

# PC Specialist's Handbook


## *ErgoPro*

**e** *Series*

**x** *Series*

**s** *Series*

First Edition, Release 3 - July 1996

  
**FUJITSU**

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**Fujitsu ErgoPro e-, x- and s-series PC Specialist's Handbook****Document number PM03231ED**

This document was produced by Fujitsu Computers in Helsinki, Finland.

We welcome and consider all comments and suggestions. Please send them to:

**International Technical Support**

**Fax :** +358 0 569 6609

**Internet :** PSD-HELPDESK@FUJITSU.FI

**Team Office :** HELPDESK PSD/ITS

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## General

The ErgoPro PC range consists of three series of professional PCs :

- e- series
- x- series
- s- series

The ErgoPro e-series is the entry level of the professional PCs.

The ErgoPro x-series is perfect for the professional buyer who puts productivity and long term economy.

The ErgoPro s-series provides a complete set of functions with the fastest performance and extremely quiet operation. In the ErgoPro s-series, everything is integrated.

### LITHIUM BATTERY



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

Eksplodingsfare ved fejlkting håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Lever det brugte batteri tilbage til leverandøren.

Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

Eksplodingsfare. Ved udskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparat leverandøren.

Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparatillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

Danger d'explosion en cas de remplacement incorrect de la batterie. Remplacer uniquement avec une batterie de même type ou d'un type recommandé par le constructeur. Jeter les batteries usagées conformément aux instructions du fabricant.

Explosionsgefahr bei unsachgemässigem Austausch der Batterie. Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

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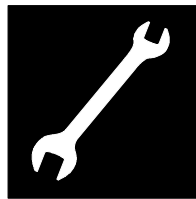
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# Section 1 :

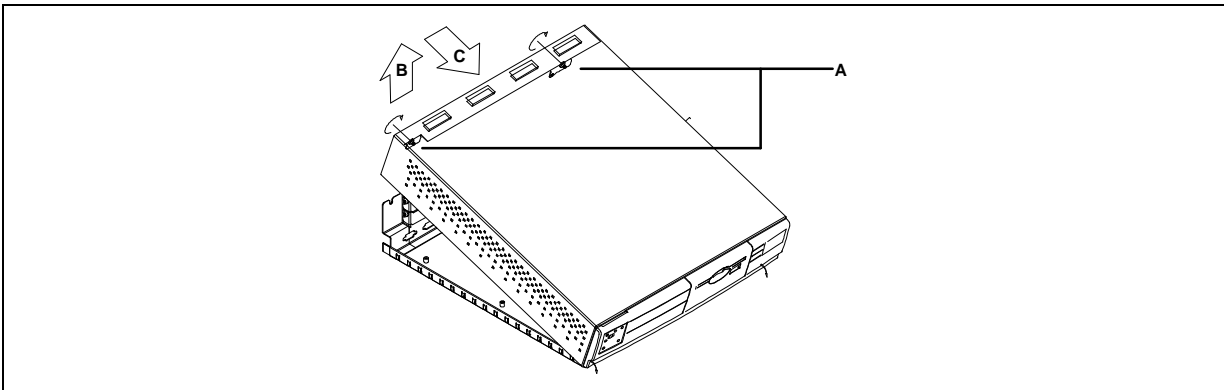
**Disassembling the  
2 slot unit  
4 slot unit  
6 slot unit**

## 2-Slot assembly/disassembly

### Opening & closing the system unit cover

To open the system unit cover, do as follows:

1. Remove any diskette(s) from the drive(s).
2. Turn off the display unit, system unit, and all other separately powered attached units.
3. Unplug the power cables of the system unit and other attached cables from their outlets.
4. Unlock the security lock, if applicable, by turning the key clockwise.
5. Use a medium-sized Posidrive screwdriver to loosen the two screws securing the system unit cover (A) but do not take them out entirely. Lift up the cover (B), holding it by the rear end, to an angle of about 10-15 degrees, and then slide it forward and off (C). Note that there is a small tab on each side of the cover; these tabs go in the small holes in the system unit thus securing the cover in place.

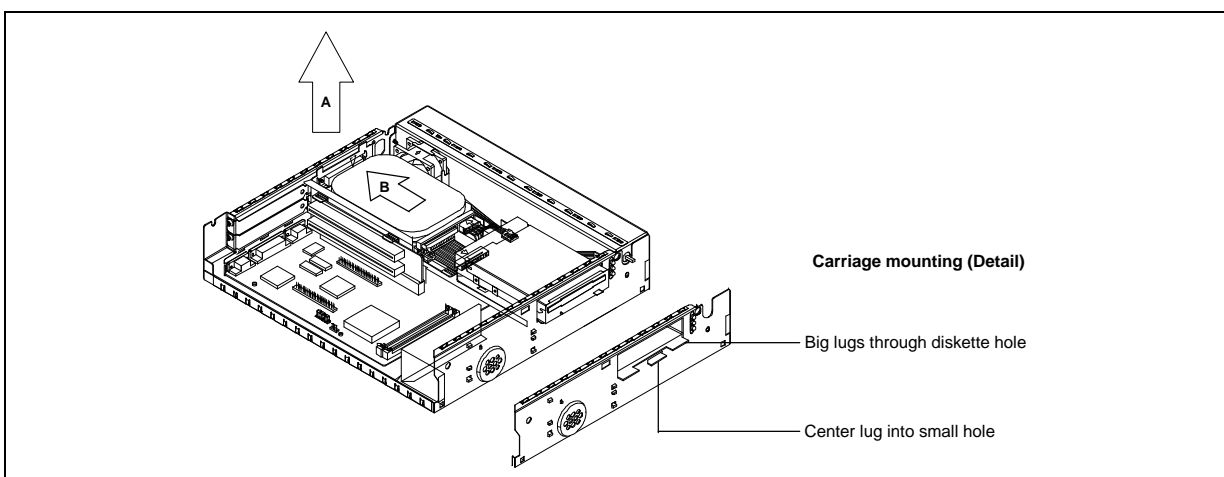


Picture 1 : Opening and closing the 2 slot unit cover

### Installing and removing disk tray

If you have installed a new hard disk or diskette drive, or replaced an existing drive with another type, check the Hard disk 0 or Floppy Drive 0 parameters in the SETUP.

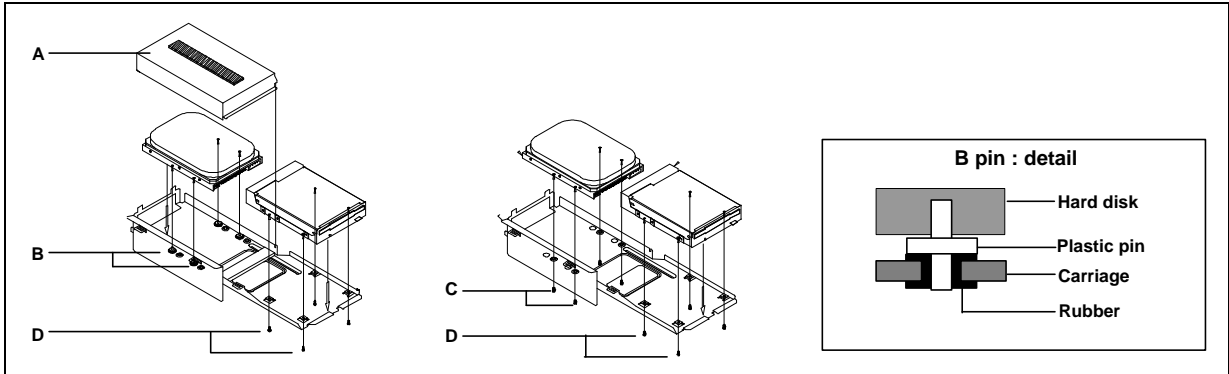
1. If the system is provided with the hard disk silencer, lift it straight up, see next page.
2. Disconnect the power and data cables from the fixed disk and diskette drives.
3. Carefully lift the disk tray (about 50mm), with both drives on it, by the rear (A), checking that the power and data cables do not become caught as they pass through the hole.
4. When the cables are through the hole, pull the plate toward the rear (B) of the machine to disengage the diskette drive and the mounting lug (See picture) from the front of the chassis.



Picture 2 : Installing and removing disk carriage

### Installing and removing mass memory devices

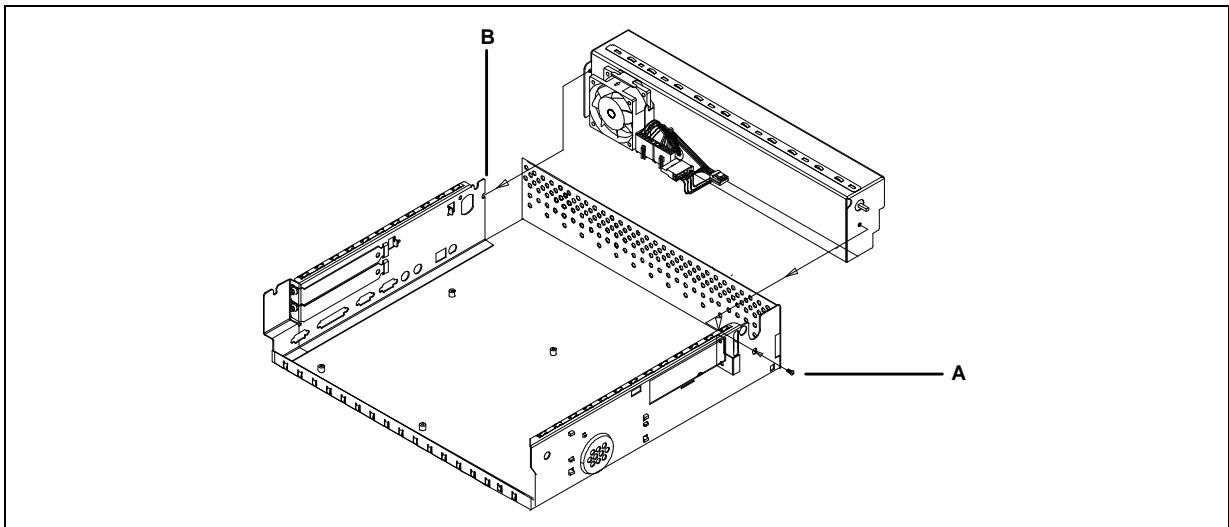
1. If the system is provided with a HD-silencer (A), lift it out. The hard drive itself is placed on plastic pins (B) and does not have any screws that hold it in its position.
2. If a HD-silencer is not used, remove the four screws (C) that hold the hard drive in its place.
3. The floppy drive is always attached to the carriage with four screws (D), which have to be removed



Picture 3 : Installing and removing mass memory devices on carriage (2 slots)

### Removing the power supply

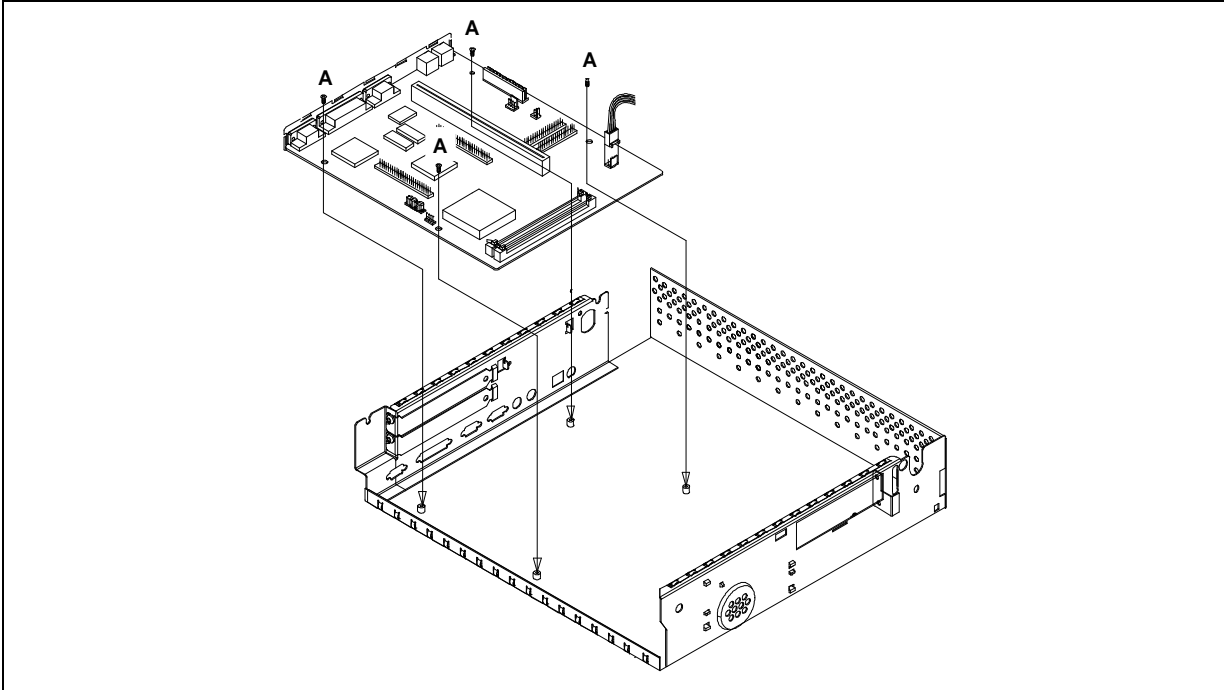
1. Remove the disk tray . There is no need to remove the disks from the tray.
2. Disconnect the wiring loom from the motherboard .
3. Disconnect the fan cable from the motherboard.
4. Undo the two screws which hold the power supply in the chassis. There is one at the front (A), below the power switch, and one at the rear, next to the top power connector (B).
5. Lift the power supply out of the chassis, lifting both ends at the same time.



Picture 4 : Removing the 2 slot power supply

## Replacing the mother board

1. Remove any adapter card(s).
2. Remove the disk tray.
3. Disconnect the fan and the power supply, and remove the data cables from the motherboard.
4. Disconnect the LED cable, noting its position.
5. Remove the backplane.
6. Undo the screws which secures the motherboard (A) into the chassis, slide the motherboard towards yourself to free it from the hooks, and lift it out of the chassis.



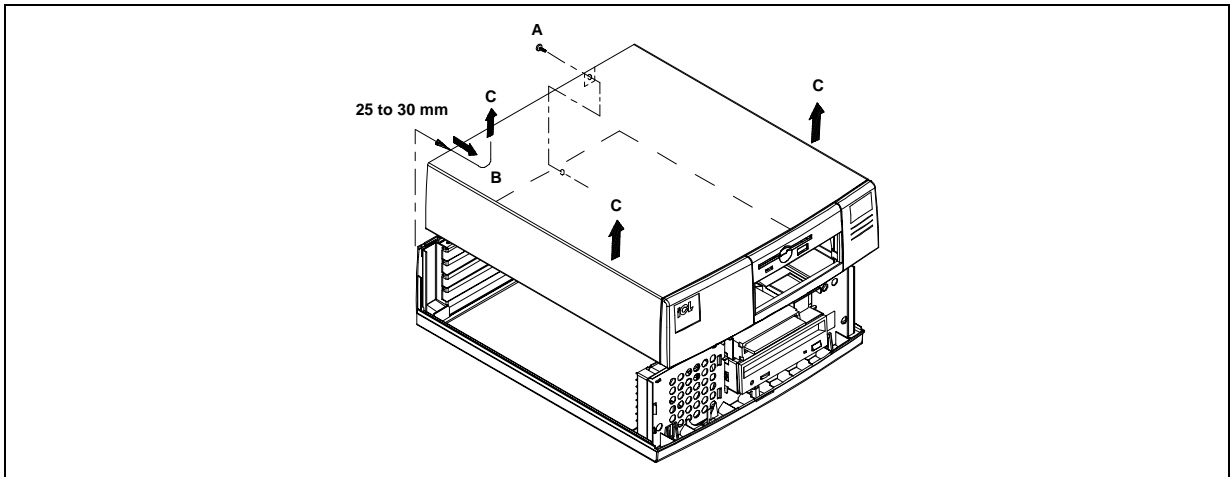
Picture 5 : Removing the motherboard (2 slot)

## 4-Slot assembly/disasassembly

### Opening & closing the system unit cover

To open the system unit cover, do as follows:

1. Remove any diskette(s) from the drive(s).
2. Turn off the display unit, system unit, and all other separately powered attached units.
3. Unplug the power cables of the system unit and other attached cables from their outlets.
4. Unlock the security lock, if applicable, by turning the key clockwise.
5. Remove the screw(A) at the rear with the medium-sized posidrive screwdriver.
6. Slide the cover about 30mm(B) toward the front panel of the system unit, and lift (C) it slowly straight up as in the picture.

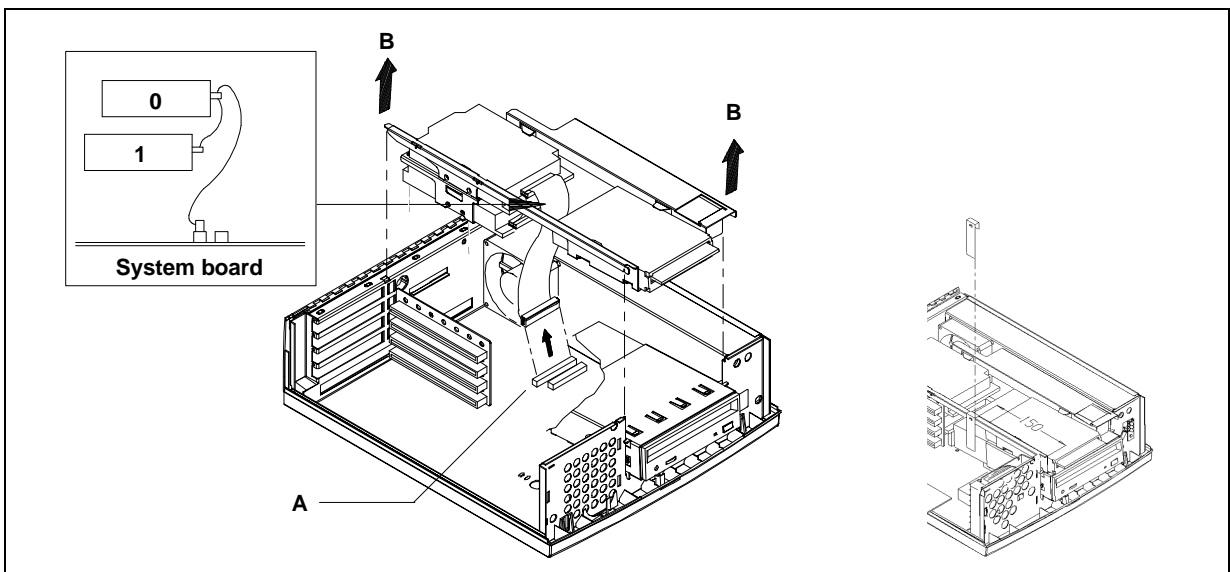


Picture 6: Opening and closing the 4 slot system cover

### Removing and installing the mass memory carriage

If you have installed a new hard disk or diskette drive, or replaced an existing drive with another type, check the Hard disk or Floppy Drive parameters in the SETUP.

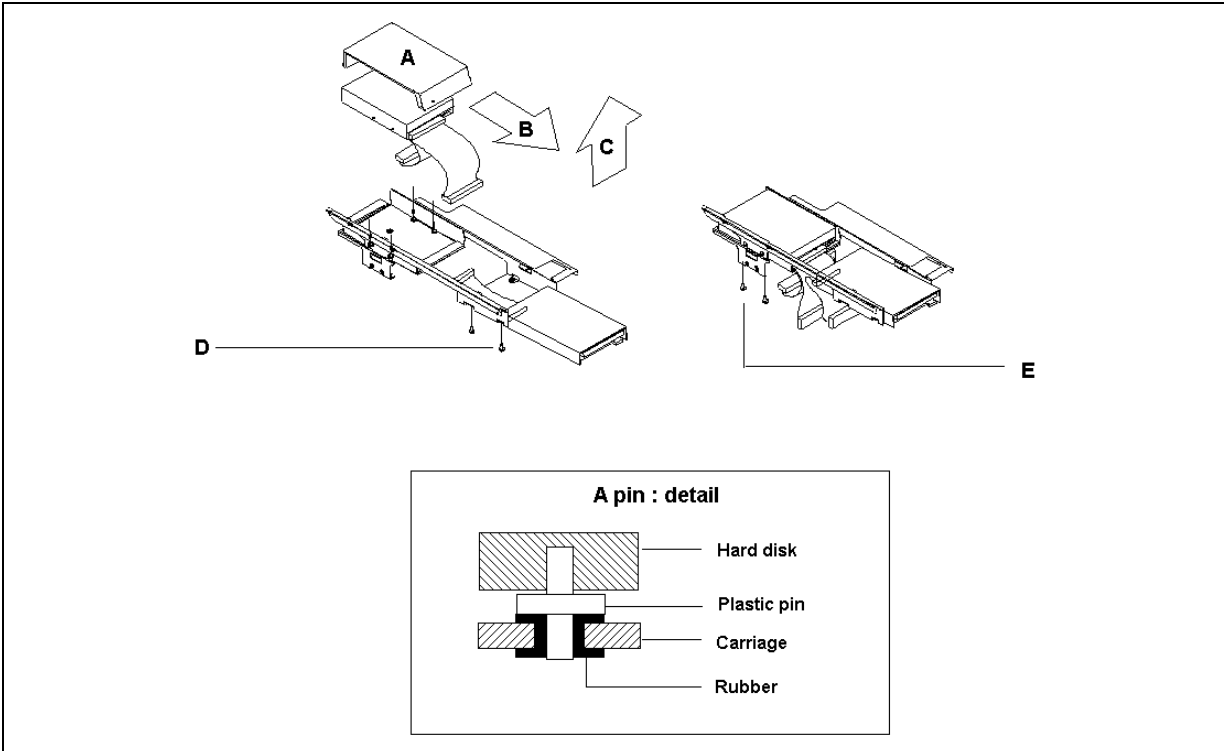
1. If the system is provided with the hard disk silencer, see instructions on the next page.
2. Disconnect the power and data cables from the fixed disk and diskette drives (A).
3. Take out the mass memory carriage (B)



Picture 7: Removing the mass memory carriage (4 slot)

### Installing and removing mass memory devices

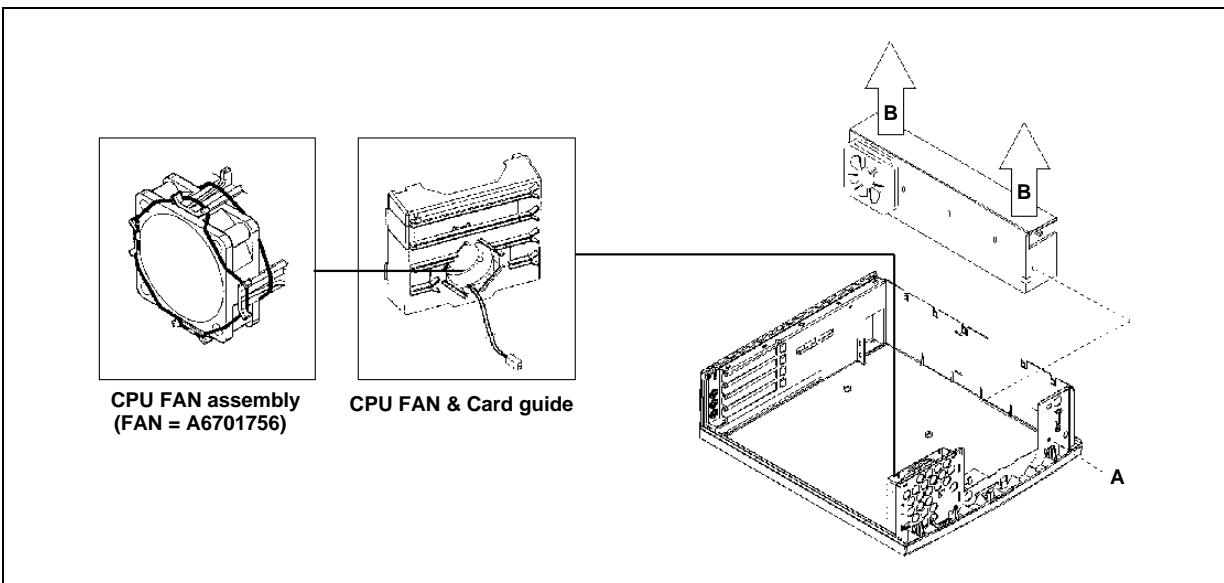
1. If the system is provided with a HD-silencer (A), pull the lower edge (B) of the silencer towards the floppy drive (about 2mm) lifting it up at the same time 20 to 30mm (C). Then push the silencer (about 3mm) towards the back panel, and lift it out. The hard drive itself is placed on plastic pins(F) and does not have any screws to hold it in its position.
2. If the HD-silencer is not used, remove the four screws (E) that hold the hard drive in place
3. The floppy drive is always attached to the carriage with four screws (D), which has to be removed,



Picture 8 : Installing and removing mass memory devices on carriage

### Removing the power supply

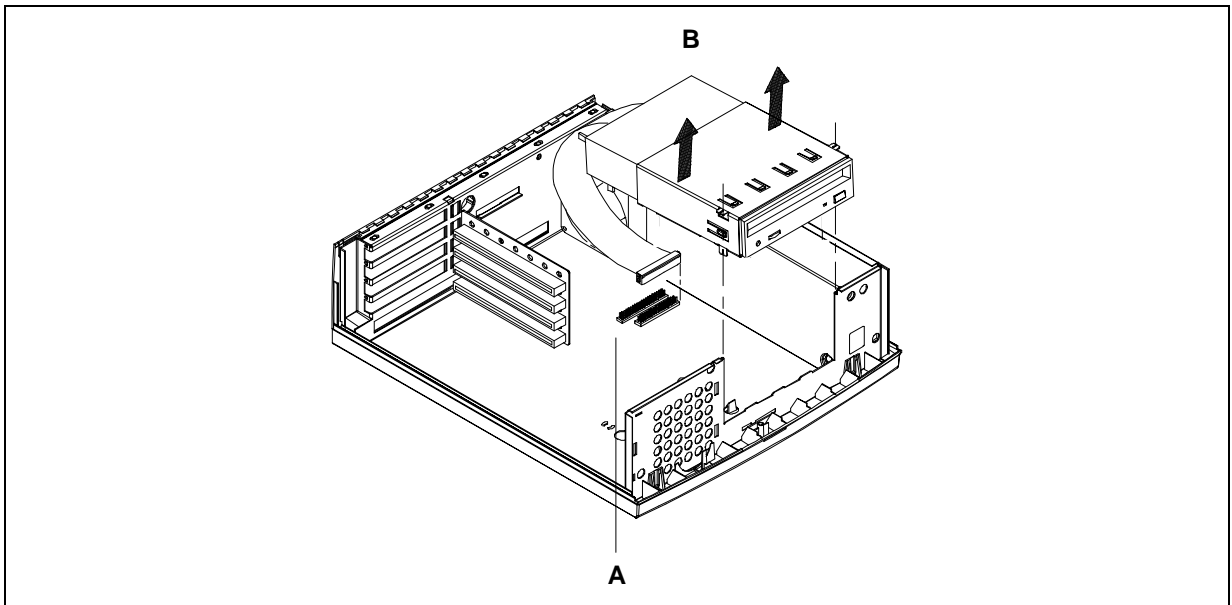
1. Remove the mass memory carriage.
2. Disconnect all the cables from the power supply to the system board
3. Undo the screw which holds the power supply into the chassis (A).
4. Lift the power supply out of the chassis, lifting both ends (B) at the same time.



