

# PC Specialist's Handbook

## *ErgoPro*

*e452/652 models*

*x453/653 models*

  
FUJITSU

Edition 2, Release 3 - June 1998

---

**FUJITSU Computers ErgoPro e452, x & xs 453/653 models PC Specialist's Handbook****Document number PM03232EF**

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

Fujitsu Computers endeavours to ensure that the information in this document is correct, but accepts no liability for any error or omission in the same.

Any procedures described in this document for operating Fujitsu Computers products should be read and understood by the operator before such products are used. To ensure that Fujitsu Computers products function without risk to safety or health, such procedures should be strictly observed by the operator. The development of Fujitsu Computers products and services is continuous and published information may not be up to date. Any particular issue of a product may contain part only of the facilities described in this document or may contain facilities not described herein. It is important to check the current position with Fujitsu Computers.

Specifications and statements as to performance in this document are Fujitsu Computers estimates intended for general guidance. They may require adjustment in particular circumstances and should therefore not be taken as formal offers or commitments.

Statements in this document are not part of a contract or program product licence save insofar as they are incorporated into a contract or licence by express written reference. Issue of this document does not entitle the recipient to access to or use of the products described, and such access or use may be subject to separate contracts or licences.

Products mentioned in this document may be trademarks or registered trademarks of their respective manufacturers.

© FUJITSU ICL Computers 1998

**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.

Eksplønsjonsfare ved feilaktig håndtering. Utskiftning 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 suositteluun tyypin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

Eksplønsjonsfare. Ved utskifting 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 apparattillverkaren. 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.

## Table of contents



### Section 1 : Servicing the unit

#### 4-Slot assembly/disassembly

Opening & closing the system unit cover .....	1-2
Removing and installing the mass memory carriage .....	1-2
Installing and removing mass memory devices .....	1-3
Removing the power supply .....	1-3
Removing the 5.25" carriage .....	1-4

#### 6-Slot assembly/disassembly

Opening & closing the system unit cover .....	1-5
Removing the mass memory carriage .....	1-5
Removing the power supply and backplane board .....	1-6
Replacing the motherboard .....	1-7

#### Mass memory expansion unit

Differing the main unit from the expansion box .....	1-8
Removing the disk/power carriage from the expansion unit .....	1-9
Expansion unit cables .....	1-9



### Section 2 : System Board & Jumper settings

#### System board AC41683/730

Block diagram .....	2-2
System board layout .....	2-3
System board jumpers .....	2-5
CPU voltage selection .....	2-6

#### System board AC41677/691/692/703

Block diagram .....	2-7
System board layout .....	2-8
System board jumpers .....	2-10
CPU Voltage selection .....	2-12
AMC Audio output (termination jumpers) .....	2-12
Graphics memory upgrade (jumpers) .....	2-12

#### System board AC41694/695/696/733/734

Block diagram .....	2-12
System board layout .....	2-13
System board jumpers .....	2-15
CPU Voltage selection .....	2-16
AMC Audio output (termination jumpers) .....	2-16
Graphics memory upgrade (jumpers) .....	2-16

#### Other boards

4-slot PCI/ISA back plane AC41638/98 .....	2-19
4-slot PCI/ISA back plane AC41693/99 .....	2-19
6-slot PCI/ISA back plane AC41637 .....	2-19
10/100Mbps Ethernet module PN010126 .....	2-20
Matrox Millennium AF31542 Graphic adapter .....	2-20
Aztech MM Pro 16III-3D Pnp .....	2-20



### Section 3 : System setup

#### Entering Setup

Entering SETUP with passwords .....	3-2
Moving around in SETUP .....	3-2
Setting parameters to default values .....	3-2

<b>Exiting SETUP</b>	
Saving changes and exiting .....	3-3
Exiting without saving changes .....	3-3
<b>SETUP screens and parameters</b>	
User menu .....	3-4
Admin menu .....	3-7
Info menu .....	3-14
Help menu .....	3-14



## Section 4 : Miscellaneous & Hints

<b>BIOS</b>	
Shadow option prompts .....	4-2
BIOS modules .....	4-2
<b>Drivers</b>	
List of drivers .....	4-4
Video .....	4-4
<b>Utilities</b>	
Video - ErgoGrafix .....	4-4
PowerMASTER .....	4-5
<b>Tips &amp; Hints</b>	
Using memory managers .....	4-5
Using ISA Configuration Utility (ICU) .....	4-5
Using DOS programs written for Sound Blaster pro .....	4-5
Hard disk partitioning (DOS 6.X) .....	4-6



## Section 5 : Power-on test & error indications

<b>Power On Self Test (POST)</b>	
Two long beeps and a message .....	5-2
Sequences of four or eight beeps .....	5-7
Sequences of five beeps .....	5-7
<b>BIOS check points</b> .....	5-8



## Section 6 : Input, Output & Special functions

<b>Audio</b> .....	6-2
<b>Floppy disk controller</b> .....	6-2
<b>Serial port communication</b> .....	6-2
<b>IrDA</b> .....	6-2
<b>Parallel port communication</b> .....	6-3
<b>PCI bus enhanced IDE interface</b> .....	6-3
<b>Keyboard &amp; mouse</b> .....	6-3
<b>Video (AC41677/683/691/692/703)</b> .....	6-3
<b>Video (AC41694/695/696/706/733/734)</b> .....	6-3
<b>Video x453/XXXs and x653/XXXs</b> .....	6-3
<b>Refresh rates</b> .....	6-4
<b>Video memory upgrades for the on-board adapter</b> .....	6-4
<b>AMC (Ati Multimedia Channel)</b> .....	6-5
<b>Fast Ethernet Module</b> .....	6-5
<b>Peripheral Component Interconnect (PCI interface)</b> .....	6-5
<b>LED board</b> .....	6-5



**Section 7 : Pin assignments**

Parallel port (Standard mode) ..... 7-2

Serial ports ..... 7-2

Mouse port..... 7-3

Keyboard connector ..... 7-3

Universal Serial Bus (USB) connector ..... 7-3

RJ45 (standard twisted pair) Ethernet port ..... 7-4

AUI Ethernet port ..... 7-4

VGA-type connector..... 7-5

VGA pass-through/AMC connector on system board ..... 7-6

ISA bus connector ..... 7-7

PCI bus connector ..... 7-8

SCSI port connector ..... 7-9

Audio connectors..... 7-10

Speaker type connector..... 7-10

Microphone type connector ..... 7-10

Line-In type connector..... 7-10

Midi/Joystick connector ..... 7-10



**Section 8 : Machines identification**

Structure code..... 8-2

Identification codes ..... 8-3



**Section 9 : Specification tables and Memory tables**

Machine specifications..... 9-2

System memory map ..... 9-7

Memory configurations (e-series)..... 9-8

SIMM recommendations (e-series) ..... 9-8

Memory configurations (x & xs-series) ..... 9-9

DIMM recommendations (x & xs-series) ..... 9-9

DMA channels ..... 9-10

Interrupt levels ..... 9-11

I/O addresses ..... 9-12

Timer ..... 9-13

Real-time clock (RTC) and CMOS RAM..... 9-13

Power supply..... 9-14

Characteristics ..... 9-14

Air circulation ..... 9-14

Power consumption..... 9-14



## List of pictures

4-slot PCI/ISA back plane AC41638/98 .....	2-19
4-slot PCI/ISA back plane AC41693/99 .....	2-19
6-slot PCI/ISA back plane AC41637 .....	2-19
AC41677/691/692/703 AMC Audio termination .....	2-12
AC41677/691/692/703 Block diagram .....	2-7
AC41677/691/692/703 CPU voltage selection jumpers .....	2-12
AC41677/691/692/703 Graphics memory upgrade .....	2-12
AC41677/691/692/703 Jumper block .....	2-10
AC41677/691/692/703 System Board Layout .....	2-8
AC41683/730 Block diagram .....	2-2
AC41683/730 CPU voltage selection jumpers .....	2-6
AC41683/730 Jumper block .....	2-5
AC41683/730 System Board Layout .....	2-3
AC41694/695/696/733/734 AMC Audio termination .....	2-16
AC41694/695/696/733/734 Block diagram .....	2-12
AC41694/695/696/733/734 CPU voltage selection jumpers .....	2-16
AC41694/695/696/733/734 Graphics memory upgrade .....	2-16
AC41694/695/696/733/734 Jumper block .....	2-15
AC41694/695/696/733/734 System Board Layout .....	2-13
Aztech MM Pro 16III-3D Pnp .....	2-20
Differing the main unit from the expansion box .....	1-8
Ethernet module .....	2-20
Expansion unit cables .....	1-9
Force flash load pads .....	2-17
Installing and removing mass memory devices on carriage .....	1-3
Matrox Millenium Graphic adapter .....	2-20
Opening and closing the 4 slot system cover .....	1-2
Opening and closing the 6 slot system cover .....	1-5
Removing the 5.25" carriage (4 slots) .....	1-4
Removing the Disk/Power carriage .....	1-9
Removing the mass memory carriage (4 slot) .....	1-2
Removing the mass memory carriage (6 slot) .....	1-5
Removing the motherboard (6 slots) .....	1-7
Removing the power supply (4 slot) .....	1-3
Removing the power supply (6 slot) and backplane board .....	1-6

## List of tables

Audio connectors pin assignement .....	7-10
Audio settings .....	6-2
AUI Ethernet port pin assignement .....	7-4
Bios ID .....	4-2
Bios reload error messages .....	5-8
DIMM recommandation (x & xs series) .....	9-9
DMA channels .....	9-10
Drivers.....	4-4
Hard disk partitioning .....	4-6
I/O adresses .....	9-12
Interrupt levels .....	9-11
ISA Bus pin assignement .....	7-7
Keyboard port pin assignement .....	7-3
Machines specifications .....	9-2
Memory configuration (e series) .....	9-8
Memory configuration (x & xs series) .....	9-9
MIDI/Joystick connector pin assignement .....	7-10
Mouse port pin assignement .....	7-3
Parallel port pin assignement .....	7-2
PCI Bus pin assignement .....	7-8
Power supply .....	9-14
Refresh rates .....	6-4
RJ45 port pin assignement .....	7-4
SCSI port connector pin assignement .....	7-9
Serial port pin assignement .....	7-2
SIMM recommandation (e series) .....	9-8
System memory map .....	9-7
Timer.....	9-13
USB port pin assignement .....	7-3
VGA connector pin assignement .....	7-5
VGA pass-through/AMC connector pin assignement .....	7-6
Video upgrades for On-board adapter .....	6-4





# **Section 1 :**

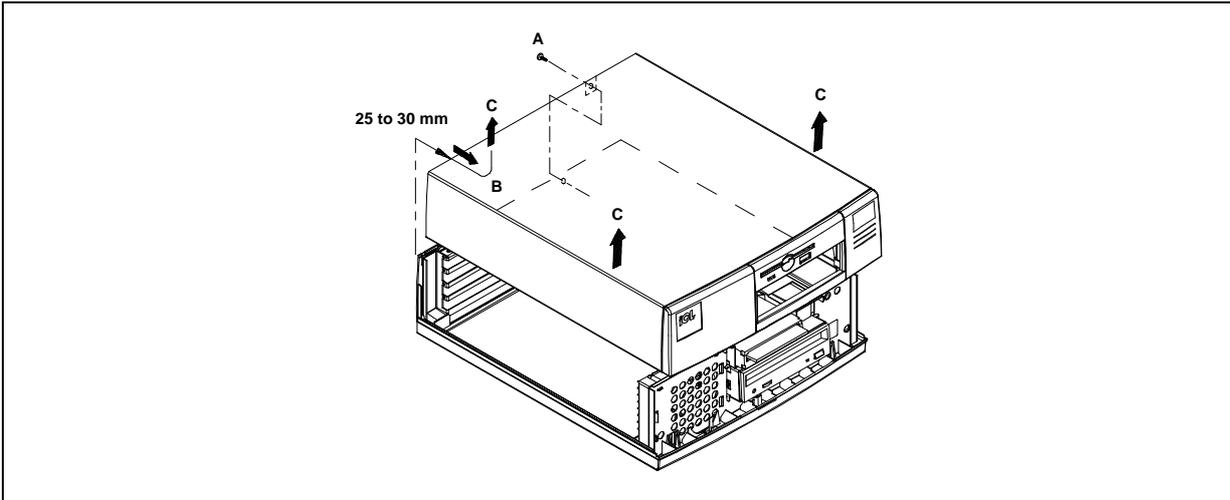
## **Disassembling the 4 slot unit & 6 slot unit**

## 4-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. 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.

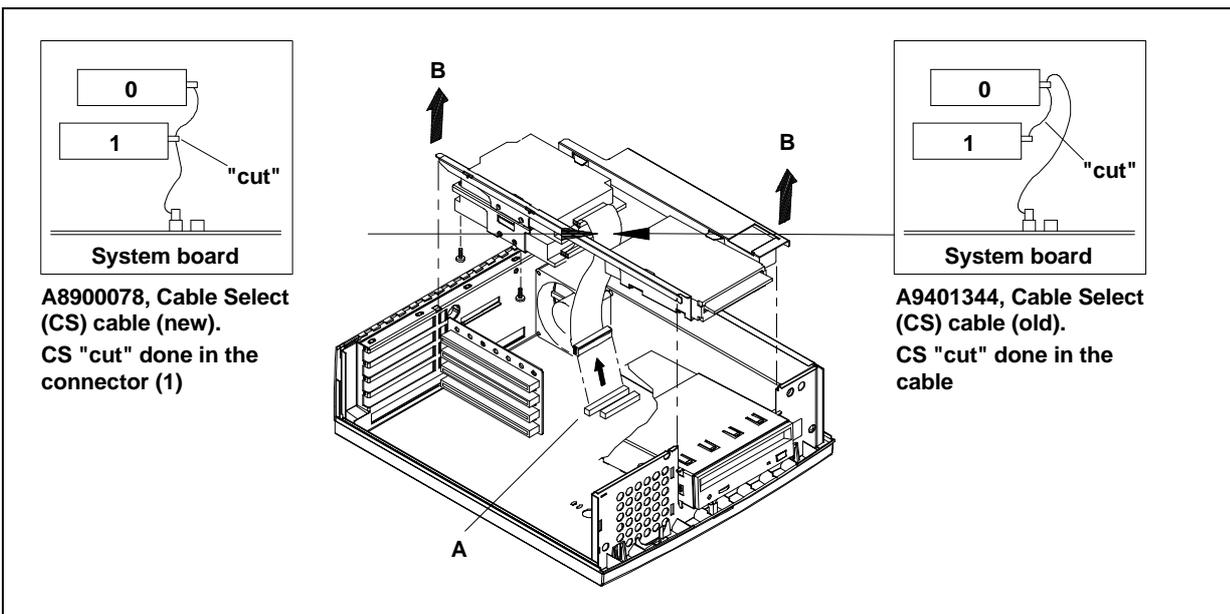


Picture 1: Opening and closing the 4 slot system cover

### 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.

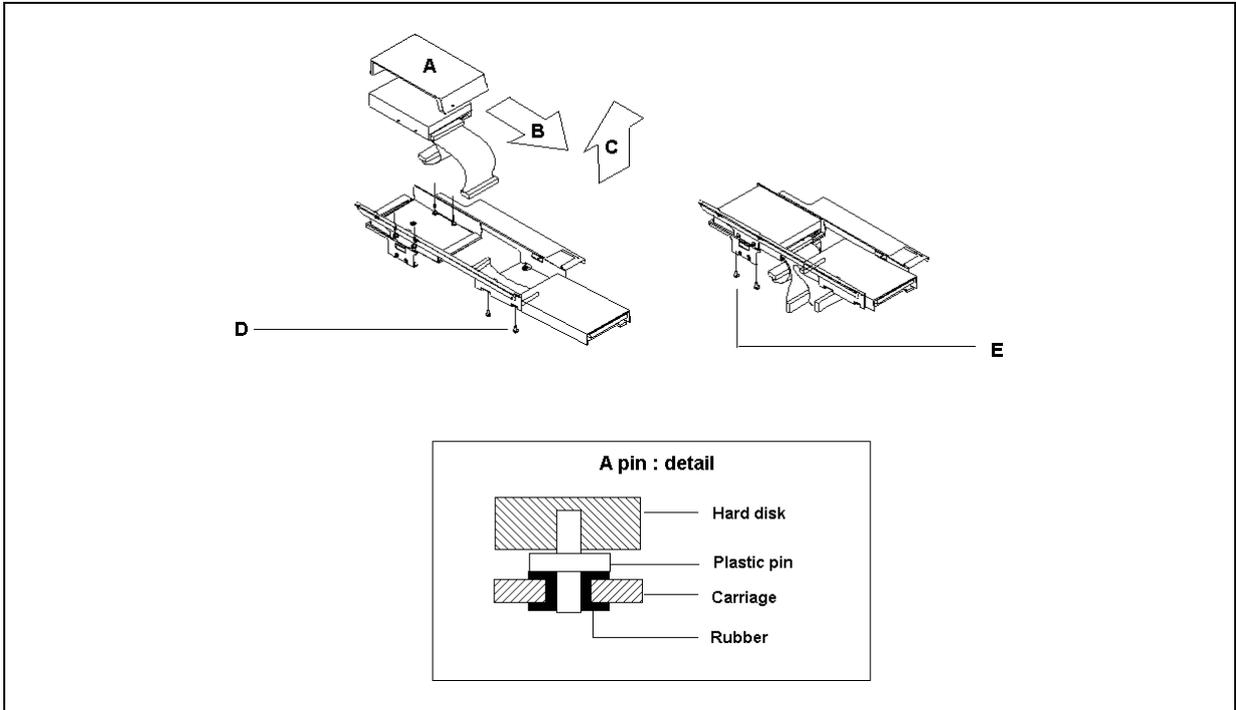
1. If the system is provided with the hard disk silencer, see instructions on the next page.
2. Disconnect the power and data cables from the fixed disk and diskette drives (A).
3. Take out the mass memory carriage (B)



Picture 2 : Removing the mass memory carriage (4 slot)

### Installing and removing mass memory devices

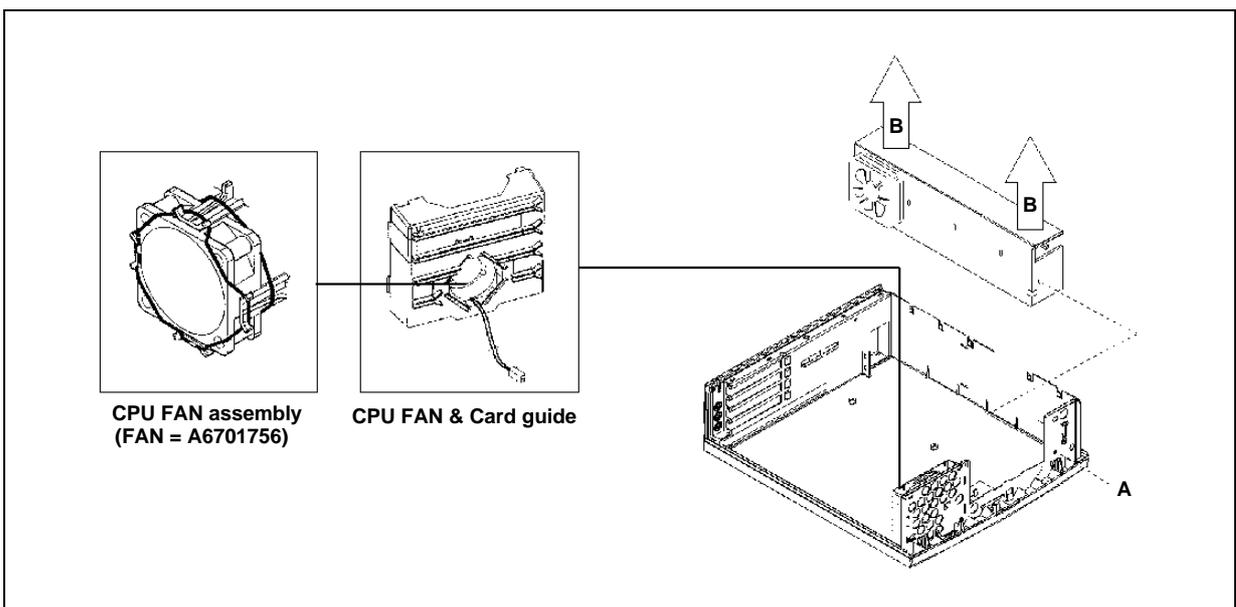
1. If the system is provided with a HD-silencer (A), pull the lower edge (B) of the silencer towards the floppy drive (about 2mm) lifting it up at the same time 20 to 30mm (C). Then push the silencer (about 3mm) towards the back panel, and lift it out. The hard drive itself is placed on plastic pins (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 3 : Installing and removing mass memory devices on carriage

