all Setup items.
Save Custom Defaults	Saves present Setup values to custom defaults.
Load Default Values	Loads values of all Setup items from previously saved custom defaults.
Discard Changes	Reads previous values of all Setup items from NVRAM.
Save Changes	Writes all Setup item values to NVRAM.

Using the System Setup Utility

The System Setup Utility (SSU) is on the Server System Configuration Software CD shipped with the server. The SSU provides a graphical user interface (GUI) over an extensible framework for server configuration. The SSU framework supports the following functions and capabilities:

- ◆ assigns resources to baseboard devices and add-in cards prior to loading the operating system (OS)
- ◆ allows you to specify boot device order and system security options
- ◆ permits viewing and clearing of the system's critical event log
- ◆ allows troubleshooting of the server when the OS is not operational
- ◆ provides a system level view of the server's I/O devices

When to Run the System Setup Utility

The SSU is a DOS-based utility that supports extended system configuration operations for onboard resources and add-in boards. You can also view the system event log and to set system boot and security options. Use the SSU when you need to

- ◆ add and remove boards affecting the assignment of resources (ports, memory, IRQs, DMA)
- ◆ modify the server's boot device order or security settings
- ◆ change the server configuration settings
- ◆ save the server configuration
- ◆ view or clear the system event log

If you install or remove an ISA add-in board, you must run the SSU to reconfigure the server. Running the SSU is optional for PCI and Plug and Play ISA add-in boards.

The SSU is PCI-aware, and it complies with the ISA Plug and Play specifications. The SSU works with any compliant configuration (.CFG) files supplied by the peripheral device manufacturer.

The I/O baseboard comes with a .CFG file. The .CFG file describes the characteristics of the board and the system resources that it requires. The configuration registers on PCI and ISA Plug and Play add-in boards contain the same type of information that is in a .CFG file. Some ISA boards also come with a .CFG file.

The SSU uses the information provided by .CFG files, configuration registers, FLASH, and the information that you enter, to specify a system configuration. The SSU writes the configuration information to flash memory.

The SSU stores configuration values in FLASH memory. These values take effect when you boot the server. POST checks the values against the actual hardware configuration; if they do not agree, POST generates an error message. You must then run the SSU to specify the correct configuration before the server boots.

The SSU always includes a checksum with the configuration data so the BIOS can detect any potential data corruption before the actual hardware configuration takes place.

What You Need to Do

The SSU may be run directly from the Server Configuration Software CD or from a set of DOS diskettes.

If you choose to run the SSU from a set of DOS diskettes, you must copy the SSU from the Server Configuration Software CD to a set of DOS diskettes and follow the instructions in the included README.TXT file to prepare the diskettes.

If your diskette drive is disabled, or improperly configured, you must use the flash-resident Setup utility to enable it so that you can use the SSU. If necessary, you can disable the drive after you exit the SSU. Information entered using the SSU overrides any entered using Setup.

Running the SSU

Running the SSU Locally

Running the ssu.bat file provided on the SSU media starts the SSU. If the server boots directly from the SSU media, the ssu.bat file is automatically run. If it boots from a different media, the SSU can be started manually or by another application. When the SSU starts in the local execution mode (the default mode), the SSU accepts input from the keyboard and/or mouse. The SSU presents a VGA-based Graphical User Interface (GUI) on the primary monitor.

The SSU runs from writable, nonwritable, removable, and nonremovable media. If the SSU is run from nonwritable media, user preference settings (such as screen colors) can not be saved.

The SSU supports the ROM-DOS V6.22 operating system. It may run on other ROM-DOS compatible operating systems but they are not supported. **The SSU will not operate from a “DOS-box” running under an operating system such as Windows.**

Running the SSU Remotely

Running the SSU remotely requires a remote server with a Server Monitor Module 2 (SMM2) card and a local system with Remote Control software available.

The SMM2 card provides video memory, keyboard, and mouse redirection support for the remote server. The Remote Control console of the local system displays and sends video memory and user input to the remote server through either a modem or an Ethernet link. Because the SSU runs exclusively on the remote server, any files required for the SSU to run must be available on the remote server (on removable or nonremovable media).

If you connect the local system to the remote server through a network or modem you can see the console, control the mouse, and control the keyboard of the remote server.

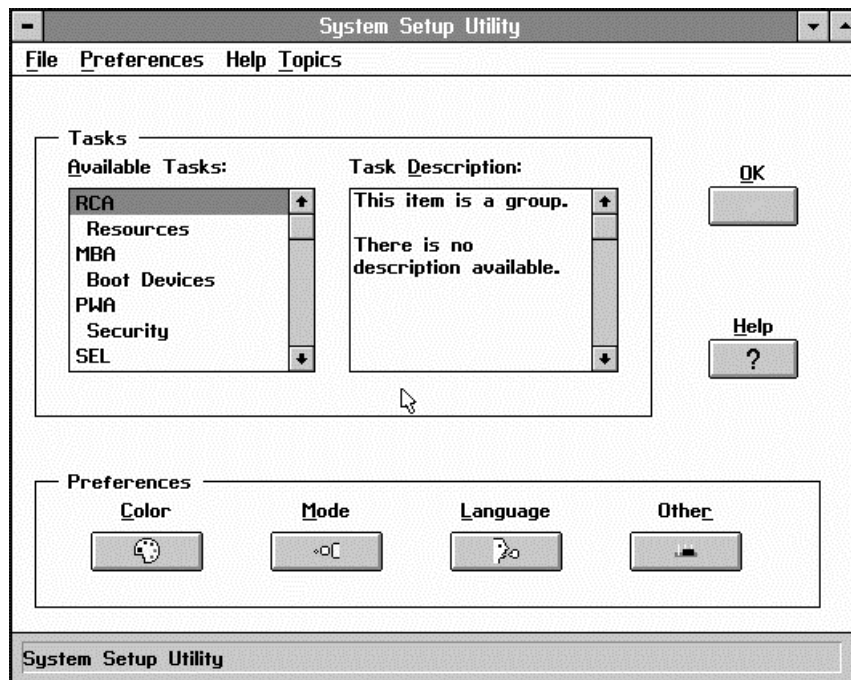
Starting the SSU

SSU consists of a collection of task-oriented modules plugged into a common framework called the Application Framework (AF). The Application Framework provides a launching point for individual tasks and a location for setting customisation information. For full functionality the SSU requires the availability of the AF.INI, AF.HLP, plus any .ADN files and their associated .HLP and .INI files.

1. Turn on your video monitor and your system.
2. There are two ways to start the SSU.
 - a. **After creating set of SSU diskettes from the CD:** Insert the first SSU diskette in drive A, and press the reset button or <Ctrl+Alt+Del> to reboot your server from the diskette.
 - b. **Directly from the Server Configuration Software CD:** Insert the Server Configuration CD into your CD-ROM drive and press the reset button or <Ctrl+Alt+Del> to reboot. When prompted to do so, press <F2> to enter BIOS Setup. From the Boot Menu, select the Boot Device Priority option and then select CD-ROM as your primary boot device. Save those settings and exit BIOS Setup. The server will boot from the CD-ROM and display a menu of options. Follow the instructions in the menu to start the SSU.
3. When the SSU title appears on the screen, press <Enter> to continue.
4. The mouse driver loads if it is available; press <Enter> to continue.
5. This message appears:

Please wait while the Application Framework loads....