Picture 9 : Removing the power supply (4 slot)

### Removing the 5.25" carriage

1. Remove the mass memory carriage .
2. Disconnect all the cables connected to the 5.25" device (A).
3. Take out the carriage (B).

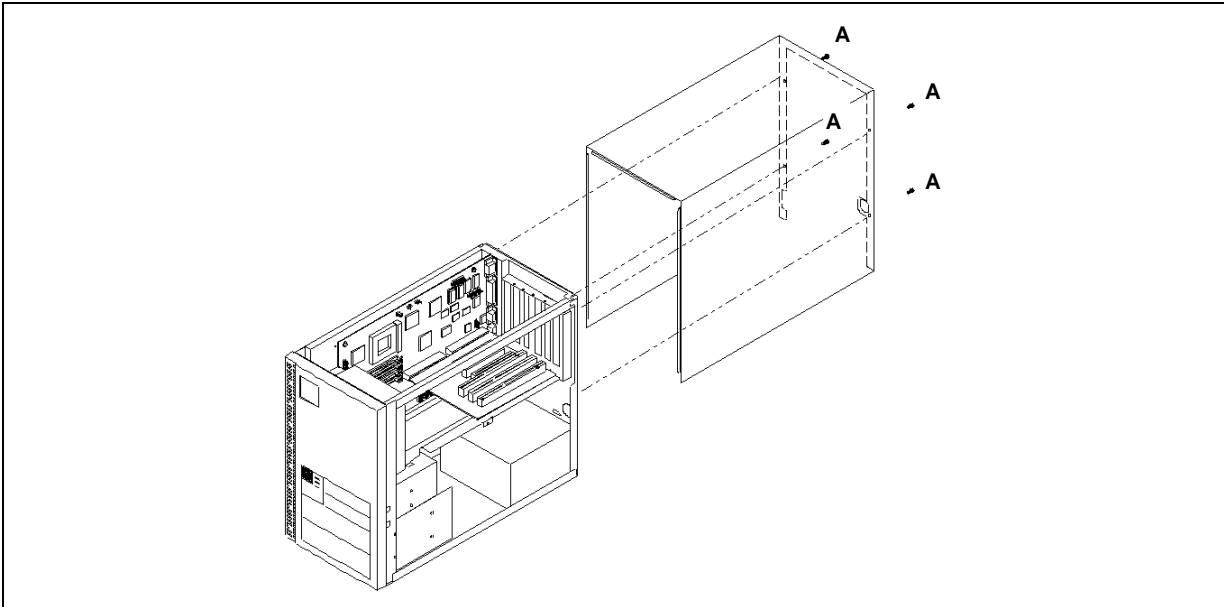


Picture 10 : Removing the 5.25" carriage (4 slots)

## 6-Slot assembly/disasassembly

### Opening & closing the system unit cover

1. Remove any diskette(s) from the drive(s).
2. Turn off the display unit, system unit, and all other separately powered attached units (e.g., printers).
3. Unplug the power cables of the system unit and other attached cables from their outlets.
4. Unlock the security lock, if applicable, by turning the key clockwise.
5. Use a medium-sized Posidrive screwdriver to open the four screws securing the system unit cover (A), and slide the cover backward as shown below (B).

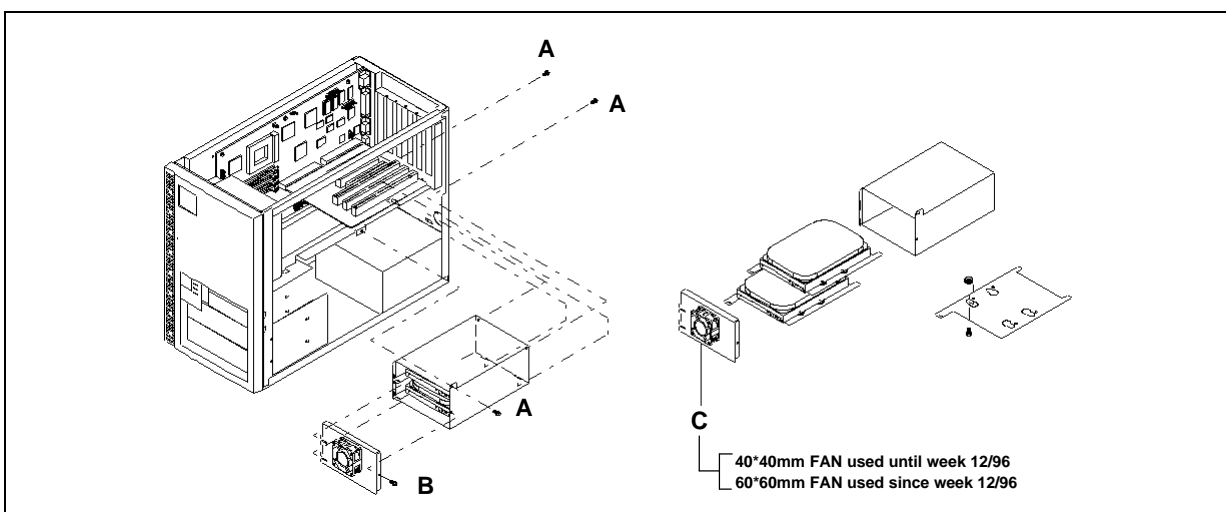


Picture 11 : Opening and closing the 6 slot system cover

### Removing the mass memory carriage

To remove the mass memory, do as follows:

1. Remove the screw (B) with the medium-sized posidrive screwdriver and disconnect the mass memory carriage fan (C) from the mother board.
2. Disconnect all cables connected to hard drives .
3. Remove the 3 screws (A) (2 at the rear of the unit, and one on the side) with the medium-sized posidrive screwdriver.
4. Take out mass memory carriage.



Picture 12 : Removing the mass memory carriage (6 slot)



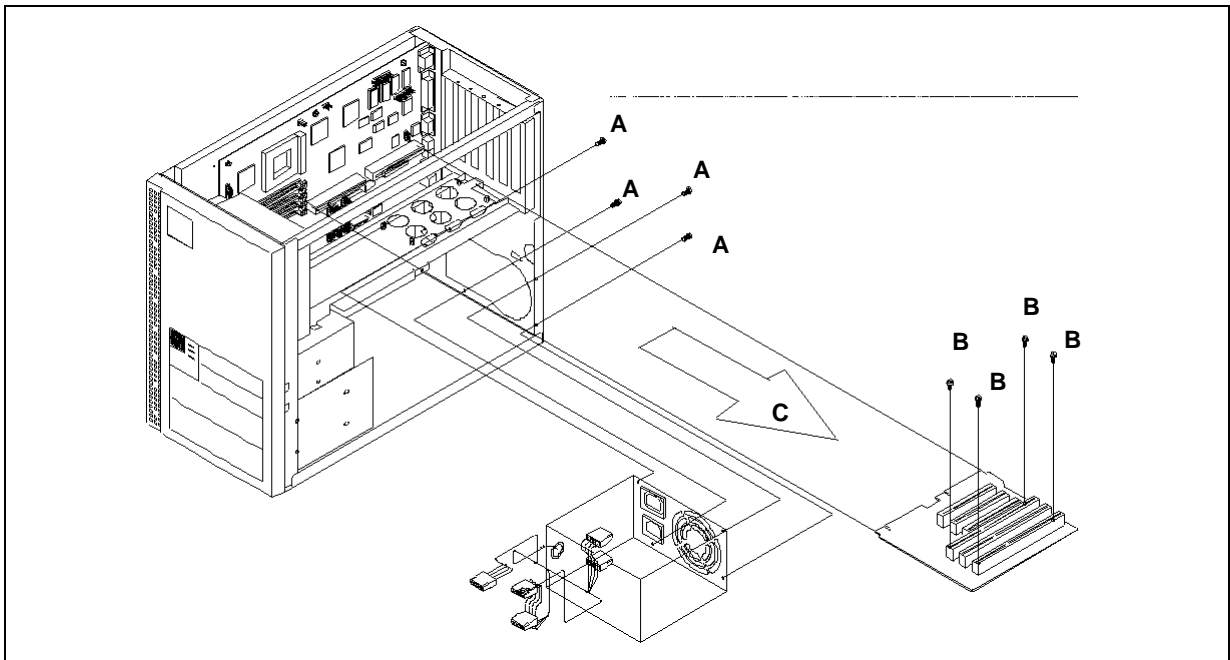
## Removing the power supply and backplane board

### Power supply

1. Disconnect the wiring loom from the motherboard .
2. Undo the four screws (A) which hold the power supply into the chassis.
3. Take out the power supply.

### Backplane

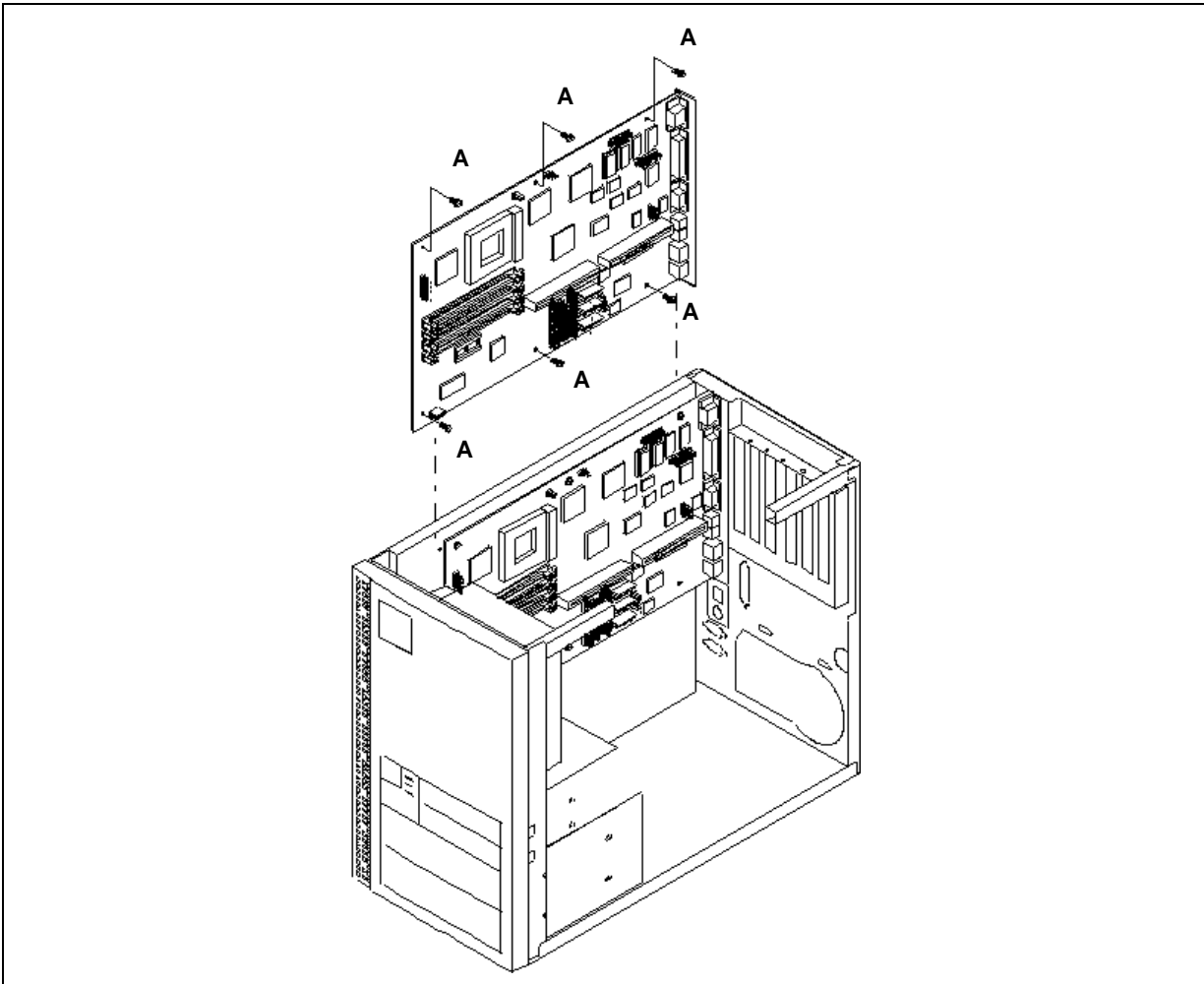
1. Undo the four screws (B) which hold the backplane into the chassis.
2. Pull the backplane out (C)



Picture 13 : Removing the power supply (6 slot) and backplane board

## Replacing the motherboard

1. Remove any adapter card(s).
2. Remove the disk tray.
3. Disconnect the fan and power supply , and remove the data cables from the motherboard.
4. Disconnect the LED cable , noting its position.
5. Remove the backplane.
6. Undo the screw which secures the motherboard into the chassis, slide it towards yourself to free it from the hooks, and lift the motherboard out of the chassis.

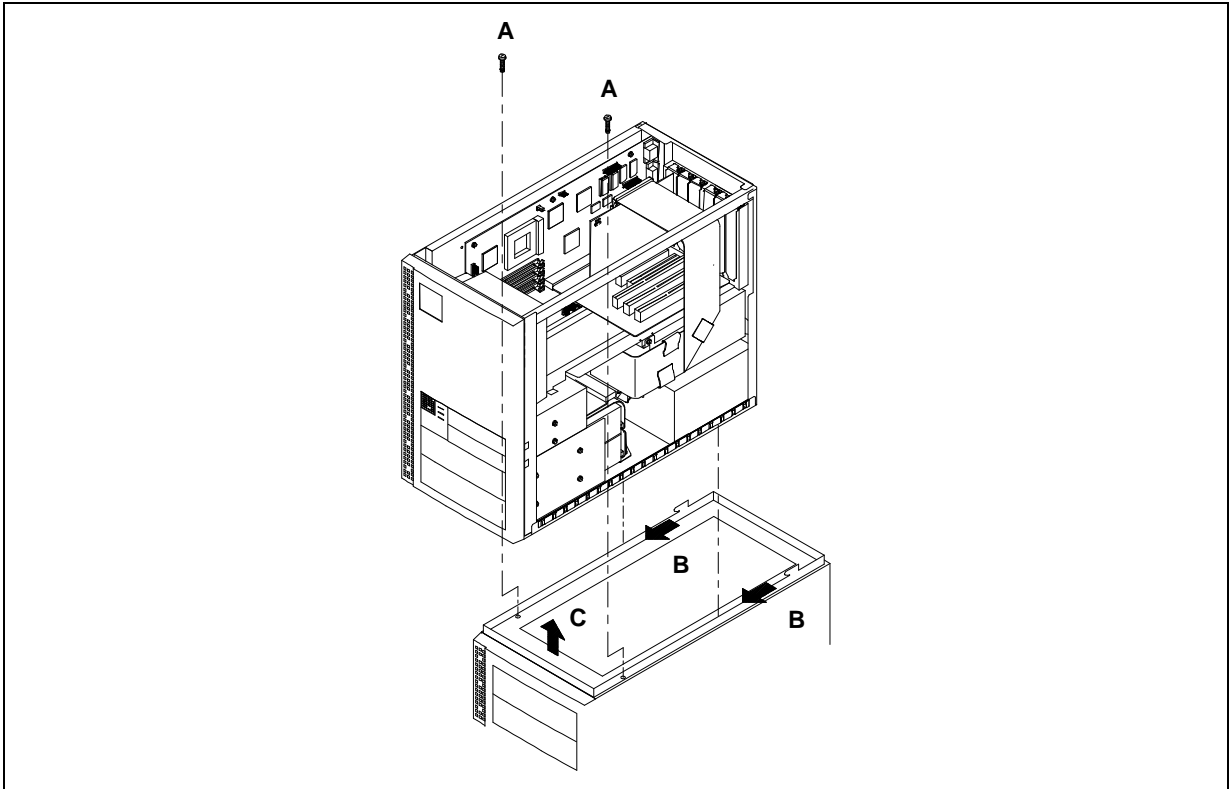


Picture 14 : Removing the motherboard (6 slots)

## Mass memory expansion unit

### Differing the main unit from the expansion box

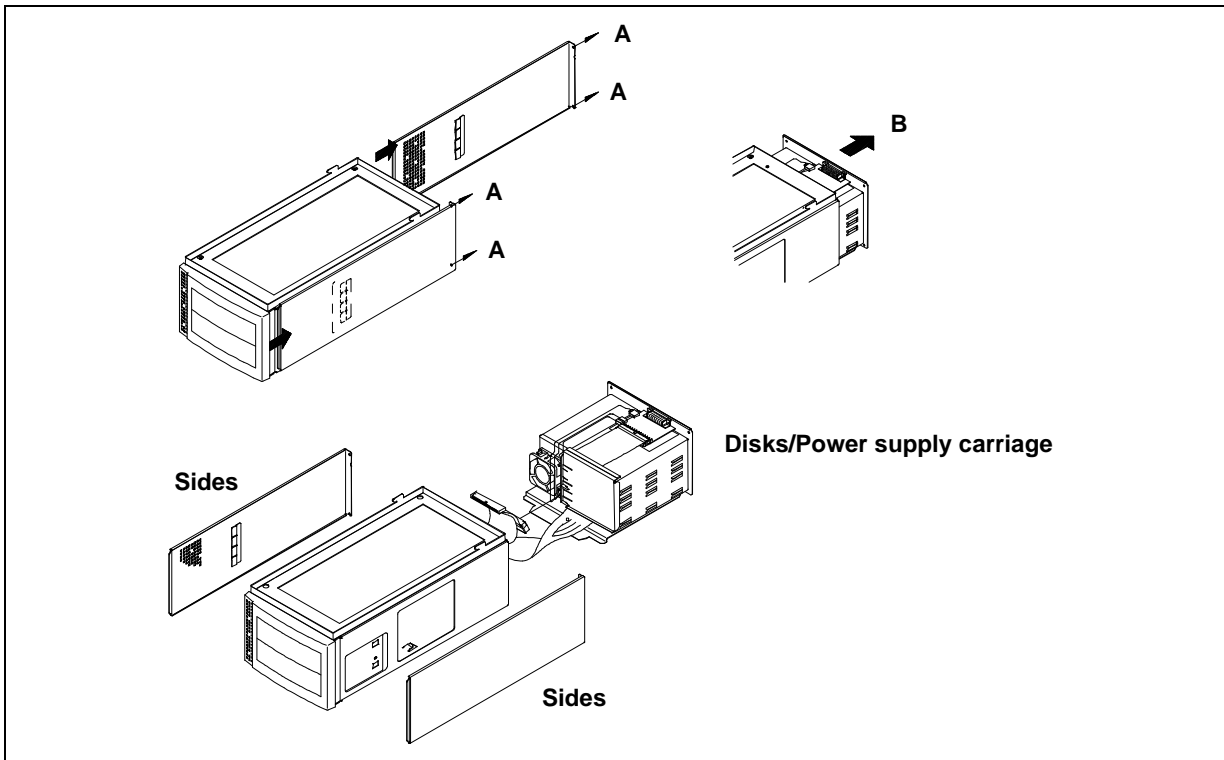
1. Disconnect the power cables and all the other cables connected to the unit.
2. Remove the main unit cover (see page 8)
3. Undo the screw (A) which secures the expansion unit into the chassis of the main unit.
4. Slide the main unit about 40mm(B) toward the front, and lift (C) it slowly straight up as in the picture.



Picture 15 : Differing the main unit from the expansion box

### Removing the disk/power carriage from the expansion unit

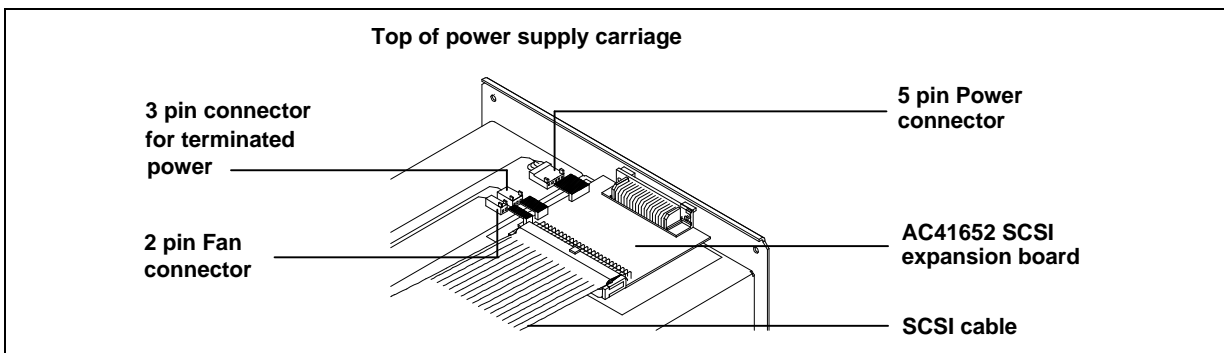
1. Undo the 4 screws (A) which secures the sides and the carriage into the chassis of the expansion unit.
2. Slide the sides toward the back to remove them (B)
3. Pull out the carriage from the back of the unit.



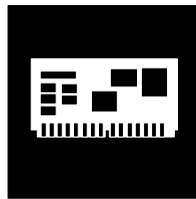
Picture 16: Removing the Disk/Power carriage

### Expansion unit cables

1. Undo the 4 screw (A) which secures the sides and the carriage into the chassis of the expansion unit.
2. Slide the sides toward the back to remove them (B)
3. Pull out the carriage from the back of the unit.