### Removing the power supply

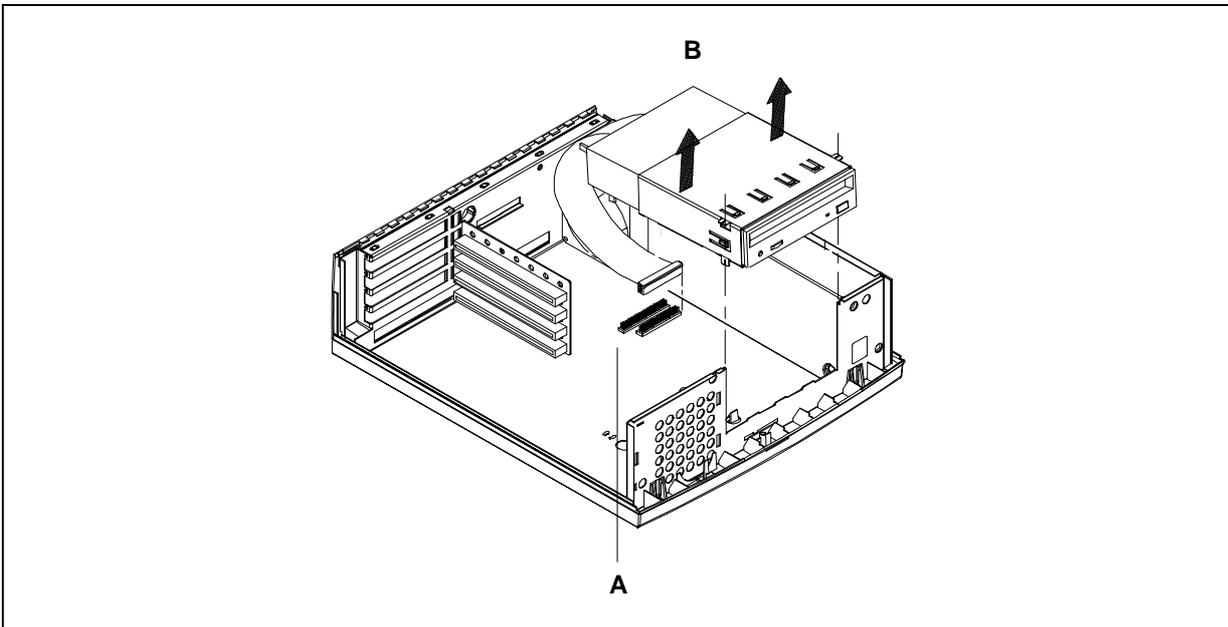
1. Remove the mass memory carriage
2. Disconnect all the cables from the power supply to the system board
3. Undo the screw which holds the power supply into the chassis (A).
4. Lift the power supply out of the chassis, lifting both ends (B) at the same time.



Picture 4 : 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).

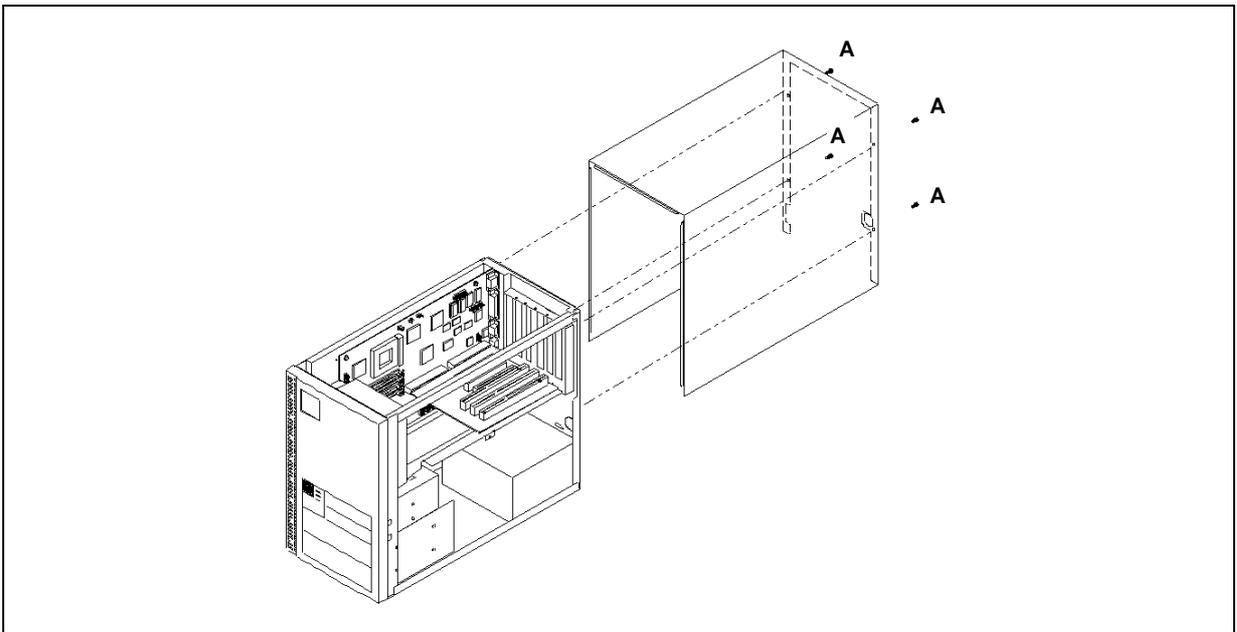


Picture 5 : Removing the 5.25" carriage (4 slots)

## 6-Slot assembly/disassembly

### 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).

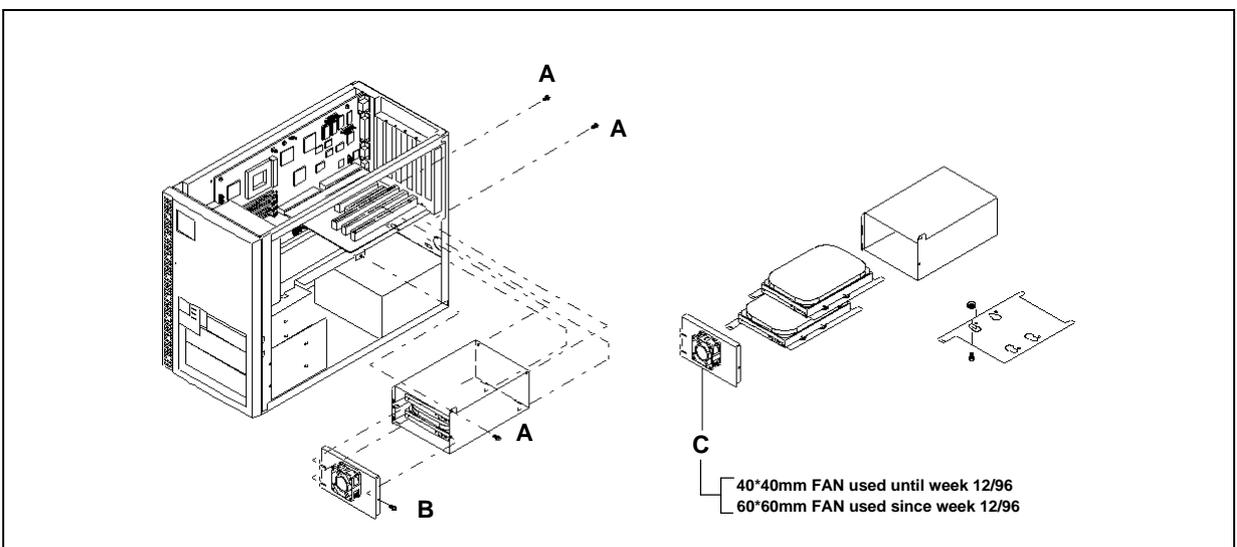


Picture 6 : Opening and closing the 6 slot system cover

### 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 7 : Removing the mass memory carriage (6 slot)

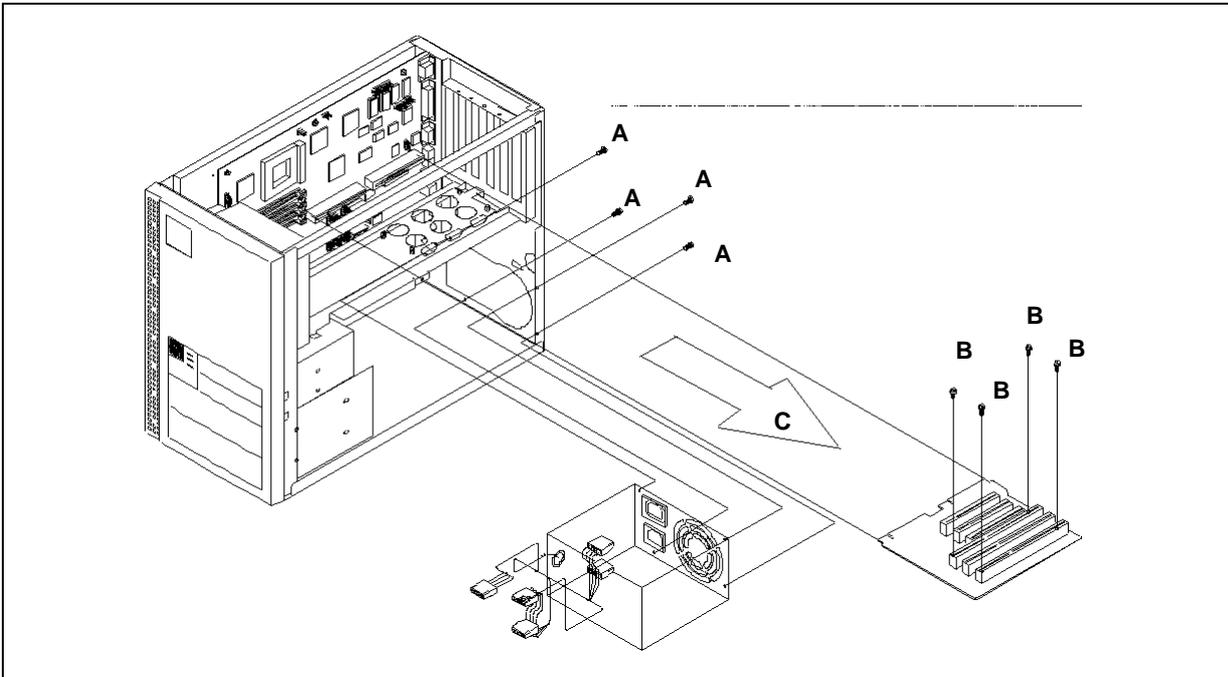
## Removing the power supply and backplane board

### 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

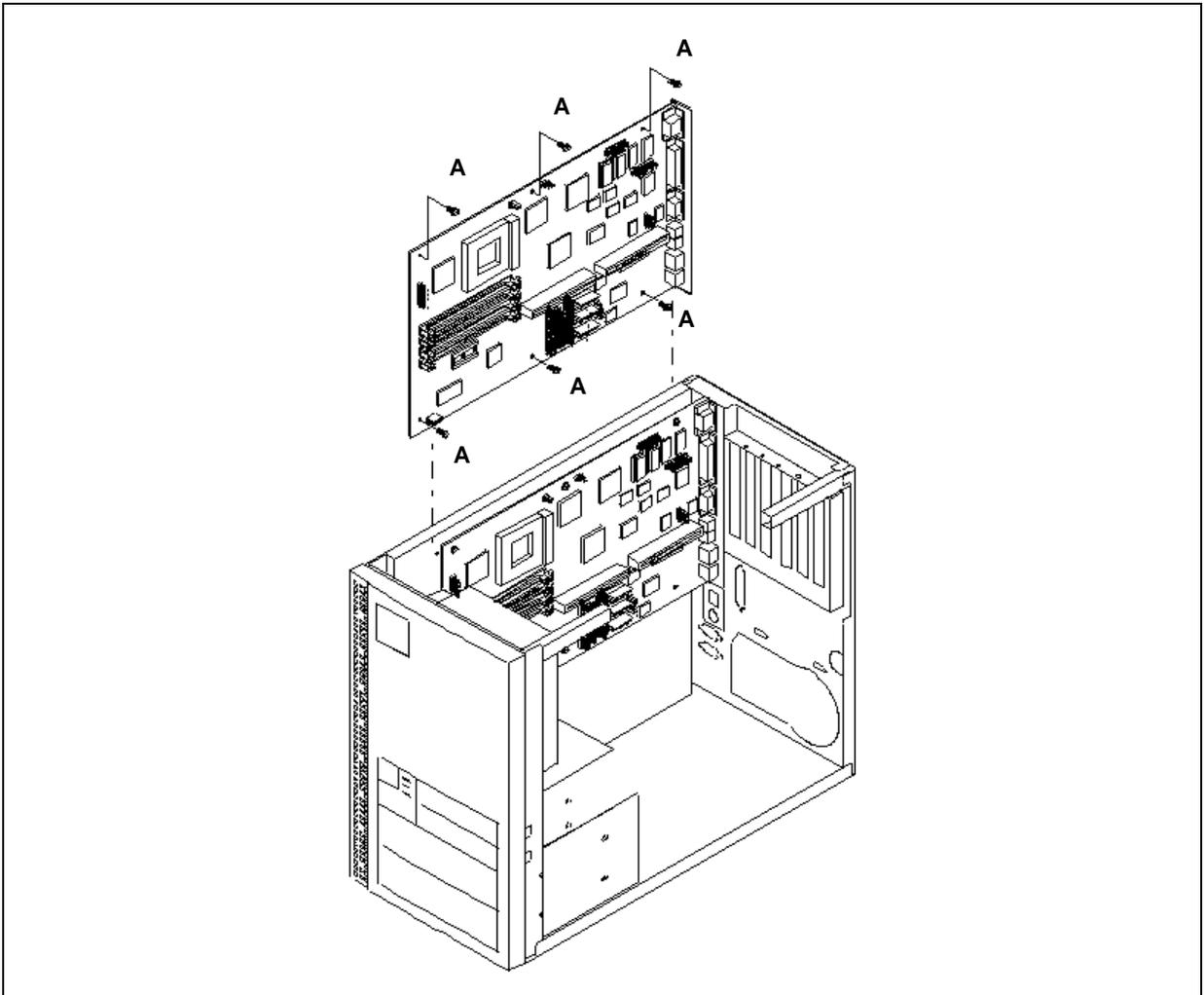
1. Undo the four screws (B) which hold the backplane into the chassis.
2. Pull the backplane out (C)



Picture 8 : 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.

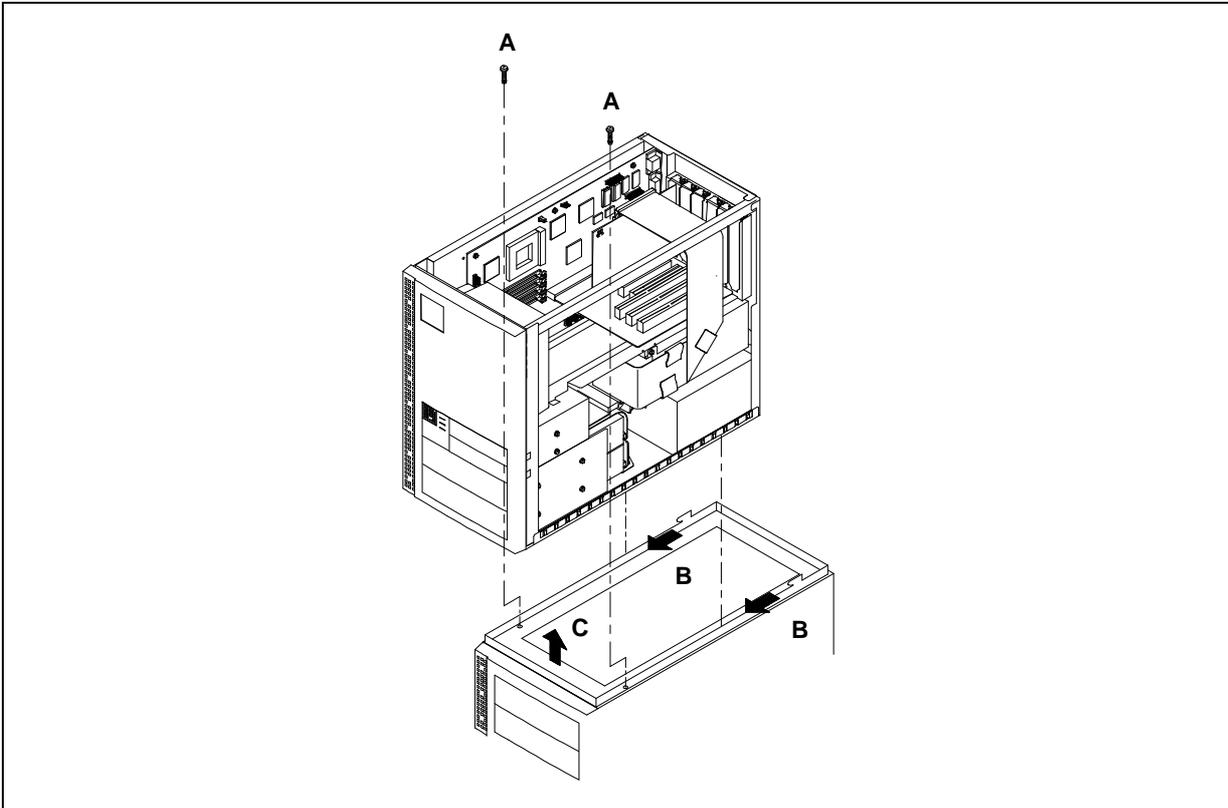


Picture 9 : Removing the motherboard (6 slots)

## Mass memory expansion unit

### Differing the main unit from the expansion box

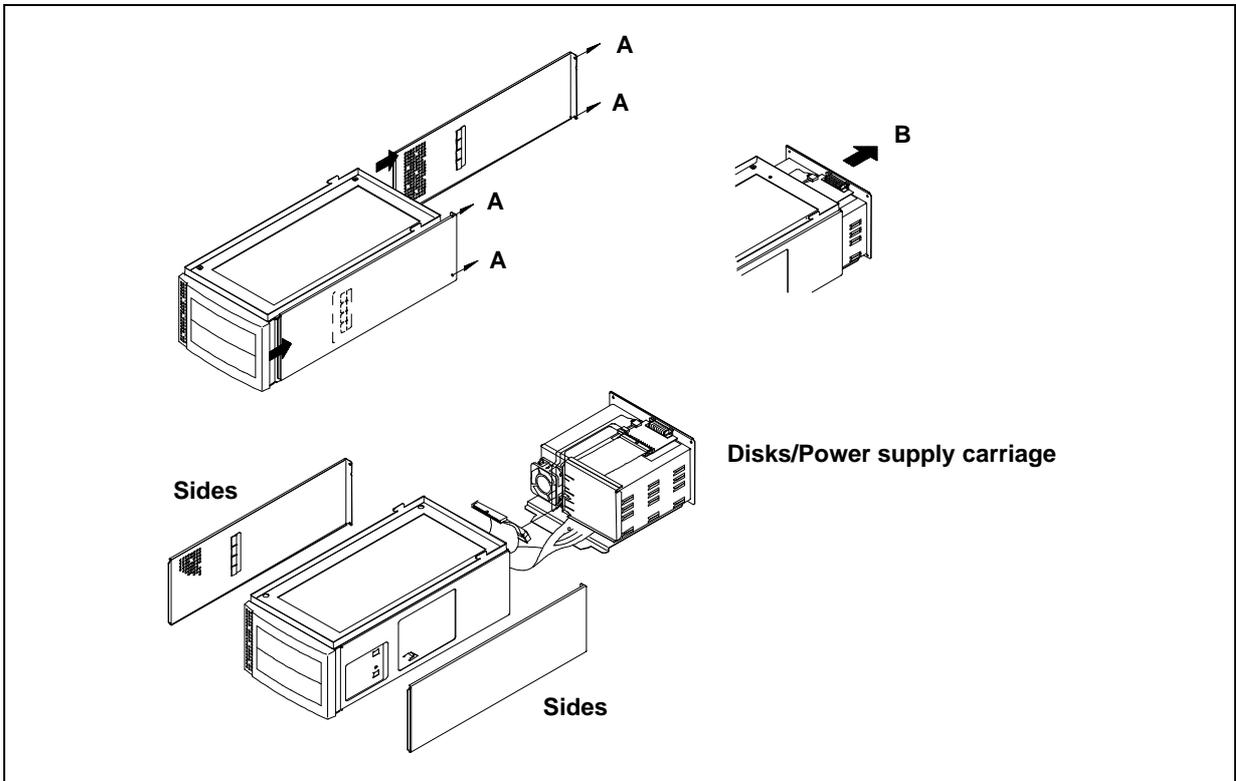
1. Disconnect the power cables and all the other cables connected to the unit.
2. Remove the main unit cover
3. Undo the screw (A) which secures the expansion unit into the chassis of the main unit.
4. Slide the main unit about 40mm(B) toward the front, and lift (C) it slowly straight up as in the picture.