6. When the main window of the SSU appears, you can customize the user interface before continuing.



Customising the SSU

The SSU lets you customise the user interface according to your preferences. The AF sets these preferences and saves them in the AF.INI file so that they take effect the next time you start the SSU. There are four user-customisable settings:

- ◆ **Colour**—this button lets you change the default colours associated with different items on the screen with predefined colour combinations. The colour changes are instantaneous.
- ◆ **Mode**—this button lets you set the desired expertise level.
 - ◇ novice
 - ◇ intermediate
 - ◇ expert

The expertise level determines which tasks are visible in the Available Tasks section and what actions each task performs. For a new mode setting to take effect, you must exit the SSU and restart it.

- ◆ **Language**—this button lets you change the strings in the SSU to strings of the appropriate language. For a new language setting to take effect, you must exit the SSU and restart it.
- ◆ **Other**—this button lets you change other miscellaneous options in the SSU. The changes are instantaneous.

To change the interface default values:

Use the mouse to click on the proper button in the Preferences section of the SSU Main window.

or

Use the tab and arrow keys to highlight the desired button, and press the spacebar or <Enter>.

or

Access the menu bar with the mouse or hot keys (Alt + underlined letter).

NOTE

If you run the SSU from nonwritable media (like a CD-ROM), these preferences will be lost when you exit the SSU.

Launching a Task

It is possible to have many tasks open at the same time, although some tasks may require complete control to avoid possible conflicts. The tasks achieve complete control by keeping the task as the centre of operation until you close the task window.

To launch a task:

In the SSU Main window, double-click on the task name under Available Tasks to display the main window for the selected task.

or

Highlight the task name, and click on OK.

or

Use the tab and arrow keys to highlight the desired button, and press the spacebar or <Enter>.

Resource Configuration Add-in (RCA) Window

The RCA provides three major functions:

- ◆ Creates representations of devices that cannot be discovered by the system (ISA cards)
- ◆ Modifies the contents of the system by adding and removing devices
- ◆ Modifies the resources used by devices

You can use the RCA window to define an ISA card or add an ISA card by clicking on the appropriate button. Removing an ISA card requires that the card be highlighted in the Devices section of the screen before clicking on the button. You can only add as many ISA cards as you have ISA slots available.

1. From the SSU main window, launch the RCA by selecting the “Resources” task under the RCA heading in the task box.
2. When the RCA window appears, it displays messages similar to the following:

Baseboard: System Board

PCI Card: Bus 00 dev 00 -- Host Processor Bridge

PCI Card: Bus 00 dev 0D -- Multifunction Controller

PCI Card: Bus 00 dev 0F -- Ethernet Controller

PCI Card: Bus 00 dev 12 -- Multifunction Controller

PCI Card: Bus 00 dev 14 -- VGA Controller

3. To configure a device, select its name in the Devices section of the RCA window, and press the spacebar or <Enter>, or click on it.
4. It is possible to close the RCA window and return to the AF by clicking on the Close button. Any changes made will be kept in memory for use by the RCA when it is rerun.
5. Save all the changes made by clicking on the Save button. Saving writes your current configuration to nonvolatile storage where it will be available to the system after every reboot.
6. Closing the window by clicking on the system menu, the dash in the upper-left corner, discards all changes.

Defining an ISA Card

An ISA card usually comes with a vendor-created .CFG file that specifies the resources the card requires to function properly. If the .CFG file is unavailable, you must manually create it or define the card through the SSU. Defining an ISA card consists of specifying the name of the card and the resources it consumes. This allows the RCA to consider the ISA card resource requirements when the RCA tries to resolve conflicts. The information is also used by the system BIOS to configure the hardware when the system is booted.

1. To add or remove ISA card resources, click on the appropriate resource buttons, select the desired value, and click on Add or Remove.
2. After you complete the necessary information, click on Save.
3. To edit a card, click on Load to retrieve the card information. After making changes, click on Save.
4. To create a card, click on New.
5. To remove a current definition of a card, click on Delete.

Adding and Removing ISA Cards

Adding and removing cards through the RCA provides a way for the RCA to run its conflict detection algorithms on the resources requested by the cards. This alerts you to any possible problems with that particular card in the current configuration.

To add an ISA card:

1. Click on Add ISA Card in the RCA window.
2. Specify the directory for the .CFG file.
3. Select the file and click on Ok.

To remove an ISA card:

1. Select a valid ISA card in the Devices section of the RCA window.
2. Click on Remove ISA Card.

Modifying Resources

Modifying the resources of a device may be necessary to accommodate certain operating systems, applications, and drivers. It may also be necessary to modify resources to resolve a conflict.

To modify the resources associated with a device:

1. Highlight the device in the Devices section of the RCA window.
2. Press the spacebar or <Enter>, or double-click on the entry.

This displays the functions of the selected device along with possible choices and the resources associated with those choices.

To make a modification:

1. Highlight the function in the Configuration window.
2. Press the spacebar or <Enter>, or double-click on the entry (this updates the Choice and resource lists).
3. Press the tab key to get to the Choice list, and press <Enter>.
4. Use the arrow keys to select a proper choice, and press <Enter> again.
5. If the choice allows multiple possible values for a particular resource, use the hot key to select a resource, and press the spacebar or double click on the resource.
6. Select the desired resource, and click on Ok.

System Resource Usage

Clicking on the Resource Use button in the Configuration window displays the System Resource Usage window. This window shows what resources each device is consuming. This information is useful for choosing resources if a conflict occurs. Devices can be organised according to the resources you want to examine using the options in the Resource section of the screen. The resource information can also be written to a plain text file through this window.

Multiboot Options Add-in

Under this window you can change the boot priority of a device.

1. Select a device.
2. Press the + button to move it up in the list. Press the - button to move it down.

Security Add-in

Under this window, you can set the User and Administrator passwords, and security options.

To Set the User Password

1. Click on the user password button.
2. Enter the password in the first field.
3. Confirm the password by entering it again in the second field.

To Change or Clear the User Password

1. Click on the User password button.
2. Enter the old password in the first field.
3. Enter the new password in the second field (or leave blank to clear).
4. Confirm the password by entering it again in the second field (or leave blank to clear).

To Set the Administrator Password

1. Click on the Administrator password button.
2. Enter the password in the first field.
3. Confirm the password by entering it again in the second field.

To Change or Clear the Administrator Password

1. Click on the Administrator password button.
2. Enter the old password in the first field.

3. Enter the new password in the second field (or leave blank to clear).
4. Confirm the password by entering it again in the second field (or leave blank to clear).

Security Options

Under this window, you can set the other security options:

- ◆ **Hot Key** - set a key sequence that, when pressed, will drop the server into secure mode.
- ◆ **Lock-Out Timer** - set an interval that, if no activity takes place during it, will drop the server into secure mode.
- ◆ **Secure Boot Mode** - force the server to boot directly into secure mode.
- ◆ **Video Blanking** - turn off the video when the server is in secure mode.
- ◆ **Floppy Write** - control access to the diskette drive while the server is in secure mode.
- ◆ **Reset/Power Switch Locking** - control the power and reset buttons while the server is in secure mode.

SEL Viewer Add-in

Clicking on the SELU Add-in task brings up the Server Event Log (SEL) viewer. You can load and view the current SEL data stored in the BMC, save the currently loaded SEL data to a file, view previously saved SEL data, or clear the SEL. The SEL Viewer has the following menus:

File

The File menu has the following options:

- ◆ **Load SEL...** View data from a previously saved SEL file.
- ◆ **Save SEL...** Save the currently loaded SEL data to a file.
- ◆ **Clear SEL** Clears the SEL data from the BMC.
- ◆ **Exit** Quits the SEL Viewer.

View

The View menu has the following options:

- ◆ **SEL Info** Displays information about the SEL. These fields are display only.
- ◆ **All Events** Displays the current SEL data from the BMC.
- ◆ **By Sensor** Brings up a pop-up menu that allows you to view only the data from a certain sensor type.
- ◆ **By Event** Brings up a pop-up menu that allows you to view only the data from a certain event type.