Picture 17 : Expansion unit cables

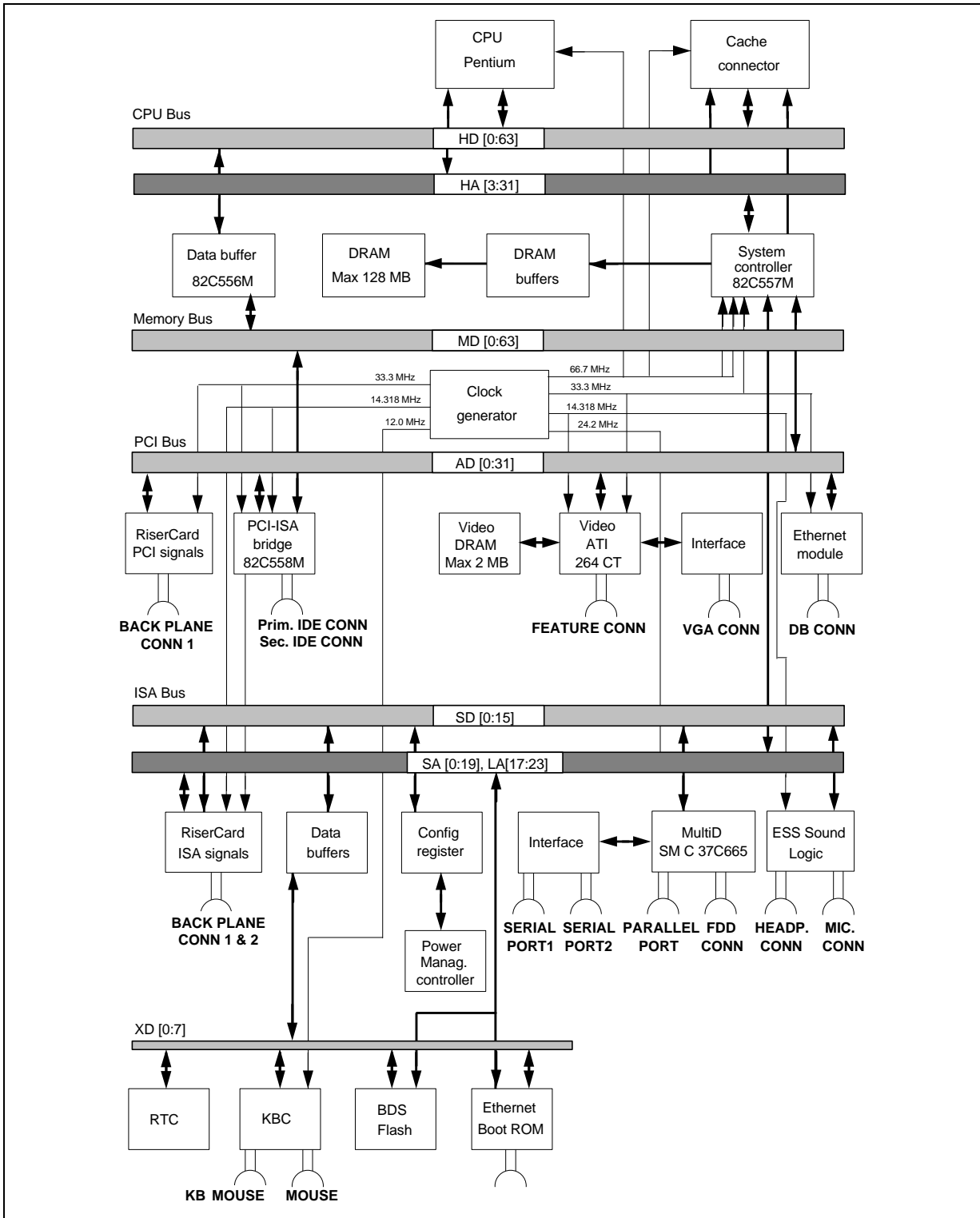


# Section 2 :

## Boards and Jumper settings

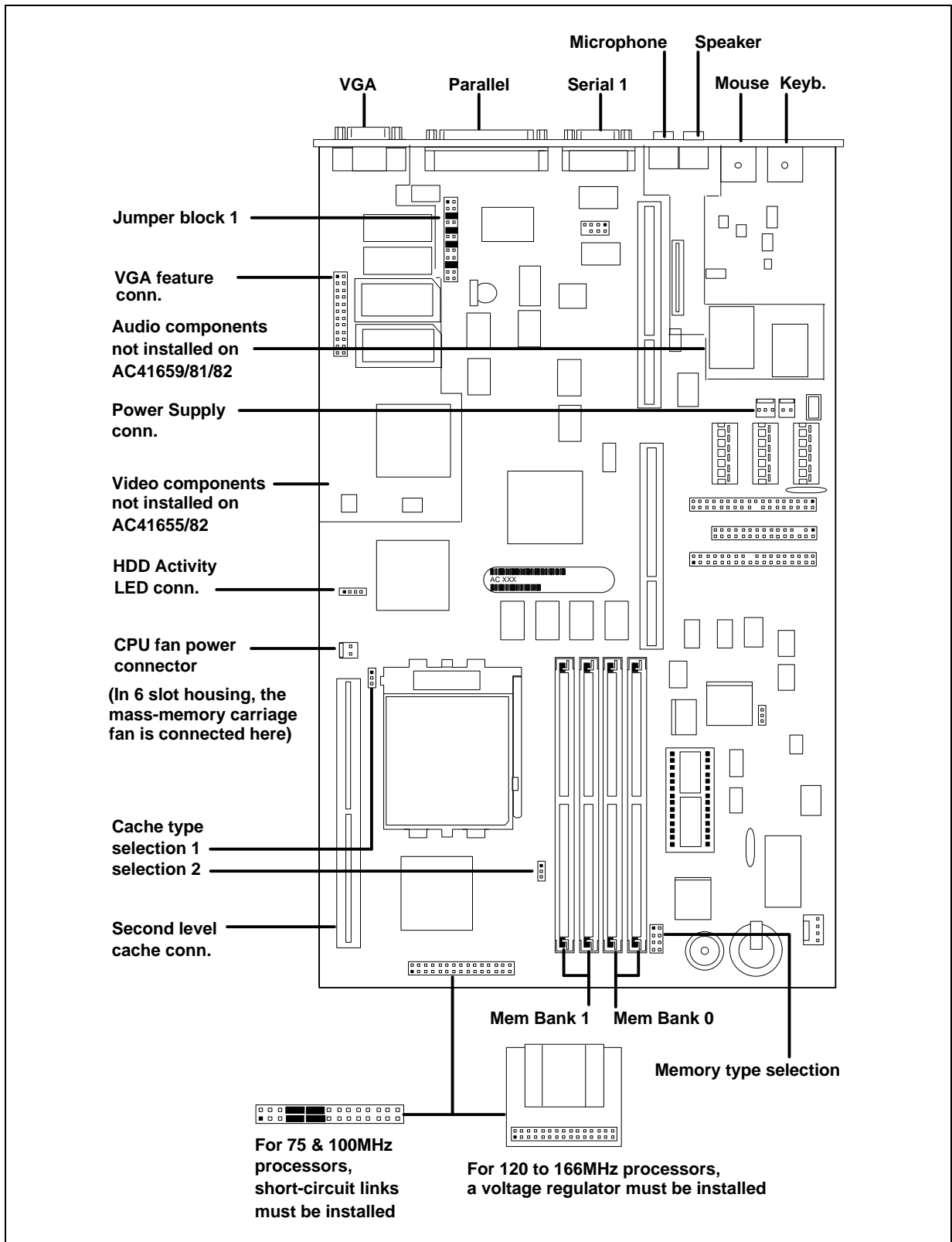
# System board AC41655/58/59/81/82/87/89

## Block diagram

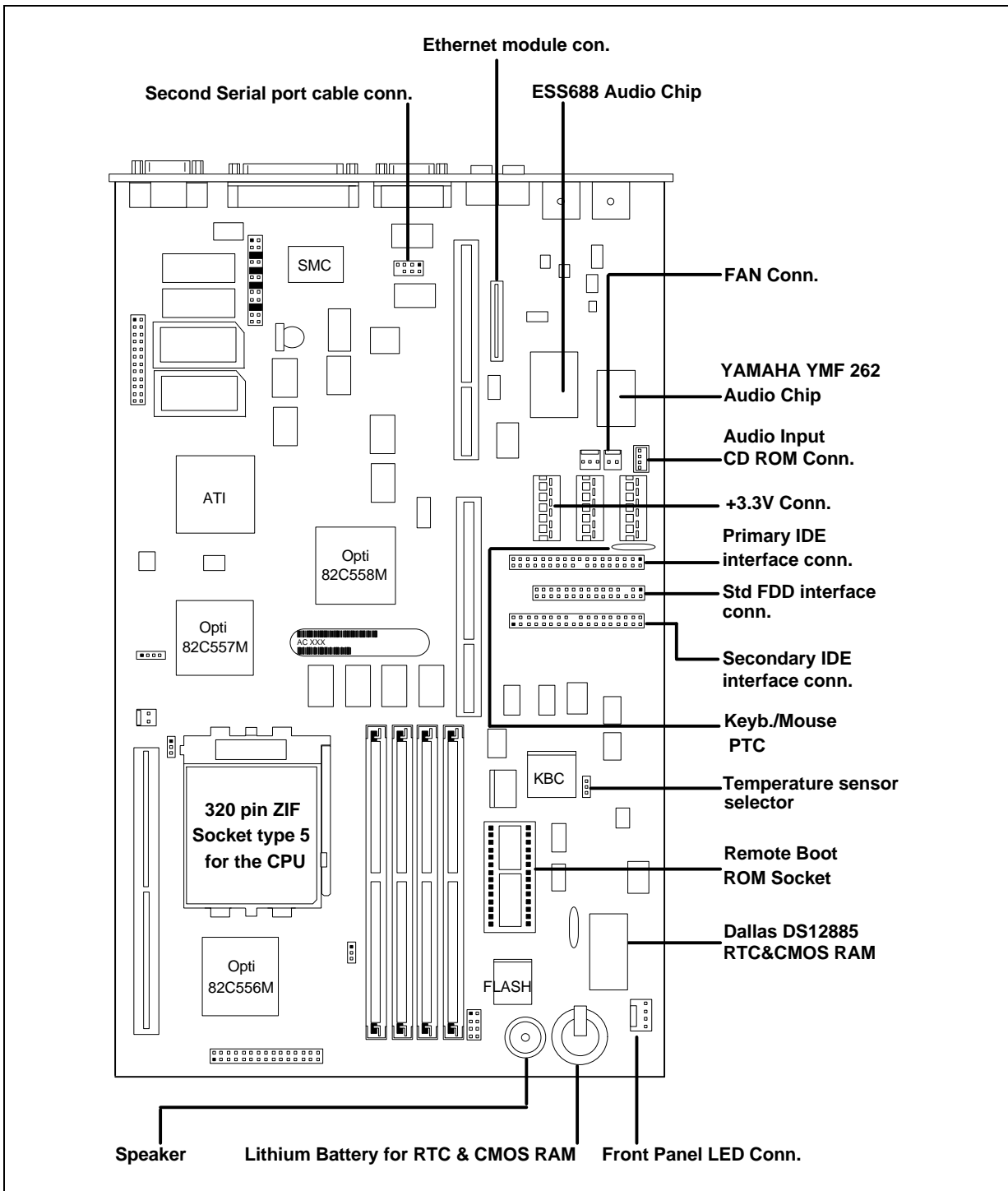


Picture 18 : Block diagram AC41655/58/59/81/82/87/89

System board layout



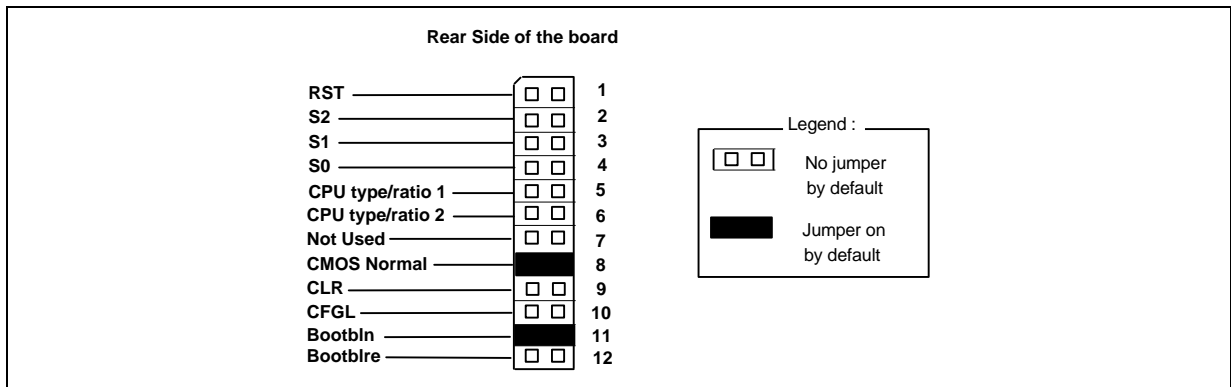
Picture 19 : AC41655/58/59/81/82/87/89 System Board Layout (1)



Picture 20 : AC41655/58/59/81/82/87/89 System Board Layout (2)



**System board jumpers (AC41655/58/59/81/82/87/89)**



Picture 21 : Jumper block 1 for AC41655/58/59/81/82) System board

**RST:** Short-circuit pins for a second to generate a **HARD RESET** (Cold boot).

**S2, S1, S0 & CPU Type/ratio:** Speed & processor selection (see below)

Processor speed	75 MHz (50*1.5)	100MHz (66.7*1.5)	120MHz (60*2)	133MHz (66.7*2)	150MHz (60*2.5)	166MHz (66.7*2.5)
<b>S2</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>S1</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>S0</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>CPU type/ratio 1</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>CPU type/ratio 2</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**CLR:** To clear the CMOS, switch off the power, take out the jumper from **CMOS normal** pins and install it in this position; keep it there for few seconds, then put it back to CMOS normal position.

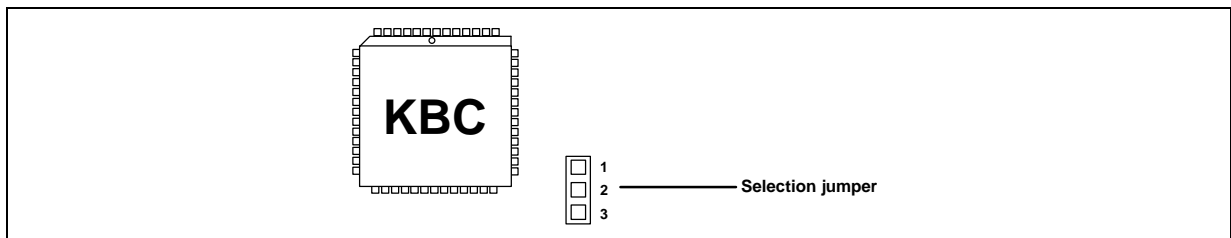
**CFGL:** When the jumper is installed, the system lock is enabled, and all the setup menus under ADMIN menu of the RSU (Setup) are write protected.

**BOOTBLN:** Supplies +5V to the FLASHRAM. The jumper must be installed for normal operation of the FLASHRAM.

**BOOTBLRE:** If the loader (boot block) of the FLASHRAM BIOS needs to be updated, boot up the system, then remove the **BOOTBLN** jumper, and install the jumper in this position and use FLASH.EXE file or the BIOS reload function of the resident setup utility to update the BIOS. Put the jumper back in the BOOTBLN position before switching off the system.

**Temperature sensor selection**

This jumper selects the temperature sensor for fan speed regulation circuit. There are 2 sensors on these boards, one close to CPU Socket and one close to PSU Connectors.

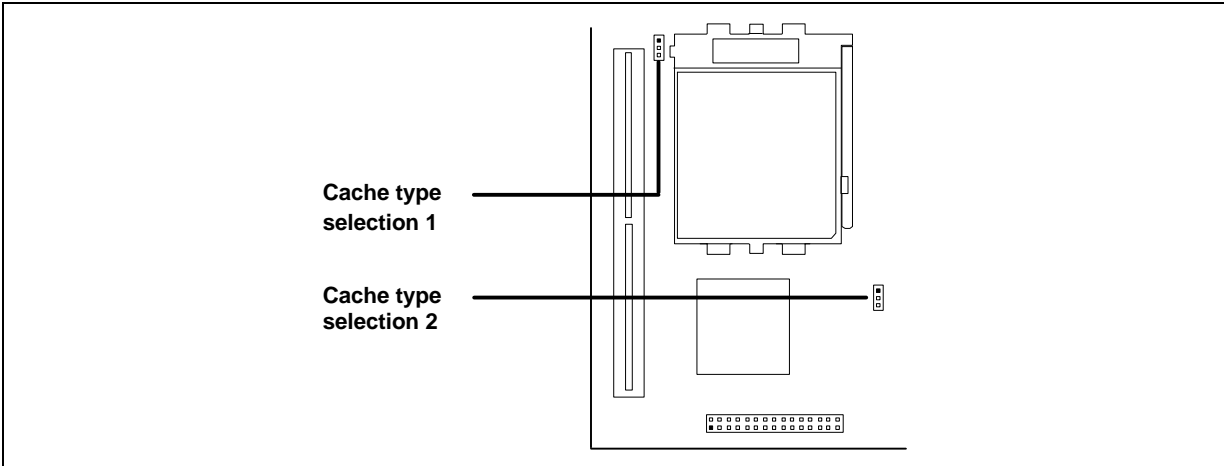


Picture 22: Temperature Sensor Selection jumper (AC41655/58/59/81/82/87/89)





For model :	Jumper must be installed on pins :
251	1-2
450/451	2-3
651	2-3

### Cache type selection jumpers

The integrated cache controller (OPTI 82C557M) supports 0/256/512kB Asynchronous and Pipeline Burst Synchronous implementations using a direct-mapped write-back scheme. It supports read and write bursting 3-2-2-2 bursts for Asynchronous and 3-1-1-1 burst for synchronous SRAM's.

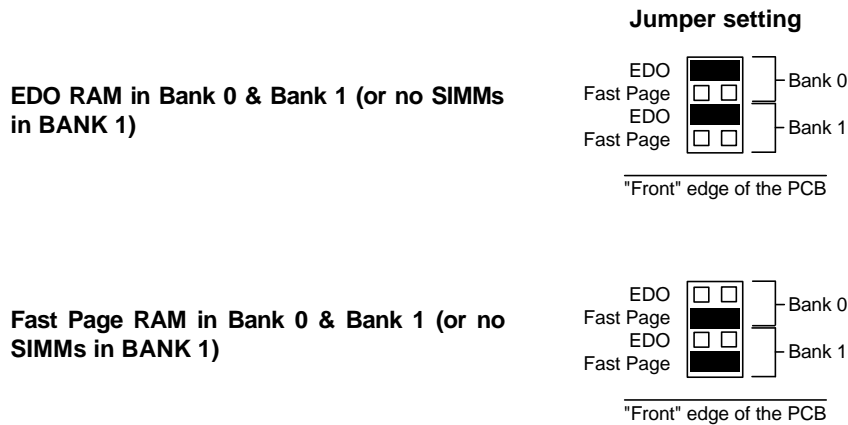


Picture 23: Cache selection jumpers location

	Synchronous Cache Module installed	Asynchronous Cache Module installed/ No Cache
<b>Jumper Cache Type 1</b>		
<b>Jumper Cache Type 2</b> (This jumper may not be available on all the boards)		

### Memory type selection jumper

The 64-bit memory subsystem supports two types of 32-bit SIMM modules, EDO mode DRAM and Fast Page mode DRAM (standard DRAM). These types of RAM can be used at the same time, but not in the same memory bank. EDO DRAM can be used in BANK 0 and Fast Page DRAM in BANK 1 or vice versa, but not mixed in the same bank. To full fill the 64-bit data bus width, SIMM modules must be installed in pairs. Jumpers for memory type must be always set according to the installed SIMM type.



## Force FLASH load

The following procedures should be used if the FLASHRAM BIOS has been lost or incorrectly updated.

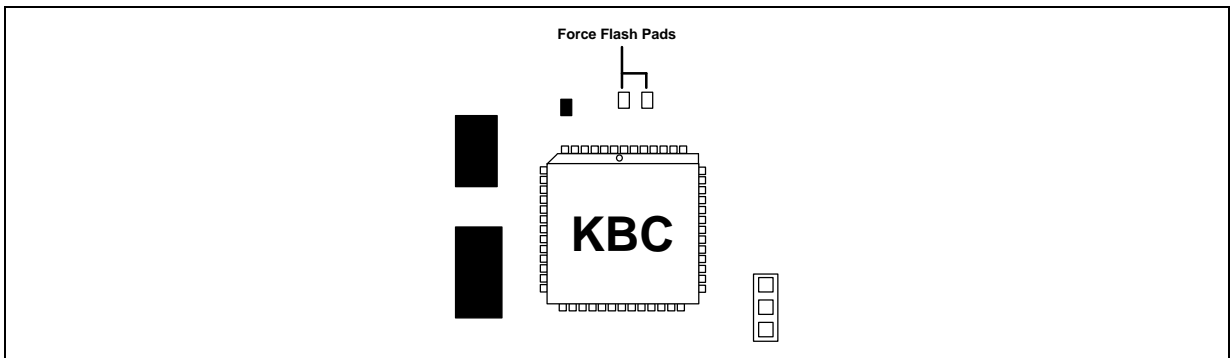
Before using the procedures in this section, take some time to make sure that you have the correct LDB file for your system. You must have an LDB which is supported by the boot block loader version on your system.

**Note:** You must never rename any of the LDB files. The file names contain machine and BIOS version information. Any changes could make the file or the PC unusable.

### Load procedure

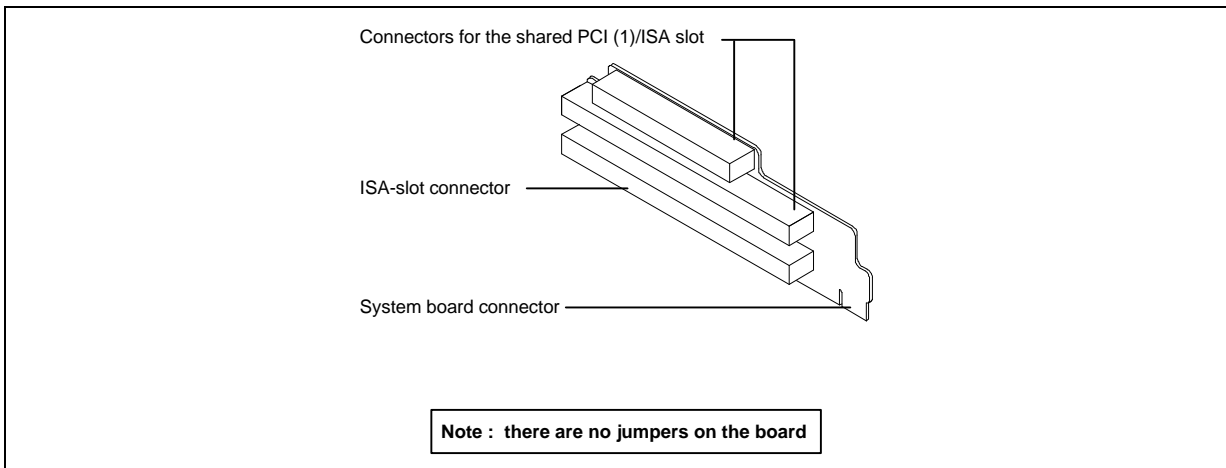
- Copy the correct BIOS LDB file to the root directory of a pre-formatted blank floppy. The file will be named BXX\_YYY.LDB, where XX is the machine ID, and YYY will change depending on the BIOS version.
- Locate the BOOTBLRE and BOOTBLN pin pairs from the jumper block 1. Refer to the System board jumpers section for the exact position.
- With the power off, take the link from BOOTBLN position and place it over the BOOTBLRE pin pair.
- With the power off, short-circuit the "force flash load" solder pads. To locate the pads, see the following picture.
- Switch on the power and wait for the continuous short beep signal (• • •...). Do **not** power off the PC. If you do not hear this signal, you have not shorted the solder pads correctly; you must turn off the power and try again, or the boot block loader will not work correctly.
- With the power on, remove the short from the solder pads. The beep signal to insert the LDB floppy will start (• • • — •). This signal will repeat until the floppy with the correct LDB-file is inserted.
- Insert the LDB floppy into drive A:
- The system will perform the automatic BIOS upgrade procedure, and after couple of minutes the PC boots up.
- With the power on, remove the link from the BOOTBLRE pin pair and put the link on the BOOTBLN pin pair.