Picture 10 : Differing the main unit from the expansion box

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

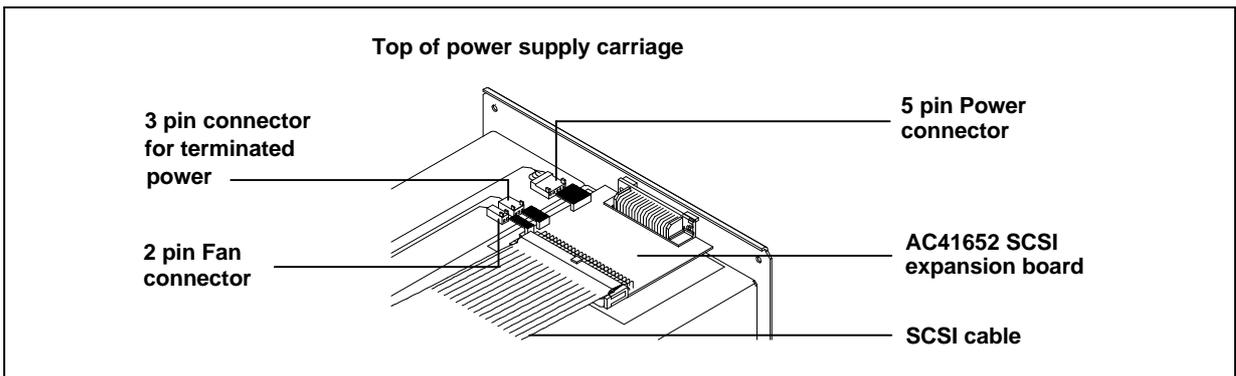
1. Undo the 4 screws (A) which secures the sides and the carriage into the chassis of the expansion unit.
2. Slide the sides toward the back to remove them (B)
3. Pull out the carriage from the back of the unit.



Picture 11: Removing the Disk/Power carriage

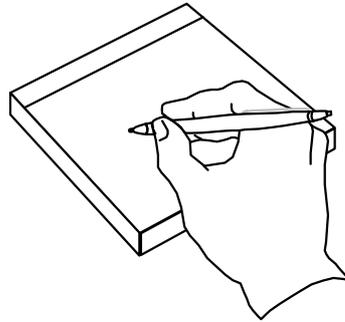
### Expansion unit cables

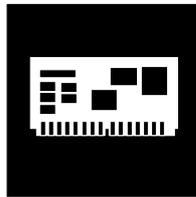
1. Undo the 4 screw (A) which secures the sides and the carriage into the chassis of the expansion unit.
2. Slide the sides toward the back to remove them (B)
3. Pull out the carriage from the back of the unit.



Picture 12 : Expansion unit cables

**THIS PAGE IS INTENTIONALLY LEFT BLANK !**



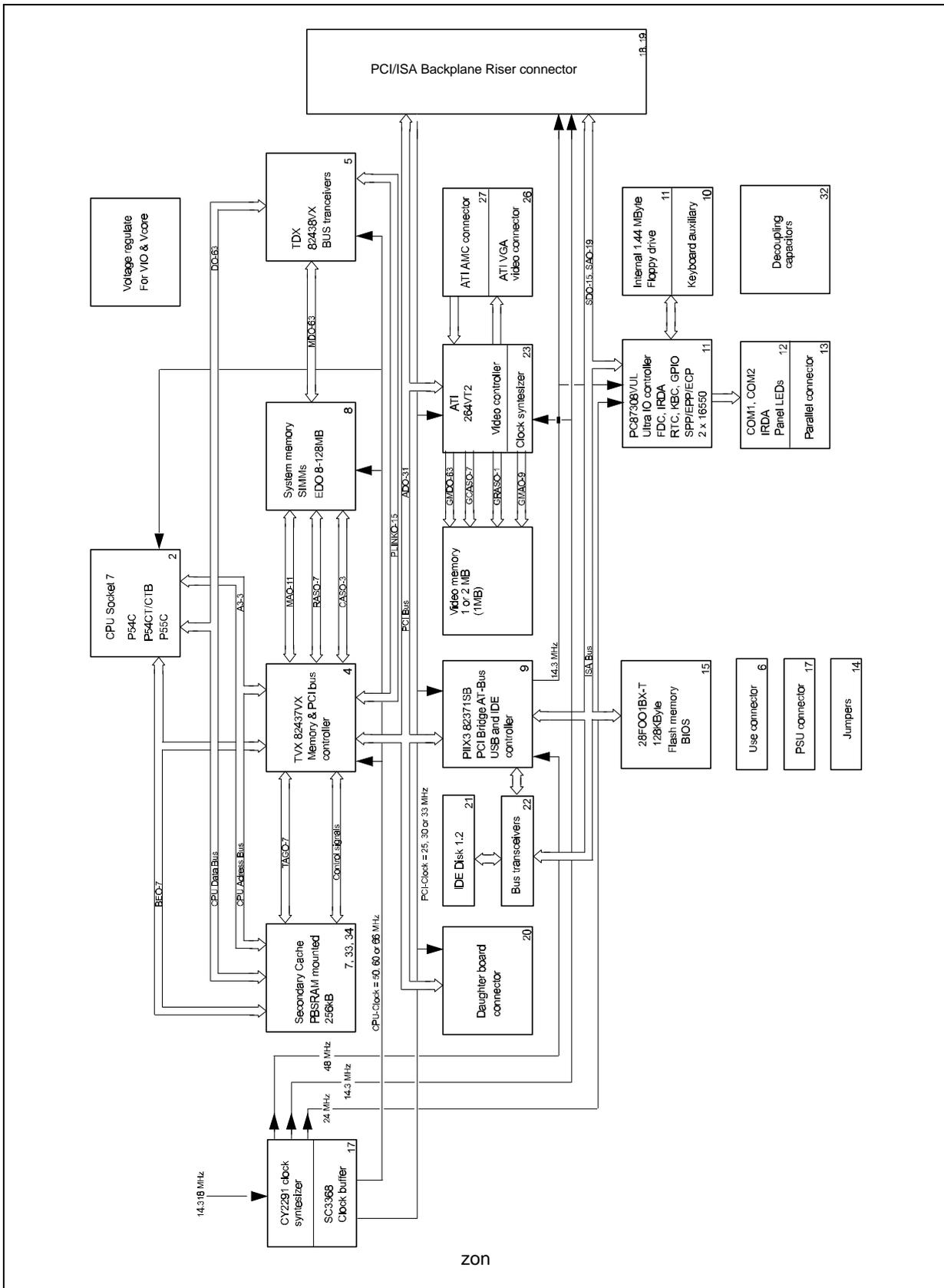


# Section 2 :

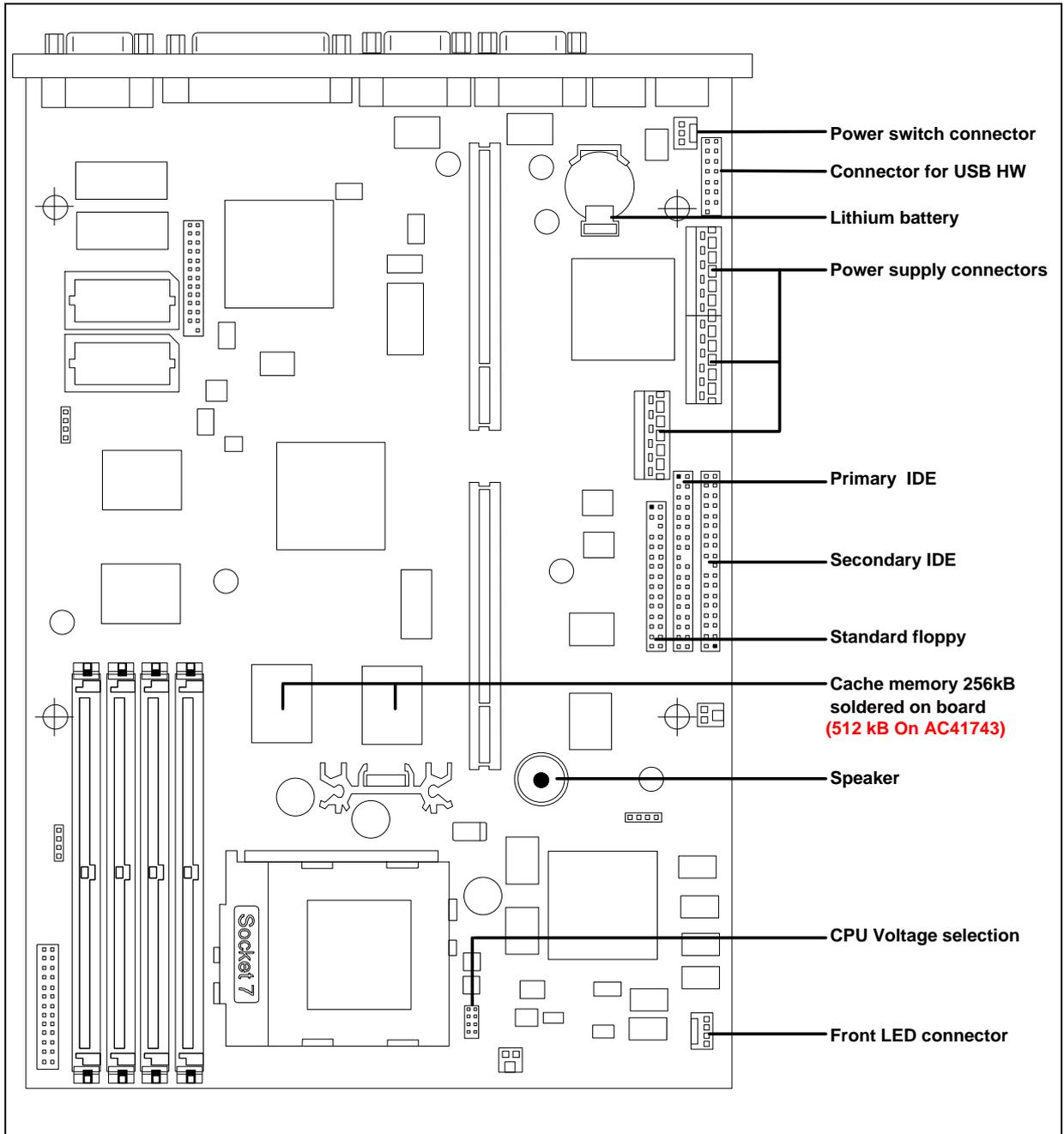
## Boards & Jumper settings

# System board AC41683/730/741/743

## Block diagram

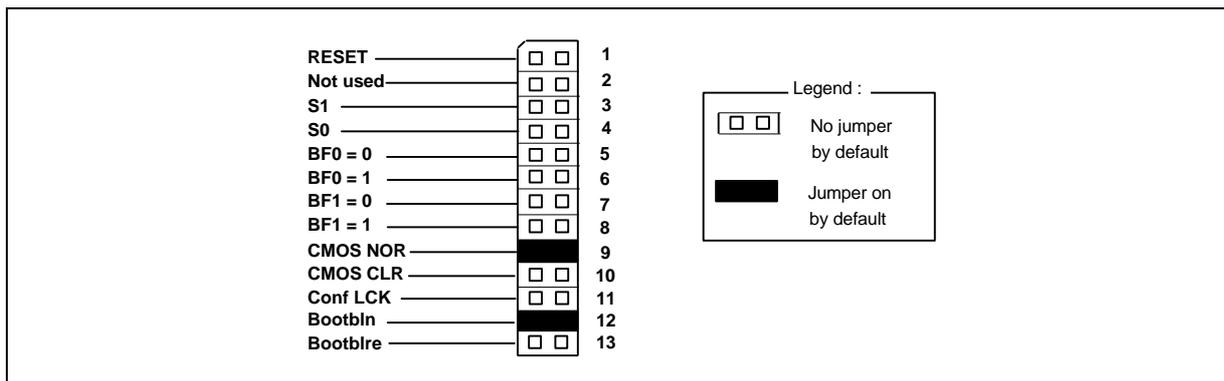


Picture 14 : AC41683/730/741/743 System Board Layout (1)



Picture 15 : AC41683/730/741/743 System Board Layout (1)

**System board jumpers (AC41683/730/741/743)**



Picture 16 : Jumper block for AC41683/730/741/743 System board

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

**S1, S0 &** Speed &

**BF0, BF1:** processor selection (see below)

Processor speed	120MHz (60*2)	133MHz (66.7*2)	150MHz (60*2.5)	166MHz (66.7*2.5)	200MHz (66.7*3)	233MHz (66.7*3.5)
<b>S1</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>S0</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>BF0 = 0</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>BF0 = 1</b>	<input type="checkbox"/>					
<b>BF1 = 0</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>BF1 = 1</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

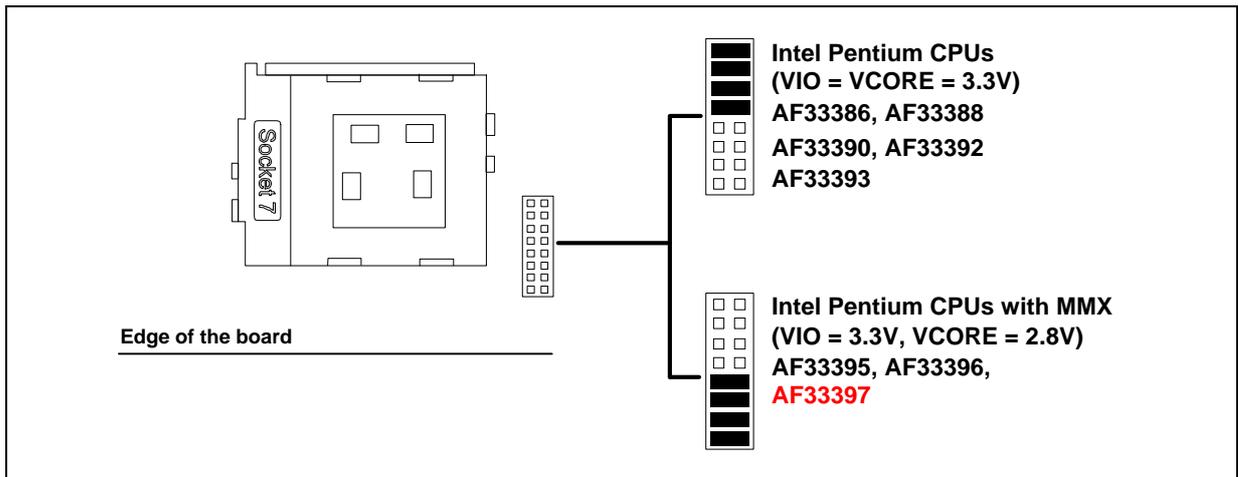
**CMOS CLR:** To clear the CMOS, switch off the power and disconnect the mains cable. Take out the jumper from **CMOS nor** pins and install it in this position; keep it there for 60 seconds, then put the jumper back to CMOS normal position and reconnect the mains cable.

**Conf LCK** 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. 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.