Settings

The Settings menu has the following options:

- ◆ **Display HEX/Verbose** toggles between the Hex/interpreted mode of displaying the SEL records.
- ◆ **Output Text/Binary** determines whether SEL data will be saved to the file (as under File - Save) in binary format or verbose format.

Help

The Help menu has the following option:

- ◆ **About** Displays the SEL Viewer version information.

Exiting the SSU

Exiting the SSU causes all windows to close.

1. Exit the SSU by opening the menu bar item **F**ile in the SSU Main window.
2. Click on Exit.

or

Highlight Exit, and press <Enter>.

Emergency Management Port Console

The Emergency Management Port (EMP) Console provides an interface to the Emergency Management Port (EMP) called the Console Manager. This interface allows remote server management via a modem or direct connection.

The following server control operations available with the Console Manager are:

- ◆ connecting to remote servers
- ◆ powering the server on or off
- ◆ resetting the server
- ◆ switching the server console between EMP active and BIOS re-direct modes

The Console Manager uses three management plug-ins to monitor the server:

- ◆ SEL viewer
- ◆ SDR viewer
- ◆ FRU viewer

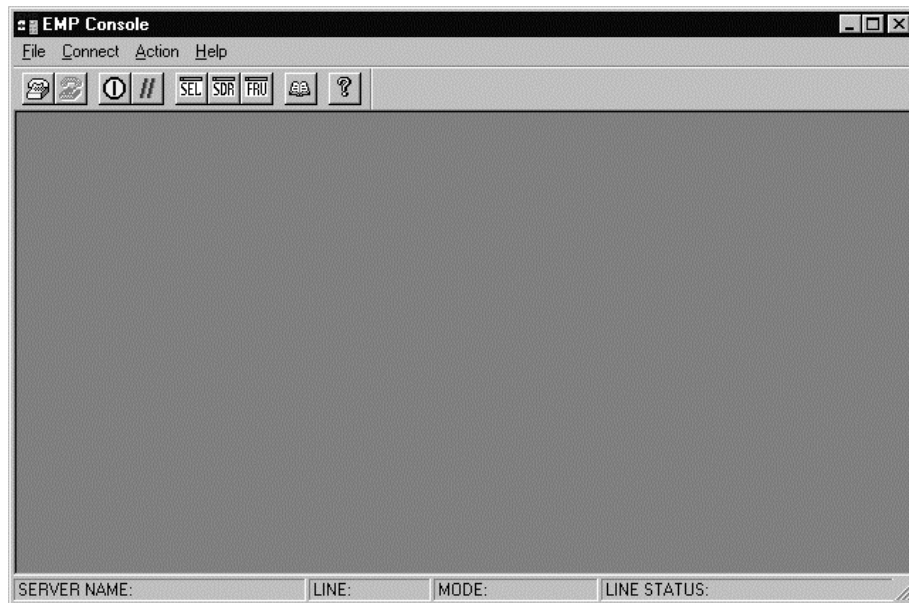
The Console Manager also has a support plug-in Phonebook, which you can use to create and maintain a list of servers and their phone numbers. You can launch the Connect dialog directly from the Phonebook dialog to connect to a selected server.

How the EMP Console Works

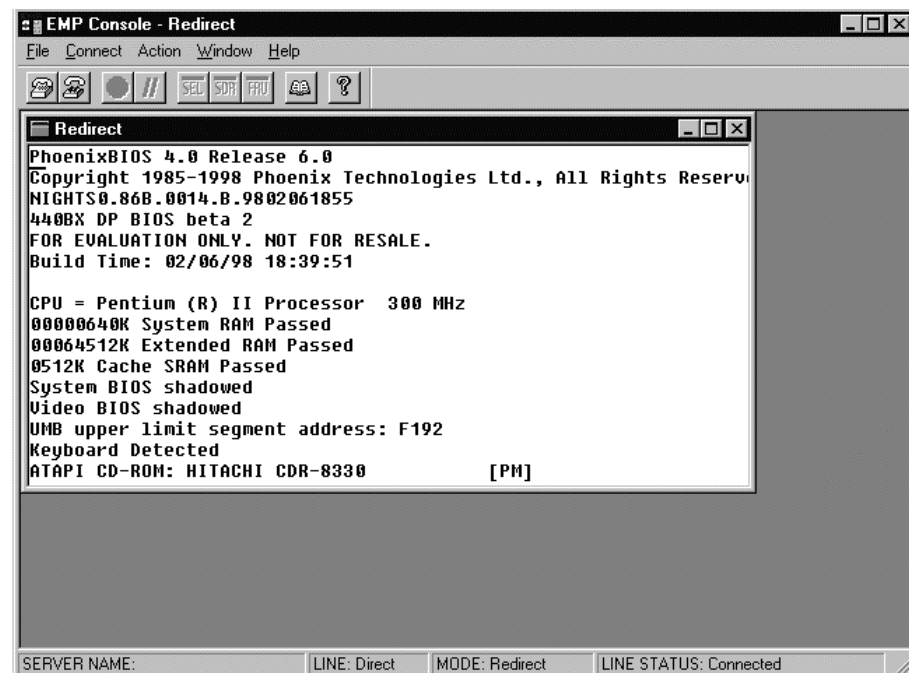
The EMP shares use of the COM 2 port with the system. When the EMP has control of the port, the port operates in command state. When the system has control of it, the port operates in redirect state. When connecting to a server, the EMP Console checks to determine the current COM 2 port state. The following discussion covers how the EMP Console functions in each state:

- ◆ *Command state* is the default COM 2 state. In this state, the EMP Console communicates with the server's firmware, allowing the client to remotely reset or power the server up or down. The client can also view the server's System Event Log (SEL), Field Replaceable Unit (FRU) information, or Sensor Data Record (SDR) table.
- ◆ In *redirect state*, the EMP Console serves as a PC ANSI terminal window for BIOS console redirection. Commands typed in this terminal window are transmitted through BIOS to the server's console, and text displayed on the server console are displayed on the EMP Console's terminal window. With the EMP in this state, you can remotely view boot messages, access BIOS setup, and run DOS text mode applications through the EMP Console's terminal window.

EMP Console in Command State



EMP Console in Redirect State



The above shows the EMP Console window in redirect state with the terminal window. The text that appears on the server monitor displays in the redirect window.

Availability of the various EMP Console features is determined by two things: the EMP access mode selected during configuration in the System Management Submenu of the BIOS Server Menu, and if the server's COM 2 port is configured for console redirect in BIOS. The three EMP access modes are disabled, pre-boot, and always active.

EMP Console Access Modes (Server Configured for Console Redirect)

Mode	Server is powered off	During POST	After OS boots
Disabled	Redirect window appears, but is blank	Redirect window	Redirect window
Pre-boot	EMP commands available	Redirect window*	Redirect window
Always Active	EMP commands available	Redirect window*	EMP commands available

* The operation mode can be modified by selections in the post reset and post-power-up dialogs. These are server control dialogs available with the EMP Console.

EMP Console Access Modes (Server not Configured for Console Redirect)

Mode	Server is powered off	During POST	After OS boots
Disabled	Redirect window appears, but is blank	Redirect window appears, but is blank	Redirect window appears, but is blank
Pre-boot	EMP commands available	EMP commands available	Redirect window appears, but is blank
Always Active	EMP commands available	EMP commands available	EMP commands available

Requirements

This section outlines the requirements and configurations necessary for using the EMP Console.