### Force flash load pads



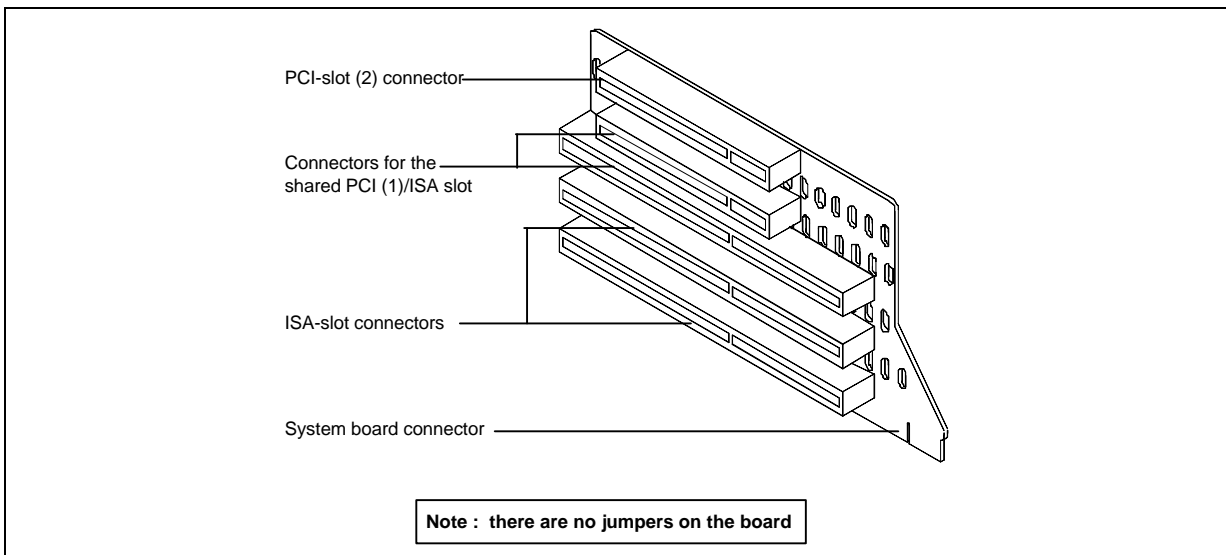
Picture 24: Force flash load pads

## 2-slot PCI/ISA back plane AC41639



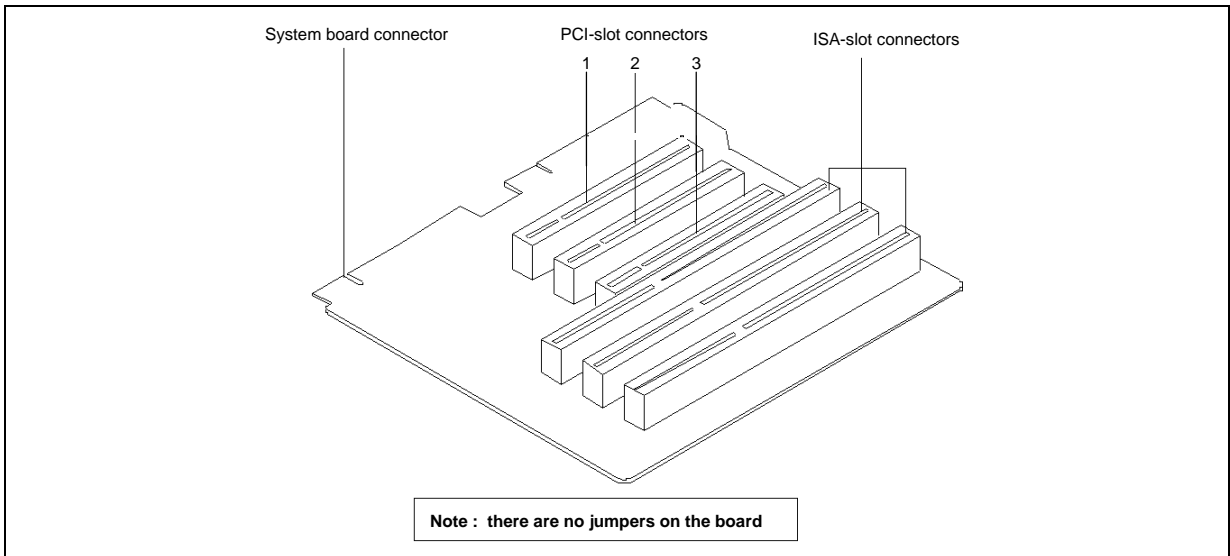
Picture 25: 2 slots PCI/ISA back plane AC41639

## 4-slot PCI/ISA back plane AC41638



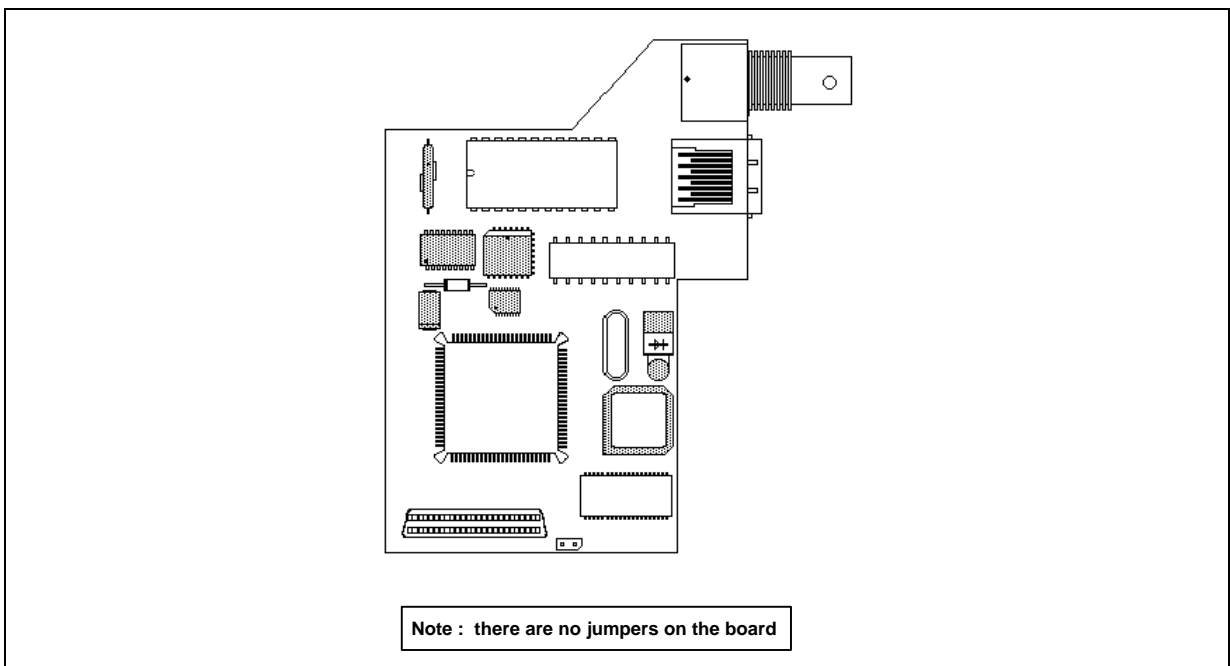
Picture 26 : 4-slot PCI/ISA back plane AC41638

### 6-slot PCI/ISA back plane AC41637



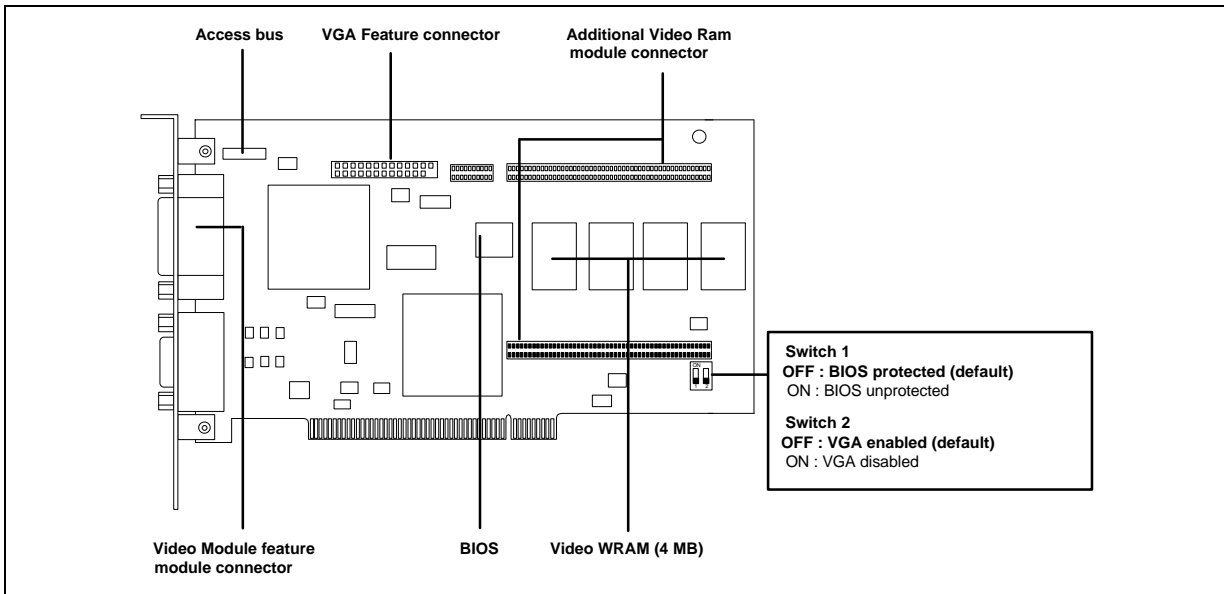
Picture 27 : 6-slot PCI/ISA back plane AC41637

### Ethernet module AC41635



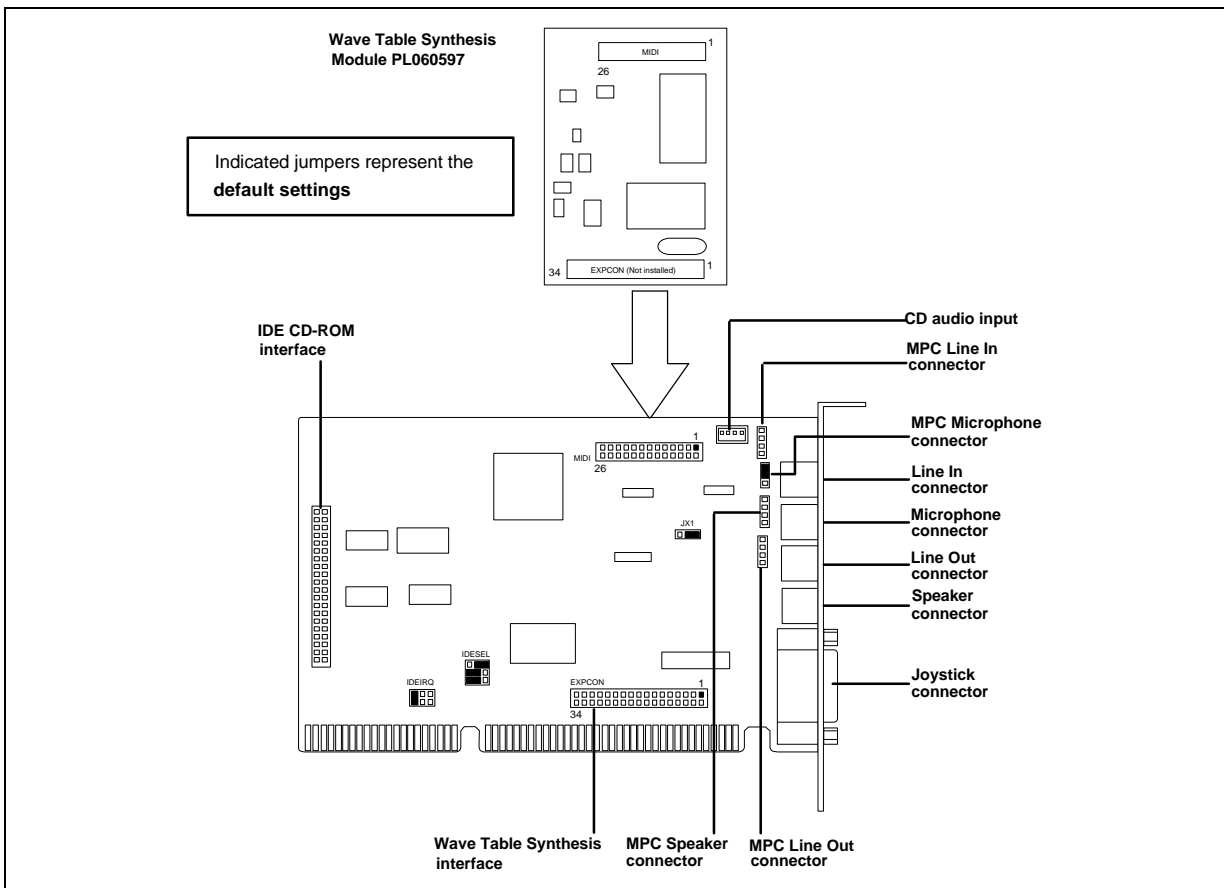
Picture 28 : Ethernet module

## Matrox Millennium AF31542 Graphic adapter

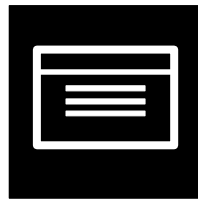


Picture 28 : Matrox Millenium Graphic adapter

## Aztech AF30064 Sound board



Picture 29 : Aztech Sound board



# **Section 3 :**

## **System Setup**

## Entering Setup



Close all open files and leave your application program before entering Setup. You cannot exit back into an application. The system automatically reboots when you leave Setup.

To enter SETUP, do as follows:

1. Turn on the power to the system, or if the system is already on, press CTRL+ALT+DEL.
2. As the system starts, the message Press <Ins> for Set-up Mode appears at the bottom of the screen. Immediately press and hold down either the zero (Ins) or Insert key.

## Entering SETUP with passwords

There are two passwords, the User password and the System password, that control which menus you are allowed to modify. The User password is explained in detail in the User-Security menu, and the System password in the Admin-Security menu.

The effect of the passwords is outlined below.

- Only a User password is set. The User password is required to start your system. When trying to enter SETUP, you are prompted for the User password. If you enter the correct password, you can modify parameters and view all menus in SETUP. However, if you press ENTER at the password prompt, you can modify the parameters only in the Admin (Administrator) menu and view the Info and Help menus.
- Only a System password is set. Anyone can start your system, enter SETUP and, if desired, modify parameters in the User menu and view the Info and Help menus. However, the System password is required to modify parameters in the Admin menu.

Both passwords are set

- 1  
To enter your system, type the User password. User-Security menu
- 2  
To enter SETUP, type either the User or System password depending on the menus you want to modify. Typing the User password allows you to modify the parameters in the User menu, and to view the parameters in the Admin, Info and Help menus. Typing the System password allows you to modify the parameters in the Admin menu, and to view the User, Info and Help menus.
- 3  
If you try to enter a menu, e.g. Admin menu, which you do not have access rights to, you are prompted for that password, e.g. in this case the System password.

Failed boot attempts, their time and date of entry are stored in the boot log in the User-Security menu, as is the time and date of the last successful boot.

The security features, passwords and instructions for setting, changing, and removing them are described later in this chapter.

## Moving around in SETUP

There are two levels in the SETUP Utility, the main menu and the sub menu, and two sets of SETUP options, one to be made by the user and the other by the system administrator.



Use the LEFT ARROW and RIGHT ARROW keys to move to and highlight the desired menu, and press the ENTER or DOWN ARROW key to make a selection.

Press ESC to exit each parameter and each level, e.g., to exit a parameter to the main menu level, press ESC three times.

### **Setting parameters to default values**

Some screens have the option Set default parameters in the bottom left-hand corner . If you want to set all the parameters in a screen to their respective factory default values, do the following:

- 1 Move the cursor to Set default parameters.
- 2 Press ENTER.
- 3 An entry window appears prompting you to cancel or confirm your choice.
- 4 Use the UP or DOWN ARROW keys to select Cancel or OK and press ENTER.

## Exiting SETUP

You can exit SETUP from any level of the utility by pressing ESC until this menu appears offering you two choices:

- Quit without updating parameter memory
- Update parameter memory

## Saving changes and exiting

To save new values, select Update parameter memory and exit and press ENTER. The changes are saved in FLASH RAM and CMOS RAM, and the system restarts.

## Exiting without saving changes

If you want to exit SETUP without saving any changed or new values, select Quit without updating parameter memory. The system restarts.

## SETUP screens and parameters

The screens and the parameters of the SETUP Utility are described in detail on the following pages.

Should you need assistance at any time while working in SETUP, press F1 for context-sensitive on-line help. The help information is related to the current option in the menu, but you can view all the other options within the same menu using the PAGE UP and PAGE DOWN keys. To scroll the help text in the display window, use the UP and DOWN ARROW keys.

## User menu

### User-Config menu

#### Set date

The date of the battery-powered system calendar is displayed in the top right-hand corner of the screen. To change the date :

1. Use the UP or DOWN ARROW keys to move to the Set date parameter and press ENTER.
2. Type the new date in the entry window in the ISO date format YY-MM-DD (Year-Month-Day). For example, to set the date to February 27, 1994, type 94-02-27.

The 20th century is assumed for years 80-99, the 21st for 00-79.

You may use any non-numeric character or a space to separate the month, date and year, but the separator is always displayed as a hyphen (-).

3. Press ENTER to save the date, and the calendar is updated immediately.
4. To exit without setting the date, press ESC.

If you enter a date in the incorrect format, a short beep sounds, and the date does not change.

#### Set time

The time on the battery-powered system clock is displayed in the top right corner of the screen. To set the time, e.g., in the case of Daylight Savings Time:

1. Move to the Set time parameter by using the UP and DOWN ARROW keys and press ENTER.
2. Type the correct time in the entry window in the format Hours: Minutes: Seconds. SETUP uses a 24-hour clock, i.e., 6 a.m. is expressed as 6:00, 6 p.m. as 18:00.

You may use any non-numeric character or a space to separate the hours, minutes and seconds, but the separator is always displayed as a colon (:).

If you do not enter a figure for the seconds, 00 will be used.

3. Press ENTER to save the time, and the calendar is updated immediately.
4. To exit without setting the time, press ESC.

If you enter the time in an incorrect format, a short beep sounds, and the time does not change.

### **Start-up NumLock**

This parameter determines whether the numeric keypad is in numeric mode when you start the system. Set the parameter to Enabled or Disabled according to the way your operating system works; some operating systems automatically use the numeric mode when loaded.

## User-Security menu

User security menu can be hidden (excluded) from Admin/module menu (XRSSEC)

### User password

When setting a password , follow the guidelines below :

Passwords may be up to 30 characters long.

Recommended values for passwords are the letters A to Z, and/or numbers 0 to 9.

Passwords should not contain these characters: ESC, F11, F12, PRINT SCREEN, SCROLL LOCK, PAUSE, CAPSLOCK, SHIFT, CTRL, ALT, ALT GR, BACKSPACE, NUM LOCK.

Follow the instructions in the table below to set, change and remove a password.

#### Set a new password

Move the cursor to User password and press ENTER. Type a password in the entry window and press ENTER, then retype it and press ENTER again.

#### Change the current password

Move the cursor to the User password parameter and press ENTER. Type the current password and press ENTER. Then type the new password, press ENTER, retype the new password and press ENTER once more.

#### Remove the password

Follow the steps above for changing your password, but press ENTER instead of typing in a new password. The parameter value changes to None.

If you make a typing error or enter an incorrect password, you have altogether three consecutive attempts to enter the correct password. If all three fail, the system halts for three hours.

After three hours, you are again prompted to enter the password . This time you have two chances.

After entering the correct password, you are prompted to read and clear the boot log (instructions for this are given later in this section). Then you can reboot the system.

### Security level

This feature defines how security measures, e.g. locking of the keyboard and blanking of the display unit screen, are set. There are four options - low, medium, high, and customised - for this parameter, and their effect is determined by the sub parameter settings (pre-defined for all options except Customised) whose individual effects are outlined below.

As you move the cursor to each option, the respective settings of the security sub parameters are displayed in a pop up window to the right of the option.

To configure the sub parameters differently, press ENTER on the option Customised and configure the sub parameters accordingly.

#### Lock key

Specify a key that, when pressed together with CTRL and ALT, immediately locks the keyboard and a PS/2-type mouse until the User password is entered. To define the third key, press ENTER on the

parameter, and press any character or numeric key. To stop using the Lock key combination, repeat the procedure above and press ENTER instead of a new key.

### **Time-out**

Specify a period of time which upon expiration locks your keyboard and PS/2-type mouse if you have enabled Lock KB at time-out and/or Clear screen at time-out/KB lock. To define a Time-out value, press ENTER on the parameter, type in a time period from 2 to 99 minutes and press ENTER.

### **Lock KB at time-out**

Lock your keyboard and PS/2-type mouse when you have used neither for the time specified in the parameter Time-out plus/minus 15 seconds or when you press the Lock key combination. Pressing ENTER on this parameter toggles between Enabled and Disabled. To unlock the keyboard and/or mouse, enter your User password.

### **Clear screen at time-out/KB lock**

Blank the display unit screen once the Time-out value expires. Pressing ENTER on this parameter toggles between Enabled and Disabled. To restore the screen, press any keyboard key or click or move the mouse. If Lock KB at time-out is enabled or the Lock key combination has been pressed, you must enter the User password to return the screen to its normal state.

### **Invalid password lockout time**

Set the amount of time in minutes during which the user is locked out of the system when three consecutive incorrect User passwords are entered. Once the time expires, the user is prompted to enter the correct password; if the correct password is entered, the user is made aware of the invalid entry attempts by a prompt to view Read boot log immediately. Press ENTER on this sub parameter, type a lockout time from 0 to 255 minutes and press ENTER to confirm the value. Typing in a value of 0 disables this parameter.

### **Limit passwordattempts**

Permanently secure the system against incorrect password attempts. If Yes is selected for this sub parameter, the user has three consecutive attempts to enter the correct password. If all three fail, the system halts for the period set in Invalid password lockout time. The user is given two more attempts to enter the correct password; if these two attempts fail, the system locks permanently and you must contact an ICL representative to have your system serviced.

### **Read boot log**

When a User password is defined, press ENTER on this parameter to examine a read-only log of two types of boot attempts:

Successful boot attempts are denoted by Valid in the type column with the date and time of the last successful boot.

Unsuccessful boot attempts are listed as Invalid in the type column with the date and time of each attempt. Up to three consecutive illegal boot attempts may be carried out before your system locks up for a time-out period of three hours.

### **Clear boot log**

Use this parameter to clear all information in the list of failed boot attempts. Press ENTER on the parameter, and confirm your choice by selecting OK or Cancel.

When the boot log is fully occupied with entries, all entries, except the last three, are automatically erased.

### **User-Power menu**

**PowerMASTER**

This menu item can be hidden (excluded) from Admin/module menu (XRSPOWER)

Use this parameter to enable or disable PowerMASTER, the full- featured power management system, which is explained in detail in the ErgoPRO PowerMASTER User's Guide delivered with your system. When this parameter is Enabled, your system is conserving power.

As an alternative to using the **User-Power** menu in SETUP, PowerMASTER can also be controlled and configured using the PowerMASTER graphical user interface in the Windows environment (refer to the ErgoPRO PowerMASTER User's Guide for more information).

**Power save at lock**

This parameter controls whether or not the power save features of PowerMASTER are activated when the Lock key combination, specified in the **User-Security** menu, is pressed. For instructions on defining a Lock key, refer to the section Security level earlier in this chapter.

**Power save key**

When PowerMASTER is Enabled, this parameter allows you to specify a third key that, when pressed simultaneously with CTRL and ALT, sets your system into Power Save mode.

By default, the third key is DOWN ARROW, but you can easily define a different key by pressing ENTER on the parameter and typing the desired key. Recommended values for the third key are SPACE BAR, LEFT ARROW, RIGHT ARROW, or DOWN ARROW. To discontinue using the Power save key, press ENTER twice on this parameter.

Ensure that the key you select for the third key is not the same one that you specified for the Reset key parameter in the User Config menu.

**Hard disk time-out**

This parameter allows you to specify an amount of time after which the hard disk (fixed disk drive) powers down if it has not been accessed during this Hard disk time-out value. Press ENTER on the parameter, and an entry window appears in which you can type in the amount of time in minutes.

Defining a value of 0 (zero) disables this parameter, taking the hard disk drive out of power management control.

**Screen time-out**

Use this parameter to specify the amount of time after which the screen blanks if there has not been any mouse or keyboard activity during this Screen time-out value. Press ENTER on the parameter, and an entry window appears in which you can type in the amount of time in minutes.

This time-out value can be controlled by changing:

this Screen time-out parameter in the User-Power menu,

the Time-out value in the Security level parameter of the User-Security menu and

the Monitor time-out in the PowerMASTER Windows graphical user interface.

Defining a value of 0 (zero) disables this parameter, taking the display out of power management control.

**Admin menu**

The Administrator menus are active when the cursor highlights the word Admin. If a System password is set, only those who have knowledge of this password can modify the parameters in this menu; see Admin-Security menu later in this chapter for more information.

The Admin menu has three to four sub menus, depending upon your system configuration, and their functions in brief are outlined below.

**Config**

Configure the operation of memory devices and communication ports.

**Security**

Set protective measures such as a system password, device boot up order and password length.

**Module**

Enable and disable BIOS modules, move modules within the option ROM area and examine the addresses of your system configuration.

**Misc**

Enable and disable :  
- Internal & External Cache of the CPU  
- PCI Mach64 reloc I/O  
- PCI VGA Palette snooping

**PCI**

Enable and disable IRQs of the PCI devices and to see installed PCI devices.

**Admin-Config menu**

The Admin-Config menu with its default parameter values is shown below.

### **Floppy drive 0, Floppy drive 1**

This parameter describes the type of diskette drive(s) installed in the system unit. In SETUP the first diskette drive (drive A) is defined as Floppy drive 0 and the second (drive B) as Floppy drive 1.

Select the correct value by following these guidelines and press ENTER to save your selection.

In standard configurations diskette drive A is a 3.5-inch, 1.44 MB drive. Thus, the correct value for Floppy drive 0 is 3.5" 1.44 MB.

If your system unit has no second diskette drive (drive B), the correct value for Floppy drive 1 is None.

If you install an optional device such as a tape streamer unit in drive B, use the value None for Floppy drive 1.



**Hard disk 0, Hard disk 1**

This parameter specifies the type of fixed disk drive(s) installed in or connected to your system. Hard disk 0 is the parameter that denotes the first (or only) fixed disk drive of your system, and Hard disk 1 is the parameter that denotes the second, if one exists, fixed disk drive of your system.

The identity lever, located on the front panel of your system, specifies the type of pre-installed fixed disk drive delivered with your system.

To change the type of the fixed disk drive, move the cursor to Hard disk 0 and press ENTER. A window menu lists the available types described below.

**None or non-IDE**

No fixed disk is installed or if an option board BIOS should be used to control the fixed disk.

**Auto IDE/AT**

IDE/AT-type disk is installed. Disk parameters are automatically retrieved. This option must be used with hard disks larger than 528MB.

**User defined IDE/AT**

You want to manually define the parameters for IDE/AT or ST506 fixed disk drive(s). This option can not be used with hard disks larger than 528MB.