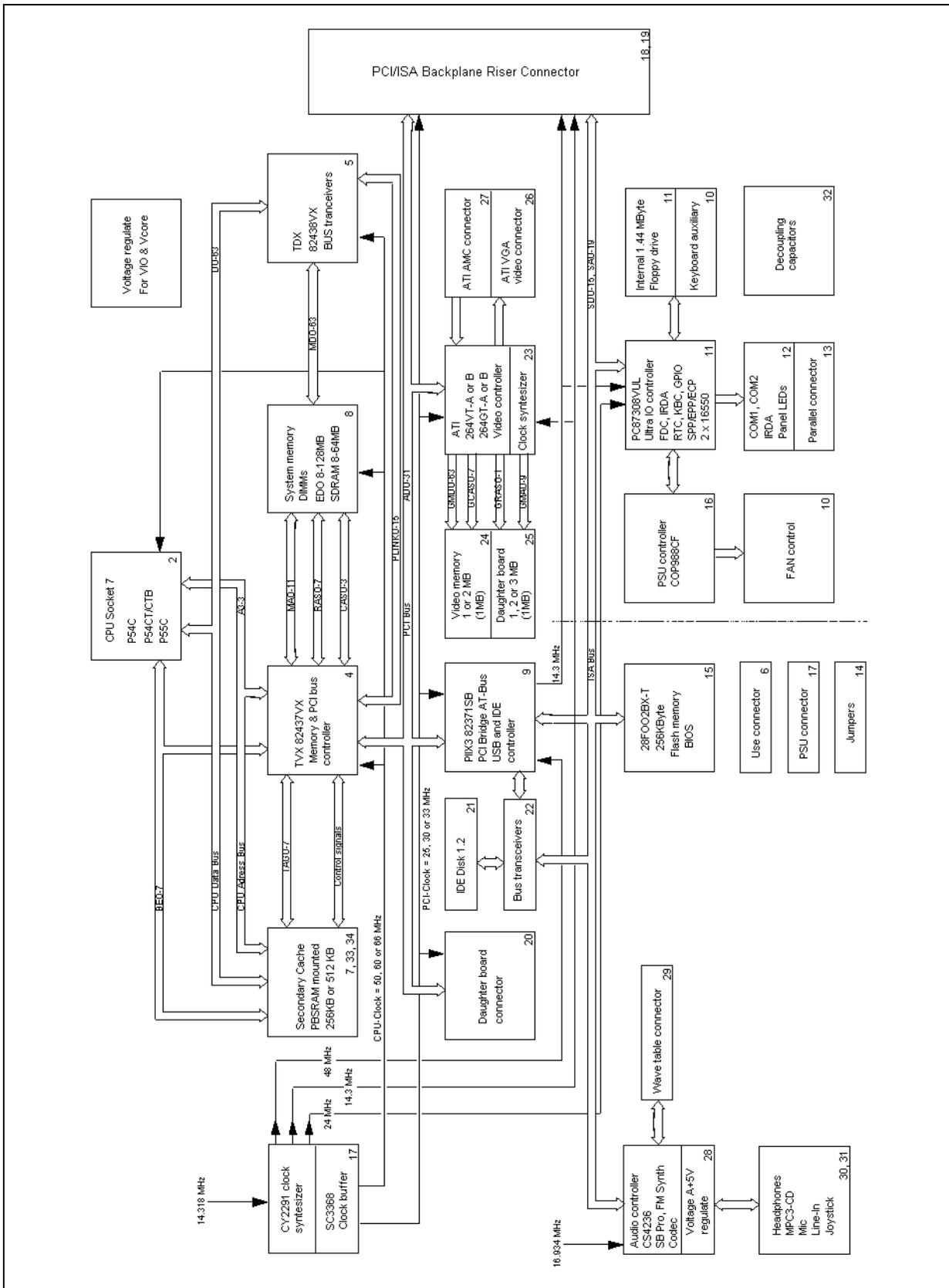
### CPU voltage selection



Picture 17: CPU voltage selection jumpers

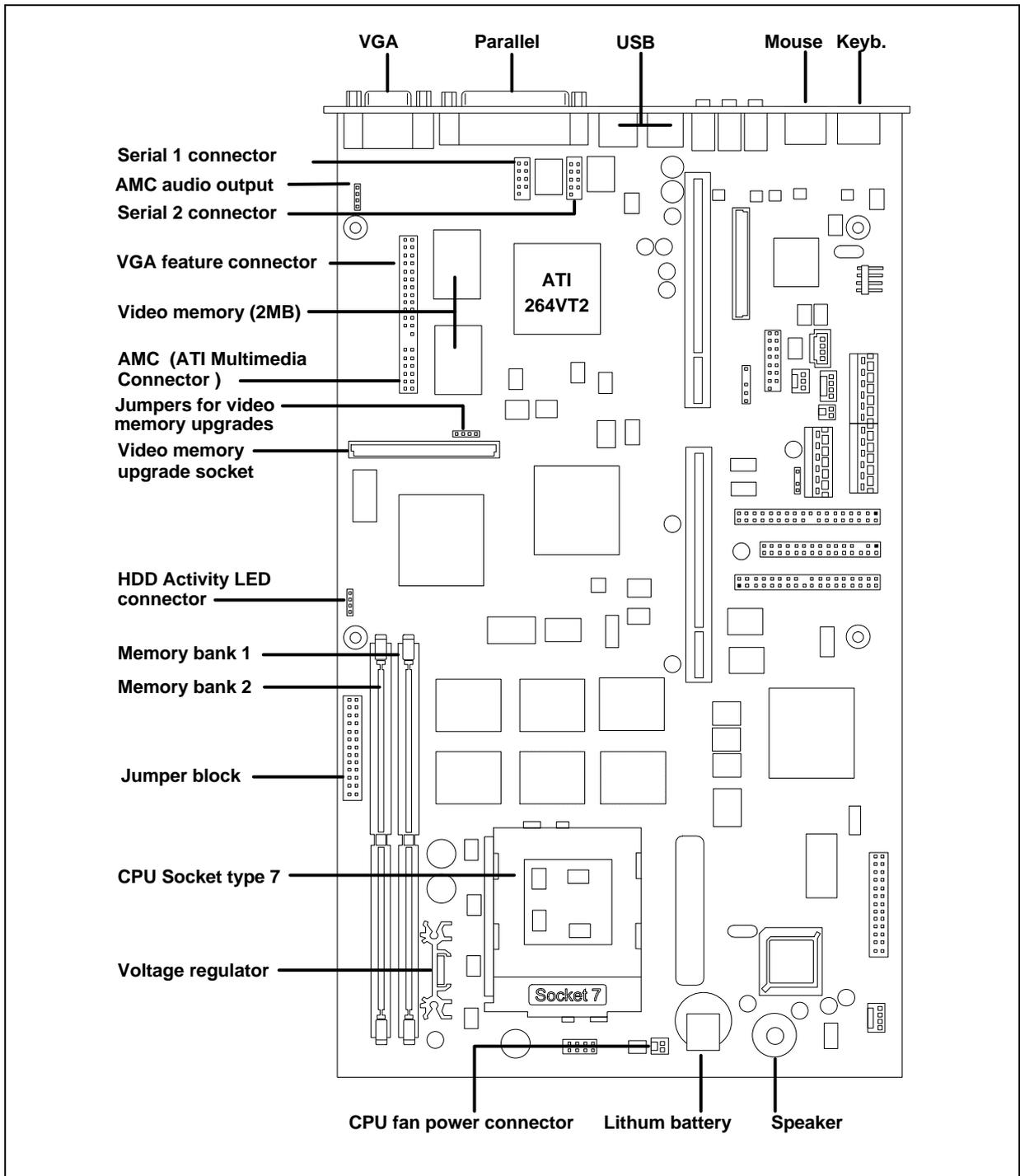
# System board AC41677/691/692/703

## Block diagram

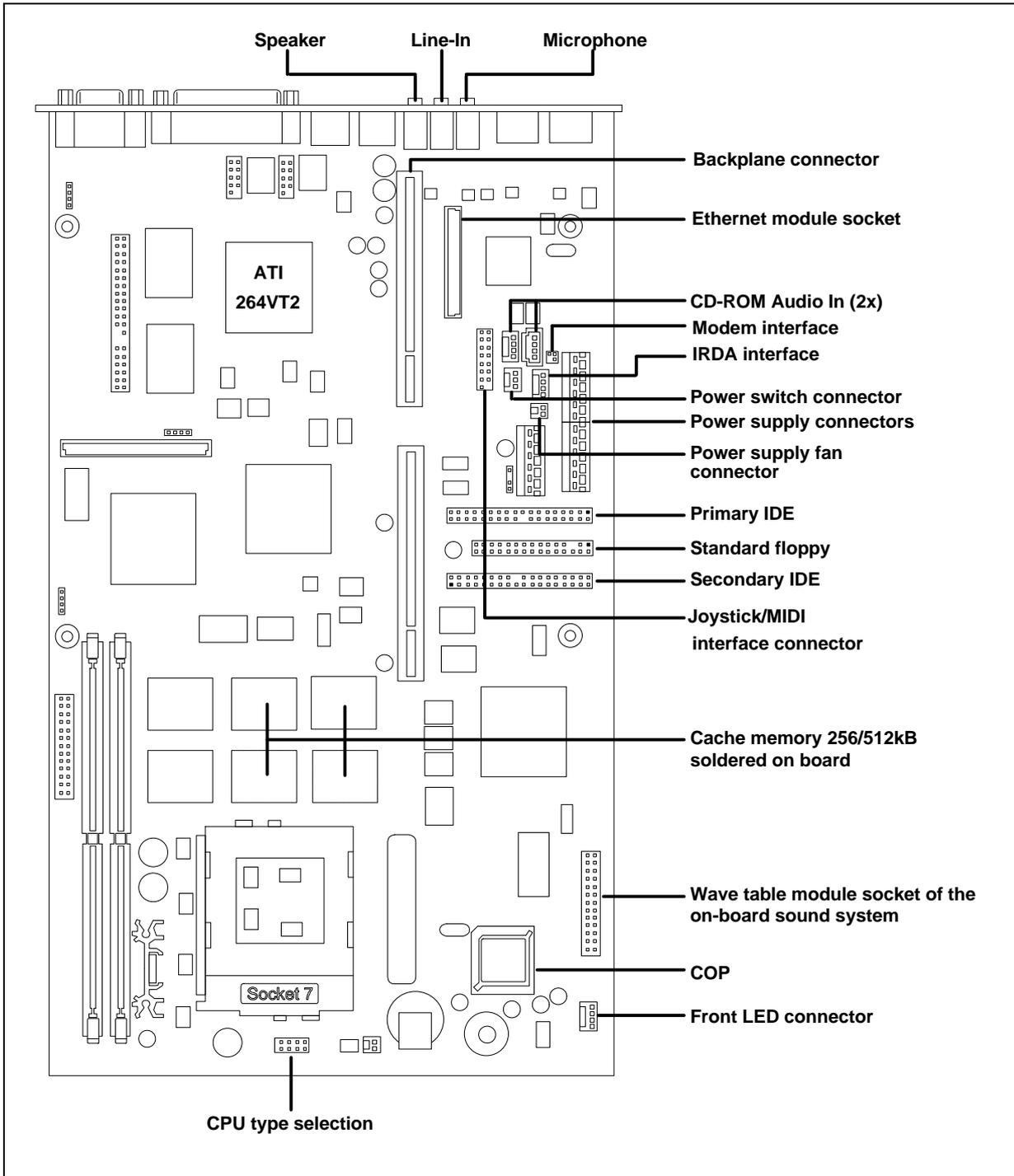


Picture 18 : AC41677/691/692/703 Block diagram

System board layout

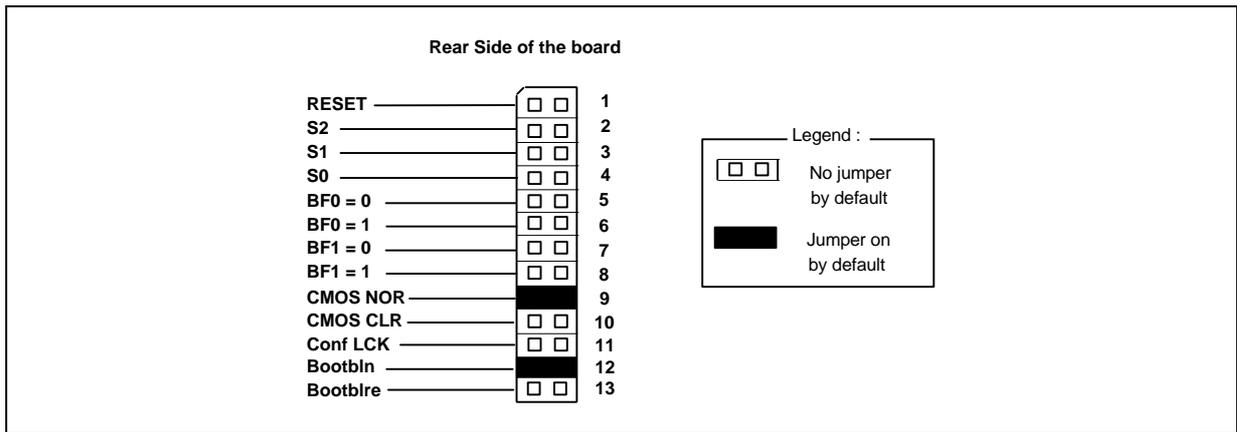


Picture 19 : AC41677/691/692/703 System Board Layout (1)



Picture 20 : AC41677/691/692/703 System Board Layout (2)

**System board jumpers (AC41677/691/692/703)**



Picture 21 : Jumper block for AC41677/691/692/703 System board

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

**S2, S1, S0 & Speed &**

**BF0, BF1:** processor selection (see below)

Note! pin pair S2 does not need a link on system boards which HW version is D or later.

Processor speed	120MHz (60*2)	133MHz (66.7*2)	150MHz (60*2.5)	166MHz (66.7*2.5)	200MHz (66.7*3)	233MHz (66.7*3.5)
<b>S2</b>	■	■	■	■	■	■
<b>S1</b>	■	□ □	■	□ □	□ □	□ □
<b>S0</b>	□ □	■	□ □	■	■	■
<b>BF0 = 0</b>	■	■	■	■	□ □	□ □
<b>BF0 = 1</b>	□ □	□ □	□ □	□ □	■	■
<b>BF1 = 0</b>	□ □	□ □	■	■	■	□ □
<b>BF1 = 1</b>	■	■	□ □	□ □	□ □	■

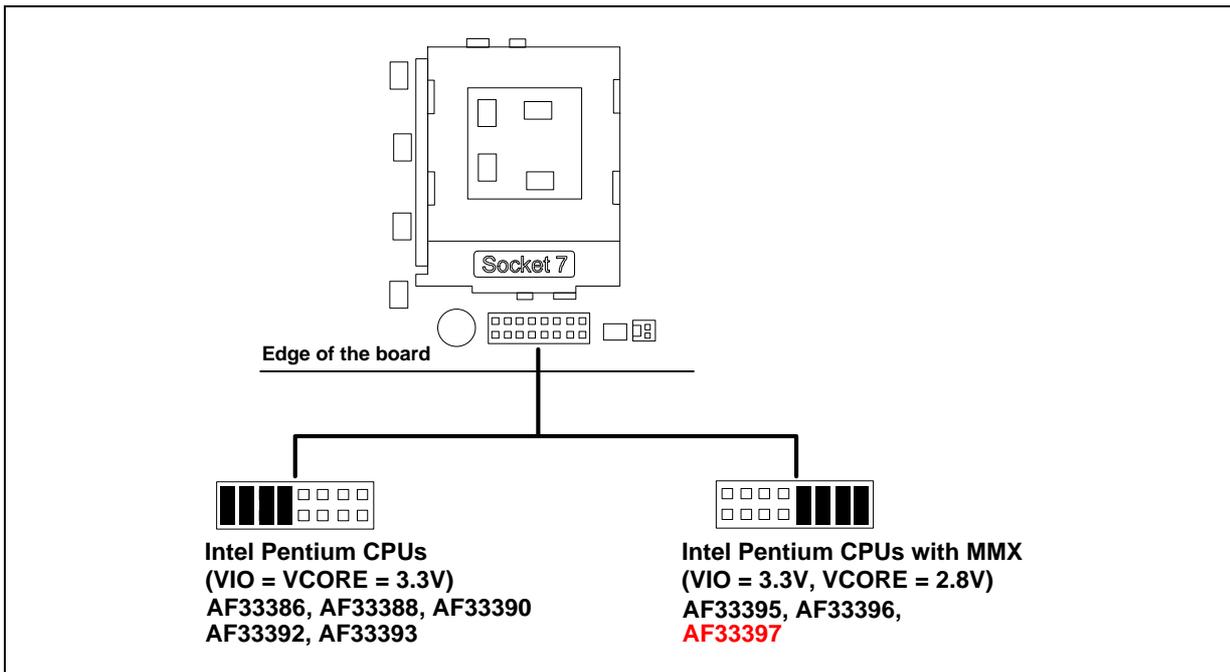
**CMOS CLR:** To clear the CMOS, switch off the power and disconnect the mains cable. Take out the jumper from **CMOS nor** pins and install it in this position; keep it there for 60 seconds, then put the jumper back to CMOS normal position and reconnect the mains cable.

**Conf LCK** 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.

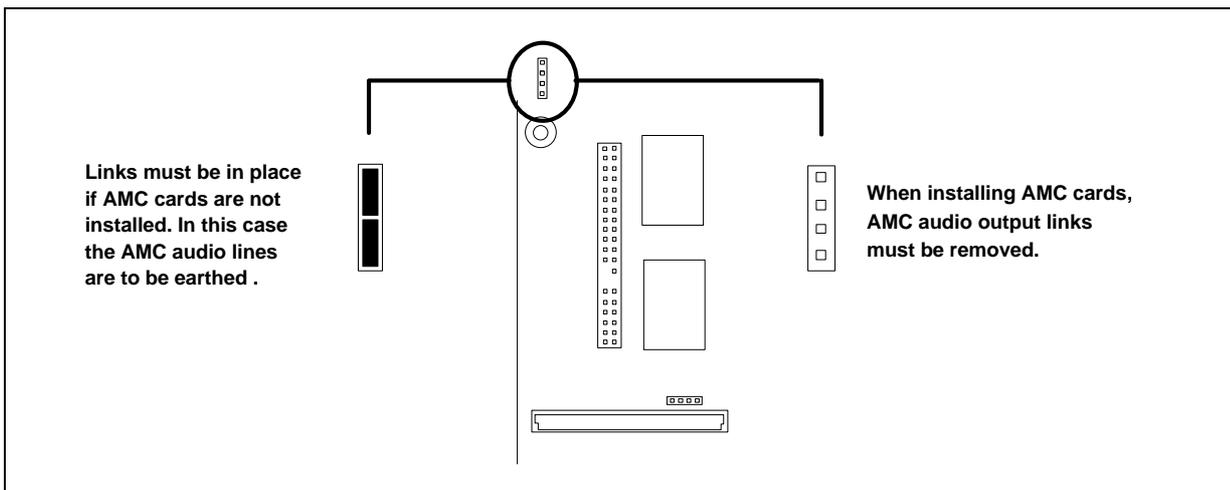
**BOOTBLRE:** If the loader (boot block) of the FLASHRAM BIOS needs to be updated, boot up the system, then remove the **BOOTBLN** jumper, and install the jumper in this position. Use FLASH.EXE file or the BIOS reload function of the resident setup utility to update the BIOS. Put the jumper back in the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

### CPU Voltage selection



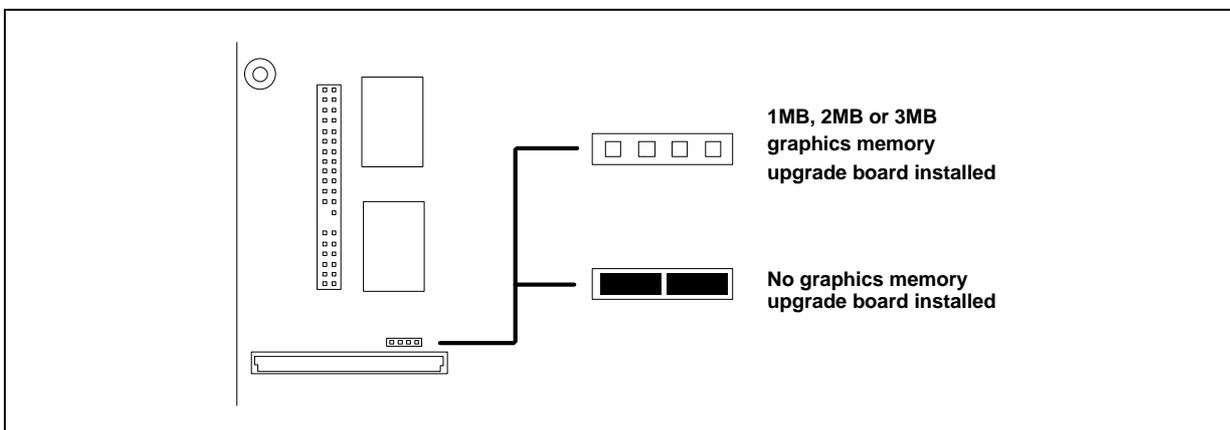
Picture 22: CPU voltage selection jumpers