Operating Systems:

- ◆ Windows 95
 - ◇ 16 MB of RAM, 32 MB recommended
 - ◇ 20 MB disk space
- ◆ Windows NT
 - ◇ Windows NT 4.0 or later
 - ◇ 24 MB of RAM, 32 MB recommended
 - ◇ 20 MB disk space

Client Configuration: The EMP Console will support all COM ports on the client system, along with any Windows NT/95 compatible modem.

Server Configuration: The EMP Console requires the server's COM 2 port to be connected to an external modem or directly connected to a serial cable.

Direct Connect Configuration: A null modem serial cable is needed. Connect one end of the cable into the COM 2 port of server and the other into a port on the client machine.

Modem Configuration: On the client, the EMP Console uses the Windows Application Program Interface (API) to determine if a modem is connected and available. The EMP Console does not configure the modem; it should be preconfigured through Windows.

For modem support, the server must use a Hayes compatible 14400 bps modem. The modem must be on the NT Hardware Compatibility List provided by Microsoft. The server modem must be set in auto-answer mode for the EMP Console to be able to connect to it.

Setting Up the Server for the EMP

To use the EMP, you must configure the server's BIOS with specific settings. These settings take place in two submenus of the BIOS Server menu, the System Management Submenu and the Console Redirect Submenu. The earlier BIOS settings section shows all available options. This section focuses on those settings that must be configured to use the EMP.

System Management Submenu

All EMP related settings occur from the System Management Submenu of the Server main menu. Change Only the items below; all other default settings should remain the same.

EMP Password: Anytime you attempt to initiate a connection, a prompt for the user password appears. If you never set up the EMP password, anyone can access the EMP by clicking OK through the password prompt.

In the EMP Password area of the System Management Submenu, type in a password of up to 8 alphanumeric characters. If a beep is heard, the password was not accepted and a different password must be entered.

EMP Access Modes: Choose either Disabled, Pre-boot, or Always Active, depending on the type of EMP access needed. The tables above show what is available with a given setting.

EMP Restricted Mode Access: Set Restricted Mode to either enabled or disabled as needed. If in enabled mode, this means that the EMP Console's server control options, Power On/Off and Reset, are unavailable. In disabled mode, these same server control options are available.

EMP Direct Connect/Modem Mode: Select Direct Connect if a null modem serial cable directly connects the server's COM 2 port to the EMP Console client machine. If they are connected via a modem, select Modem Mode.

Console Redirection Submenu

These settings in the Console Redirection Submenu of the Server menu must be set exactly as noted to be able to use the EMP.

COM Port Address: Select 2F8. This is the COM 2 port that must be used by the EMP. The IRQ# setting automatically populates with the correct number based on the COM Port Address choice.

Baud Rate: Select 19.2k.

Console Type: Choose PC ANSI.

Flow Control: Choose CTS/RTS + CD.

Main EMP Console Window

The main EMP Console window provides a graphical user interface (GUI) to access server control operations and to launch the management plug-ins from. At the top of the GUI is the menu and tool bar. These provide the options to initiate plug-ins and other support features. A status bar at the bottom displays connection information like server name, line status, and mode.

Toolbar

The tool bar buttons of the EMP Console main window combine server control and management plug-in options available from the Connect and Action menus as follows:



Generates the Connect dialog to allow connection to a selected server.



Launches the SDR viewer.



Disconnects from the server currently connected to.



Launches the FRU viewer.



Generates the Power On/Off dialog.



Opens the phonebook.



Generates the Reset dialog.



Opens the online help.



Launches the SEL viewer.

Status Bar

The status bar displays at the bottom of the current window. It contains the following status information:

- ◆ **SERVER NAME:** the name of the server connected to.
- ◆ **LINE:** the type of line connection. This would be either direct or modem.
- ◆ **MODE:** either Redirect or EMP, depending on whether the EMP has control of the COM 2 port.
- ◆ **LINE STATUS:** gives status information on the server connection. For example, if a server is connected, the status bar says "Connected." Otherwise, the line is blank.

EMP Console Main Menu

- ◆ **File**
 - ◇ **Exit** - Exits the EMP Console.
- ◆ **Connect**
 - ◇ **Disconnect** - disconnects the server connection.
 - ◇ **[Re]Connect** - raises the connect dialog.
 - ◇ A list of the five most recent connections - can click on one of the five servers most recently connected to. A connection to the selected server is initiated.
- ◆ **Action**
 - ◇ **Power On/Off** - powers the server on or off with post-power-up options.
 - ◇ **Reset** - resets the server with post-reset options.
 - ◇ **SEL Viewer** - opens the SEL viewer.
 - ◇ **SDR Viewer** - opens the SDR viewer.
 - ◇ **FRU Viewer** - opens the FRU viewer.
 - ◇ **Phonebook** - opens the phonebook dialog.
- ◆ **Help** - provides version information and help topics for the EMP Console.

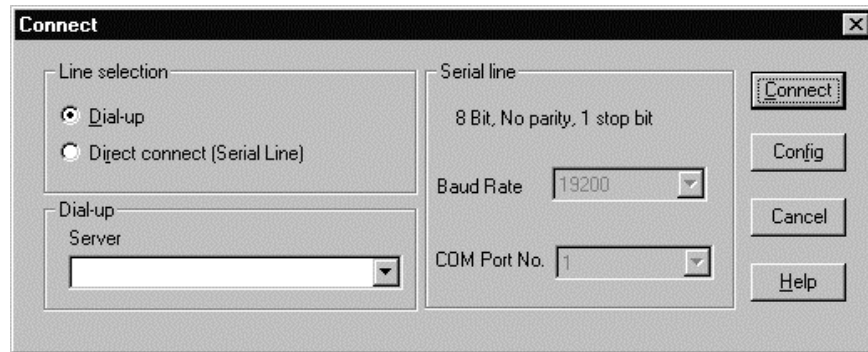
Server Control Operations

Three server control operations are available from the menu or toolbar of the main EMP Console window, remote server connection, powering the server on and off, and resetting the server. The server console mode can also be switched between EMP active and BIOS redirect modes through post-power-up and reset options.

Connect

When you select [Re]Connect from the Connect menu, the Connect dialog allows you to connect to a selected server. If the client machine is already connected to a server, initiating connection generates a warning message. It lets you know that the existing connection will be terminated if you continue trying to initiate the new connection. You are prompted to enter the EMP password whenever a connection is attempted.

Connect Dialog



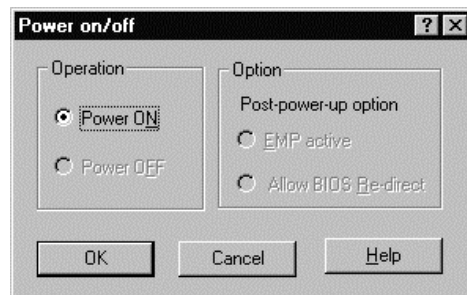
Options available in the dialog are:

- ◆ **Line Selection** - you can specify whether to use a direct connection or dial-up modem connection to the server.
 - ◇ **Dial-up** - connects to a selected server with a modem.
 - ◇ **Direct connect (Serial Line)** - connects to the selected server directly using a null modem serial cable.
- ◆ **Server** - you can select or enter a server name from a dropdown edit list box of available servers. A server must be selected when the line selection is Dial-up.
- ◆ **Serial Line** - must be filled out when the line selection is set to Direct connect (Serial Line).
 - ◇ **Baud Rate** - must be 19200 for EMP to connect properly.
 - ◇ **COM Port No.** - set the COM Port number to which the null modem serial cable is connected.
- ◆ **Connect** - initiates connection to the connected server. When this button is clicked, you are prompted for the EMP password.
- ◆ **Config** - displays the Phonebook dialog.
- ◆ **Cancel** - exits the Connect dialog without any action taken.
- ◆ **Help** - displays dialog level help information.