If you have both IDE/AT and SCSI fixed disk drives connected to your system, configure the IDE/AT disk drive as Hard disk 0.

**Local bus IDE**

Use this parameter to enable or disable the local bus IDE interface on your system board. When Enabled, the BIOS determines the ANSI mode supported by the attached fixed disks and sets transfer speed according to the highest mode (0 to 4) supported. It is recommended that this parameter value remain Enabled unless you install a SCSI expansion board.

**Parallel port**

This parameter controls the functionality of the parallel port on the system board. Press ENTER on the parameter and a sub menu, similar to the one below, appears:

**Base I/O address**

Set the base address for the parallel port. Auto, the recommended value for this sub parameter, allows the system to check the port determination scheme upon power-on. Selecting Disabled deactivates the parallel port on the system board, while selecting 378H or 278H configures the parallel port to the respective addresses.

**Interrupt level**

Set the Interrupt level for the parallel port. Auto, the recommended value for this sub parameter, allows the Interrupt level value to correspond with the levels selected for the Base I/O address and other channels. If 378H is selected for the Base I/O address, the Interrupt level will be set to IRQ 7 and if 278H is selected for the Base I/O address, the Interrupt level will be set to IRQ 5.

**DMA channel**

Set the DMA channel for the parallel port. By default, the DMA channel is set to Disabled. Select Disabled only if you select ECP for the next parameter, Mode.

#### **Mode**

Determine the way in which the parallel port is to be used. The available values are: SPP (Standard Parallel Port, which is used by AT- and PS/2-compatible peripherals), EPP (Enhanced Parallel Port, which is used by peripherals supporting EPP), ECP (Extended Capabilities Port, which is used by peripherals supporting ECP)

#### **Serial port 1 and serial port 2**

This parameter controls the address of the serial ports on the system board. Press ENTER on either parameter to view an entry window with the following available selections.

#### **Auto**

A port determination scheme is used; the system checks at power-on if any additional expansion boards with serial ports are connected. If one additional port is connected, the system board Serial port 1 is configured for 0378H or 0278H, whichever address is not in use, and the system board Serial port 2 is disabled. If two additional ports are connected, the system board serial ports are automatically disabled.

**3F8H:IRQ4 (COM1)**

Sets the base address and interrupt level to this value.

**2F8H:IRQ3 (COM2)**

Sets the base address and interrupt level to this value.

**Disabled**

Disables either one or both ports, depending on the number of available ports.

**Shadow option ROMs**

This parameter, when enabled, copies the ROM (Read-Only Memory) of expansion boards to the RAM memory between C0000H and DFFFFH on the system board, thereby speeding up performance considerably.

Some ROMs, such as the system board ROMs (system BIOS and VGA BIOS) are always shadowed, other expansion board ROMs cannot be shadowed, and others you can choose to shadow using this parameter.

To enable shadowing:

1. Press ENTER on the Shadow Option ROMs parameter to toggle between Enabled and Disabled.
2. An entry window appears listing information on installed optional ROMs, shadowing, and the size and location of the starting address of each shadowed ROM.
3. The Shadowable column indicates if a ROM is:
  - automatically shadowed (Yes)
  - never shadowed (No)
  - shadowed at your option (-)

**Keyboard**

This parameter controls whether or not messages about keyboard errors are displayed during the power-on self-test. Pressing ENTER toggles between the values Installed and Not installed.

If you use the system unit without a keyboard, for example, as a server, set this parameter to Not installed. Otherwise, keep the default value Installed.

If you have set the parameter to Not installed, you can still connect a keyboard to the system unit, for example, when you need to view or change SETUP parameters.

**Configuration port**

This parameter controls the configuration of the I/O address range (2) which is occupied by the system registers. The default value of 120H should only be changed if the same address is needed by an expansion board. In this case, press ENTER on the parameter, choose one of the available values, 120H, 130H or 140H, and press ENTER to accept the value.

**BIOS reload**

Use this parameter when you want to initiate a BIOS reload. The BIOS of your system is placed in a write enabled, non-volatile memory called FLASH RAM, and an update is supplied on a 3.5-inch, 720 kB/1.44 MB diskette.

The file name for the BIOS load file is BXX\_VVV.LDB where XX is BIOS ID and VVV is the revision identifier. Two reload options are available and are explained in the table below.

**BIOS modules**

Load only the BIOS modules into FLASH RAM.

**BIOS and Loader**

Reload the BIOS and the boot-block portion of the flash memory. This option is reserved primarily for ICL service personnel.

**To load a new BIOS:**

1. Press ENTER on the parameter BIOS reload and select BIOS modules.
2. Insert the diskette with the BIOS load file into drive A.
3. Press ESC and exit SETUP with the option Update parameter memory and exit.
4. Wait for approximately one minute for the BIOS to load. During this time the screen is blank. The system reboots automatically, and the power-on self-test is performed as indicated by a series of beeps which are outlined in the section Power-on test and start-up messages.

If a BIOS is found to be invalid, you are alerted by a special beep sequence (explained below). In this case, you must reload your BIOS as described in the steps above.

The error code beep sequences are:

Beep code	Indicates
••••	Error reading diskette
••••-	Cannot read diskette (or no diskette in the drive)
•••	Cannot find the BIOS file
•••••	FLASH RAM failed
••••-	FLASH RAM erase failed
•••••	FLASH RAM programming failure
••••-	Bad file
•••••	FLASH Boot-block erase failed (BIOS Reload jumper may not be mounted)

### Admin-Security menu

The Admin-Security menu appears as shown below and is followed by an explanation of the parameters.

#### System password

Set a System password when you want to prevent users from altering parameters in the Admin menu and to establish administrator rights. When setting, changing or removing a system password, follow the same guidelines and instructions that were given for the User password in the section **User-Security** menu earlier in this chapter.

As an alternative to setting a System password, you can also control access to the Admin menus by setting the System Lock jumper on the system board. For more information and instructions on setting the lock.

#### User password override

This parameter gives the system administrator the right to remove the User password, if needed; this feature is useful if, for example, the administrator resides over many users in a controlled environment in which access to the users' computers is necessary.

The User password override parameter works in the following manner:

1. The administrator sets User password override to Enabled when a User password is not defined.
2. The user sets a User password on the system.
3. The administrator is able to enter the system by overriding the User password.
4. The user needs to set another User password.

#### Clear user password

This parameter actually performs the clearing of the User password. If the User password override parameter is Enabled, the User password is removed from the protected configuration area of the system's memory when this parameter is Enabled. This parameter has no effect if the User password override parameter is not Enabled.

#### Minimum password length

This parameter allows the administrator to specify a minimum length for the User password. If a minimum length is set, a User password is valid only if it conforms to the limit. The user is not allowed to start the system until a password with the valid length is defined.

To specify the minimum password length, select the parameter, press ENTER, and type the number of characters (0 - 30) that the password length must at least be to be considered a valid password.

### **Boot medium 1, Boot medium 2, Boot medium 3**

The boot medium parameters help you to protect your system by specifying the boot medium order for system boot up.

The system boots first from whatever medium is set as Boot medium 1, then 2, and finally 3. By customising the boot up order you can, for instance, rule out a medium you consider unsafe. The available values for boot media and their effect on boot up order are:

#### **None**

If you specify None for all parameters, the system will not boot. However, should you only want to specify one or two boot parameter(s), set the one(s) you are not using to None.

#### **Floppy**

System boots from the diskette (floppy) according to the medium you designated it to.

#### **Hard disk**

System boots from the fixed disk according to the medium value you give it.

#### **Network**

System boots from the network protocol. The alternatives available are: Novell RPL (Novell)RPL/BOOTP (LAN Manager and UNIX dialects)IEEE 802.1 (UNIX dialects) and Other (to be used when the boot procedure is handled by an expansion board with an ICL BIOS.

#### **Compatible**

Specifies the following default order for boot up: first from a diskette, then from the fixed disk, and lastly over the network. This value can be only selected for Boot medium 1 ; if selected, the other boot medium parameters are set to None automatically.

**NOTE:** If using an expansion board that does not have an ICL BIOS, select Compatible for Boot medium 1.

### **Floppy controller**

This parameter controls the operation of the onboard diskette drive controller. The available values and their usage are described below.

#### **Disabled**

You do not use the onboard controller. If this is the case and no other diskette drive controller is installed, set the values for Floppy drive 0 and Floppy drive 1 in the **Admin-Config** menu to None.

### **Server mode**

Use this parameter if your system unit is functioning as a server or working as a multi-user computer. Press ENTER on the parameter to toggle between the values Enabled and Disabled; their effects are explained below. This function is available only in DOS environment (special driver needed).

**Enabled**

The system boots, but it does not prompt for a password. Instead, the keyboard and mouse lock. In this state, users cannot access the system with the keyboard or mouse until the User password is given. In case of a PC unit with Instant on function, system also boots up after power break down.

**Disabled**

The system prompts for the User password at boot up. In case of a PC unit with Instant on function, system does not boot up after power break down.

Use of this parameter requires the installation of a unique device driver in order for the parameter to function as explained above. Contact your ICL service representative for more information.

**Anti-theft system**

Use this parameter to activate the Theft Prevention system. If the power to the computer is disrupted, then the System password is requested before the User password in order to start the computer. Options are:

**Enabled****Disabled****User password unlocks**

Use this parameter to unlock the activated Theft Prevention system with the User password instead of the System password. Options are:

**Enabled****Disabled**

## Admin-Module menu

The Admin-Module menu references the interfaces between your system hardware and application software and appears as shown below, followed by an explanation of its parameters.

### Select module

This parameter allows you to enable or disable and to alter the destination address for system modules. By moving these modules within the option ROM memory area (C0000h through EFFFFh), you can avoid address collisions or optimise the usage of this memory area.

When pressing ENTER on this parameter, a listing of all modules is displayed. For each module stored in FLASH RAM, the following is listed:

Module name in abbreviated form (for example, RPLODI stands for Remote Program Load)

Date the module was created

Category - whether it is an optional menu in SETUP, a system BIOS, storage, video, or LAN module

Module number that specifies device unique information, for example LAN ID

Choice of initiating the module early or late during the power-on self-test (POST)

Whether or not the module is discarded before start-up

Whether the module is write enabled at some point in time

The size of the module in 16-byte units

Choice of flagging the module in order to prevent it from being loaded at all. This is especially useful if you do not use the module's associated hardware.

Most of the information in this menu is read-only. You can, in this menu, only disable/enable modules and alter module destination addresses.

### Load segment

Instead of using jumpers to control the segment address of modules, you can easily configure the segment address to which the module is loaded before POST using this parameter. When you press ENTER on this parameter, you are greeted with an entry window in which you may enter the load segment.

### Exclude module

This parameter determines whether or not the optional module is loaded. Pressing ENTER toggles between the values Yes (the module is never loaded) and No (the module is loaded, unless the system BIOS specifies otherwise).

## Info menu

The Info menu has no sub menus, and the parameters cannot be modified; this menu serves mainly as a source of general information on your system.

When you make changes to your system, the parameters are updated automatically and immediately, but the changes are displayed only after you boot the computer

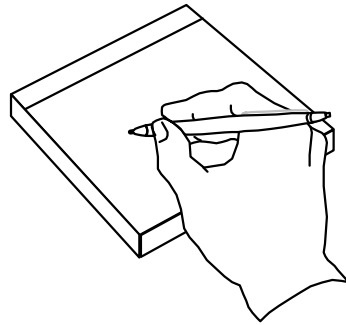
## Help menu

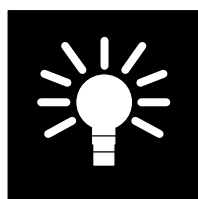


The Help menu contains a text file of information. Much of this information reflects what is written in this manual and in the context- sensitive help that you can receive at all times by pressing F1.

Press ENTER to access the help information and use PAGE UP and PAGE DOWN keys to scroll the information page by page.

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# **Section 4 :**

## **Miscellaneous and Hints**

## BIOS

The system BIOS is always shadowed. The system and video BIOS (if system is provided with on-board video controller) are stored in a Flash RAM, thus the BIOS is field upgradable with a floppy.

At boot-up a short copyright message is displayed indicating the BIOS version and unit ID (machine identifier).

```
ROM BIOS #53 Version Y.YY
(c) Copyright International Computers Limited 1993
```

The IDs are divided as follows:

PC-type	Unit ID
e450/75, e451/651 (AC41659)	54
s450/133n, s650/133 (AC41655), x251/451/651 (AC41658/687, with audio)	53
x451/166s, x651/166s (AC41682), x251/451/651 (AC41681/689, w/o audio)	57

## Shadow option proms

The video BIOS and ROMs on add-on boards can be shadowed, if shadowing is supported by the add-on board.

Shadowing ROMs on option boards gives better performance. Shadowing is done using the SETUP utility. The "Shadow option PROMs" parameter displays (when enable is selected) a list indicating whether the board in question can be shadowed in the following way:

**Yes** XAPI support, will be shadowed  
**No** XAPI support, can not be shadowed  
 - No XAPI support, shadowed at your option

XAPI is short for ICL's proprietary eXtended APplication Interface.

## BIOS modules

In the Resident Setup Utility (RSU), there is a menu called ADMIN/MODULE, which is used to handle the addresses of the BIOS modules, and in some cases to exclude the module. When activating the SELECT MODULE menu, the following table is shown.

Name	Date	Category #	POST	Discard	Writable	Size	Segment	Excl.
xrsCf9	1994-11-5	Setup	0	-	Yes	Always	04A0H	0000H No
HRA10I1b	1994-18	Video	0	Early	No	POST	0800H	C000H No
SysOv11	1995-1-20	System	1	Early	No	Never	0400H	E400H No

**Name & date:** Name of the module and date when it has been written or updated.

**Distrib:** Handles the unpacking and shadowing of the BIOS modules. Does not reserve memory.

**xrsCf9:** Includes the User config menu, Does not reserve memory.

**xrsSec:** Includes the User Security menu. Does not reserve memory.

**xrsPower:** Includes the User Power menu. Does not reserve memory.

**Prodtest:** Used for factory testing. Does not reserve memory.

**MACH64CT:** Onboard Video BIOS

**AMDLAN:** Remote boot Bios for Ethernet module

**AMDSCSI:** SCSI Bios for SCSI module

**SysOv11:** Chip set initialisation 1. This module is removed from the memory before loading of the operating system.

- SysOvl2:** Chip set initialisation 2. This module is removed from the memory before loading of the operating system.
- SysOvl3:** Chip set initialisation 3. This module is removed from the memory before loading of the operating system.
- SysData:** SETUP, help- and chipset data
- SysNode:** Plug and play module, contains data structures for the system board devices (which are P&P configurable).
- SysBase:** Main part (56kB) of the system BIOS starting from the segment address F000. This module is always present, but parts of it can be used for memory managers.
- SysStat:** The last 8kBytes of the system BIOS in the F-segment. This module is always present.

**Category:** Defines the type of the module, and the use:

- SETUP:** module is shown as a menu item in the RSU.
- VIDEO** module contains the BIOS for the device mentioned (LAN etc.)
- SYSTEM:** Modules in this category are part of the system BIOS

**#1** The loading order of the modules, if more than one module is used for same purposes. In some cases this is also used to point out the right module, which is selected from any sub-menu (remote boot, for example)

**POST** Defines when the module is loaded and activated

- EARLY:** Module is activated in the beginning of the option BIOS loading, video BIOS is a typical example of EARLY module.
- LATE:** Module is activated at the end of the option BIOS loading, SCSI BIOS is a typical example of LATE module.
- :** Module is not loaded during the POST.

**Discard** Defines if the module is thrown away after use

- YES:** Module stays in the memory
- NO:** Module does not stay in the memory

**Writable** Defines the state when it is possible to write in the memory area reserved by the module.

- Always:** Area is not write protected at all.
- POST:** Write operations are allowed during the POST.
- NEVER:** Area is always write protected.

**Size** Size of the module in bytes.

**Segment** This is the segment address where the module is loaded during the boot.

**Excl** This field informs if the module has been excluded (disabled), in which case the module is not used.

## Drivers

### List of drivers

	Audio	LAN	Video
MS DOS			
DOS lanmanager		ICL	
OS/2 lanmanager		ICL	
WFW3.11	ICL	ICL	ICL
WIN NT 3.5 WS	SB	ICL	ICL
WIN NT 3.1 AS		ICL	ICL
OS/2 2.11			ICL
OS/2 WARP	ICL		
Novell 3.1X & 4.X		ICL	
SCO UNIX 3.4.D V4		ICL	

**ICL** ICL supplies an utility diskette which includes the drivers for the operating system.

**SB** Soundblaster drivers of the operating system can be used

### Video

Video drivers for the following software packages are available:

<b>Matrox Millennium Video Adapter</b>	<b>ICL ErgoGRAFIX Video Adapter</b>
AutoCAD 12 & 13	AutoCAD 10
OS/2 2.1	AutoCAD 11 & 12
OS/2 WARP	OS/2 2.1
Intergraph MicroStation 5.0	Intergraph MicroStation 4.0
MS Windows 3.11	MS Windows 3.1
	MS Windows NT
	MS Word (for DOS) 5.X, 6.0
	Wordperfect (for DOS) 5.X, 6.0

## Utilities

### Video - ErgoGrafix

#### Install.exe

Install.exe program is used to configure the ErgoGRAFIX PCI video adapter with the monitor in use. All the driver installations are also done with the install program.

#### ICL Desktop

ICL Desktop is a Windows application for the ErgoGRAFIX PCI video adapters, and it can be used to set the resolution and number of colours for Windows environment. Before ICL Desktop can be used, Install.exe must be used to set the correct monitor type.

#### Flash.exe

Flash.exe can be used to update the system BIOS through the network or from the floppy drive. The version of the FLASH.EXE must be 2.35 or later.

## PowerMASTER

Power master is available for following operating systems: DOS/Windows and Windows '95

### Power master II ver 2.30

This version of Power master is used in ErgoPro e-series, and can not be used in the x- and s-series. The main reason for this is that this version of Power master does not have support for instant on-functions

### Power master III ver 3.1

This version of POWER master is used in ErgoPro x-, x(s)- and s-series, and can not be used in the e-series. The main reason for this is that e-series does not have support for instant on-functions which are needed with Power master III.

### PMSUSP.SYS (Version 4.00)

Driver makes a copy of the interrupt vectors (part of the instant on function) and must be the first driver loaded in the config.sys file.

```
Device = PMSUSP.SYS
```

### PMSUSPE.EXE

This is the actual Suspend/Resume software module (uses the interrupt vector copied by PMSUSP.SYS).

```
Device = PMSUSP.EXE
```

### APM.SYS (Version 2.0 needed)

APM.SYS is the interface between the operating system (DOS or Windows) and BIOS/Hardware. APM.SYS must be installed if power management functions are to be used with DOS or Windows. To install it, add the following instruction in your Config.sys file:

```
Device = APM.SYS
```

### POWER.EXE

Power.exe is the interface between DOS and APM.SYS. It must be installed if power management functions are to be used with DOS. If Windows is in use, power.exe is not required. Instead of using power.exe, the computer type in the Windows setup must be set to MS-DOS System with APM.

To install it, add the following line in your Config.sys file:

```
Device = Power.EXE
```

## Tips & Hints

### Using memory managers

The system BIOS area (F-segment) and therefore most of the BIOS modules are supposed to be available for Plug and Play functions, any time. Because of that the use of F-segment for memory managers is very limited.

Memory managers can not use 32kB of the F-segment (I=F000-F7FF). Instead of that the limit is somewhere between 2 to 8kB (I=F000-F07F to F000-F1FF)

Note that these instructions are for basic environment and available memory/parameters may vary between BIOS versions.

#### EMM386 Memory manager

To maximise the amount of upper memory available for DOS drivers and programs, following lines are needed in the config.sys.

```
DEVICE = HIMEM.SYS
DEVICE = EMM386.EXE I=C800-EEFF I=F000-F1FF (NOEMS)
DOS = HIGH,UMB
```

This selection gives you 153kB free memory from the upper memory. (158kB - 5kB for EMM386).

#### QEMM Memory manager (ver 7.5)

To maximise the amount of upper memory available for DOS drivers and programs, following line is needed in the config.sys.

```
DEVICE = QEMM386.SYS FRAME=NONE RAM=C800-EEFF RAM=F000-F1FF
```

This selection gives you 154kB free memory from the upper memory. (158kB - 4kB for QEMM).

The optimize-function of the QEMM, place two to three lines at the beginning of the config.sys file, and in case that ICU-driver (Isa Configuration Utility) was installed before optimize function of the QEMM was used, system fails during this operation. Optimize function can be continued, if the ICU driver (DWCFGMG.SYS) is copied to the first line of the config.sys file.

### Using ISA Configuration Utility (ICU)

The driver DWCFGMG.SYS must be loaded before HIMEM.SYS

### Using DOS programs written for Sound Blaster pro

There are no DOS drivers for the on-board audio/Aztech audio board, but programs written for Sound Blaster Pro can be used if following line is in the Autoexec.bat file (check the values from your audio interface):

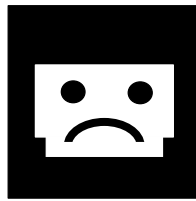
```
SET BLASTER = A220 I5 D1
```

### Hard disk partitioning (DOS 6.X)

Note that the physical size of a 1 byte file will be 1 cluster which may be (depending on the disk used) as little as 2048 Bytes or as great as 32768 Bytes of disk space used.

Partition size	Cluster size (allocation unit)	FAT type
1MB -15MB	4096 Bytes	FAT12
16MB -128MB	2048 Bytes	FAT16
129MB -256MB	4096 Bytes	FAT16
257MB -512MB	8192 Bytes	FAT16
513MB -1GB	16386 Bytes	FAT16
1GB -2GB	32768 Bytes	FAT16
2GB -4GB	The maximum partition size for DOS is 2GB	N/A





# **Section 5 :**

**Power-on self test  
and  
error indications**

## Power On Self Test (POST)

After the power has been turned on, the system performs a power on self-test to check that all parts are working properly.

If the test does not find any faults, you will hear one long beep. When the display unit has warmed up, you will see a message like this:

```
ROM BIOS #40 Version x.xx
Copyright (c) International Computers Limited 1993
640 kB Base memory
3072 kB Extended memory
```

The message indicates the BIOS version (here represented by the x letters), and the total amount of memory installed on the system board (divided into base memory and extended memory).

If the self-test finds any faults it will indicate them in one of the following three ways:

- You will hear two long beeps and see a message on the display unit screen.
- You will hear a sequence of four or eight beeps immediately after you have started the system.
- If you hear five beeps, the BIOS load has been initiated either through SETUP, or by the check done at hard reset.

The following pages describe the steps that you should take if either fault situation should occur.

### Two long beeps and a message

The format these messages take is:

```
BIOS(code): short description
```

If you see a message that does not have this format, it probably comes from an additional board installed in the system unit. For further information, refer to the documentation of the board .

If the keyboard is concerned, the start-up procedure will continue after a while. Otherwise, you will see this message:

```
Press <F1> to continue, <INS> for SETUP.
```

Pressing **F1** allows you to bypass the fault without correcting it. Enter SETUP by pressing the number zero (0) , as the message instructs, and check that the configuration parameters are correct (mainly those on the User-Config screen). Should the message persist, check the following list, and contact service as instructed below.

Error messages 1 to 8 are a summary of what might go wrong during the start-up sequence. They are normally preceded by one or more of the other error messages. Unlike the rest of the error messages, they are not intended to indicate a precise error location.

List of messages :

```
BIOS (1): Keyboard failed
BIOS (2): CMOS failed
BIOS (3): Floppy failed
BIOS (4): Hard disk failed
BIOS (5): Real-time clock test failed
BIOS (6): Memory test failed
BIOS (7): Option PROM failed
```

The initialisation routine of an option PROM has returned an error indication.

```
BIOS (8): General self-test error
```

The system has detected an error during start-up. Possible causes include an incorrect serial or parallel port set-up, or cache problem.

```
BIOS(15): Memory cache failure
```

- BIOS(16): Option PROM address H, bad checksum**  
 The option PROM (additional board programs) at the specified address (memory paragraph) contains a bad checksum and may be defective.
- BIOS(17): Serial port 1 failed**  
**BIOS(18): Serial port 2 failed**  
 The serial port(s) has/have conflicting I/O-addresses. Check the Admin-Config menu in SETUP and change the value of the respective serial port parameter to Disabled or Auto.
- BIOS(19): Parallel port failed**  
 The parallel port on the back plane board probably conflicts with that on an option board. Check the Admin-Config menu SETUP and change the value of the parallel port parameter to Disabled, Auto, 378H, or 278H.
- BIOS(20): Bad checksum in system config area**  
**BIOS(21): Bad checksum in the user config area**  
 There is (or has been) a bad checksum in the parameter memory. This means that the memory contents have been changed, but not by the SETUP Utility. When this fault exists, only the base memory and the diskette drive can be used because the information in the parameter memory is unreliable. Use SETUP to check the parameters. If the error persists, battery-backed-up RAM may be defective.
- BIOS(22): CMOS clock error**  
 The system clock has stopped, or operates at the wrong speed. Use SETUP to correct the speed.
- BIOS(23): Hard disk init failed**  
 A fixed-disk fault has been recorded in the parameter memory, and SETUP has not been used for checking the fixed-disk types since the recording. When an unformatted fixed disk is installed, this message is normal and should be ignored. Use SETUP to correct the fixed-disk type. If the message persists, the fixed disk or the disk controller is defective.
- BIOS(24): Bad memory size in CMOS RAM**  
 The actual memory size clashes with that in the parameter memory. Use SETUP to correct the size.
- BIOS(25): Bad configuration in CMOS RAM**  
 There is (or has been) invalid information in the parameter memory. Check the parameters in SETUP.
- BIOS(26): Bad CMOS RAM checksum**  
 There is (or has been) a bad checksum in the parameter memory. This means that the memory contents have been changed, but not by the SETUP Utility. When this fault exists, only the base memory and the diskette drive can be used because the information in the parameter memory is unreliable. Check the parameters in SETUP. If the error persists, battery-backed-up RAM may be defective, and you should have it replaced.
- BIOS(27): No battery for CMOS clock/RAM**  
 The battery-backed-up RAM system clock/calendar and parameter memory are defective. If the error persists, contact service to have the battery-backed-up RAM changed.
- BIOS(30): Keyboard error, key = scan codeH**  
 The system detected a stuck key during the start-up procedure. This message also appears if you have pressed any key during the start-up procedure, in which case you can ignore it.
- BIOS(31): Keyboard error**  
 While the keyboard was being reset, connection with the controller was disconnected.
- BIOS(32): Keyboard error**  
 During reset, the keyboard did not respond to the reset command.
- BIOS(33): Keyboard error**  
 During reset, the keyboard did not acknowledge the reset command.