### AMC Audio output (termination jumpers)



Picture 23: AMC Audio termination

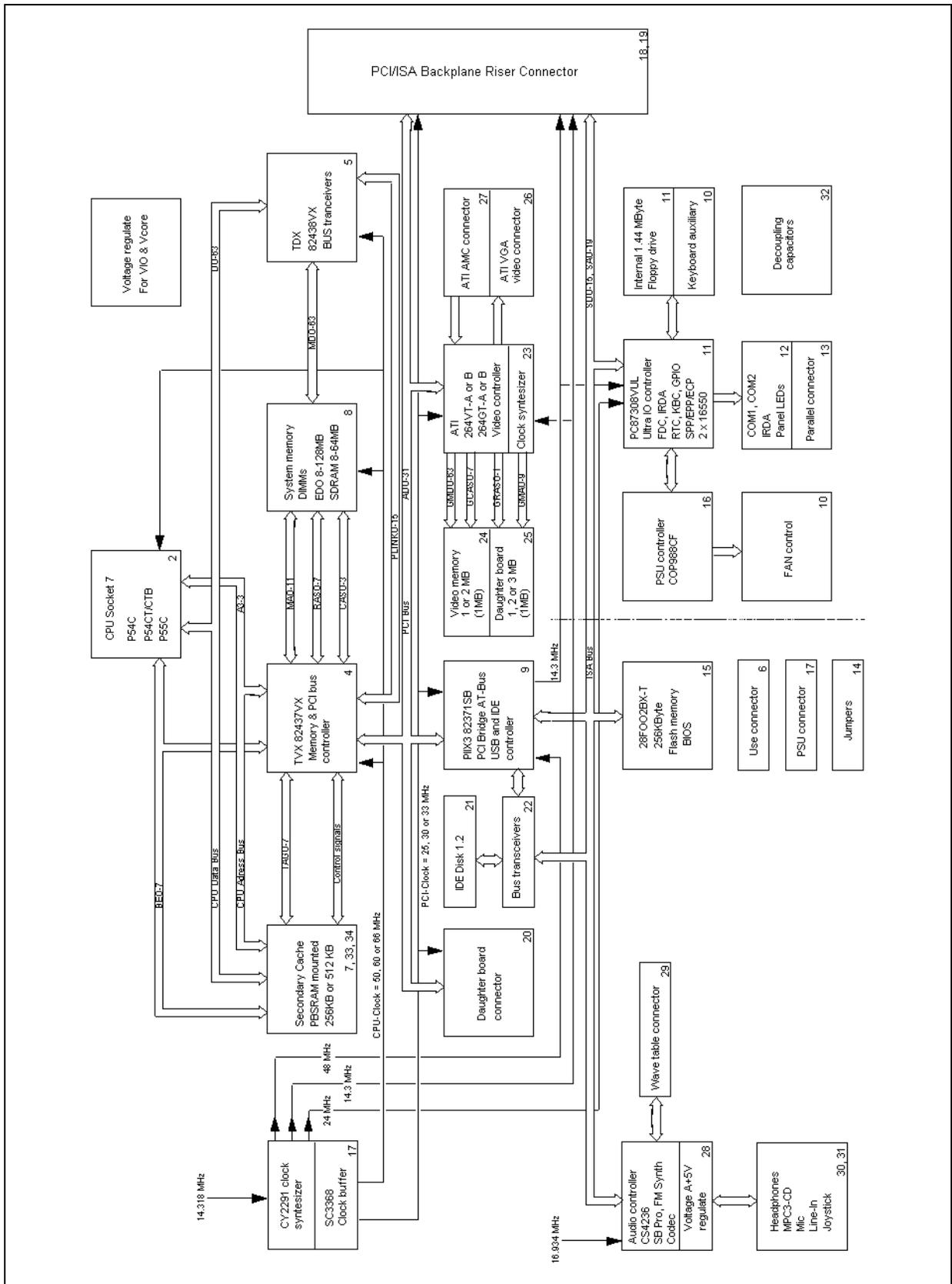
### Graphics memory upgrade (jumpers)



Picture 24: Graphics memory upgrader

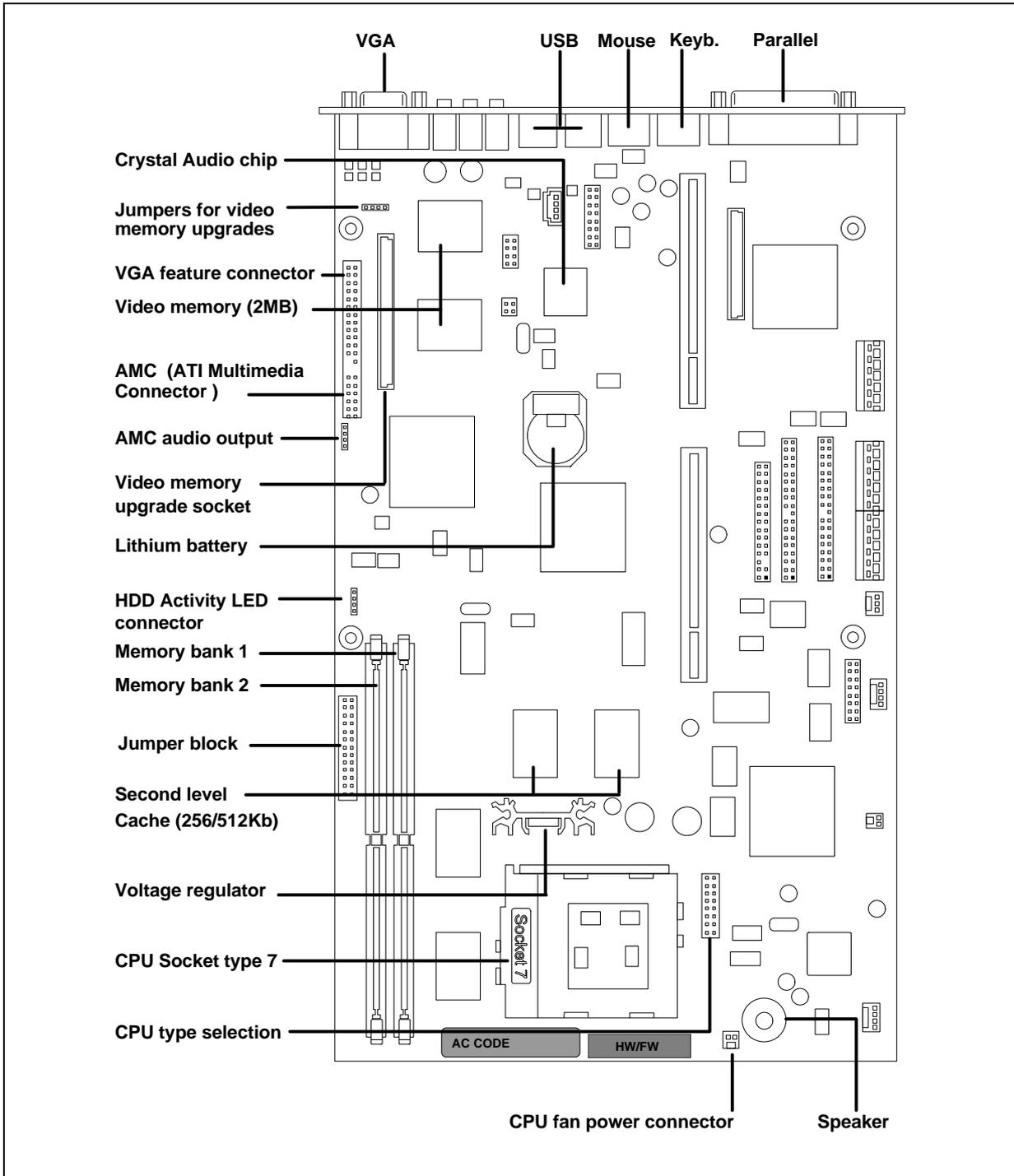
# System board AC41694/695/696/706/733/734

## Block diagram

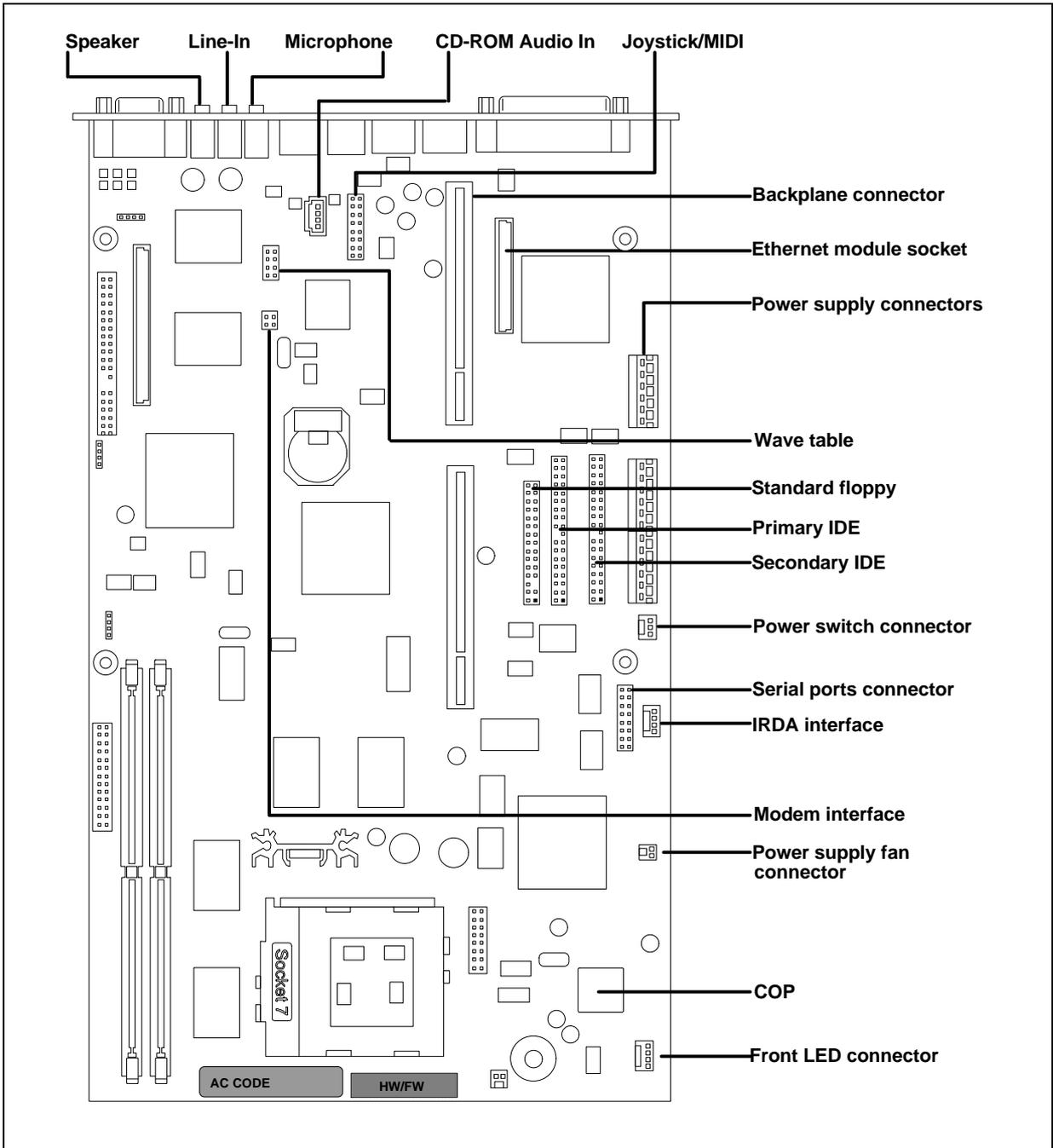


Picture 25 : AC41694/695/696/706/733/734 Block diagram

### System board layout

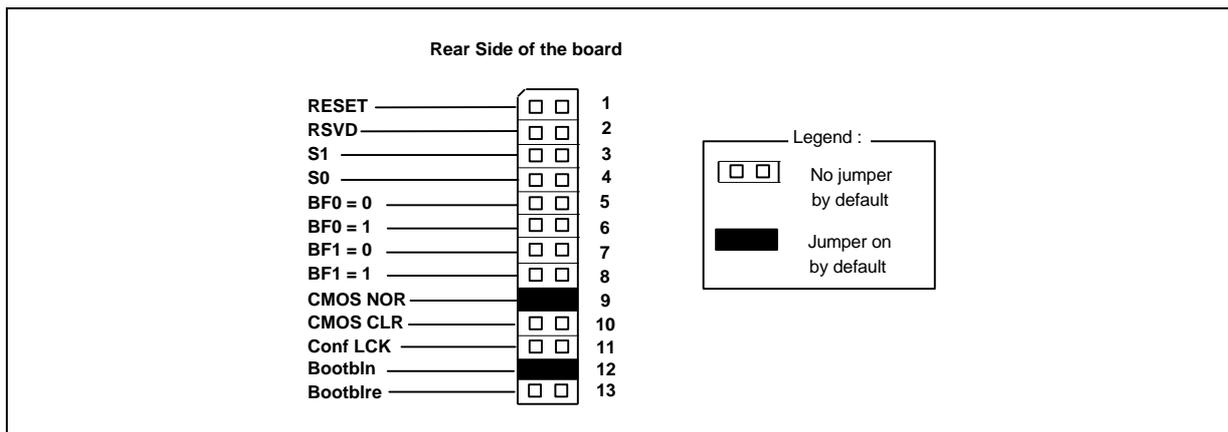


Picture 26 : AC41694/695/696/706/733/734 System Board Layout (1)



Picture 27 : AC41694/695/696/706/733/734 System Board Layout (2)

**System board jumpers (AC41694/695/696/706/733/734)**



Picture 28 : Jumper block for AC41677/691/692/703/733/734 System board

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

**RSVD** Not in use

**S1, S0 &** Speed &

**BF0, BF1:** processor selection (see below)

Processor speed	120MHz (60*2)	133MHz (66.7*2)	150MHz (60*2.5)	166MHz (66.7*2.5)	200MHz (66.7*3)	233MHz (66.7*3.5)
<b>S1</b>	■	□ □	■	□ □	□ □	□ □
<b>S0</b>	□ □	■	□ □	■	■	■
<b>BF0 = 0</b>	■	■	■	■	□ □	□ □
<b>BF0 = 1</b>	□ □	□ □	□ □	□ □	■	■
<b>BF1 = 0</b>	□ □	□ □	■	■	■	□ □
<b>BF1 = 1</b>	■	■	□ □	□ □	□ □	■

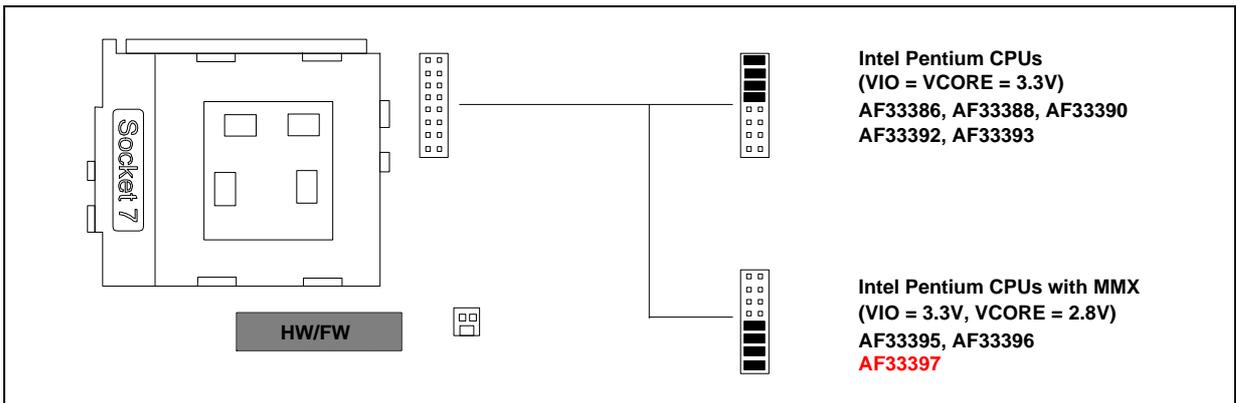
**CMOS CLR:** To clear the CMOS, switch off the power and disconnect the mains cable. Take out the jumper from **CMOS nor** pins and install it in this position; keep it there for 60 seconds, then put the jumper back to CMOS normal position and reconnect the mains cable.

**Conf LCK** 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.

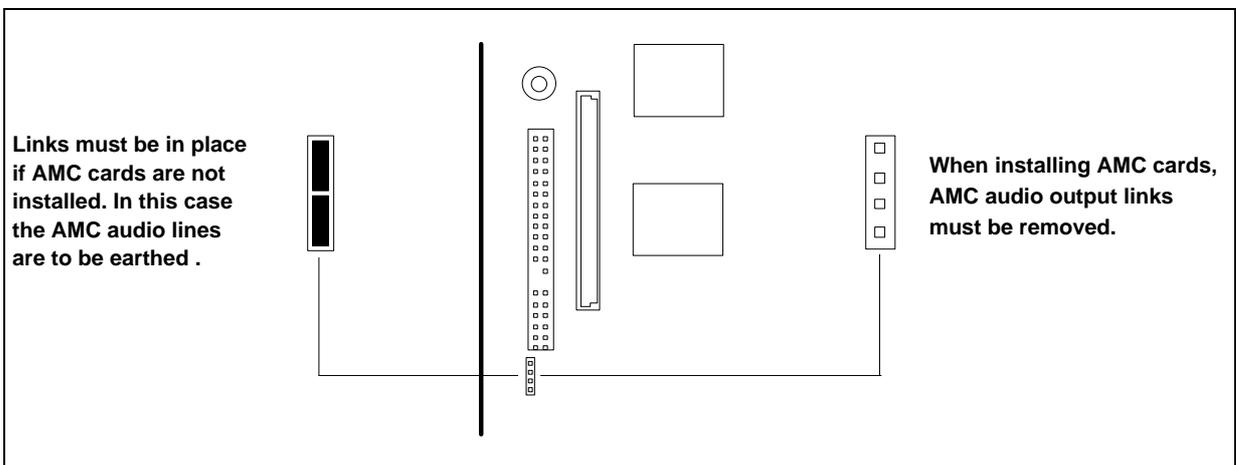
**BOOTBLRE:** If the loader (boot block) of the FLASHRAM BIOS needs to be updated, boot up the system, then remove the **BOOTBLN** jumper, and install the jumper in this position. Use FLASH.EXE file or the BIOS reload function of the resident setup utility to update the BIOS. Put the jumper back in the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

### CPU Voltage selection



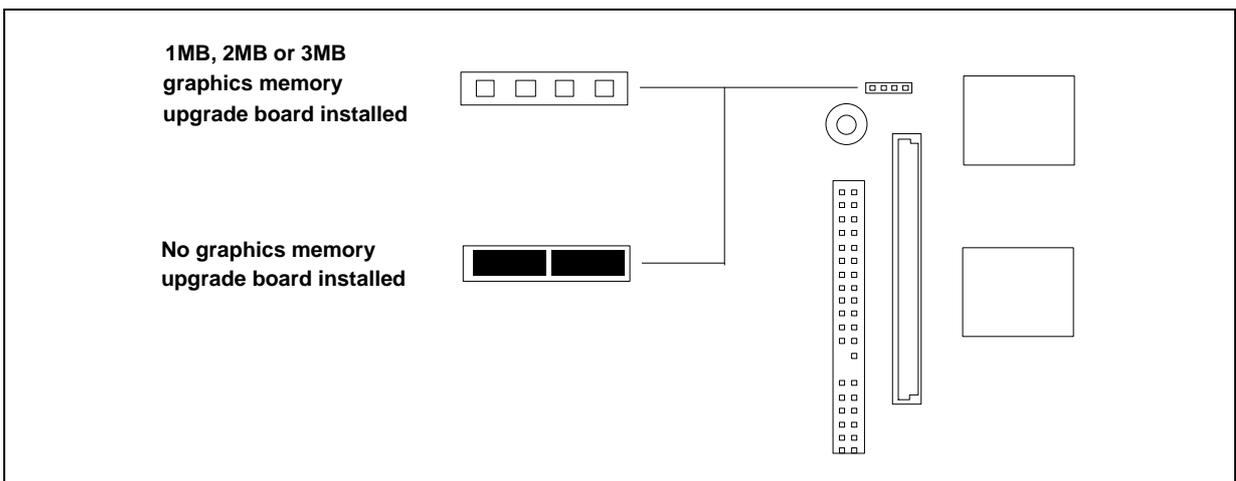
Picture 29: CPU voltage selection jumpers