Power On/Off

Selecting Power On/Off from the Action menu allows you to power the server on or off, with post-power-up options. It generates the Power on/off dialog.

Power On/Off Dialog



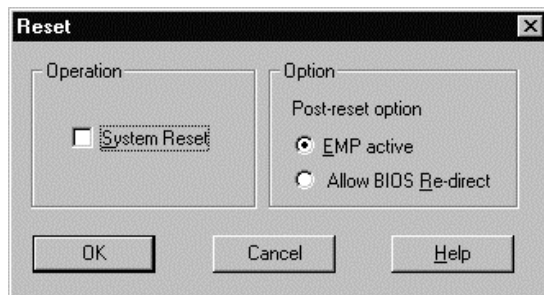
Options available in the dialog are:

- ◆ **Power ON** - powers on the server.
- ◆ **Power OFF** - powers off the server. This option is not allowed if the server is configured in RESTRICTED mode for EMP operations.

- ◆ **Post-power-up option** - sets the mode selection of the server to EMP active or BIOS redirection. The setting is available after the next power-up. The default selection is EMP active.
- ◆ **Cancel** - exits the dialog without any action taken.
- ◆ **Help** - displays dialog level help information.

Reset

Selecting Reset from the Action menu generates the Reset dialog so that you can remotely reset the server with post-reset options.

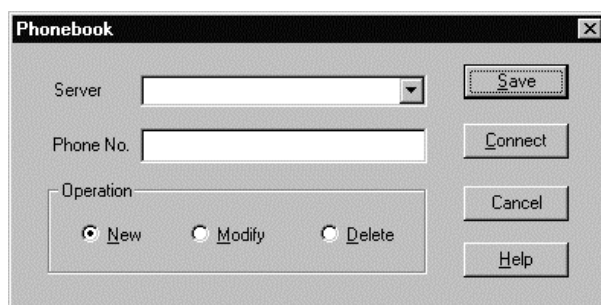


Options available in the dialog are:

- ◆ **System Reset** - resets the server with the selected post-reset options. This operation is not allowed if the server is configured in RESTRICTED mode for EMP operations.
- ◆ **Option Group** - sets the post-reset option that will be effective after reset. The options are EMP active or BIOS redirection. The default selection is EMP active.
- ◆ **Cancel** - exits the dialog without any action taken.
- ◆ **Help** - displays dialog level help information.

Phonebook

The EMP Console provides a support plug-in known as the Phonebook. The Phonebook stores names and numbers of servers in a list that can be updated by adding, modifying or deleting entries. The Phonebook can be opened from the main menu and tool bars, or launched from the Connect dialog by clicking the Config button.



Options available in the dialog are:

- ◆ **Server** - a dropdown list of server names previously stored in the Phonebook. If the New radio button is selected in the Operation area, this area is cleared.
- ◆ **Phone No.** - the number of the selected server. If the New radio button is selected in the Operation area, this area is cleared.
- ◆ **Operation**

- ◇ **New** - lets you make a new entry in the phonebook. Selecting this option clears the Server and Phone No. fields. You must click Save for the entry to be added to the phonebook.
- ◇ **Modify** - lets you edit an existing entry. You select an existing entry from the Server dropdown edit box and modifies the existing phone number before selecting this option. Click Save in order to store this entry in the phonebook.
- ◇ **Delete** - lets you delete an entry from the phonebook. You must first select an existing server from the Server dropdown edit box before selecting this option. You must click Save for the entry to be deleted.
- ◆ **Save** - saves a new or modified Phonebook entry or deletes an entry if the Delete radio button was selected.
- ◆ **Connect** - raises the Connect dialog with the server from the Phonebook's Server dropdown edit box already populating the Connect dialog's Server dropdown edit box.
- ◆ **Cancel** - exits the dialog without any action taken.
- ◆ **Help** - displays dialog level help information.

Management Plug-ins

SEL Viewer

The SEL viewer provides access to the System Event Log on the server and can display records in either hexadecimal or text (verbose) form. Options available through the SEL viewer are:

- ◆ View the SEL from a file
- ◆ Save the SEL to a file
- ◆ View SEL summary info
- ◆ View all SEL entries
- ◆ View SEL info by event type
- ◆ View SEL info by sensor type
- ◆ Set SEL display mode to either Hex or verbose mode
- ◆ Set the SEL output file format to either text or binary format
- ◆ Close the SEL viewer
- ◆ Exit the EMP Console

SEL Viewer Menu Options

The following menu options are found on the SEL viewer menu bar:

- ◆ **File**
 - ◇ **Open** - you can view SEL data from a previously saved file if it was stored in binary format. Selecting the Open menu item allows you to specify a filename under which the data is found. The default filename is "SELLOG.DAT." If the file cannot be opened, the program displays an error message.
 - ◇ **Close** - you can close the SEL viewer.
 - ◇ **Save As** - dumps the SEL data to a file in either binary raw or verbose text format. The binary file may be retrieved later. Selecting this option lets you specify a filename to which the data would be saved. The default filename is "SELLOG.DAT." If there is no data, an error message will be displayed.

- ◇ **Exit** - exits the EMP Console.
- ◆ **Connect**
- ◆ **View**
 - ◇ **SEL Information** - displays SEL summary information as returned by the server.
 - ◇ **All Events** - displays all events in the SEL.
 - ◇ **By Sensor Type** - shows all events in the SEL generated by a specific sensor type such as voltage, temperature, etc.
 - ◇ **By Event** - displays all the events in the SEL of a particular type; for example, by memory or threshold. A pop-up menu lets you select the event type to display. This pop-up menu displays all the event types that may be generated by the particular hardware.
- ◆ **Settings** - you can change several operating parameters for the SEL viewer. This menu displays the following suboptions:

Display HEX/Verbose - toggles between HEX mode and interpreted mode of displaying SEL records.

Output Text/Binary - determines whether SEL data will be saved to the file in binary format or verbose format.
- ◆ **Window** - gives options for displaying currently open windows.
- ◆ **Help** - provides version information for the SEL viewer and provides help topics on the EMP Console.

SDR Viewer

The SDR viewer lets you view the Sensor Data Records retrieved from the SDR repository. Options available through the SDR viewer are:

- ◆ View all SDR records
- ◆ View SDR entries by SDR type
- ◆ View SDR summary info
- ◆ Set SDR display mode to either Hex or verbose mode
- ◆ Close the SDR viewer
- ◆ Exit the EMP Console

SDR Viewer Menu Options

The following menu options are found on the SDR viewer menu bar:

- ◆ **File**
 - ◇ **Close** - closes the SDR viewer.
 - ◇ **Exit** - exits the EMP Console.
- ◆ **View**
 - ◇ **Display all Records** - displays all records from the SDR repository.
 - ◇ **SDR Type** - displays the records of a particular SDR type. You select an SDR type from a pop-up menu that displays all the SDR types available for the given hardware.
 - ◇ **SDR Info** - displays the SDR summary information as returned by the server.
- ◆ **Settings** - lets you change operating parameters for the SDR viewer. This menu displays the following suboption:
 - ◇ **Display HEX/Verbose** - toggles between HEX mode and interpreted mode of displaying SDR records.

- ◆ **Window** - gives options for displaying currently open windows.
- ◆ **Help** - provides version information for the SDR viewer and provides help topics on the EMP Console.