- BIOS(34): Keyboard error**  
During reset, the keyboard returned an unknown identity code. Have the keyboard replaced.
- BIOS(35): Keyboard error**  
No response from keyboard after reset command.
- BIOS(40): System board Parity Error. Address = <xxxx xxxx> H.**  
An error at address <xxxx xxxx> H on the system board has been detected.
- BIOS(41): Expansion Memory Parity Error.**  
**Address = <xxxxxxxx> H.**  
An error at address <xxxx xxxx>H on an expansion board has been detected.
- BIOS(50): Floppy error, status = codeH**  
When resetting the diskette controller, BIOS returned an error code. If this message persists, you will need a new diskette drive, disk controller, floppy cable or a processor board.
- BIOS(60): Hard disk controller error, status = codeH**  
The disk controller reset failed. If this message persists, the fixed-disk controller must be replaced.
- BIOS(61): Hard disk controller error, status = codeH**  
Internal diagnostics failed. If this message persists, the fixed-disk controller must be replaced.
- BIOS(62): Hard disk number failure, status = codeH**  
An INIT DRIVE or RECALIBRATE DRIVE command failed. The number indicates the concerned fixed disk (0 = first disk, 1 = second disk). If this message persists, the fixed disk must be replaced.
- BIOS(63): Hard disk number failure, status = codeH**  
An attempt to read a sector on the innermost cylinder failed. The number indicates the concerned fixed disk (0 = first disk, 1 = second disk). This message might be caused by an error in the set-up parameters. Check the parameters in SETUP. If the message persists, the fixed disk must be replaced.
- BIOS(70): Boot load failed. System stopped.**  
An INT18 was issued during the loading of the operating system Either there is a device hardware failure, or the program is not designed for use on an AT-type system unit.
- BIOS(74): Boot failure**    **Unable to boot from medium 1 (x)**  
                          **Unable to boot from medium 2 (x)**  
                          **Unable to boot from medium 3 (x)**  
**System halted.**  
Instead of one or more lines reading Unable to boot from medium x, the following line may be displayed :  
**Boot medium x not specified.**  
In the message, "x" stands for a diskette drive, fixed disk or network. The system boot up failed on account of any of the following reasons:  
A system diskette is not fully inserted in drive A. Check that the diskette is properly inserted.  
If the diskette in drive A: is not a system diskette, replace the diskette with a system diskette.  
The diskette-drive controller may be disabled. If your system has a system-board diskette-drive controller, set the values of the Floppy controller parameter in the Admin-Security screen to Read only or Read/Write.  
If the fixed disk is damaged, have your system unit serviced. If the fixed disk has no operating system, install the operating system.  
The fixed-disk controller may be disabled. Check the value of the Hard disk 0 parameter in the Admin-Config menu to see that it reflects the type of fixed disk installed.  
Your system may have an incorrect boot PROM. If this is the cause of the problem, have your system serviced.  
Your workstation might not be connected to the network. Connect the network cable.  
If the LAN adapter is configured incorrectly, re-configure the adapter.  
If the network is down, contact your system administrator.

If you have not specified a bootup order, set it with the Boot medium parameters in the Admin-Security menu.

Any of the following messages indicates that the initialisation of an auxiliary device (connected to the PS/2- type mouse connector) failed. Turn off the system; replace or remove the device.

- BIOS(80): **Auxiliary error**  
KBD/AUX 5V missing
- BIOS(81): **Auxiliary error**  
Aux clock-line stuck low
- BIOS(82): **Auxiliary error**  
Aux clock-line stuck high
- BIOS(83): **Auxiliary error**  
Aux data-line stuck low
- BIOS(84): **Auxiliary error**  
Aux data-line stuck high
- BIOS(85): **Auxiliary error**  
Data buffer full when not expected
- BIOS(86): **Auxiliary error**  
Aux communication error
- BIOS(88): **Auxiliary error**  
Aux reset did not respond correctly
- BIOS(89): **Auxiliary error**  
Aux interface test failed
- BIOS(95): **CMOS contents restored from flash memory**  
The contents of CMOS were lost and restored from flash RAM
- BIOS(97): **PSU controller initialization failure**  
System BIOS was not able to read the status registers of the PSU controller (COP)
- BIOS(100): **IRQ allocation error, IRQ n**  
Two or more devices are trying to use the same interrupt level "n"
- BIOS(101): **No interrupt line available**  
A Device could not be assigned an interrupt level due to all IRQ being occupied by other devices
- BIOS(102): **Shadow memory allocation error**  
There is not a memory range large enough available to be allocated for an option BIOS
- BIOS(103): **Memory allocation error**  
A memory range large could not be allocated for a device due to conflict with other devices
- BIOS(104): **Port allocation error, address xxxxh**  
Two or more devices are trying to allocate the same I/O port range at starting address xxxxh
- BIOS(105): **Port allocation error**  
A device could not be assigned an I/O port range due to conflict with other devices
- BIOS(106): **DMA allocation error, DMA n**  
Two or more devices are trying to use the same DMA channel "n"

**BIOS(107): No DMA channel available**

A Device could not be assigned an DMA channel due to all DMA channels being occupied by other devices

**BIOS(110): RAM Buffer allocation error**

The PnP BIOS has encountered too many resource conflicts causing an internal RAM buffer to overflow.

**BIOS(120): PnPISA configuration error, CSN n - function disabled**

BIOS has disabled a device as a result of a conflict

## Sequences of four or eight beeps

If you hear a sequence of four or eight beeps immediately after you have started the system, the self-test has detected an equipment failure. Turn all units off, check their connections, and try again. If you hear the sequence again, write it down, and call our local service representative as instructed later in this chapter.

The following list contains the signal sequences. Short beeps are indicated with •, long beeps with -. Message numbers are shown in brackets.

---

### 4 beeps

- (1) There is no refresh of the system DRAM memory.
- (2) The system timer is not working properly, or the CPU oscillator is too slow/fast.
- (3) A memory address problem exists in the first megabyte of the memory on the processor board.
- (4) A memory data fault exists in the first megabyte of the memory on the processor board.
- (5) A memory parity error exists in the first megabyte of the memory on the processor board.
- (8) The checksum of the BIOS ROM is not correct.
- (10) The clock, calendar, and parameter memory circuitry are defective.

---

### 8 beeps

- (9,0) The keyboard controller did not accept the `Keyboard Lock Time-out' command.
- (9,1) `Unlock Keyboard Scan Code' is not accepted.
- (9,2) `Lock Keyboard Scan Code' is not accepted.
- (9,5) Keyboard controller is busy. Cannot execute the self-test.
- (9,6) Keyboard self-test is not accepted.
- (9,7) Keyboard self-test is not accepted.
- (9,8) Keyboard self-test is indicated controller failure.
- (9,9) `Read Input Port' is not accepted.
- (9,10) `Read Input Port' is not answered.
- (9,11) `Write CCB' is not accepted.
- (9,12) `Write CCB/Keyboard Type' is not accepted.
- (9,14) `Hard Reset' is not accepted.
- (9,15) `Lock Keyboard Code' is not accepted.

## Sequences of five beeps

If you hear a sequence of five beeps immediately after you have started the system, or when updating the BIOS, BIOS has detected an FLASH RAM or a LDB-file failure.

The following list contains the signal sequences. Short beeps are indicated with •, long beeps with -. Message numbers are shown in brackets.

- Error reading diskette
- Cannot read diskette (or no diskette in the drive)
- Cannot find the BIOS file
- FLASH RAM failed
- FLASH RAM erase failed
- FLASH RAM programming failure
- Bad file



## BIOS check points

This table shows the checkpoint number (hex) and what BIOS is doing while this checkpoint is displayed :

If the code is not shown on this list, contact ICL Service Provider.

- 01 Disable internal cache
- 02 Disable parity checking. Do early chipset init. Disable DMA-controllers, CMOS and RTC.
- 03 Initialize the 8254 timer, all channels.
- 04 Set up DMA controllers (see chp 1C-22 below)
- 06 Chipset unique code (e.g. DRAM configuration).
- 08 CMOS battery fail detected, CMOS is set to default, XCMOS (PCMOS) is cleared.
- 09 Initialize interrupt controllers.
- 0A Check system memory, 64K-256K
- 10 Reset cause = Normal power on. Check CPU general purpose registers, halt if failure.
- 11 Disable parity checking. Port 61 = FC
- 12 Disable both DMA controllers. Port 08 = 04, Port D0 = 04
- 13 Disable RTC interrupts by clearing bits 7 - 3 of CMOS cell 0B and then reading cell 0C.
- 14 Turn off color video signal. Port 3D8 = 01
- 15 Turn off monochrome video signal. Port 3B8 = 01
- 16 Turn off EGA video signal and selecting color palette zero. Port 3C0 = 0
- 19 Initialize the 8254 timer, all channels. Port 43 = 36, Port 40 = 00, 00
- 1C Reset both DMA controllers. Port 0D = Anything, Port DA = Anything
- 1D Initialize DMA channel 0, both controllers. Port 0B = 40, Port D6 = C0
- 1E Initialize DMA channel 1, both controllers. Port 0B = 41, Port D6 = 41
- 1F Initialize DMA channel 2, both controllers. Port 0B = 42, Port D6 = 42
- 20 Initialize DMA channel 3, both controllers. Port 0B = 43, Port D6 = 43
- 21 Clear DMA page registers 80 to 8F.
- 22 Enable both DMA controllers and clear mask of master controller. Port D0 = 00, Port 08 = 00, Port D4 = 00
- 23 Test refresh by waiting for a 'HIGH' on bit 04 of port 61.
- 24 Test refresh by waiting for a 'LOW' on bit 04 of port 61. Wait for 10000 refresh cycles to DRAM.
- 25 Test first 64k memory address lines by writing 11 at 0000:8000, 10 at 0000:4000 and so on until writing 01 at 0000:0000. These locations are then verified.

### For boot block code only:

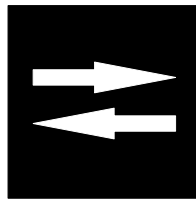
Copy boot PROM to RAM and jump into RAM. Set up interrupt vectors 00-1F. Copy constants to RAM. Test CMOS battery fail bit (if fail, see chp 08).

- 26 Test first 64k memory address lines by writing 11 at 0000:8000, 10 at 0000:4000 and so on until writing 01 at 0000:0000. These locations are then verified.
- 27 Enable parity checking. Port 61 = F0
- 28 Fill lower 64k of RAM with FFFF.
- 29 Compare lower 64k of RAM against FFFF.
- 2A Check for any parity error.
- 2B Fill lower 64k of RAM with 0000.
- 2C Compare lower 64k of RAM against 0000.

- 2D Check for any parity error.
- 2E Disable parity checking. Port 61 = FC
- 2F Clear lower 64k of memory (Note: No test is performed). Restore ResetFlag (write to location 40:72). Set up stack, SS:SP = 0000:0400. Set up interrupt vectors.
- 30 Checksum BIOS from F000:0000 to F000:FFFF.
- 31 Test KB-controller. In case of error, the emitted speaker error code gives detailed description of error cause.
- 32 Enable address line A20.
- 33 Perform a function check of the CMOS cell 0F (Shut-down cause) by writing and reading a 1, 2, 4, 8 ... When the walking one test is finished the contents of cell 0F is set to zero.
- 34 Check CMOS battery bit in cell 0D.
- 35 Write a CMOS default contents into the CMOS memory. This is the CMOS memory contents after battery power has been removed.
- 36 Checksum the CMOS memory. This is done in two parts: One checksum for cells 10 to 2D is located at 2E (msb) and 2F (lsb).
- 37 Check if CMOS memory is OK (Battery OK, Shut-down cell 0F OK and checksum OK). If good, set the BIOS data area 'Equipment byte' and 'Memory size word' from CMOS cells 10 and 15, 16.
- 39 Initialize interrupt controllers (master and slave).Port20 = 11Port 21 = 08, 04, 01, FFPort A0 = 11Port A1 = 70, 02, 01, FFPort 21 = Port 21 AND FB (Slave enabled)
- 3A Enable interrupt vectors.Vector 00 - 1F set to BIOS code/dataVector 20 - 5F set to Default\_IntVector 60 - 66 set to 0000:0000Vector 67 - 6F set to Default\_IntVector 70 - 77 set to BIOS code/dataFrom now on processor interrupts are enabled.
- 3B Enable IRQ 0 (timer). Bit 0 of port 21 is cleared. From now on timer interrupts are running.
- 3C Determine CPU speed by comparing processor clock to timer clock (1.19MHz).
- 3D Test video type in CMOS configuration. If no video then next checkpoint is 41. If color video then next checkpoint is 3F.
- 3E Test memory from B000:0000 to B000:7FFF with data 5555. If memory found then 'Equipment byte' is modified and next checkpoint is 41.
- 3F Check color video memory (B800:0000 to B800:7FFF) with data 5555. If memory found then next checkpoint is 41.
- 40 Test mono video memory with data is 5555. If memory is OK then next checkpoint is 41. No other video memory found. Modify 'Equipment byte'.
- 41 Scan for video adapter PROM from C000:0000 to C800:0000.Initialize video card and clear screen (A lot of video I/O is done here).
- 42 Checksum video boards at C000:0000 to C800:0000 and call it to initialize itself.
- 47 Print power on message on screen.Read keyboard power on status at port 60.
- 48 DS458: Enable/Disable Unix mode according to CMOS.
- 50 DS458: EISA Configuration.
- 51 Clear 640k flag (bit 8) in CMOS cell 33.
- 52 Scan base memory starting at 64k for end of memory. Pattern is 0000 and FFFF.
- 53 Check memory addressability by writing 1000 at 1000:0000, 2000 at 2000:0000 then 4000 at 4000:0000 and so on until end of base memory and then reading back and verifying. If memory is OK then next checkpoint is 55.
- 54 Print error message on screen.
- 55 Check base memory data with patterns FFFF, AAAA, 5555, 0101 and 0000. Each 64k block tested is verified with a message written on screen.
- 56 Compare memory size to what is specified in CMOS memory. Set 640k flag if 640k memory was found.
- 57 Check extension memory. Enter protected mode.
- 59 Scan expansion memory until end is found. Data used is 0000 and FFFF.

- 5A Check memory addressability by writing 0010 at 100000, 0020 at 200000 then 0040 at 400000 and so on until end of memory. The data is then verified in another loop. If all address lines are good then next checkpoint is 5C.
- 5B If extended memory size doesn't correspond to CMOS, print error message on screen.
- 5C Check extended memory data with patterns FFFF, AAAA, 5555, 0101 and 0000. Each 64k block tested is verified with a message written on screen.
- 5D Set size of good extended memory in CMOS cells 30 (lsb) and 31 (msb). Switch back to real mode. (Checkpoints will restart with 00)
- 60 Make E000:0000 to F000:FFFF cacheable. Enable CPU cache. Copy compression header & algorithm to RAM.
- 61 Decompress BIOS.
- 62 Distribute BIOS.
- 80 Reset cause = Memory tested. Restore both 8259's interrupt masks.
- 81 Compare extended memory size against size specified in CMOS cells 17 and 18 and update CMOS if necessary.
- 82 Test the real time clock against the 8254 timer by checking that the UIP (Update In Progress) bit is toggling.
- 83 Initialize and selftest the keyboard.
- 84 Enable keyboard interrupts (IRQ 1).
- 85 If the 'Ins' key is pressed then clear the 'ResetFlag' indicating cold reset and jump to the Resident Set-up Utility. No more checkpoints will be issued. S458: Set up cache. ead KB ID and set numlock if requested in CMOS RAM.
- 86 Search for printer ports attached (the data register is written and then read back) and report their base addresses in BIOS data area. The 'EquipmentFlag' is updated to reflect the number of printer ports attached.
- 87 Search for RS-232 ports much in the same way as above (the Int\_ID register is read and tested against data F8).
- 88 Set-up floppy drive(s) according to CMOS memory cell 10. The drives are initialized using BIOS interrupt 13. Modify 'EquipmentFlag' to reflect the number of floppy drives in the system.
- 89 If CMOS cell 12 is zero then jump to checkpoint 8A. Else, set-up and initialize hard disks according to CMOS memory cells 12, 19 and 1A. Modify 'EquipmentFlag' to reflect the number of hard disk drives in the system.
- 8A For each bit set in the CMOS error cell (0E) an appropriate message is printed on screen.
- 8B Turn off NMI and clear any parity errors. Option PROMs from C800:0000 to (not including) E000:0000 are checksummed and then installed by a far call to each PROM.
- 8C The BIOS ResetFlag (at 0040:0072) is cleared.
- 8D If no errors is reported in the CMOS error cell (0E) or in BIOS data area error byte (0040:0012) then next checkpoint is 90.
- 8E Beep twice (frequency = 523Hz = C2), display the 'Press F1 to continue' message and wait for the 'F1' key. However, if error was a faulty keyboard then ...
- 8F ... wait (4 seconds) and continue with boot.
- 90 Beep for 1/2 second at 880 Hz.
- 91 Adjust the BIOS data timer tick cells (words 0040:006C and 006E) to show the number of ticks since midnight. (This involves reading the CMOS clock via BIOS interrupt 1A)
- 92 Detect and initialize the 80287 controller. If nothing is found then next checkpoint is 94.
- 93 80287 found. Its interrupt is enabled and the 'EquipmentFlag' is updated. If the CMOS memory 'FeatureFlag' is enabled then also the CMOS memory equipment byte is updated.
- 94 IRQ 9 is enabled
- 96 Disable NMI and clear any parity error. Any BIOS option PROM at E000:0000 is checksummed and initialized by a far call to it. Continue with checkpoint A0.
- 9F Disable interrupts and jump to shadowed BIOS.

- A0 Reset cause = Boot request. Enable NMI and parity checking. The address line A20 is gated off.
- A1 If any password is installed in CMOS memory then a prompt for the password is displayed and a password is read. When a correct password is given, control continues at checkpoint A2.
- A2 Print a new line and do interrupt 19 (boot system).
- A3 Copy option PROM to shadow RAM.
- B0 Enter INT 19. Set up floppy parameters to BIOS default.
- B1 Select floppy drive A:.
- B2 Clear memory locations 0000:7C00 to 0000:7E00.
- B3 Check if floppy boot is enabled in CMOS memory.
- B4 Try loading a boot sector from floppy drive A:. Boot sector is good if last two bytes = 55 AA.
- B5 Try loading a boot sector from floppy drive B:. If boot sector is good (last two bytes = 55 AA) then next checkpoint is BB.
- B6 Send reset command to hard disk controller via normal BIOS interrupt 13, function 00.
- B7 Read hard disk parameters via BIOS interrupt 13, function 08. If error (from BIOS interrupt or recorded in CMOS memory) or no hard disks then try drive A: once every second.
- B8 Read boot sector into memory location 0000:7C00.
- B9 A retry is performed (five retries total). Reset hard disk controller with BIOS interrupt 13, function 0D.
- BA Insure that the last two bytes of the boot sector contain 55, AA. If not then try boot from A: once every second.
- BB Clear screen and jump to location 0000:7C00.
- F6 Load video BIOS from floppy.
- F7 Load power management BIOS from floppy.
- F8 Load system BIOS from floppy.
- F9 Start flash programming. Write enable flash.
- FA Identify flash.
- FB Program flash with zeros.
- FC Erase flash.
- FD Program flash with new data.
- FE Reset flash to read mode and write disable flash.



# Section 6 :

Input  
Output  
Special functions

## Audio

### x251/451/651

### s450/133n and s650/133

The on-board (system board) audio interface is controlled by the ESS688 Audiodrive and Yamaha YMF262 synthesiser chips. This combination makes the audio interface Soundblaster Pro compatible (OPL3) with following external/internal connections:

- mono microphone input
- stereo CD-ROM drive audio inputs
- stereo headphone output (2\*75mW/32Ohm) for headphones or active speakers

The maximum audio sample frequency is 44.1kHz, 8/16-bits per channel.

The audio chips are connected to the system via 8-bit wide ISA interface. This interface, when enabled, reserves one IRQ (5, 7, 9, 10), one DMA (None, 0, 1, 3), and one I/O (220-22F, 240-24F) channel.

Audio interface can be disabled through the Resident SETUP Utility.

### x451/XXXs and x651/XXXs

The Aztech MM-PRO16IIA 3D is a Sound Blaster Pro compatible non PnP 16-bit ISA audio board (one ISA slot is occupied). It offers three input channels (in stereo) 16-bit 44.1kHz stereo sound, full duplex communication over internet phone software and 3D surround sound effects. An optional wave-table synthesis module is available to produce realistic instrument sounds.

External/internal connections

	External	Internal
Inputs	Mono microphone Stereo line-in Midi/game port	Stereo CD-ROM drive audio inputs
outputs	Stereo line-out Stereo speaker	

Factory default settings

IRQ	DMA	I/O (hex)
5, 9 and 10	0 and 1	200 - 207, 220 - 22F, 300 - 301, 388 - 38B, 530 - 537 and 610 - 61F

Use Aztech preparation disk to set the factory default values (Genesis external EX0003344)

## Floppy disk controller

The floppy disk controller is 82077AA-compatible (both software and register level). It can handle the following floppy drive types: 360kB, 1.2MB, 720kB, 1.44MB and 2.88MB.

The floppy controller is placed in the: SMC FDC37C665GT

Floppy interface can be disabled through the Resident SETUP Utility.

## Serial port communication

It comprises 2 high speed NS16C550 compatible UARTs with send/receive 16 Byte FIFOs. The 2 connectors are 9-pin standard RS-232C D-type connectors. Port receivers (SN75C185) are set to FAIL-SAFE mode. The UARTs are placed in the SMC FDC37C665GT.

The maximum transfer speed supported by the BIOS functions is 19200b, and by the HW 115kb.

Instant on-function wakes up the system when the modem generates the Ring Indicator signal, this function is available on serial port 1.

The on-board serial ports can be configured to COM1 or COM2, they can be disabled through the Resident Set-up Utility.

## Parallel port communication

### e450/75, e451/651

There is one standard parallel port using a standard 25-pin female D-type connector. The following mode is supported:

Standard mode (SPP) : IBM PC/XT, PC/AT, and PS/2 compatible bi-directional parallel port.

The port interface logic and buffers are placed in the:

SMC FDC37C665GT

The on-board parallel port can be configured to LPT1 or LPT2, it can be disabled through the Resident SETUP Utility.

### x251/451/651

#### x451/XXXs and x651/XXXs

#### s450/133n and s650/133

There is one multi-mode parallel port using a standard 25-pin female D-type connector. The parallel port mode can be set through the Resident Set-up Utility. The following modes are supported:

Standard mode (SPP) : IBM PC/XT, PC/AT, and PS/2 compatible bi-directional parallel port.

Enhanced mode (EPP): Enhanced parallel port, compatible with IEEE P1284-I specification.

High speed mode (ECP): Microsoft and Hewlett Packard Extended Capabilities Port, compatible with IEEE P1284-I specification.

The multi mode port interface logic and buffers are placed in the SMC FDC37C665GT.

The on-board parallel port can be configured to LPT1 or LPT2, it can be disabled through the Resident SETUP Utility.

## PCI bus enhanced IDE interface

There are two enhanced PCI (master mode) bus IDE controllers/interfaces on the system board (build in the OPTi 82C558M) which can handle up to four IDE devices. The 82C558 supports PIO modes 0 to 4 and DMA multiword mode 2 timing. An integrated 32byte read prefetch FIFO and an 32byte posted write FIFO supports bus mastering burst read and write operations on the PCI bus. The primary IDE bus can handle up to 2 hard drives or other IDE devices, and the secondary IDE bus can handle up to two non-hard drive IDE devices.

The master IDE interface, when enabled, reserves IRQ 14, and IRQ 15 is used if the slave IDE controller is enabled. The on-board PCI bus IDE interfaces can be Enabled/Disabled from the Resident SETUP Utility.