### AMC Audio output (termination jumpers)



Picture 23: AMC Audio termination

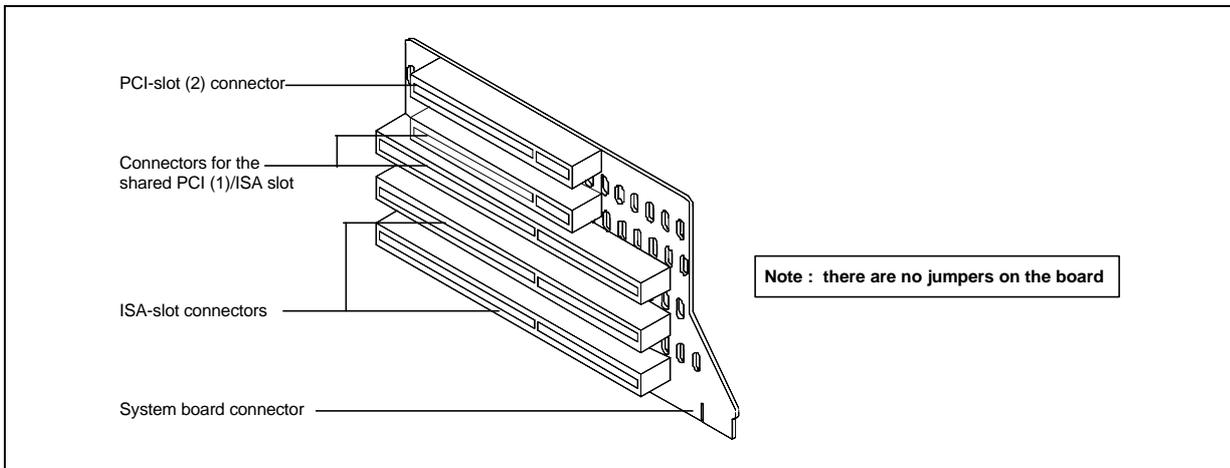
### Graphics memory upgrade (jumpers)



Picture 30: Graphics memory upgrader

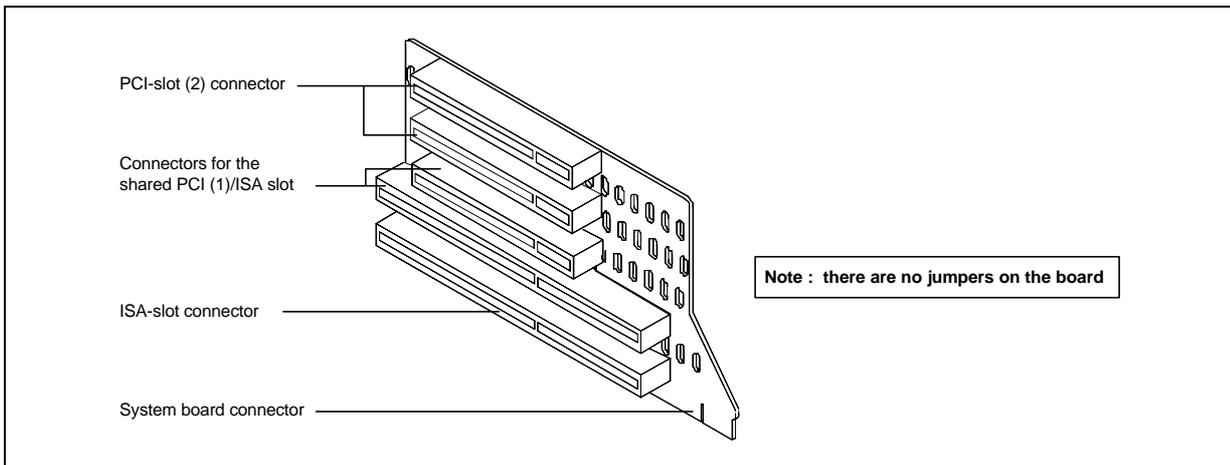
## Other boards

### 4-slot PCI/ISA back plane AC41638/98



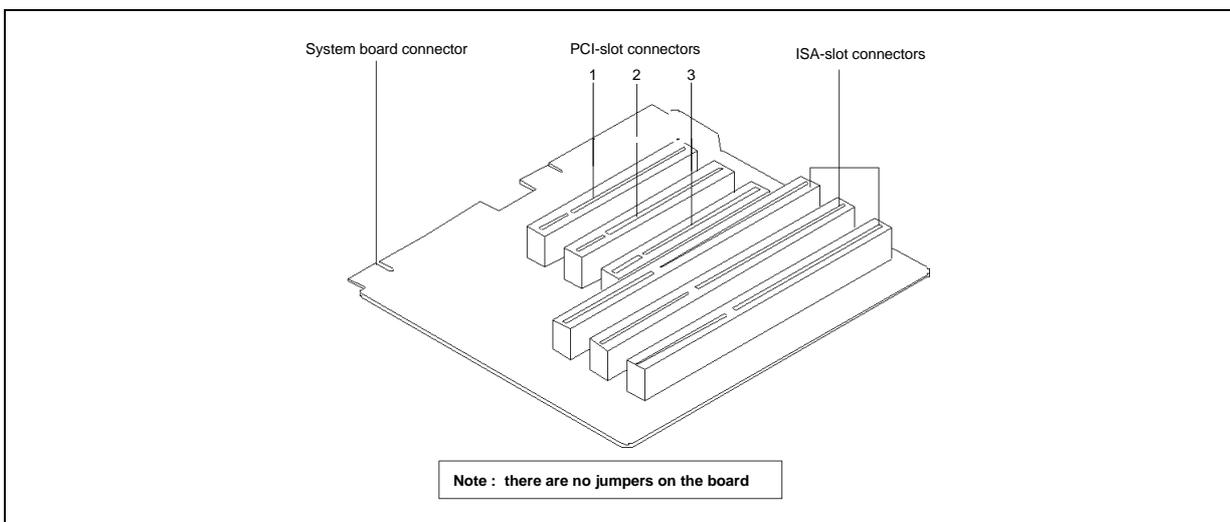
Picture 33 : 4-slot PCI/ISA back plane AC41638/98

### 4-slot PCI/ISA back plane AC41693/99



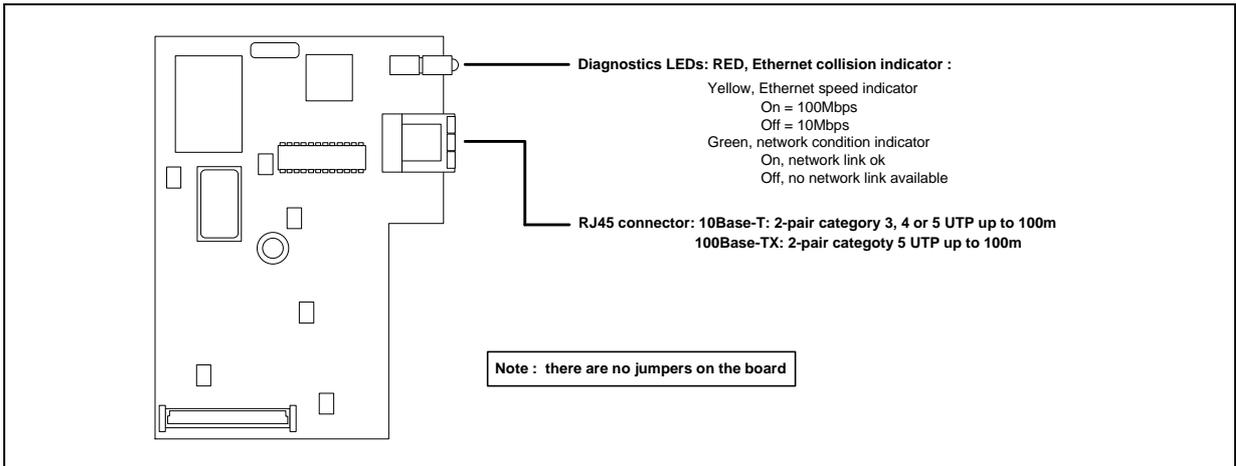
Picture 34 : 4-slot PCI/ISA back plane AC41693/99

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



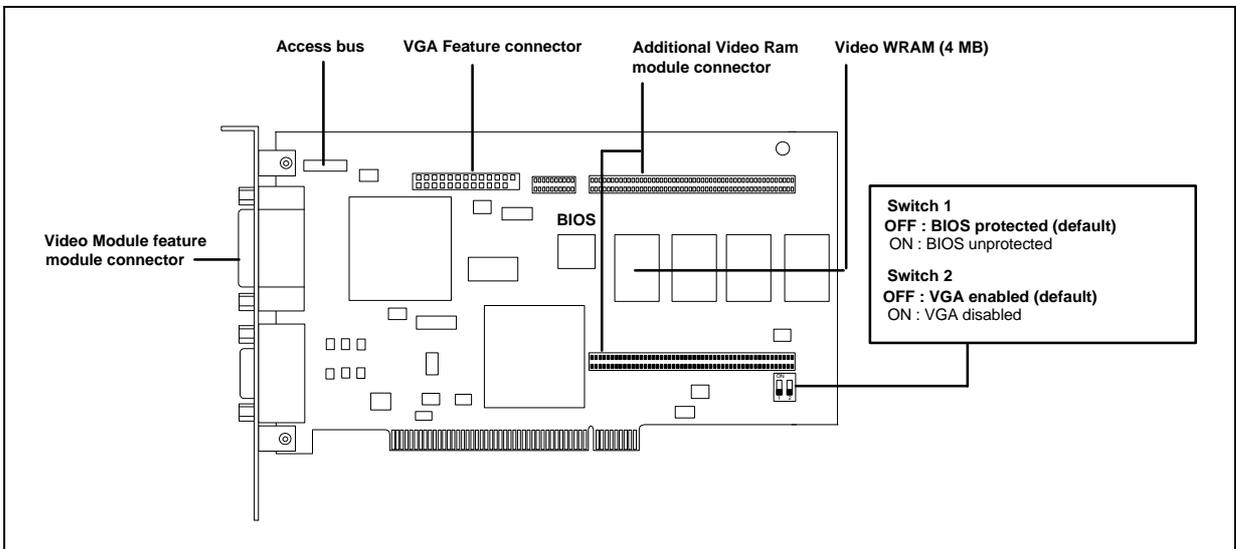
Picture 35 : 6-slot PCI/ISA back plane AC41637

### 10/100Mbps Ethernet module PN010126



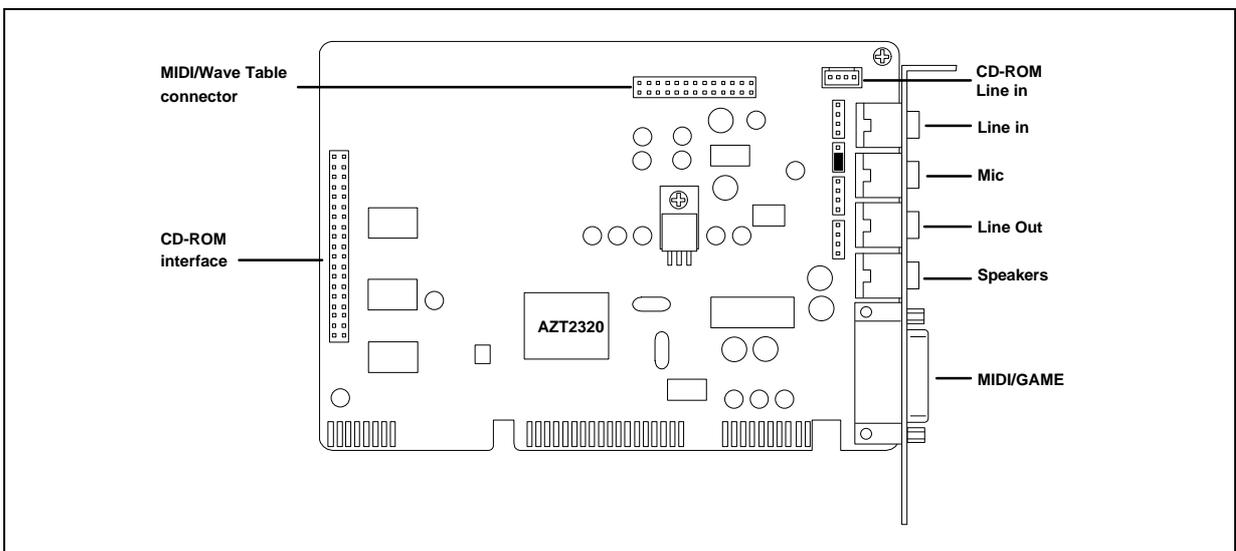
Picture 36 : Ethernet module

### Matrox Millennium AF31542 Graphic adapter



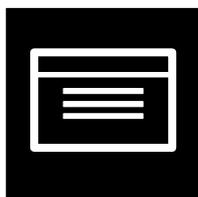
Picture 37 : Matrox Millenium Graphic adapter

### AZTECH MM PRO 16III-3D PnP



Picture 38: Aztech MM PRO 16III-3D PnP





# **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 menu 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

#### Config menu

##### Set date (Not available on all BIOS versions)

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 (Not available on all BIOS versions)

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.

### 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 6 (User) and 29 (System) 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.

**Powersave and 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 and sets the system in power conservation mode. 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.

**Lock timeout**

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.

**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 password attempts**

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 Fujitsu 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.

**Power menu****Timeout settings**

Use this parameter to specify the timeout values that, once they expire, set your hard disk, monitor, and the entire system in power saving mode. The options are :

**Auto**

Your system automatically determines when the monitor, disks, and the system unit will enter power saving mode. You can adjust when this occurs by using the up and down arrow keys.

**Disabled**

Power conservation on your computer is disabled.

**Manual**

You can manually set timeout values. The range for your hard disk is 5 to 240, for your monitor 2 to 99, and for the entire system (suspend timeout) 5 240 minutes.

In suspend mode, the CPU is stopped and all devices operate in the lowest possible power consumption state.

**Power save and lock key**

Use this parameter to specify a third key that, when pressed simultaneously with CTRL and ALT, sets your computer in power conservation mode when the Timeout settings parameter is set either to Auto or Manual, and locks the keyboard and a PS/2 type mouse until a password is entered. 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 and lock 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.

## 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.

## Admin-Config menu

### 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.

### Primary Master, Primary Slave, Secondary Master, Secondary Slave

Use these parameters to specify how the system detects the IDE devices such as hard disk drives attached to the primary and secondary IDE interfaces. The options are:

#### Auto

Attached devices (ATA or ATAPI) are automatically detected. You should use this option as long as everything works.

#### User defined

If auto detection fails, you can manually identify an IDE device to the system using this options. Refer to the documentation that came with the device.

#### None

Disables the disk.

**Note :** The system boots from the IDE disk it detects first. The disks are detected using the following order: Primary Master, Primary Slave, Secondary Master, Secondary Slave. If you have installed both IDE and SCSI disks, the system most likely boots from the IDE disk. To boot from the SCSI disk, disable all IDE disks or refer to the SCSI disk documentation for a possible proprietary solution.

The first disk should always be installed as a Master. Slave-only configurations are not supported. It is OK to install disks on the secondary interface without installing disks on the primary interface.

Avoid installing IDE hard disks and other IDE devices on the same cable. If this cannot be avoided, install the hard drive as a Master and the other devices as a Slave.

**Primary Interface**

Use this parameter to enable or disable the Primary IDE controller. The options are:

**Auto**

the onboard Primary IDE controller is automatically enabled if something is connected to it; otherwise it is disabled.

**Disabled**

only used if you want to disable the controller even if you have disks installed. You can use this to free resources, mainly interrupts, or if you have an IDE option board with its own BIOS.

**Secondary Interface**

Use this parameter to enable or disable the Secondary IDE controller. The options are:

**Auto**

the onboard Secondary IDE controller is automatically enabled if something is connected to it; otherwise it is disabled.

**Disabled**

only used if you want to disable the controller even if you have disks installed. You can use this to free resources, mainly interrupts, or if you have an IDE option board with its own BIOS.

**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.

**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)

**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.

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.

**3E8H:IRQ4 (COM3)**

Sets the base address and interrupt level to this value.

**2E8H:IRQ3 (COM4)**

Sets the base address and interrupt level to this value.

**3F8H:IRQ11 (COM1)**

Sets the base address and interrupt level to this value.

**2F8H:IRQ10 (COM2)**

Sets the base address and interrupt level to this value.

**3E8H:IRQ11 (COM3)**

Sets the base address and interrupt level to this value.

**2E8H:IRQ10 (COM4)**

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, 820H, 830H or 840H, 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)

**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 - 8) that the password length must at least be to be considered a valid password.

**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**

**Show asset tag at boot**

Use this parameter to define whether the asset tag string should be visible on the last row of the display when the computer boots. The options are:

**Enabled**  
**Disabled**

**Asset tag**

Use this parameter to edit and save any string of text of 0 to 64 characters. Use only the letters A to Z, and/or numbers 0 to 9. This asset tag uniquely identifies your PC. You can for example type your name and location.

**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.

**Unattended boot**

This function controls the start up of the power supply after voltage brake and user password during the boot. The available values and their usage are described below.

**Disabled**

Power supply does not start automatically after voltage brake and user password is asked during boot

**Enabled**

Power supply starts automatically after voltage brake and user password is not asked during boot In DOS environment a special utility called SERVMODE.EXE can be used to lock the keyboard and mouse

**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.

**Configure menus**

Access to BIOS menus listed here can be disabled/enabled

**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).

## Misc Menu

### Cache

This parameter controls both the internal cache to the processor, and an optional external cache. The options are:

- Enabled
- Disabled

### PCI VGA palette snooping

Historically, the VGA colour palette -or RAMDAC- could be multiplied on a number of display boards on the ISA bus, all using the same port-addresses. This way, all palettes contained the same colours. The PCI bus would effectively isolate any VGA on the PCI bus from a similar RAMDAC on the ISA bus. The colours loaded into the PCI VGA would not be copied to the ISA device. The devices using this technique are mainly video input and output overlay boards, using a single monitor and connecting the VGA and overlay through the feature connector.

To enable the possibility of having multiple RAMDACs on both the PCI and ISA bus, the PCI VGA palette snooping can be enabled. In this mode, all output to the VGA RAMDAC will be visible to all devices on both the ISA and the PCI bus. The speed of the slowest bus (ISA) will determine how fast the RAMDAC can be written. If there is a single RAMDAC in use, the function is not needed and can be disabled. There will be no great impact on overall performance.

Some graphics controllers set up the VGA snooping in their own power-up initialisation. In such a case, any manual selection -either 'Enabled' or 'Disabled'- will be overridden at the next power-on.

When entering SETUP, the current state of the graphics hardware will always be displayed, regardless of whether it is a fixed setting from the graphics sub-system or a previous manual selection. Enabling the VGA snooping might cause colour corruption on some graphics boards. Keep the default state unless change is absolutely necessary.

## PCI menu

### Configure

Use this parameter to view the bus, device, vendor ID, device ID, function, class of each PCI device, and to select the IRQ for each PCI device. Press ENTER on this parameter and a submenu appears. The only user-configurable parameter in this submenu is the IRQ.

Press ENTER on the device you wish to configure. The IRQ selections available are Auto (the computer selects automatically an unused interrupt level) and None (the PCI board does not use an interrupt level).

## Info menu

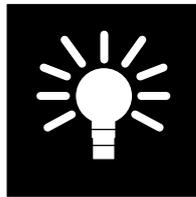
The Info menu has no sub menus, and the parameters cannot be modified; this menu serves mainly as a source of general information on your system.

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.