FRU Viewer

The FRU viewer allows you to view the server's FRU (Field Replaceable Units) data from the server's baseboard FRU information area. Options available with the SDR viewer are:

- ◆ View all FRU records
- ◆ View FRU summary info
- ◆ Set FRU display mode to either Hex or verbose mode
- ◆ Close the FRU viewer
- ◆ Exit the EMP Console

FRU Viewer Menu Options

The following menu options are found on the FRU viewer menu bar:

- ◆ **File**
 - ◇ **Close** - closes the FRU viewer.
 - ◇ **Exit** - exits the EMP Console.
- ◆ **View**
 - ◇ **Display all Records** - displays all FRU data, which consists of chassis, board, and product information.
 - ◇ **FRU Info** - displays the FRU summary information as returned by the server.
- ◆ **Settings** - lets you change operating parameters for the FRU viewer. This menu displays the following suboption:
 - ◇ **Display HEX/Verbose** - toggles between HEX mode and interpreted mode of displaying FRU records.
 - ◇ **Window** - gives options for displaying currently open windows.
 - ◇ **Help** - provides version information for the FRU viewer and provides help topics on the EMP Console.

FRUSDR Load Utility

The Field Replacement Unit (FRU) and Sensor Data Record (SDR) Load Utility is a DOS based program used to update the server management subsystem's product level FRU, SDR, and the Desktop Management Interface (DMI) non-volatile storage components (EEPROMs). The load utility:

- ◆ discovers the product configuration based on instructions in a master configuration file
- ◆ displays the FRU information
- ◆ updates the non-volatile storage device (EEPROM) associated with the Baseboard Management Controller (BMC) that holds the SDR and FRU area
- ◆ updates the DMI FRU area located in the BIOS non-volatile storage device
- ◆ generically handles FRU devices that may not be associated with the BMC

When to Run the FRUSDR Load Utility

You should run the FRUSDR Load Utility each time you upgrade or replace the hardware in your server, excluding add-in boards, hard drives, and RAM. For example, if you replace an array of fans, you need to run the utility. It programs the sensors that need to be monitored for server management.

Because the utility must be reloaded to properly initialise the sensors after programming, turn the server off and remove the AC power cords from the server. Wait approximately 30 seconds, and reconnect the power cords.

What You Need to Do

The FRUSDR Load Utility may be run directly from the Configuration Software CD or from diskettes you create from the CD. Before you can run the FRUSDR Load Utility from a diskette, you must copy the utility from the Server Configuration Software CD to a DOS-bootable diskette.

If your diskette drive is disabled, or improperly configured, you must use BIOS Setup to enable it. If necessary, you can disable the drive after you are done with the FRUSDR utility.

How You Use the FRUSDR Load Utility

This utility is compatible with ROM-DOS Ver. 6.22, MS-DOS Ver. 6.22, and later versions. The utility accepts CFG, SDR and FRU load files. The executable file for the utility is frusdr.exe. The utility requires the following supporting files:

- ◆ one or more .fru files describing the system's field replaceable units
- ◆ a .cfg file describing the system configuration
- ◆ a .sdr file describing the sensors in the system

Command Line Format

The basic command line format is

```
frusdr [-?] [-h] [-d {dmi, fru, sdr}] [-cfg filename.cfg] -p -v
```

Command	Description
frusdr	Is the name of the utility.
-? or -h	Displays usage information.
-d {dmi, fru, sdr}	Only displays requested area.
-cfg filename.cfg	Uses custom CFG file.
-p	Pause between blocks of data.
-v	Verbose, display any additional details.

Parsing the Command Line

The FRUSDR Load Utility allows only one command line function at a time. A command line function may consist of two parameters; for example, -cfg filename.cfg. Any invalid parameters result in displaying an error message and exiting the program. You can use either a slash (/) or a minus sign (-) to specify command line options. The -p and -v flags may be used in conjunction with any of the other options.

Displaying Usage Information

When the utility is run with the `-?` or `-h` command line flags, the following message is displayed when the verbose flag `-v` is added to the help command:

FRU & SDR Load Utility Version 2.0 Revision R.2.1

```
Usage:   frusdr           Is the name of the utility.
        -? Or -h         Displays usage information.
        -d {dmi,fru,sdr} Only displays requested area.
        -cfg filename.cfg Uses custom CFG file.
        -p               Pause between blocks of data.
        -v               Verbose, display any additional details.
```

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This utility must be run from a system executing DOS. Running in a Window's DOS box is insufficient and will provide incorrect results. Programming the BMC FRU area clears the SDR table, therefore the SDR table must be reprogrammed. Upon completing the programming of the FRU and SDR areas, the server should be rebooted.

Note: DOS users may alternatively use a `'/'` instead of the `'-'`.

The following information is display if `-v` option is included in the command line.

The `/D FRU` command may be followed with up to 16 device addresses. These device addresses are used to view up to 16 different FRU areas, instead of the default of displaying the BMC FRU. The arguments following the `"-d FRU"` are in the same order and value as the `NVS_TYPE`, `NVS_LUN`, `DEV_BUS` and `DEV_ADDRESS` which are found in the FRU file header in each FRU file. The LUN address is optional. If the LUN address is used, it must start with an `'L'`.

```
Usage:   FRUSDR -d fru (device) [lun] (bus) (addr) (addr2) (etc)
Example: FRUSDR /D FRU IMBDEVICE L00 00 C0 C2
```

The configuration file may be used to load multiple FRU and SDR files. In the configuration file, you may define which FRU and SDR areas are to be programmed. Additionally, you may request information from the user or ask the user to choose which areas to program.

Displaying a Given Area

When the utility is run with the `-d DMI`, `-d FRU`, or `-d SDR` command line flag, the indicated area is displayed. Each area represents a sensor; one sensor for each instrumented device in the server. If the given display function fails because of an inability to parse the data present or a hardware failure, the utility displays an error message and exits.

Displaying DMI Area

The DMI area is displayed in ASCII format when the field is ASCII or as a number when the field is a number. Each DMI area displayed is headed with the DMI area designated name. Each field has a field name header followed by the field in ASCII or as a number.

Example:

To display the DMI area, type `frusdr -d dmi` and press <Enter>. A message similar to the following appears:

Displaying DMI Area...

System Information (Type 1, 8 bytes)

Manufacturer = Intel
Product = NA440BX BP
Version = 000000000000
Serial Number = 0123456789

Board Information (Type 2, 8 bytes)

Manufacturer = Intel
Product = N440BX Ultra SCSI Backplane
Version = 681234-501
Serial Number = N03121530

Chassis Information (Type 3, 9 bytes)

Manufacturer = Intel
Type = Main Server Chassis
Version = 000000-000
Serial Number = 9912345678
Asset Tag# =

Displaying FRU Area

The FRU area is displayed in ASCII format when the field is ASCII or as a number when the field is a number. Each FRU area displayed is headed with the FRU area designated name. Each field has a field name header followed by the field in ASCII or as a number. The Board, Chassis, and Product FRU areas end with an END OF FIELDS CODE that indicates there is no more data in this area. The Internal Use area is displayed in hex format, 16 bytes per line.