## Keyboard & mouse

The keyboard and PS/2-type mouse are controlled by an Intel 8742 (or compatible) single chip processor.

The code of the keyboard processor is based on ICL's own BIOS/KBC platform.

## Video

### e450/75, e451, e651, x251, x451, x651

The on-board PCI bus video (ErgoGrafix 422i) is controlled by an ATI-264CT chip with 1MB of video RAM (DRAM), which is expandable up to 2MB. The timing parameters have been set so that 70ns RAM modules or faster can be used. The ATI-264CT has a build-in RAMDAC, which can handle pixel frequencies up to 135MHz.

The ATI-264ct is a 32-bit video engine, slave, which is connected directly to the 32-bit on-board PCI bus. If the video RAM is 1MB, the data path between the video memory and ATI-264ct chip is 32-bit wide, if the video RAM is 2MB, the ATI ct-chip can utilize 64-bit data path. The video interface is DDC2B compatible. The On-board ErgoGrafix 422i is automatically disabled by the plug and play BIOS when a PCI or ISA video board is installed.

### s450/113n and s650/133

The ErgoGrafix 664 PCI bus (one PCI slot is occupied) video adapter is based on the ATI MACH64GX chip, with 2MB of video RAM (VRAM). The amount of video RAM, which speed is 70ns, is expandable up to 4MB. The ATI68860 RAMDAC can handle pixel frequencies up to 135MHz

The ATI-MACH64GX is a 32-bit video engine, slave, which is connected to the 32-bit PCI bus, the data path between the video RAM and ATI chip is always 64-bits wide. The video interface is DDC1 compatible.

### x451/XXXs and x651/XXXs

Matrox Millennium, based on MGA-2064W 64-bit graphics processor with 4 MB dual ported Window RAM (WRAM) memory, is a 32-bit PCI bus graphics adapter (one PCI slot is occupied). The amount of WRAM can be upgraded up to 8 MB with an optional WRAM memory expansion board. If the memory expansion is used - the optional HW MPEG-1, video in a window and frame capture card (all-in-one) can not be attached to the Millennium board (and vice versa). RAMDAC, which has 64-bit data path to the WRAM, can handle pixel frequencies up to 220 MHz.

### Refresh rates

Maximum defined refresh rates.

Video controller	Video Memory	Resolutions				
		640*480	800*600	1024*768	1280*1024	1600*1200
ErgoGrafix 422i	1 MB	75/24	60/24	NA	NA	
		100/16 (o)	75/16	NA	NA	
		100/8 (o)	100/8 (o)	75/8	75/4	
	2 MB	75/24	60/24	NA	NA	
ErgoGrafix 664	2 MB	100/16 (o)	75/16	75/16	NA	
		100/8 (o)	100/8 (o)	100/8 (o)	75/8	
	4MB	100/24 (o)	100/24 (o)	100/16 (o)	75/8	
		100/24 (o)	100/24 (o)	100/16 (o) 75/24	75/24	
Matrox Millennium	4MB	100/24	100/24	100/24	90/24	75/16
	8MB	100/24	100/24	100/24	90/24	75/24

60/24 = Refresh rate is 60Hz and there are 24 Bits per Pixel

(o) = Overscan Mode

(i) = Interlaced Mode

NA = Not Available

### Video memory upgrades for the on-board adapter

Memory on the system board	Memory upgrade module	Module code for the upgrade module	kit code for the upgrade module	Total video memory
1MB ( )	1MB ( )	NA	PL060119	2MB ( )

The amount of installed and detected memory, can be checked with the diagnostics utility (DOS)



## Network

The Ethernet Local Area Network interface is build around an AMD PCnet PCI-bus (master device) controller (AMD Am79C970). which is a single chip Ethernet Controller.

The Ethernet interface can be connected either to a Twisted Pair (TP) cable through an 8 pin RJ45 connector or to a BNC connector. The used interface is automatically detected.

The receive and transmit buffers are kept in the in-build fifos of the AMD chip, both of the buffers can store 128 bytes.

The Ethernet interface also includes Remote Boot options. The Remote Boot codes, when activated, are integrated into the system BIOS, but stored in a separate FLASHRAM.

Some of the parameters such as Network address are stored in a 16 \* 64-bit EPROM.

The IRQ of the LAN interface can be disabled from the Resident SETUP Utility, by setting the IRQ to none, in the Admin/PCI/Configure menu

## Peripheral Component Interconnect (PCI interface)

Connects the CPU and PCI bus in asynchronous mode and runs the PCI bus always at the half speed of the CPU bus (external frequency of the CPU). This means that if the external clock of the CPU is 50MHz (75MHz internal), the PCI bus is running at 25MHz. The hardware and the BIOS are compliant to the version 2.0 of the PCI specification and has support for four PCI master devices

## Instant on

This function is controlled by the COP912CH single chip processor, which is powered by the +5V stand-by voltage, this means that the COP is powered always when mains power cable is connected to the system unit, even if the system is switched off. The COP is controlling the on/off functions of the power supply, also the suspend to disk function is handled by the COP.

Note, the units with instant on-function will be automatically powered on every time when mains power is connected to the system unit.

## LED board

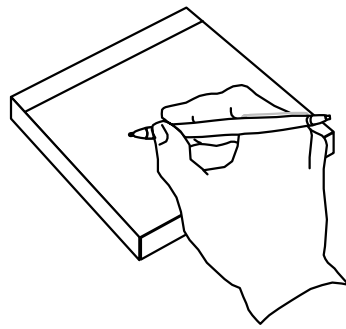
The LED board has three indicators that are located on the front panel, from top to bottom:

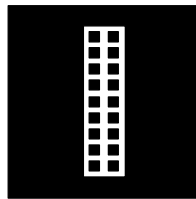
**POWER** (Green) Illuminated when the system is switched ON.

**HDD** (Green) Illuminated during network (when ICL Ethernet PCI module is in use) and HDD activity.

**KEYBOARD LOCK** (Yellow) Illuminated when the keyboard lock is activated. the keyboard lock may be activated either manually or automatically.

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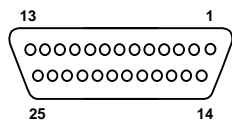




# Section 7 :

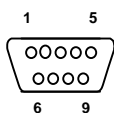
## Pin assignments

### Parallel port (Standard mode)



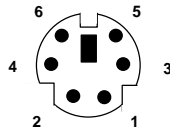
PIN	In/Out	Signal
1	Out	Strobe
2	In/Out	Data bit 0
3	In/Out	Data bit 1
4	In/Out	Data bit 2
5	In/Out	Data bit 3
6	In/Out	Data bit 4
7	In/Out	Data bit 5
8	In/Out	Data bit 6
9	In/Out	Data bit 7
10	In	Acknowledge
11	In	Busy
12	In	Paper End
13	In	Select
14	Out	Auto Line Feed
15	In	Error
16	Out	Initialise Printer
17	Out	Select In
18- 25	-	Ground

### Serial ports



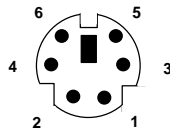
PIN	In/Out	Signal
1	In	Carrier Detect
2	In	Receive Data
3	Out	Transmit Data
4	Out	Data Terminal Ready
5	-	Signal Ground
6	In	Data Set Ready
7	Out	Request to Send
8	In	Clear to Send
9	In	Ring Indicator

## Mouse port



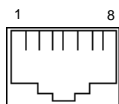
PIN	Signal
1	Data
2	Reserved
3	Ground
4	+ 5 V DC
5	Clock
6	Reserved
Shield	Frame Ground

## Keyboard connector



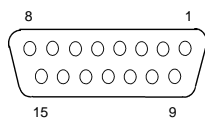
PIN	Signal
1	Keyboard Data
2	Mouse Data
3	Ground
4	+ 5 V DC
5	Keyboard Clock
6	Mouse Clock
Shield	Frame Ground

### RJ45 (standard twisted pair) Ethernet port



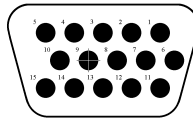
PIN	Signal
1	Transmitted Data (+)
2	Transmitted Data (-)
3	Received Data (+)
4	Not connected
5	Not connected
6	Received Data (-)
7	Not connected
8	Not connected

### AUI Ethernet port



PIN	Signal
1	Signal Ground
2	Collision Detect (+)
3	Transmitted Data
4	Signal Ground
5	Received Data (+)
6	Signal Ground
7	Not connected
8	Signal Ground
9	Collision Detect (-)
10	Transmitted Data
11	Signal Ground
12	Received Data (-)
13	Power (+12 V)
14	Signal Ground
15	Not connected

## VGA-type connector



PIN	Signal
1	(R) Analog Red Colour signal <sup>1</sup>
2	(G) Analog Green Colour signal <sup>2</sup>
3	(B) Analog Blue Colour signal <sup>1</sup>
4	Not connected
5	Reserved (Ground)
6	Return signal for Red colour(GND) <sup>1</sup>
7	Return signal for Green colour(GND) <sup>2</sup>
8	Return signal for Blue colour(GND) <sup>1</sup>
9	+5V for the DDC circuitry of the monitor
10	Digital Ground
11	Not connected
12	DDC ID1
13	Horizontal deflection control signal <sup>3</sup>
14	Vertical deflection control signal <sup>3</sup>
15	DDC ID2

<sup>1</sup> Used only with colour displays

<sup>2</sup> Used with colour and monochrome displays

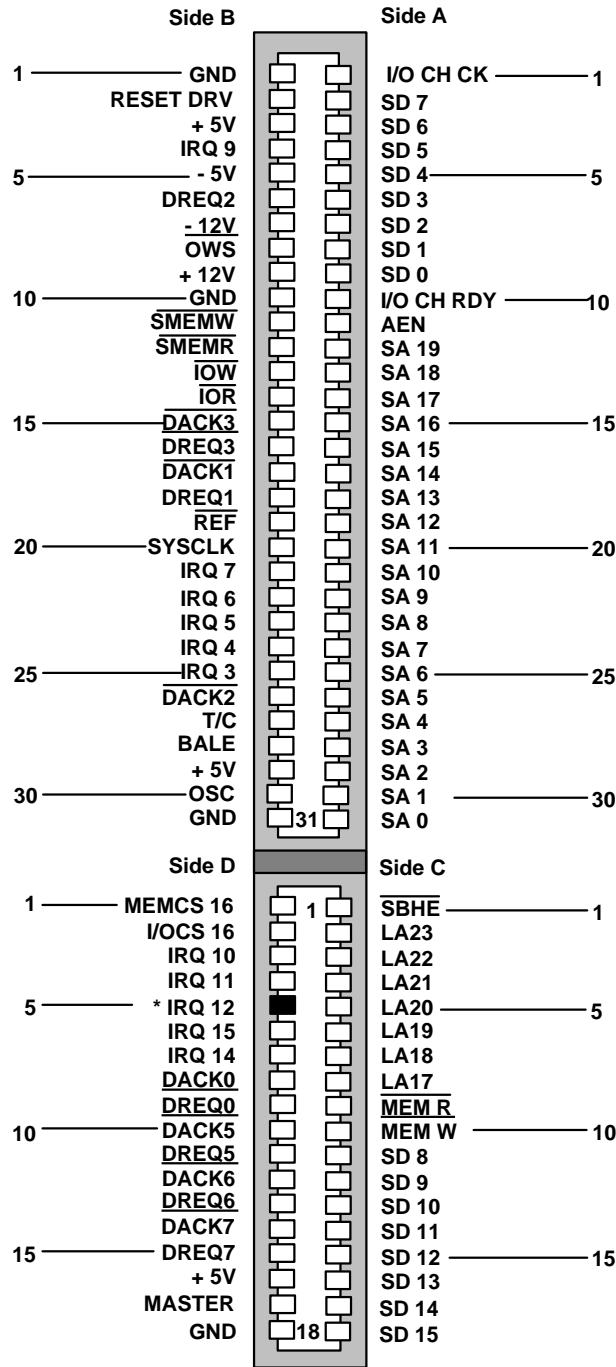
<sup>3</sup> HSYNC/VSYNC: TTL

Analog signals R, G, B: 0V to 0.7V terminated to 75 ohm



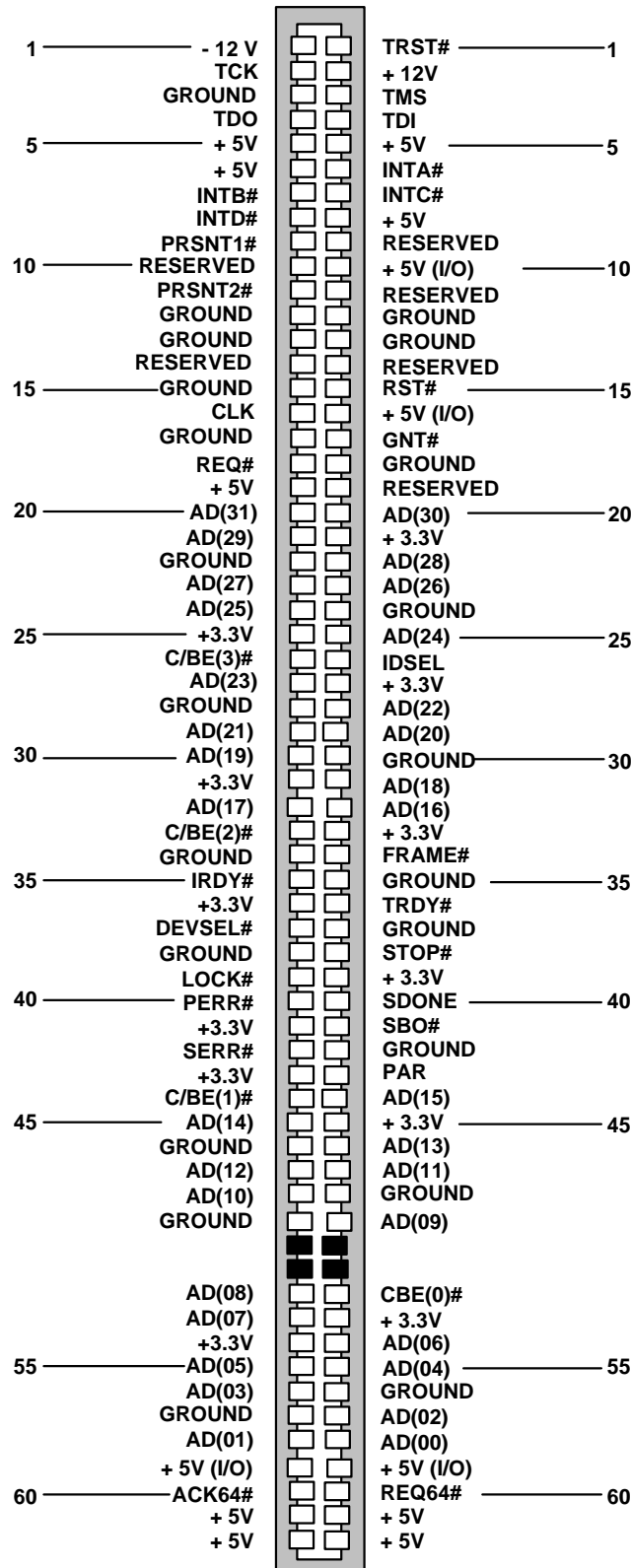


### ISA bus connector

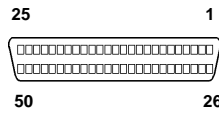


\* : Reserved for PS/2 type mouse, but the mouse interface can be disabled from the RSU (setup)

### PCI bus connector



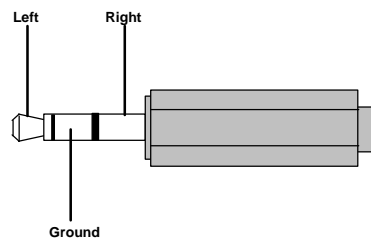
### SCSI port connector



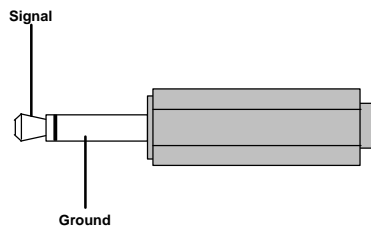
PIN	Signal
1-12	Signal ground
13	Open
14-25	Signal ground
26	Data bit 0
27	Data bit 1
28	Data bit 2
29	Data bit 3
30	Data bit 4
31	Data bit 5
32	Data bit 6
33	Data bit 7
34	Data parity bit
35-37	Signal ground
38	Termination power
39-40	Signal ground
41	ATN
42	Signal ground
43	BSY
44	ACK
45	RST
46	MSG
47	SEL
48	C/D
49	REQ
50	I/O

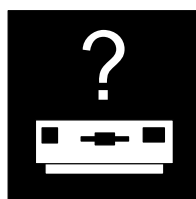
## Audio connector

### Speaker type connector



### Microphone type connector





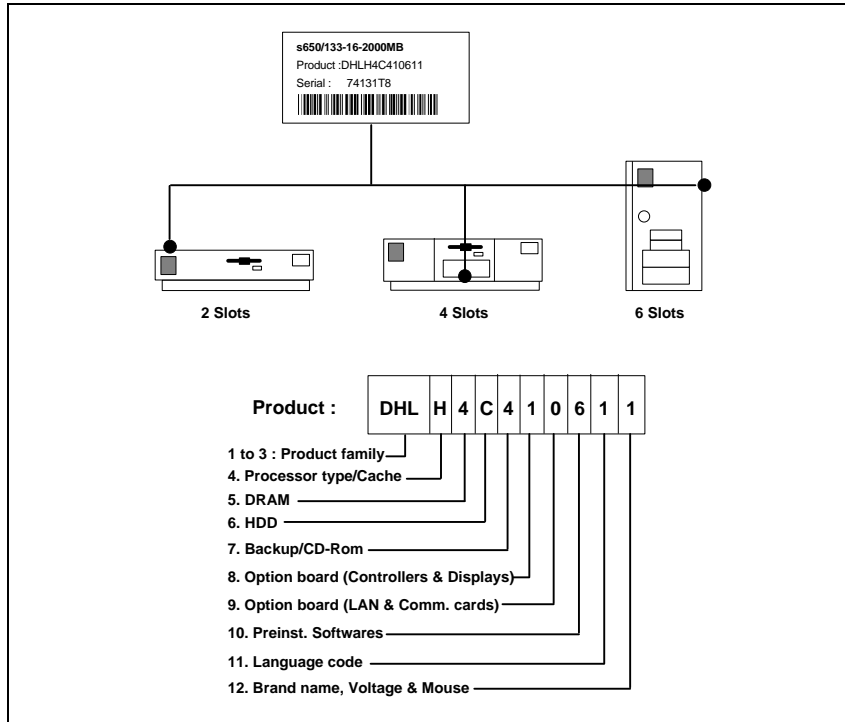
# Section 8 :

## Machines identification

## e-, x- and s- series : structure code

Every ErgoPro has an identification panel located in the system unit. The picture below shows the location of the identification panel on 2, 4 & 6 slot housings.

This code can be divided into ten parts, indicating that way the exact configuration of the machine. The following pages are explaining those codes, family by family.



## Identification codes

The following code information should be used for product identification only. The information should not be used to build up an ordering code.

### 1-3. PRODUCT FAMILY

The letter(s) in brackets ( ) is/are for the fourth digit

DEB (7/8)	e450/75	AC41659		
DEB (6/C)	e451/100	AC41659		
DEB (A/B)	e451/120	AC41659		
DEB (G)	e451/133	AC41659		
DEB (J)	e451/150	AC41659		
DH2 (C)	e651/100	AC41659		
DK2 (7/8)	x251/75 with audio	AC41658	=> 200596	AC41687
DK2 (6/C)	x251/100 with audio	AC41658	=> 200596	AC41687
DK2 (B)	x251/120 with audio	AC41687		
DFC (7/8)	x451/75 with audio	AC41658	=> 200596	AC41687
DFC (C)	x451/100 with audio	AC41658	=> 200596	AC41687
DFM (B)	x451/120 with audio	AC41658	=> 200596	AC41687
DFM (G)	x451/133 with audio	AC41658	=> 200596	AC41687
DFM (K)	x451/150 with audio	AC41658	=> 200596	AC41687
DFM (N)	x451/166 with audio	AC41658	=> 200596	AC41687
DHB (G)	x651/133 with audio	AC41658	=> 200596	AC41687
DHB (N)	x651/166 with audio	AC41658	=> 200596	AC41687
DK3 (6/C)	x251/100 w/o audio	AC41681	=> 200596	AC41689
DK3 (B)	x251/120 w/o audio	AC41689		
DFD (C)	x451/100 w/o audio	AC41681	=> 200596	AC41689
DFN (G)	x451/133 w/o audio	AC41681	=> 200596	AC41689
DHD (G)	x651/133 w/o audio	AC41681	=> 200596	AC41689
DFP (R)	x451/166s	AC41682		
DHC (R)	x651/166s	AC41682		
DEU (H)	s450/133n	AC41655		
DHL (H)	s650/133	AC41655		

### 4. PROCESSOR + CACHE

6	100MHz	AF33380
7	75MHz	AF33384
8	75MHz + 256kB Async cache	AF33384 + AF33701
A	120MHz	AF33386
B	120MHz + 256kB Async cache	AF33386 + AF33706
	120MHz + 256kB Sync cache	AF33386 + AF33710 (x251/120)
C	100MHz + 256kB Async cache	AF33380 + AF33706
G	133MHz + 256kB Async cache	AF33388 + AF33706
	133MHz + 256kB sync cache	AF33388 + AF33710 (x451/651)
H	133MHz + 512kB Async cache	AF33388 + AF33704
J	150MHz + 256kB Async cache	AF33390 + AF33706
K	150MHz + 256kB sync cache	AF33390 + AF33710
N	166MHz + 256kB sync cache	AF33392 + AF33710
R	166MHz + 512kB sync cache	AF33392 + AF33712

### 5. DRAM

2	8MB (2*4MB EDO SIMM)	AF33800
3	8MB (2*4MB FP SIMM)	AF33256
4	16MB (2*8MB EDO SIMM)	AF33801
5	32MB (2*16MB EDO SIMM)	AF33802
6	16MB (2*8MB FP SIMM)	AF33291
9	32MB (2*16MB FP SIMM)	AF33258
A	64MB (2*32MB EDO SIMM)	AF33803
J	16MB + 2MB (2*8MB EDO SIMM)	AF33801 + A4343168
N	32MB + 2MB (2*16MB EDO SIMM)	AF33802 + A4343168

**6. HDD**

0	No HDD	
8	540MB IDE (4500-5400 rpm)	AF21210
9	850MB IDE (4500 rpm)	AF21209
A	1 GB IDE (5400)	AF21208
B	2x1GB IDE (5400)	AF21208
C	2GB IDE (5400)	AF21202
E	1,2 GB IDE	AF21214
K	1GB SCSI	AF21192
L	2GB SCSI (7200 rpm)	AF21220

**7. BACKUP / CD-ROM**

0	No backup / cd-rom	
4	CD-ROM IDE quad	AF23295
	CD-ROM IDE 6-speed	AF23304 (x451 133->)
5	CD-ROM SCSI	AF23288
D	CD-Recordable SCSI	AF23309

**8. OPTION BOARDS (SCSI)**

0	No option board	
1	Matrox video 4 MB, Aztech audio	AF31542+ AF30064
2	ErgoGrafix 664 incl.2MB	AF31537
3	ErgoGrafix 664 incl.2+2MB	AF31537+ AF31536
6	No option board, but 2nd serial port.	
E	ErgoGrafix 664 2MB, PCI SCSI 2940	AF31537 + AF31075
F	ErgoGrafix 664 4MB, PCI SCSI 2940	AF31537 + AF31536 + AF31075

**9. OPTION BOARDS (LAN and Communication cards)**

0	No option board	
6	EtherTeam PCI module	AC41635

**10. PREINST. SW**

3	Win NT WS 3.51 (ENG/GE/FI)
5	Dos 6.2, WfWg 3.11, (No manuals).
6	Windows 95.
7	Dual install: Windows 95 or Dos 6.2+WfWg 3.11, Product ID Key Card, Setting up Windows for Workgroups.

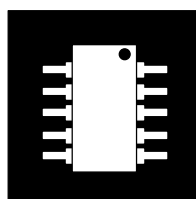
**11. LANGUAGE CODE**

1	English Windows 95 / MPI WfWg
A	Hungarian
E	English
F	Danish
G	German
H	Spanish
J	French
K	Dutch
L	Norwegian
M	Finnish
N	Swedish
P	Portuguese
S	Italian
U	Multilingual
V	Czech
Y	Polish

**12. BRAND NAME / VOLTAGE/MOUSE**

1	230V Fujitsu ICL ErgoPro e/x/s, mouse.
2	115V Fujitsu ICL ErgoPro e/x/s, mouse.
3	230V MikroMikko Ergo e/x/s, mouse.
4	230V ICL ErgoPro e/x/s (Spain), mouse.