# **Section 4 :**

## **Miscellaneous & 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).

**FUJITSU System BIOS #56 Version Y.YY**  
**(c) Copyright FUJITSU ICL Computers Limited 1997**  
**The IDs are divided as follows:**

PC-type	Unit ID
x453/XX, x653/XX, x453/XXs & x653/XXs	56
e452/XX	58

## 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 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.
Setup	1997-2-24	System	0	-	No	Never	0940H	0000H	No
m64vtedo	1996-9-25	Video	0	Early	No	POST	0800H	C000H	No
smm	1996-9-6	System	0	-	No	Never	0820H	3000H	No

**Name & date:** Name of the module and date when it has been written or updated.  
**sys** System BIOS, reserves memory area EF7F-EFFF + F000-FFFF  
**Setup** Code for setup (RSU). Does not reserve memory.  
**m64vtedo** On-board Video BIOS for e452/652 (EDO RAM)  
**m64vtsd** On-board Video BIOS for x-series (SGRAM)  
**smm:** SMM BIOS  
**BootGard:** Code for Bootblock virus detection. Does not reserve memory.  
**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.

<b>Discard</b>	Defines if the module is thrown away after use
<b>YES:</b>	Module stays in the memory
<b>NO:</b>	Module does not stay in the memory
<b>Writable</b>	Defines the state when it is possible to write in the memory area reserved by the module.
<b>Always:</b>	Area is not write protected at all.
<b>POST:</b>	Write operations are allowed during the POST.
<b>NEVER:</b>	Area is always write protected.
<b>Size</b>	Size of the module in bytes.
<b>Segment</b>	This is the segment address where the module is loaded during the boot.
<b>Excl</b>	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			
OS/2 lanmanager			
WFW3.11	Fujitsu	Fujitsu	Fujitsu
WIN NT	Fujitsu	Fujitsu	Fujitsu
WIN '95	Fujitsu	Fujitsu	Fujitsu
OS/2 2.11			
OS/2 WARP	Fujitsu		Fujitsu
Novell 3.1X & 4.X		Fujitsu	
SCO UNIX 3.4.D V4			

## 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	MS Windows NT
OS/2 2.1	AutoCAD
OS/2 WARP	OS/2 2.1
Intergraph MicroStation 5.0	Intergraph MicroStation
MS Windows 3.11	MS Windows 3.1

## 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 2.43 or later.

## SERVMODE.EXE

SERVMODE.EXE is used to lock the keyboard and mouse under DOS environment when unattended boot and user password are enabled. Keyboard and mouse can be unlocked with the user password. Following lines are needed in the config.sys to activate the lock.

```

Install=path\mouse.com                (if dos mouse driver installed)
Install=path\Keyb.com sv.,, \path\keyboard.sys  (if dos keyboard driver installed)
Install=path\servmode.exe
    
```

## PowerMASTER

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

## Tips & Hints

### Using memory managers

The system BIOS area (F-segment) and therefor 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):