Example:

To display the FRU area, type **frusdr -d fru** and press <Enter>. A message similar to the following appears:

Common Header Area (Version 1, Length 8)

Header Area Version = 01h
Internal Area Offset = 01h
Chassis Area Offset = 0Ah
Board Area Offset = 0Eh
Product Area Offset = 16h
PAD = 00h
PAD = 00h
CHECKSUM = D0h

Internal Information Area (Version 0, Length 72)

00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00

Chassis Information Area (Version 1, Length 32)

Chassis Type = 11h
Part Number (ASCII) = 000000-000
Serial Number (ASCII) = 9912345678

END OF FIELDS CODE

Board Information Area (Version 1, Length 64)

Unicode Country Base = 00h
Manufacturing Time (mins) = 733803
Manufacturer Name (ASCII) = Intel
Product Name (ASCII) = N440BX
Serial Number (ASCII) = 0123456789

```

      Part Number (ASCII)           = 000000-000
END OF FIELDS CODE

Product Information Area (Version 1, Length 80)
  Unicode Country Base             = 00h
  Manufacturer Name (ASCII)        = Intel
  Product Name (ASCII)             = N440BX DP
  Part Number (ASCII)              = 000000000000
  Version (ASCII)                  =
  Serial Number (ASCII)            = 0123456789
  Asset Tag (ASCII)                =
END OF FIELDS CODE

```

Displaying SDR Area

The SDR non-volatile storage area is displayed in the following hex format. The data is separated by a Sensor Record Number X header, where X is the number of that sensor record in the SDR area. The next line after the header is the sensor record data in hex format delineated by spaces. Each line holds up to 16 bytes. The data on each line is followed by the same data in ASCII format; nonprintable characters are substituted by a period (.).

Example:

To display the SDR area, type **frusdr -d sdr** and press <Enter>. A message similar to the following appears:

```

Reading SDR Record #1
      0E 00 10 01 37 20 00 0F 05 00 10 F1 F8 02 01 85....7.....
      02 00 00 00 04 00 00 C4 02 00 08 30 C2 07 91 95.....0....
      8E FF 00 1B 1B 00 99 95 00 8A 8E 02 02 00 01 CC.....
      53 43 53 49 2D 42 2D 54 65 72 6D 33          SCSI-B-Term3

Reading SDR Record #2
      0E 40 10 01 30 20 00 13 05 00 10 F1 F8 04 01 05.@..0 .....
      00 00 00 20 29 00 00 1E 02 00 00 00 00 00 00 00... ).....
      00 FF 00 03 03 00 00 00 00 42 49 02 02 00 01 C5.....BI.....
      46 41 4E 2D 32          FAN-2

```

Using Specified CFG File

The utility can be run with the command line parameter of **-cfg filename.cfg**. The filename can be any DOS accepted, eight-character filename string. The utility loads the specified CFG file uses the entries in the configuration file to probe the hardware and to select the proper SDRs to load into non-volatile storage.

Displaying Utility Title and Version

The utility displays its title:

```
FRU & SDR Load Utility, Version 2.0, Revision X.XX
```

Where X.XX is the revision number for the utility.

Configuration File

The configuration file is in ASCII text. The utility executes commands formed by the strings present in the configuration file. These commands cause the utility to perform various tasks needed to ultimately load the proper SDRs into the non-volatile storage of the BMC and possibly generic FRU devices. Some of the commands may be interactive and require you to make a choice.

Prompting for Product Level FRU Information

Through the use of a Configuration File, the utility may prompt you for FRU information.

Filtering Sensor Data Record From the SDR File

The MASTER.SDR file has all the possible SDRs for the system. These records may need to be filtered based on the current product configuration. The configuration file directs the filtering of the SDRs.

Updating the SDR Non-volatile Storage Area

After the utility validates the header area of the supplied SDR file, it updates the SDR repository area. Before programming, the utility clears the SDR repository area. If the SDR file is loaded via a .cfg File, the utility filters all tagged SDRs depending on the product configuration set in the Configuration File. Nontagged SDRs are automatically programmed. The utility also copies all written SDRs to the SDR.TMP file. It contains an image of what was loaded, and the TMP file is also useful for debugging the server.

Updating FRU Non-volatile Storage Area

After the configuration is determined, the utility updates the FRU non-volatile storage area. First it verifies the Common Header area and checksum from the specified FRU file. The Internal Use Area is read out of the specified .FRU file and is programmed into the non-volatile storage. The Chassis Area is read out of the specified .FRU file. Last it reads the Product Area out of the specified FRU file, then the area is programmed into the FRU non-volatile storage. All the areas are also written to the FRU.TMP file, which happens before the areas get programmed.

Updating DMI FRU Non-volatile Storage Area

After programming the BMC FRU area, the utility then programs the following Chassis, Board, and Product FRU information to the DMI fields.

Example:

```
Loading DMI System Area
Manufacturer Name : Intel
Name : NA440BX Server System
Version Number : SMADN000BN00
Serial Number : 0123456789

Loading DMI Board Area
Manufacturing Name : Intel
Name : BMAD440LX
Serial Number : 0123456789
Version Number : 681234-501

Loading DMI Chassis Area
Chassis Part Number : 000000-000
Chassis Serial Number :
Asset Tag :
```

If a failure occurs, the utility displays an error message and exits.

Cleaning Up and Exiting

If an update was successfully performed, the utility displays a single message and then exits.

If the utility fails, it immediately exits with an error message and exit code.

Upgrading the BIOS

Preparing for the Upgrade

Before you upgrade the BIOS, prepare for the upgrade by recording the current BIOS settings, obtaining the upgrade utility, and making a copy of the current BIOS.

Recording the Current BIOS Settings

1. Boot the computer and press <F2> when you see the message:
Press <F2> Key if you want to run SETUP
2. Write down the current settings in the BIOS Setup program.

NOTE

Do not skip step 2. You will need these settings to configure your computer at the end of the procedure.

Obtaining the Upgrade Utility

You can upgrade to a new version of the BIOS using the new BIOS files and the BIOS upgrade utility, iFLASH.EXE. You can obtain the BIOS upgrade file and the iFLASH.EXE utility through your computer supplier.

NOTE

Please review the instructions distributed with the upgrade utility before attempting a BIOS upgrade.

This upgrade utility allows you to:

- ◆ Upgrade the BIOS in flash memory.
- ◆ Update the language section of the BIOS.

The following steps explain how to upgrade the BIOS.

Creating a Bootable Floppy Diskette

- ◆ Use a DOS or Windows 95 system to create the floppy disk.
- ◆ Insert a floppy disk in floppy drive A.
- ◆ At the C:\ prompt, for an unformatted floppy disk, type:

format a:/s

or, for a formatted floppy disk, type:

sys a:

- ◆ Press <Enter>

Creating the BIOS Upgrade Floppy Diskette

The BIOS upgrade file is a compressed self-extracting archive that contains the files you need to upgrade the BIOS.

1. Copy the BIOS upgrade file to a temporary directory on your hard disk.
2. From the C:\ prompt, change to the temporary directory.
3. To extract the file, type the name of the BIOS upgrade file, for example:

10006BI1.EXE

4. Press <Enter>. The extracted file contains the following files:

LICENSE.TXT

README.TXT

BIOS.EXE

5. Read the LICENSE.TXT file, which contains the software license agreement and the README.TXT file, which contains the instructions for the BIOS upgrade.
6. Insert the bootable floppy disk into drive A.
7. To extract the BIOS.EXE file to the floppy disk, change to the temporary directory that holds the BIOS.EXE file and type:

BIOS A:

8. Press <Enter>.
9. The floppy disk now holds the BIOS upgrade and recovery files.

Upgrading the BIOS

1. Boot the computer with the floppy disk in drive A. The BIOS upgrade utility screen appears.
2. Select Update Flash Memory From a File.
3. Select Update System BIOS. Press <Enter>.
4. Use the arrow keys to select the correct .bio file. Press <Enter>.
5. When the utility asks for confirmation that you want to flash the new BIOS into memory, select Continue with Programming. Press <Enter>.
6. When the utility displays the message upgrade is complete, remove the floppy disk. Press <Enter>.
7. As the computer boots, check the BIOS identifier (version number) to make sure the upgrade was successful.
8. To enter the Setup program, press <F2> when you see the message:

Press <F2> Key if you want to run SETUP

9. For proper operation, load the Setup program defaults. To load the defaults, press <F9>.
10. To accept the defaults, press <Enter>.
11. Set the options in the Setup program to the settings you wrote down before the BIOS upgrade.
12. To save the settings, press <F10>.
13. To accept the settings, press <Enter>.
14. Turn off the computer and reboot.