# Section 9 :

Specification tables  
Memory tables

## Machine specifications

### Processor

	e450/75 x251/75 x451/75	e451/100 e651/100 x251/100 x451/100	e451/133 x451/133 x651/133 s450/133n s650/133	e651/150 x451/150	x451/166 x651/166 x451/166s x651/166s
<b>Processor &amp; speed</b>	iNTEL Pentium-75MHz SPGA package	iNTEL Pentium-100MHz SPGA package	iNTEL Pentium-133MHz SPGA package	iNTEL Pentium-150MHz SPGA package	iNTEL Pentium-166MHz SPGA package
<b>External clock</b>	50MHz	66.7MHz	66.7MHz	60MHz	66.7MHz
<b>System clock</b>	25 MHz (PCI) 8.33 MHz (ISA)	33.3 MHz (PCI) 8.25 MHz (ISA)	33.3 MHz (PCI) 8.25 MHz (ISA)	30MHz (PCI) 7.5MHz (ISA)	33.3 MHz (PCI) 8.25 MHz (ISA)
<b>Overdrive</b>	TBA	TBA	TBA	TBA	TBA
<b>Internal cache of the processor</b>	8kB, 2-way write-through for data 8kB, 2-way write-back for code				
<b>Co-processor</b>	Build-in Pentium				

### General

	e450/451	e651	x251	x451	x651
<b>Socket type</b>	320 pin ZIF socket type 5				
<b>Second level cache</b>	256kB asynchronous Direct mapped, write-back	256kB asynchronous Direct mapped, write-back	Optional 256kB asynchronous Direct mapped, write-back	256kB asynchronous/ pipeline burst synchronous, Direct mapped, write-back <sup>(1)</sup>	256kB asynchronous/ pipeline burst synchronous, Direct mapped, write-back <sup>(1)</sup>
<b>Video</b>	On the system board, ICL ErgoGrafix 422i PCI bus video adapter				
<b>Audio</b>	No	No	On-board, as factory option	On-board, as factory option <sup>(2)</sup>	On-board, as factory option <sup>(2)</sup>
<b>Power master</b>	2.3	2.3	3	3	3
<b>Instant On</b>	No	No	Yes	Yes	Yes
<b>Theft prevention</b>	No	No	Yes	Yes	Yes
<b>HD silencer</b>	No	Yes	Yes	Yes	Yes
<b>LAN</b>	No	No	Optional ethernet-module	Optional ethernet- module	Optional ethernet-module
<b>SCSI</b>	Optional Adaptec 1510B	No	Optional Adaptec 1510B	Optional Adaptec 1510B	No
<b>Serial ports</b>	Two (one for e450) 16C550 compatible serial port, with 9-pin male connectors  (Fail safe, with 16 byte FIFO)	Two 16C550 compatible serial ports, with 9-pin male connectors <sup>(3)</sup>  (Fail safe, with 16 byte FIFO)	Two 16C550 compatible serial ports, with 9-pin male connector  (Fail safe, with 16 byte FIFO)	Two 16C550 compatible serial ports, with 9-pin male connectors  (Fail safe, with 16 byte FIFO)	Two 16C550 compatible serial ports, with 9-pin male connectors  (Fail safe, with 16 byte FIFO)
<b>IDE disks</b>	540MB 850MB 1.2GB	850MB 1.2GB 2GB	540MB 850MB 1.2GB	540MB 850MB 1.2GB 2GB	1.2GB 2GB

<sup>(1)</sup> Asynchronous cache for CPUs running from 75MHz to 100MHz, and synchronous cache for CPUs running at 133MHz or faster.

<sup>(2)</sup> On x-series, two system boards available - one with audio and one without audio components installed.

<sup>(3)</sup> One serial port for e651/100 and two for e651/150

General (Continued)

	x451/XXs	x651/XXs	s450/133n	s650/133
<b>Socket type</b>	320 pin ZIF socket type 5			
<b>Second level cache</b>	512kB pipeline burst synchronous, Direct mapped, write-back		512kB asynchronous Direct mapped, write-back	
<b>Video</b>	Matrox millenium PCI bus video adapter board		ICL ErgoGrafix 664 PCI bus video adapter board	
<b>Audio</b>	16bit Aztech MM Pro ISA board		On-system board	
<b>Power master</b>	3	3	3	3
<b>Instant On</b>	Yes	Yes	Yes	Yes
<b>Theft prevention</b>	Yes	Yes	Yes	Yes
<b>HD silencer</b>	Yes	Yes	Yes	Yes
<b>LAN</b>	ICL PCI ethernet-module			
<b>SCSI</b>	Adaptec 2940U PCI card	Adaptec 2940U PCI card	No	Adaptec 2940 PCI card
<b>Serial ports</b>	Two 16C550 compatible serial ports, with 9-pin male connectors  (Fail safe, with 16 byte FIFO)	Two 16C550 compatible serial ports, with 9-pin male connectors  (Fail safe, with 16 byte FIFO)	Two 16C550 compatible serial ports, with 9-pin male connector  (Fail safe, with 16 byte FIFO)	Two 16C550 compatible serial ports, with 9-pin male connectors  (Fail safe, with 16 byte FIFO)
<b>IDE disks</b>				

Architecture & configuration

	251	450/451	650/651
<b>Chip set</b>	OPTI Viper M, 82C556M, 82C557M and 82C558M		
<b>Memory banks</b>	2 with EDO DRAM and Fast Page DRAM support		
<b>SIMM modules/bank</b>	2		
<b>BIOS</b>	128kB Boot Block Flash RAM, ICL Platform with Plug and Play functions		
<b>Keyboard controller</b>	ICL platform		
<b>Floppy drives</b>	None, 720kB, 1.44MB and 2.88MB (3.5"), 360kB and 1.2MB (5.25")		
<b>Hard disk interface</b>	PCI bus enhanced IDE interface with two connectors (support for four IDE devices), PIO modes 0 to 4 and DMA modes 0 to 2		
<b>Parallel port</b>	One bi-directional parallel port with 25-pin female connector (SPP, ECP and EPP)		
<b>Architecture/expansion slots</b>	1 PCI (32b) 1 PCI/ISA (32/16b)	1 PCI (32b), 1 PCI/ISA (32/16b) 2 ISA (16b)	3 PCI (32b) 3 ISA (16b)
	<b>NOTE !</b> The lowest slot can not take full length boards, maximum length of board is 170mm.		
<b>Power supply</b>	75W 115/230V, 48Hz to 63Hz	120W 115/230V, 48Hz to 63Hz	200W 115/230V, 48Hz to 63Hz
	All power supplies have the monitor outlet connected directly to the mains voltage (without power switch)		
<b>FAN</b>	One FAN to circulate the air inside the housing. The rotation speed of the FAN is temperature controlled. In 2-slot and 6-slot system the control logic is on the system board and in 4-slot system in the Power Supply		
<b>Dimensions</b>			
<b>Width</b>	352mm	368mm	205mm
<b>Height</b>	80mm	112mm	340mm (350mm with stand)
<b>Depth</b>	430mm	432mm	440mm
<b>Weight</b>	5.2/6.2kg	8 to 12kg	11 to 15kg

## System memory map

Address range	Size (kB)	Use	Cached
000000 - 09FBFF	639	Base memory	Yes
09FC00 - 09FFFF	1	Extended BIOS data area	Yes
0A0000 - 0AFFFF	64	VGA graphics	No
0B0000 - 0B7FFF	32	VGA text (colour mode)	No
0B8000 - 0BFFFF	32	VGA text (mono mode)	No
0C0000 - 0C7FFF	32	VGA BIOS	Yes/No <sup>(2)</sup>
0C8000 - 0CBFFF	16	Ethernet module Remote Boot <sup>(4)</sup>	
0CC000 - 0CE1F	8,5	SCSI BIOS <sup>(4)</sup>	
0C8000 - 0DFFFF	96	Free	No
0E0000 - 0EEFFF	60	Free <sup>(1)</sup>	No
0EF000 - 0EF7FF	2	Reserved for the CPU memory management	No
0EF800 - 0EFFFF	2	Plug & Play Bios Area <sup>(5)</sup>	Yes
0F0000 - 0FFFFFF	64	System BIOS	Yes
100000 - TOM <sup>(3)</sup>			Yes

- (1) This area can be used by memory managers. Option boards cannot be used on this area.
- (2) In case that video BIOS is ICL XAPI compatible, XAPI function in the video BIOS defines if the area is cached or not (the BIOS of the onboard video adapter is always cached). If video BIOS is not XAPI compatible, area is cached, when Shadow Option Prom selection is enabled (Resident Set-up Utility).
- (3) TOM = Top Of Memory
- (4) Reserved if the module is active
- (5) See Tips & Hints to configure Memory Manager

## Memory configurations

Bank 0	Bank 1	Total memory
2 * 4MB	-	8MB
2 * 4MB	2 * 4MB	16MB
2 * 8MB	-	16MB
2 * 4MB	2 * 8MB	24MB
2 * 8MB	2 * 8MB	32MB
2 * 16MB	-	32MB
2 * 4MB	2 * 16MB	40MB
2 * 8MB	2 * 16MB	48MB
2 * 16MB	2 * 16MB	64MB
2 * 32MB	-	64MB
2 * 4MB	2 * 32MB	72MB
2 * 8MB	2 * 32MB	80MB
2 * 16MB	2 * 32MB	96MB
2 * 32MB	2 * 32MB	128MB

\* : Includes all the speed variants

## SIMM recommendations

### s-, x- and e-series

SIMM size (MB)	Description	Speed	Type	Pins	Module	Kit code
4	1M*32	70ns	Fast Page	72	AF33256	PL060093
8	2M*32	70ns	Fast Page	72	AF33291	PL060091
16	4M*32	70ns	Fast Page	72	AF33258	PL060095
32	8M*32	70ns	Fast Page	72	AF33259	PL060096
4	1M*32	60ns	EDO	72	AF33800	PL060125
8	2M*32	60ns	EDO	72	AF33810	
16	4M*32	60ns	EDO	72	AF33802	PL060127
32	8M*32	60ns	EDO	72	AF33803	PL060128

#### Explanations of the terms :

- Speed:** This is the slowest access speed that can be used. When using Fast Page mode SIMMs or Fast page and EDO SIMMs at the same time, the chipset is using 70ns timing parameters (it doesn't matter what speed of SIMMs are installed). When using only EDO SIMMs, the chip set is using 60ns timing parameters.
- Module:** Product code which is used to identify spares numbers and correct SIMM brands used with these machines.
- Kit code:** This is the code that can be used when ordering memory upgrades. Note that the kit code is only for one SIMM module. So, in case of Pentium, 2 kits must be ordered.

## Channels, addresses and timer counters

### DMA channels

The system board supports seven ISA-compatible DMA channels by utilising two DMA controller chips which operate in cascade mode as a master-slave pair. The slave uses channels 0 to 3, supporting 8-bit data transfers while the master controller uses channels 4 to 7, supporting 16-bit data transfers. Controllers are 8237A compatible.

The following table lists each DMA channel and its use.

16-bit channels	8-bit channels	Use(s)
Master (CTRL1)	Slave (CTRL2)	
	CH 0	On-board audio (x251/451/651 and s-series) <sup>1</sup> Aztech audio (xs-series)
	CH 1	On-board audio (x251/451/651 and s-series) <sup>2</sup> Aztech audio (xs-series)
	CH 2	Diskette drive controller
	CH 3	On-board audio (x251/451/651 and s-series) <sup>2</sup>
CH 4		Cascading slave to master
CH 5		
CH 6		
CH 7		

<sup>1</sup> : When enabled

<sup>2</sup> : Alternative selection

## Interrupt levels

Two programmable interrupt controllers supply interrupt control. The controllers are cascaded together as a master-slave pair and provide 15 ISA-compatible interrupt levels. Excluding NMI, all interrupts can be masked. Controllers are 8259A compatible.

The table below shows the interrupt level assignments.

Interrupt	Function
<b>NMI</b>	Parity error (System memory does not have parity checking)
<b>Master (Controller 1)</b>	
<b>IRQ0</b>	Timer output 0 (internal)
<b>IRQ1</b>	Keyboard controller
<b>IRQ2</b>	Interrupt from slave
<b>IRQ3</b>	COM2 (x- and s-series)
<b>IRQ4</b>	COM1
<b>IRQ5</b>	On-board audio (x251/451/651 and s-series) <sup>1</sup> Aztech audio (xs-series)
<b>IRQ6</b>	Diskette drive controller
<b>IRQ7</b>	<b>LPT1</b> , On-board audio <sup>2</sup>
<b>Slave (Controller 2)</b>	
<b>IRQ8</b>	Real-time Clock
<b>IRQ9</b>	On-board audio <sup>2</sup> Aztech audio (xs-series)
<b>IRQ10</b>	On-board audio <sup>2</sup> Aztech audio (xs-series)
<b>IRQ11</b>	Rerouted PCI IRQ (Default for ICL/AMD Ethernet) <sup>3</sup>
<b>IRQ12</b>	PS/2-type mouse device
<b>IRQ13</b>	Math co-processor error
<b>IRQ14</b>	Primary IDE interface
<b>IRQ15</b>	Secondary IDE interface

<sup>1</sup> : When enabled

<sup>2</sup> : Alternative selection

<sup>3</sup> : When installed

## I/O addresses

The I/O address map is shown below. The hexadecimal addresses 000 to 0FF are reserved for the system board I/O. The addresses hex 100 through 3FF are available for the I/O channel. Additional addresses are allocated for the TokenRing adapter boards, and serial ports COM3 and COM4.

Bold italics indicate I/O addresses that are used in the basic configuration, including the VGA Display adapter board, the IDE interface, and the SCSI Mass storage adapter board.

System board addresses 000 to 0FF

Hex range	Device
000 - 00F	DMA controller 1, slave
020 - 021	Interrupt controller 1, master
022, 024	Chip set configuration registers
040 - 043	Timer/Counter 1
060 , 064	Keyboard controller
061	Test register
070 - 071	Real-time clock, CMOS RAM
080 - 08F	DMA page registers
0A0 - 0A1	Interrupt controller 2, slave
0C0- 0DF	DMA controller 2, master
0F0	Clear Math co-processor busy
0F1	Reset Math co-processor
0F8 - 0FF	Math co-processor

I/O channel addresses 100 to 3FF

Hex range	Device
102	ErgoGrafix
120 - 121	ICL config. registers by default
<b>130 - 131</b>	<b><i>Alternative for ICL config. registers</i></b>
<b>140 - 141</b>	<b><i>Alternative for ICL config. registers</i></b>
170 - 177	Secondary IDE interface
1CE - 1CF	ErgoGrafix 422i (when PCI MACH64 I/O reloc is disabled (RSU))
1F0 - 1F7	Primary IDE interface
200 - 207	Aztech audio (xs-series)
220 - 22F	On-board audio interface (10 bit decoding) Aztech audio (xs-series, Sound Blaster compatibility module)
<b>240 - 24F</b>	<b><i>Alternative for audio interface (10 bit decoding)</i></b>
278 - 27B	Parallel port 2 (LPT 2)
<b>278 - 27F</b>	<b><i>Parallel port 2 (LPT 2), EPP mode</i></b>
280 - 29F	On-board Ethernet (alternative)
2A0 - 2BF	On-board Ethernet (alternative)
2CE - 2EF	ErgoGrafix 422i (when PCI MACH64 I/O reloc is disabled (RSU))
2F8 - 2FF	Serial port 2 (COM2)
300 - 301	Aztech audio (xs-series, MIDI (MPU401) module)
378 - 37B	Parallel port 1 (LPT1)



<b>378 - 37F</b>	<b>Parallel port 1 (LPT1), EPP mode</b>
388 - 38B	Aztech audio (xs-series)
3B0 - 3DF	On-board Local bus HRA10i/ErgoGrafix
3E0 - 3E1	PCMCIA host adapter, when installed.
3F0 - 3F7	Diskette drive controller
3F8 - 3FF	Serial port 1 (COM1)

I/O channel addresses 500 to FFFF

Hex range	Device
530 - 537	Aztech audio (xs-series, MS sound system compatibility module)
610 - 61F	Aztech audio (xs-series)
678 - 67A	Parallel port 2 (LPT 2), ECP mode
778 - 77A	Parallel port 1 (LPT 1), ECP mode
46E8	ErgoGrafix 422i
CF8-CFF	PCI Host Bridge
A100-A1FF	ErgoGrafox 422i, when PCI MACH64 reloc is enabled (RSU)

### Timer

The system board has three programmable timers, defined as follows :

Channel	Use
CH 0	System timer
CH 1	DRAM refresh timer
CH 2	Tone generator (Speaker)

### Real-time clock (RTC) and CMOS RAM

A real-time clock component provides Real-Time Clock and Calendar functions. The circuit contains 114 bytes of battery-backed-up CMOS-static RAM memory used for clock functions, and for storing the configuration information (e.g., the number of diskette drives, the amount of system board memory, etc.).

The CMOS RAM memory is backed up with a non-rechargeable battery that has a considerable lifetime. However, should the battery begin to fail, the following message (and possibly others) appears on the screen during the power-on test:

**BIOS (27): No battery for CMOS clock/RAM  
Press <F1> to continue, <Ins> for set-up mode**

If you receive this message check your date and time values in SETUP. It could be that your Time and Date parameters contain the wrong values, causing the above message to occur. If this is the case, enter the correct values, save the changes, and this message should disappear.

## Power supply

### Characteristics

Power supply	75W (2 slot) AF81074	120W (4 slot) AF81069	200W (6 slot) AF81053
Input voltage	180-264/90-132V		
Input frequency	48Hz to 63Hz		
Max power input (w/o monitor)	110W	175W	280W
Max power output	75W	120W	200W
<b>Max output current :</b>			
+3.4V	9A (3.37V)	14A	20A
+5V	11A	17A	20A
-5V	0,3A	0,3A	0,5A
+12V	2,5A	4A	8A
-12V	0,3A	0,6A	0,5A
+5VSB	20mA	20mA	20mA
<b>Max ground leakage current</b>			
115V/60Hz	250μA	250μA	450μA
230V/50Hz	450μA	450μA	750μA

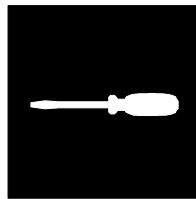
### Air circulation

	2 slot	4 slot	6 slot
Volume	7 - 15 m <sup>3</sup> /h	18 - 37 m <sup>3</sup> /h	15 - 35 m <sup>3</sup> /h

### Power consumption

System unit	Memory (RAM-Cache-Video)	Hard drives	Average Power Consumption	Power Save Mode*
<b>s-Series</b>				
s450/133n	16MB - 512 - 2MB	CD+540MB	38W	<2W
s650/133	32MB - 512 - 2MB	CD+540MB	40W	<2W
<b>x-Series</b>				
x451/166s	32MB - 512 - 4MB	CD+1GB	41W	<2W
x451/120	24MB - 256 - 2MB	CD+1GB	36W	<2W
x251/75	8MB - 256 - 1MB	CD+270MB	28W	<2W
<b>e-Series</b>				
e651/100	16MB - 256 - 1MB	CD+540MB	32W	28W
e450/75	8MB - 256 - 1MB	CD+270MB	28W	26W

\* : When all the power safe features are enabled.



# Section 10 :

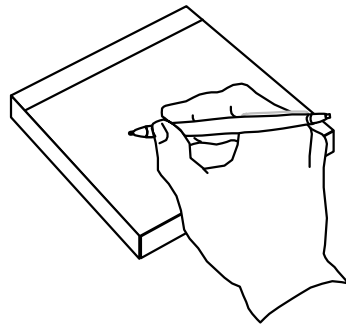
## Spare parts table

**Spare parts**

Part No	Unit ID	Description	MTBF	Repair
AC41659	AC41659	System Board e251/451/651 e450/75	100 000	Yes
AC41658	AC41658	System Board x251/451/651 with audio	100 000	Yes
AC41687	AC41687	System Board x251/451/651 with audio (Socket 7 and version 1.5 of the Opti chipset) replaces AC41658.	100 000	
AC41681	AC41681	System Board x251/451/651 w/o audio	100 000	Yes
AC41689	AC41689	System Board x251/451/651 w/o audio (Socket 7 and version 1.5 of the Opti chipset) replaces AC41681	100 000	
AC41682	AC41682	System Board x451/s & x651/s	100 000	Yes
AC41655	AC41655	System Board s450/133n & s650/133	100 000	Yes
AF33384	AF33384	iNTEL PENTIUM 75MHz	-	No
AF33380	AF33380	iNTEL PENTIUM 100MHz	-	No
AF33386	AF33386	iNTEL PENTIUM 120MHz	-	No
AF33388	AF33388	iNTEL PENTIUM 133MHz	-	No
AF33390	AF33390	iNTEL PENTIUM 150MHz	-	No
AF33392	AF33392	iNTEL PENTIUM 166MHz	-	No
AF33701	AF33701	256kB async cache Module for 75MHz Pentium	100 000	No
AF33706	AF33706	256kB async cache Module for 100 & 133MHz Pentium	100 000	No
AF33702	AF33702	512kB async cache Module for 75MHz Pentium	100 000	No
AF33704	AF33704	512kB async cache Module for 100 & 133MHz Pentium	100 000	No
AF33710	AF33710	256kB pipeline burst sync cache Module for 100 to 166MHz Pentiums (code AC41669 used on most modules)	100 000	No
AF33712	AF33712	512kB pipeline burst sync cache Module for 100 to 166MHz Pentiums (code AC41668 used on most modules)	100 000	No
AC41639	AC41639	Backplane/ ISA-PCI / 2-slot	100 000	No
AC41638	AC41638	Backplane / ISA-PCI / 4-slot	100 000	No
AC41637	AC41637	Backplane / ISA-PCI / 6-slot	100 000	No
7768547	AF33256	4MB FP SIMM module (70ns, 72 pins, 32-bit)	-	Yes
AF33291	AF33291	8MB FP SIMM module (70ns, 72 pins, 32-bit)	-	Yes
7768549	AF33258	16MB FP SIMM module (70ns, 72 pins, 32-bit)	-	Yes
7768550	AF33259	32MB FP SIMM module (70ns, 72 pins, 32-bit)	-	Yes
AF33800	AF33800	4MB EDO SIMM module (60ns, 72 pins, 32-bit)		
AF33810	AF33810	8MB EDO SIMM module (60ns, 72 pins, 32-bit)		
AF33802	AF33802	16MB EDO SIMM module (60ns, 72 pins, 32-bit)		
AC41635	AC41635	Ethernet PCI module	-	Yes
AF81074	AF81074	Power Supply 75W (2-slot, FAN attached)	100 000	Yes
AF81069	AF81069	Power Supply 120W (4-slot, FAN attached)	100 000	Yes

Part No	Unit ID	Description	MTBF	Repair
AF81053	AF81053	Power Supply 200W (6-slot, FAN attached)	200 000	Yes
AF81076	AF81076	Power Supply 65W (Expansion unit)	100 000	Yes
7766362	AF22128	FDD 3.5" 1.44MB (w/o front panel for 2/4-slot)	30 000	No
7764266	AF22123	FDD 3.5" 1.44MB (w/o front panel for 6-slot)	30 000	No
AF21210	AF21210	HDD 3.5" 540MB IDE	300 000	Yes
AF21209	AF21209	HDD 3.5" 850MB IDE (4500 rpm)	300 000	Yes
AF21208	AF21208	HDD 3.5" 1GB IDE	300 000	Yes
AF21214	AF21214	HDD 3.5" 1.2GB IDE	300 000	Yes
AF21222	AF21222	HDD 3.5" 1.2GB IDE	300 000	Yes
AF21202	AF21202	HDD 3.5" 2GB IDE	300 000	Yes
AF21192	AF21192	HDD 3.5" 1GB SCSI		
AF21220	AF21220	HDD 3.5" 2GB SCSI		
AF31078	AF31078	Adaptec 1510B SCSI adapter (ISA)	100 000	No
AF31075	AF31075	Adaptec 2940 SCSI host adapter (PCI)		
AF31079	AF31079	Adaptec 2940U SCSI host adapter (PCI)		
AF31357	AF31357	ErgoGrafix 664 PCI graphics adapter	-	No
AF31545	AF31545	New version of ErgoGrafix 664 PCI graphics adapter (new ATI chip)		No
AF31542	AF31542	Matrox Millennium PCI graphics adapter		
PL060595	PL060595	MPEG and Video capture module for Matrox Millennium		
PL060596	PL060596	4MB memory module for Matrox Millennium		
AF30064	AF30064	Aztech sound board		
PL060597	PL060597	Wavetable kit for Aztech sound board		
7766559	A9345084	Front panel 3.5" (4-slot)	-	No
7766558	A9345085	Front panel 5.25" + 3.5" (4-slot)	-	No
7766139	A9401230	cable, 1* FDD (2 / 4-slot)	-	No
7764873	A9400876	cable, 1* HDD IDE (2 / 4-slot)	-	No
7766383	A9401344	cable, 2* HDD IDE (4-slot, e450/75)	-	No
A8900036	A8900036	cable, 1*HDD + 1*IDE CD-ROM	-	No
A8900052	A8900052	cable, 1*IDE CD-ROM	-	No
A8900053	A8900053	cable, 1*FDD (e650/75)	-	No
A8900055	A8900055	cable, 2*HDD (e650/75)	-	No
A8900041	A8900041	cable, Audio, System Board - CD-ROM	-	No
A8900059	A8900059	cable, External serial, System Board - ext. connector	-	No
AC41645	AC41645	Voltage regulator for 120MHz to 166MHz CPUs	-	No
A5447659	A5447659	Short circuit link (jumper)		No
A9345171A	A9345171A	LED board (4 slots)	-	No
A9400779	A9400779	Lock assembly (2-slot)	-	No

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