Recovering the BIOS

It is unlikely that anything will interrupt the BIOS upgrade; however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an upgrade fails. The following procedure use recovery mode for the Setup program. for more information about Setup modes.

NOTE

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

1. Turn off all peripheral devices connected to the computer. Turn off the computer.
2. Remove the computer cover.
3. Locate jumper block J3J2.
4. Move the Recovery Boot jumper from pins 9-10 to pins 10-11 (see the jumper locations in the 'Motherboard' chapter).
5. Insert the bootable BIOS upgrade floppy disk into floppy drive A.
6. Replace the cover, turn on the computer, and allow it to boot. The recovery process will take a few minutes.
7. Listen to the speaker.
8. Two beeps and the end of activity in drive A indicate successful BIOS recovery.
9. A series of continuous beeps indicates failed BIOS recovery.
10. If recovery fails, return to step 1 and repeat the recovery process.
11. If recovery is successful, turn off the computer. Remove the computer cover and continue with the following steps.
12. Move the Recovery Boot jumper back to pins 9-10.
13. Replace the computer cover. Leave the upgrade disk in drive A and turn on the computer.
14. Continue with the BIOS upgrade.

Changing the BIOS Language

You can use the BIOS upgrade utility to change the language the BIOS uses for messages and the Setup program. Use a bootable floppy disk containing the Intel flash utility and language files.

1. Boot the computer with the bootable floppy disk in drive A. The BIOS upgrade utility screen appears.
2. Select Update **Flash Memory From a File**.
3. Select Update **Language Set**. Press <Enter>.
4. Select drive A and use the arrow keys to select the correct .lng file. Press <Enter>.
5. When the utility asks for confirmation that you want to flash the new language into memory, select **Continue with Programming**. Press <Enter>.
6. When the utility displays the message:
upgrade is complete,
remove the floppy disk. Press <Enter>.
7. The computer will reboot and the changes will take effect.

Using the Firmware Update Utility

The Firmware Update Utility is a DOS based program used to update the Baseboard Management Controller's firmware code. You only need to run the Firmware Update Utility if new firmware code becomes necessary.

Running the Firmware Update Utility

1. Create a DOS bootable diskette. The version of DOS must be 6.0 or higher.
2. Place the firmware update utility (FWUPDATE.EXE) and the *.hex file on the diskette. Make a note of the *.hex file name, you will need it later.
3. Insert the diskette into the drive and boot to it.
4. At the DOS prompt, run the executable file (FWUPDATE.EXE).
5. The utility will display a menu screen. Select "Upload Flash."
6. The utility will ask for a file name. Enter the name of the *.hex file.
7. The program will load the file and then ask if it should "Upload Boot Block." Press "N" to continue.
8. The program will next ask if it should "Upload Operational Code." Press "Y" to continue.
9. Once the operational code has been updated and verified, press any key to continue. Then press the "ESC" key to exit the program.
10. Shut the system down and remove any floppy disks that may be in the system.
11. Disconnect the AC power cord from the system and wait 60 seconds.
12. Connect the AC power cord and power up the system.

Installing Video Drivers

After configuring the system, you need to install video drivers to take full advantage of the features of the onboard Cirrus Logic CL-GD5480 super VGA video controller.

- ◆ The Configuration Software CD includes video drivers for use with DOS and Windows NT. Check the README.TXT file on the CD for information on installing these drivers.
- ◆ For other operating systems, see your OS instructions for installing device drivers.

Using the Symbios SCSI Utility

The Symbios SCSI utility detects the SCSI host adapters on the system board. Use the utility to

- ◆ change default values
- ◆ check and/or change SCSI device settings that may conflict with those of other devices in the server

Running the SCSI Utility

1. When this message appears on the video monitor:
Press Ctrl-C to run SCSI Utility...
2. Press <Ctrl+C> to run this utility. When it appears, choose the host adapter that you want to configure.

7 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.

POST Error Codes and Messages

Code	Error message
0162	BIOS unable to apply BIOS update to processor 1
0163	BIOS unable to apply BIOS update to processor 2
0164	BIOS does not support current stepping for processor 1
0165	BIOS does not support current stepping for processor 2
0200	Failure Fixed Disk
0210	Stuck Key
0211	Keyboard error
0212	Keyboard Controller Failed
0213	Keyboard locked - Unlock key switch
0220	Monitor type does not match CMOS - Run SETUP
0230	System RAM Failed at offset
0231	Shadow RAM Failed at offset
0232	Extended RAM Failed at offset

Code	Error message
0250	System battery is dead - Replace and run SETUP
0251	System CMOS checksum bad - Default configuration used
0260	System timer error
0270	Real time clock error
0297	ECC Memory error in base (extended) memory test in Bank xx
02B2	Incorrect Drive A type - run SETUP
02B3	Incorrect Drive B type - run SETUP
02D0	System cache error - Cache disabled
02F5	DMA Test Failed
02F6	Software NMI Failed
0401	Invalid System Configuration Data - run configuration utility
None	System Configuration Data Read Error
0403	Resource Conflict
0404	Resource Conflict
0405	Expansion ROM not initialized
0406	Warning: IRQ not configured
0504	Resource Conflict
0505	Expansion ROM not initialized
0506	Warning: IRQ not configured
0601	Device configuration changed
0602	Configuration error - device disabled
8100	Processor 0 failed BIST
8101	Processor 1 failed BIST
8104	Processor 0 Internal Error (IERR) failure
8105	Processor 1 Internal Error (IERR) failure
8106	Processor 0 Thermal Trip failure
8107	Processor 1 Thermal Trip failure
8108	Watchdog Timer failed on last boot, BSP switched
810A	Processor 1 failed initialization on last boot
810B	Processor 0 failed initialization on last boot
810C	Processor 0 disabled, system in Uni-processor mode
810D	Processor 1 disabled, system in Uni-processor mode
810E	Processor 0 failed FRB Level 3 timer
810F	Processor 1 failed FRB Level 3 timer
8110	Server Management Interface failed to function
8120	IOP sub-system is not functional
8150	NVRAM Cleared by Jumper
8151	NVRAM Checksum Error, NVRAM cleared
8152	NVRAM Data Invalid, NVRAM cleared

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 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; SCSI

If you have just fitted a new SCSI drive, or device, check that you have used a valid 'ID' that does not conflict with other SCSI drives or devices in the system. Check also that the SCSI bus is correctly terminated on only the last drive in the system. Look in any documentation for information.

On boot up, just after POST, a list is displayed of the devices attached to the SCSI interface, which shows the device, its parameters and the set 'ID'.

EQUIPMENT LOG

Use this equipment log to record information about your PC. You may wish to cut it out and keep it in a safe place.

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.

	<i>Model</i>	<i>Serial number</i>
System unit		
Monitor		
Keyboard		
Mouse		
Modem		
ISDN card		



Expansion cards

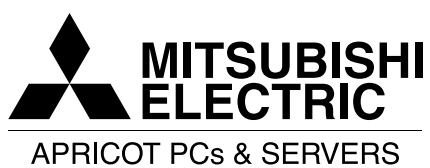
	Manufacturer	Description	Serial number
1			
2			
3			
4			

Other information

It may be useful to note any additional information here such as date of purchase, supplier, etc., along with the phone number of your maintenance provider.



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