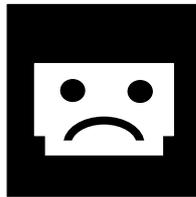
```

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 & 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:

**FUJITSU System BIOS #56 Version x.xx**  
**(c) Copyright FUJITSU ICL Computers Limited 1997**

**640 kB Base memory**  
**15360 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
- BIOS(150): PnP-ISA function disabled, type: X, vendor id XXXXXXXX**  
BIOS has disabled a device as a result of a conflict. Run the ISA Configuration Utility (ICU) in the Plug and Play Program Manager Group, or the Device Manager if you are running Windows 95. and check which device is conflicting. The type indicates what type of resource was conflicting:
- |   |        |
|---|--------|
| 0 | IRQ    |
| 1 | DMA    |
| 2 | I/O    |
| 3 | memory |

**BIOS(151): PnP-ISA function reconfigured, type: X, vendor id XXXXXXXX**

BIOS has reconfigured a device as a result of a conflict. Run the ISA Configuration Utility (ICU) in the Plug and Play Program Manager Group, or the Device Manager if you are running Windows 95, and check the new configuration. The type indicates what type of resource was conflicting:

0	IRQ
1	DMA
2	I/O
3	memory

**BIOS(200): PCI device removed from ESCD**

BIOS has detected that a PCI card has been removed from the PC.

**BIOS(201): PnP board removed from ESCD**

BIOS has detected that a PnP-ISA card has been removed from the PC.

## 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).

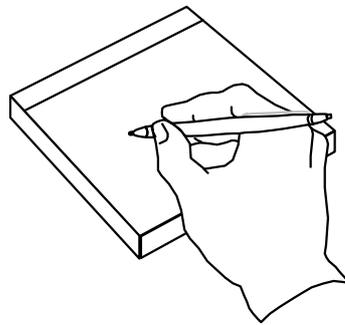
26	Test first 64k memory address lines by writing 11 at 0000:8000, 10 at 0000:4000 and so on until writing 01 at 0000:0000. These locations are then verified.
27	Enable parity checking. Port 61 = F0
28	Fill lower 64k of RAM with FFFF.
29	Compare lower 64k of RAM against FFFF.
2A	Check for any parity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

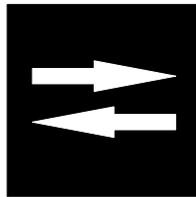
- 2D Check for any parity error.
- 2E Disable parity checking. Port 61 = FC
- 2F Clear lower 64k of memory (Note: No test is performed). Restore ResetFlag (write to location 40:72). Set up stack, SS:SP = 0000:0400. Set up interrupt vectors.
- 30 Checksum BIOS from F000:0000 to F000:FFFF.
- 31 Test KB-controller. 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.
- BF Jump to the bootsector that has been loaded in to memory (from FD/HD)
- 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.

**THIS PAGE IS INTENTIONALLY LEFT BLANK !**





# Section 6 :

## Input, Output & Special functions

## Audio

### x- and xs-series

The on-board (system board) audio interface is controlled by the CRYSTAL CS4236(B) single chip multimedia audio system controller and codec, that provides compatibility with the Microsoft Windows Sound System, and runs software written to the Sound Blaster and Sound Blaster Pro interfaces. The CS4236(B) also contains an internal FM synthesizer, an MPU-401 UART, joystick logic and Plug-and-play interfaces for a wave-table synthesizer and modem. The maximum audio sample frequency is 44.1kHz, 8/16-bits per channel.

Following external/internal connections are available

External	Internal
Mono microphone input	Stereo CD-ROM audio input
Stereo headphone output (2*60mW/32Ohm) for headphones or active speakers	Stereo AMC audio input
Stereo line input	

Device	IRQ	DMA	I/O
Audio system codec	5	0, 1	220-22F, 388-38B, 534-537
Audio system control registers	N/A	N/A	120-127
Audio system joystick (Game)	N/A	N/A	200-207
MPU-401	9	N/A	330-331

The audio chips are connected to the system via 8-bit wide ISA interface.

## Floppy disk controller

The floppy disk controller is PC8477-compatible (software level) and contains a superset of the floppy disk controller functions in the  $\mu$ DP8473, the NEC  $\mu$ PD765A and the N82077. It can handle the following floppy drive types: 360kB, 1.2MB, 720kB, 1.44MB and 2.88MB.

The floppy controller is placed in the: PC87307VUL (older boards have PC87308)

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 PC87307VUL (older boards have PC87308).

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 (3F8, IRQ4), COM2 (2F8, IRQ 3), COM3 (3E8, IRQ 4), COM4 (2E8, IRQ 3) or they can be disabled through the Resident Set-up Utility.

## IrDA

The second UART of the serial ports (PC87307VUL) supports also InfraRed communication (IrDA v1.0) up to 115.2kbps (PC87308 ver 1.1, 1.15Mbps). When IrDA mode is enable, needs special software and hardware, the UART can not be used for standard serial port communication.

## Parallel port communication

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 (EPP 1.9), and is IEEE1284 compliant.

**High speed mode (ECP):** Microsoft and Hewlett Packard Extended Capabilities Port, and is IEEE1284 compliant.

The multi mode port interface logic and buffers are placed in the PC87307VUL (older boards have PC87308).

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 Intel 82371SB) which can handle up to four IDE devices. The 82371SB 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. Both the primary and the secondary IDE bus can handle up to 2 hard drives or other IDE devices. The BIOS has support for ATAPI devices and it also supports booting from the CD-ROM.

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 controller of the PS/2-type keyboard (and PS/2-type mouse) is build in the PC87307VUL (older boards have PC87308), and provides software compatibility with the 8042A and PC87911 microcontrollers.

The code of the keyboard processor is based on AMI KBC platform.

## Video (AC41677/683/691/692/703/741/743)

The on-board PCI bus video is controlled by an ATI-264VT2 chip with 1MB or 2MB of video RAM (EDO RAM on e-series and SGRAM on x-series), which is expandable up to 2MB and 4MB. The ATI-264VT2 has a build-in RAMDAC, which can handle pixel frequencies up to 135MHz.

The ATI-264VT2 is a 64-bit video engine, slave, which is connected directly to the 32-bit on-board PCI bus. If the amount of video RAM is 1MB, the data path between the video memory and ATI-264VT2 chip is 32-bit wide, if the amount of the video RAM is 2MB or 4MB, the ATI VT-chip can utilize 64-bit data path between the chip and memory. The video interface is DDC2B compatible. The On-board graphics controller is automatically disabled by the plug and play BIOS when another video board (PCI or ISA) is installed.

## Video (AC41694/695/696/706/733/734)

The on-board PCI bus video is controlled by an ATI-264VT3 chip with 1MB or 2MB of video RAM ( SGRAM), which is expandable up to 2MB and 4MB. The ATI-264VT3 has a build-in RAMDAC, which can handle pixel frequencies up to 170MHz.

The ATI-264VT3 is a 64-bit video engine, master, which is connected directly to the 32-bit on-board PCI bus. If the amount of video RAM is 1MB, the data path between the video memory and ATI-264VT3 chip is 32-bit wide, if the amount of the video RAM is 2MB or 4MB, the ATI VT-chip can utilize 64-bit data path between the chip and memory. The video interface is DDC2B compatible. The On-board graphics controller is automatically disabled by the plug and play BIOS when another video board (PCI or ISA) is installed.

**x453/XXXs and x653/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
On-board ErgoGrafix (VT2)	1 MB (EDO/SGRAM)	100/16 75/24	100/8 75/16	100/8	47i/4	NA
	2 MB (EDO/SGRAM)	100/24 75/32	100/8 75/32	100/8 75/16	75/8	NA
	4 MB (SGRAM)	100/24 75/32	100/8 75/32	100/8 75/32	75/16 47i/24	NA
On-board ErgoGrafix (VT3)	1 MB (SGRAM)	100/32	100/16	100/8	NA	NA
	2 MB (SGRAM)	100/32	100/32	100/16	75/8	60/8
	4 MB (SGRAM)	100/32	100/32	100/24 75/32	75/24	60/16
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	System boards
1MB (EDO)	1MB (EDO)	NA	PL060135	2MB (EDO)	AC41683/730
1MB (SGRAM)	1MB (SGRAM)	AC41684	PL060131	2MB (SGRAM)	AC41692/706
1MB (SGRAM)	3MB (SGRAM)	AC41686	PL060133	4MB (SGRAM)	AC41692/706
2MB (SGRAM)	2MB (SGRAM)	AC41685	PL060132	4MB (SGRAM)	AC41677/694 /696/733/734

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

## AMC (Ati Multimedia Channel)

The ATI Multimedia Channel connector consist of two parts, the conventional VGA feature connector and the "AMC extension". The connector has been designed so that the standard VGA feature connector cables can be still used with non-AMC devices. When using AMC cards, both parts of the AMC connector are in use (single cable). Several AMC devices (normally an ISA card) can be connected to the channel at the same time (daisy chain cabling) but only one device can be used at a time.

## Fast Ethernet Module

The Fast Ethernet Local Area Network module is Intel Etherexpress pro 100B compatible and build around Intel 82557 chip which is a single chip Fast Ethernet Controller.

The Ethernet interface can be connected to a Twisted Pair (TP) cable through an 8 pin RJ45 connector. It is possible to use the module in 10Mbps or 100Mbps Twisted Pair Ethernet LAN by simply connecting the network adapter to a 10Base-T or 100Base-T hub port. By default the Fast Ethernet module automatically identifies the speed of the hub port and configures itself to the right speed without any hardware or software changes.

Remote Boot options, by default, system with the ethernet module do not have any remote boot ROMs installed.

### LEDs:

- Red**        Indicates collisions in the ethernet segment
- Yellow**    Module runs in 100Mbps mode, when Yellow LED is on. Module runs in 10MBps mode, when the Yellow LED is off.
- Green**     Indicates that the network link is functioning

### Drivers:

Novell Netware, Windows NT, Windows '95, Windows for Workgroups, Lan Server, Banyan and LANTastic

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)

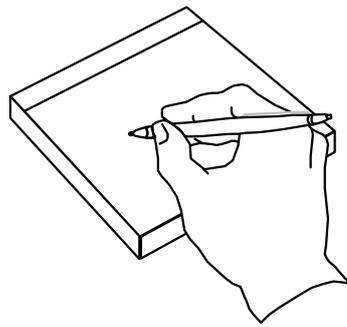
Connects the CPU and PCI bus in asynchronous mode and runs the PCI bus always at the half speed of the CPU bus (external frequency of the CPU). This means that if the external clock of the CPU is 50MHz (75MHz internal), the PCI bus is running at 25MHz. The hardware and the BIOS are compliant to the version 2.1 of the PCI specification and has support for PCI to PCI bridge and four PCI master devices

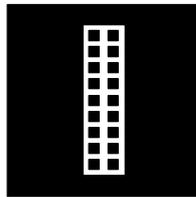
## LED board

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.

**THIS PAGE IS INTENTIONALLY LEFT BLANK !**

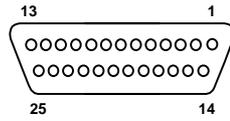




# Section 7 :

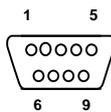
## Pin assignments

### Parallel port (Standard mode)



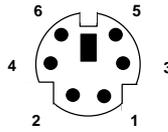
PIN	In/Out	Signal
1	Out	Strobe
2	In/Out	Data bit 0
3	In/Out	Data bit 1
4	In/Out	Data bit 2
5	In/Out	Data bit 3
6	In/Out	Data bit 4
7	In/Out	Data bit 5
8	In/Out	Data bit 6
9	In/Out	Data bit 7
10	In	Acknowledge
11	In	Busy
12	In	Paper End
13	In	Select
14	Out	Auto Line Feed
15	In	Error
16	Out	Initialise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

### Serial ports



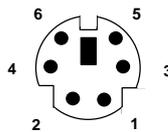
PIN	In/Out	Signal
1	In	Carrier Detect
2	In	Receive Data
3	Out	Transmit Data
4	Out	Data Terminal Ready
5	-	Signal Ground
6	In	Data Set Ready
7	Out	Request to Send
8	In	Clear to Send
9	In	Ring Indicator

## Mouse port



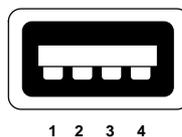
PIN	Signal
1	Data
2	Reserved
3	Ground
4	+ 5 V DC
5	Clock
6	Reserved
Shield	Frame Ground

## Keyboard connector



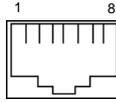
PIN	Signal
1	Keyboard Data
2	Mouse Data
3	Ground
4	+ 5 V DC
5	Keyboard Clock
6	Mouse Clock
Shield	Frame Ground

## Universal Serial Bus (USB) connector



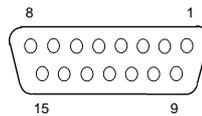
PIN	Signal
1	VCC (Cable power)
2	- Data
3	+ Data
4	Ground(Cable ground)

## RJ45 (standard twisted pair) Ethernet port



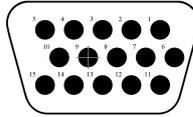
PIN	Signal
1	Transmitted Data (+)
2	Transmitted Data (-)
3	Received Data (+)
4	Not connected
5	Not connected
6	Received Data (-)
7	Not connected
8	Not connected

## 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

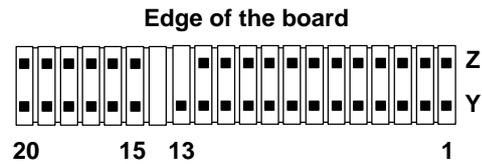
<sup>1</sup> Used only with colour displays

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

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

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

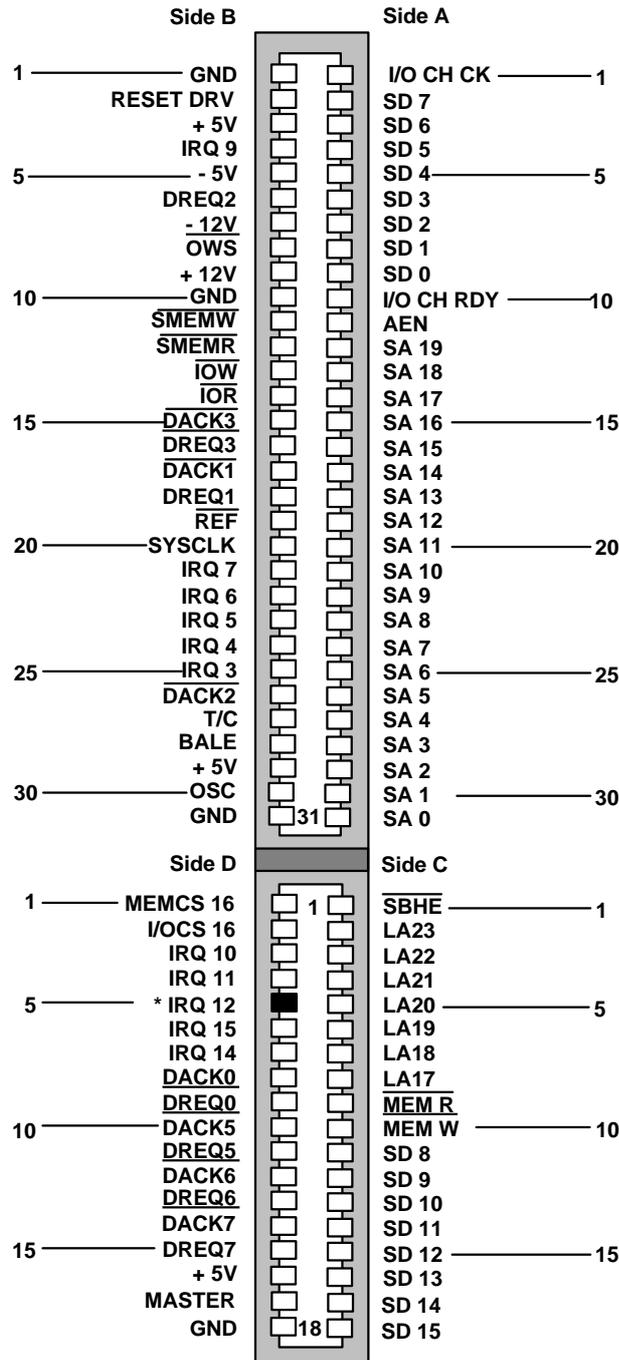
## VGA pass-through/AMC connector on system board



PIN	Signal
Y1	Pixel Data 0
Y2	Pixel Data 1
Y3	Pixel Data 2
Y4	Pixel Data 3
Y5	Pixel Data 4
Y6	Pixel Data 5
Y7	Pixel Data 6
Y8	Pixel Data 7
Y9	Pixel Data Clock
Y10	Blanking
Y11	Horizontal Sync
Y12	Vertical Sync
Y13	Ground
Z1 - Z3	Ground
Z4	Enable external Pixel Data
Z5	Enable External Sync
Z6	Enable External Clock
Z7	Not used
Z8 - Z11	Ground
Z12 - Z13	Not used

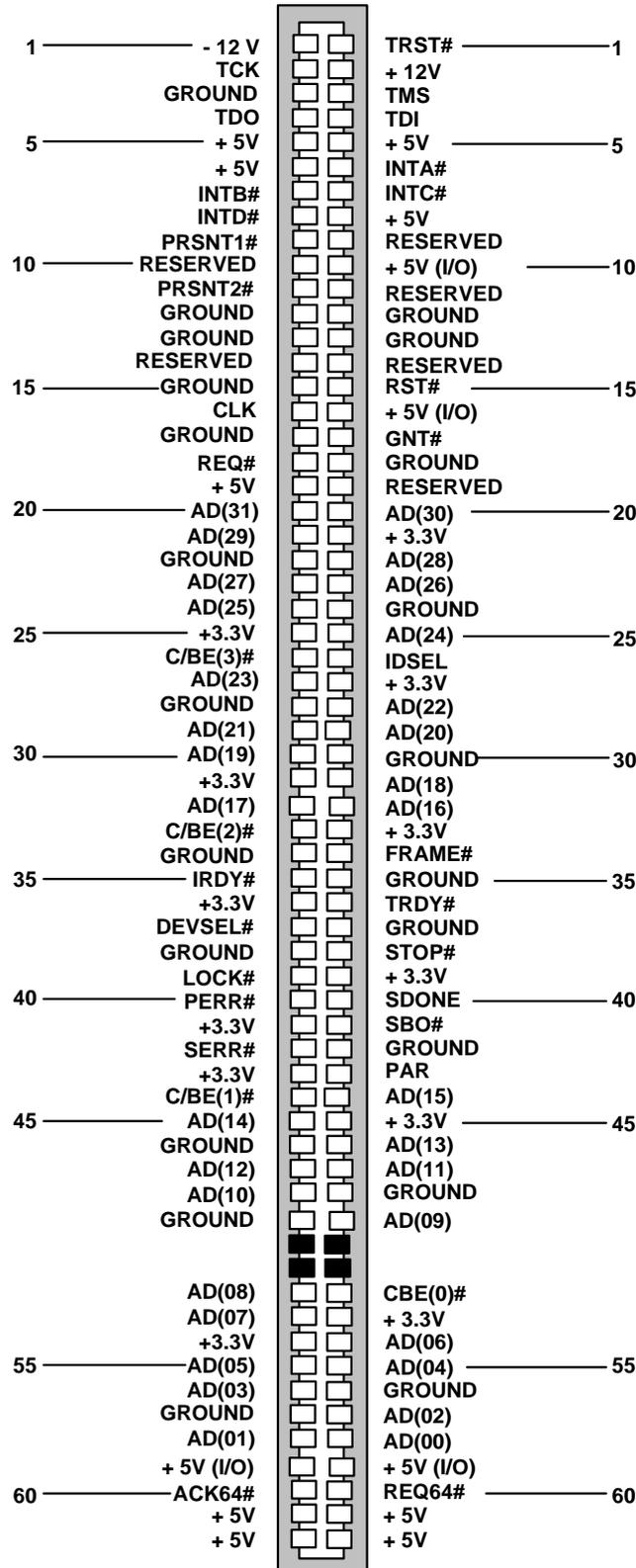
VGA feature connector meets VESA specification VS890803. All VGA feature connector signals are TTL level signals.

### ISA bus connector

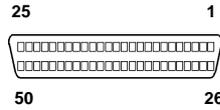


\* : Reserved for PS/2 type mouse, but the mouse interface can be disabled from the RSU (setup)

### PCI bus connector



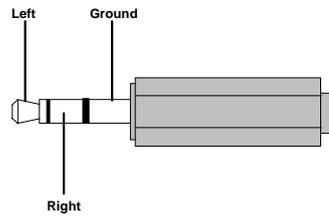
## SCSI port connector



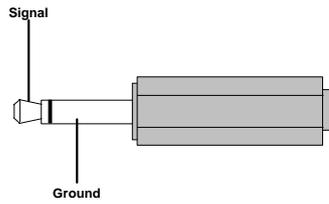
PIN	Signal
1-12	Signal ground
13	Open
14-25	Signal ground
26	Data bit 0
27	Data bit 1
28	Data bit 2
29	Data bit 3
30	Data bit 4
31	Data bit 5
32	Data bit 6
33	Data bit 7
34	Data parity bit
35-37	Signal ground
38	Termination power
39-40	Signal ground
41	ATN
42	Signal ground
43	BSY
44	ACK
45	RST
46	MSG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

## Audio connectors

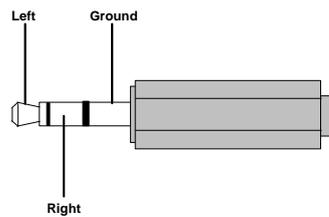
### Speaker type connector



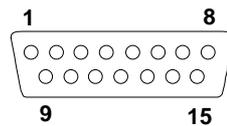
### Microphone type connector



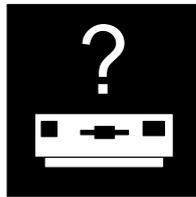
### Line-In type connector



### Midi/Joystick connector



PIN	Signal	PIN	Signal
1	Vcc	9	Vcc
2	JBUT0	10	JBUT2
3	JSX1	11	JSX2
4	Ground	12	MIDI OUT
5	Ground	13	JSY2
6	JSY1	14	JBUT3
7	JBUT1	15	MIDI IN
8	Vcc		



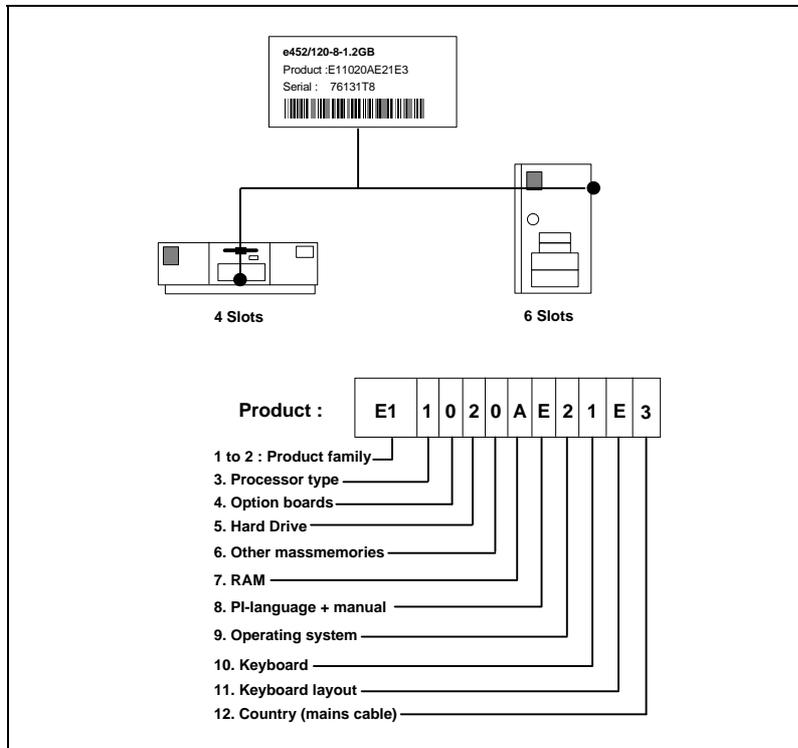
# Section 8 :

## 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 4 & 6 slot housings.

This code can be divided into eleven 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.

### 1-2. PRODUCT FAMILY

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

E1 e452/XX

G1 e652/XX

F1(2) x453/133  
 F1(4) x453/166  
 F1(5/7) x453/200  
 H1(4) x653/166  
 H1(5) x653/200

F5 x453/XX  
 H5 x653/XX

F2(1) x453/120 w/o audio, 1MB VRAM  
 F2(2) x453/133 w/o audio, 1MB VRAM  
 F2(4) x453/166 w/o audio, 1MB VRAM  
 H2(2) x653/133 w/o audio, 1MB VRAM

F4(1) x453/120 w/o audio, 2MB VRAM  
 F4(2) x453/133 w/o audio, 2MB VRAM  
 F4(4) x453/166 w/o audio, 2MB VRAM  
 H4(2) x653/133 w/o audio, 2MB VRAM

F6 x453/XX w/o audio, 2MB VRAM  
 H6 x653/XX w/o audio, 2MB VRAM

F3(4) x453/166s  
 F3(5/7) x453/200s  
 H3(5) x653/200s

F7 x453/XX with Matrox Millennium  
 H7 x653/XX with Matrox Millennium

AC41683 -> AC41730 (October/97)

↓

AC41741 (November/97)

↓

AC41743 (February/98)

AC41683 -> AC41730 (October/97)

↓

AC41741 (November/97)

↓

AC41743 (February/98)

AC41677

AC41677

AC41677

AC41677

AC41677

AC41694 -> AC41733 (November/97)

AC41694 -> AC41733 (November/97)

AC41692

AC41692

AC41692

AC41692

AC41703

AC41703

AC41703

AC41703

AC41696 -> AC41734 (November/97)

AC41696 -> AC41734 (November/97)

AC41691

AC41691

AC41691

AC41695

AC41695

### 3. PROCESSOR & HEATSINK

1 120 MHz (ceramic)

2 133 MHz (ceramic)

3 150 MHz (ceramic)

4 166 MHz (ceramic)

166 MHz (plastic)

5 200 MHz (plastic)

6 166 MHz with MMX (plastic)

7 200 MHz with MMX (plastic)

8 233 MHz with MMX (plastic)

AF33386 + PL070110

AF33388 + PL070110

AF33390 + PL070110

AF33392 + PL070110

AF33394 + PL070126

AF33393 + PL070126

AF33395 + PL070126

AF33396 + PL070126

AF33397 + PL070126

**4. OPTION BOARDS FOR e452 (structure code E1)**

0	No option board	
1	1510B	AF31078
2	Audio Sound Blaster + Intel Ether Express PRO/100	AF30083 + PN010283
3	Audio Sound Blaster + Etherlink XL PCI Combo	AF30083 + PN010267 + PM01447E
4	Audio Sound Blaster + Fast Etherlink XL PCI10/100	AF30083+PN010257+ PM01448E
5	Intel Ether Express PRO/100B	PN010283
6	Etherlink XL PCI Combo	PN010267 + PM01447E
7	Audio Sound Blaster + Etherlink 3 Combo ISA	AF30083 + PN010114+ PN01462E
8	Audio Sound Blaster+Fast Etherlink XL PCI10/100	AF30083+ PN010257+PM01448E
9	Etherlink III TPC	PN010273 + PM01462E
A	Matrox II + Ether Express	AF31548 + PN010283
B	Astec PnP	PL060600
D	Audio Sound Blaster	AF30083
E	Astec PnP+Etherlink 3 Combo ISA	PL060600+ PN010114+PM01462E
F	EtherTeam PCI	PN010117 + SE90114E
G	Audio Sound Blaster+Fast Etherlink XL PCI10/100+USB	AF30083 + PN010257+ PM01448E + AF31513
H	Audio Sound Blaster + USB	AF30083 + AF31513
J	Audio Sound Blaster + USB + Intel Ether Express PRO/100B	AF30083 + AF31513 + PN010283
K	Etherlink III TPO	PN010115 + PM01462E
L	Etherlink 3 Combo ISA	PN010114 + PM01462E
M	Fast Etherlink XL PCI10/100+1510B	PN010257+PM01448E+ AF31078
S	Fast Etherlink XL PCI10/100	PN010257+PM01448E
T	Token Ring PCI	PN011038
Y	Etherlink XL PCI	PN010262

**4. OPTION BOARDS FOR x453 (structure codes F5, F6 & F7)**

0	No option board	
1	Etherlink XL PCI Combo PN010267 + PM01447E	
2	2940U	AF31079
3	Matrox (4MB)	AF31542
5	Intel Ether Express PRO/100B	PN010283
7	Fast Etherlink XL PCI10/100	PN010257+PM01448E
8	Matrox+Fast Etherlink XL PCI10/100	AF31542+PN010257+PM01448E
9	Matrox II (4MB)	AF31548AF31542+PN010126
A	Token Ring PCI	PN011038
B	Backplane	AC41698
C	Ethernet board	PN010127
D	Matrox + Ethernet board	AF31542+ PN010127
E	Tokenring PCI	PN011055
F	Matrox II + Fast Etherlink XL PCI10/100	AF31548 + PN010257+PM01448E
H	Matrox II + Ethernet board	AF31548+PN010127
K	Etherlink III TPO	PN010115 + PM01462E
L	Etherlink 3 Combo ISA	PN010114 + PM01462E
N	Matrox (2MB) + Ethernet + MPEG	AF31546 + PN010126 + PL060595
P	Fast Etherlink XL PCI10/100+2940U	PN010257+PM01448E+AF31079
S	Fast Etherlink XL PCI10/100	PN010257+PM01448E
T	Tokenring ISA 16/4	PN011058
U	Matrox Mystique +Sw MPEG+Ethernet board	AF31555+SE90205E+PN010127
Y	Etherlink XL PCI	PN010262

**4. OPTION BOARDS FOR x653 (structure codes H5, H6 & H7)**

0	No option board	
1	Etherlink XL PCI Combo	PN010267 + PM01447E
5	ntel Ether Express PRO/100B	PN010283
7	Fast Etherlink XL PCI10/100	PN010257+PM01448E
C	Ethernet board	PN010127
D	Audio Sound Blaster	AF30083
E	Matrox + 2940U + Ethernet	AF31542+AF31079+PN010126
F	Audio Sound Blaster + Fast Etherlink XL PCI10/100	AF30083+PN010257+PM01448E
G	Etherlink III TPO + 2940U	PN010115 + PM01462E + AF31079 + PL040740
H	Matrox II + Ethernet board	AF31548+PN010126
P	Fast Etherlink XL PCI10/100+2940U	PN010257+PM01448E+AF31079
R	MatroxII + 2940U + Ethernet	AF31548+AF31079+PN010126
T	Tokenring ISA	PN011058
U	Matrox + 2940U	AF31542+AF31079
Y	Matrox II + Fast Etherlink XL PCI10/100	AF31548 + PN010257+PM01448E

**5. HARD DRIVE**

0	No Harddrive	
1	850 MB IDE	AF21209
2	1.2 GB IDE	AF21214
3	1.6 GB IDE	AF21213
4	2.0 GB IDE	AF21202
	2.0 GB IDE	AF21229
5	3.2 GB IDE	AF21226
6	3.0 GB IDE	AF21232
8	6.4 GB IDE	AF21234
A	2 GB Ultra SCSI	AF21215
B	4 GB Ultra SCSI	AF21216
C	2 GB SCSI	AF21228
D	2 * 1.0 GB Removable	2 * AF21227

**6. OTHER MASSMEMORIES**

0	None	
1	8 * CD IDE	AF23312
2	8 * CD SCSI	AF23314
3	DAT	
4	TSD	
5	MO	
6	CDR	AF23309
7	16 * CD IDE	AF23320
8	CD-RW	AF23324
9	16* CD SCSI	AF23326
A	20* CD IDE	AF23331
D	24* CD IDE	AF23337

**7. RAM**

1	16 MB SDRAM (DIMM)	AF33831 / AF33841
2	32 MB SDRAM (DIMM)	AF33832 / AF33842
3	48 MB SDRAM (DIMM)	AF33831 + AF33832
4	64 MB SDRAM (DIMM)	AF33832 + AF33832
5	128 MB EDO (DIMM)	2 * AF33823
6	64 MB EDO (DIMM)	AF33823
A	8 MB EDO (SIMM)	2 * AF33800C / 2 * AF33800G
B	16 MB EDO (SIMM)	2 * AF33810C / 2 * AF33810G
C	32 MB EDO (SIMM)	2 * AF33802C / 2 * AF33802G
F	64 MB EDO (SIMM)	2 * AF33803G
H	128 MB EDO (SIMM)	4 * AF33803G
J	48 MB EDO (SIMM)	2 * AF33810G + 2 * AF33802G

**8. PI-LANGUAGE + MANUAL**

E	English
F	Danish
G	German
H	Spanish
J	French
K	Dutch
M	Finnish
N	Swedish
P	Portuguese
U	Multi lingual

**9. OPERATING SYSTEM**

1	Windows For Workgroups
2	Windows '95
3	Windows NT
4	Windows '95 MPI

**10. KEYBOARD**

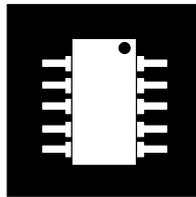
0	None
1	105EE

**11. KEYBOARD LAYOUT**

A	Hungarian
E	English
F	Danish
G	German
H	Spanish
J	French
K	Dutch
L	Norwegian
M	Finnish
N	Swedish
P	Portuguese
S	Italian
V	Czech
Y	Polish
2	Belgium
3	USA

**12 COUNTRY (MAINS CABLE + BADGE + MOUSE)**

1	EU cable, Fujitsu
2	EU cable, MikroMikko
3	UK cable, Fujitsu
4	UK cable
5	DK cable, Fujitsu
6	CH cable, Fujitsu
7	US cable, Fujitsu
8	IT cable, Fujitsu
A	AUS cable Fujitsu
B	South Africa



# Section 9 :

## Specification tables & Memory tables

## Machine specifications

### Processor related information (Non MMX machines)

Used on	e452/120 x453/120	e452/133 e652/133 x453/133 x653/133	e452/150	e452/166 e652/166 x453/166 x453/166s x653/166	e452/200 e652/200 x453/200 x453/200s x653/200 x653/200s
<b>Processor &amp; speed</b>	iNTEL Pentium-120 MHz SPGA package (ceramic)	iNTEL Pentium-133 MHz SPGA package (ceramic)	iNTEL Pentium-150 MHz SPGA package (ceramic)	iNTEL Pentium-166 MHz SPGA package (ceramic and plastic)	iNTEL Pentium-200 MHz SPGA package (plastic)
<b>MMX support</b>	No	No	No	No	No
<b>Fujitsu ICL code</b>	AF33386	AF33388	AF33390	AF33392 (ceramic) AF33394 (plastic)	AF33393
<b>Heatsink (kit)</b>	PL070110  (PL070126 can also be used)	PL070110  (PL070126 can also be used)	PL070110  (PL070126 can also be used)	PL070110 (for ceramic CPU), PL070126 (for plastic CPU)	PL070126
<b>External clock</b>	60MHz	66.7MHz	60MHz	66.7MHz	66.7MHz
<b>Clock multiplier</b>	2	2	2.5	2.5	3
<b>System clock</b>	30MHz (PCI) 7.5MHz (ISA)	33.3 MHz (PCI) 8.25 MHz (ISA)	30MHz (PCI) 7.5MHz (ISA)	33.3 MHz (PCI) 8.25 MHz (ISA)	33.3 MHz (PCI) 8.25 MHz (ISA)
<b>Overdrive<sup>1</sup> BPODPMT*****</b>	60X180	66X166 or 66X200	60X180	66X200	N/A
<b>Operating voltage</b>	VIO = 3.3V VCORE = 3.3V				
<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>	On-chip floating-point unit				

<sup>1</sup>) OverDrive CPU upgrade path recommended by Intel. Overdrives are not available from FUJITSU ICL Computers LTD.

Processor related information (MMX machines)

<b>Used on</b>	e452/166 e652/166 x453/166 x453/166s x653/166	e452/200 e652/200 x453/200 x453/200s x653/200 x653/200s	e452/233 e652/233 x453/233 x653/233
<b>Processor &amp; speed</b>	iNTEL Pentium-166 MHz SPGA package (plastic)	iNTEL Pentium-200 MHz SPGA package (plastic)	iNTEL Pentium-233 MHz SPGA package (plastic)
<b>MMX support</b>	Yes	Yes	Yes
<b>Fujitsu ICL code</b>	AF33395	AF33396	AF33397
<b>Heatsink (kit)</b>	PL070126	PL070126	PL070126
<b>External clock</b>	66.7MHz	66.7MHz	66.7MHz
<b>Clock multiplier</b>	2.5	3	3.5
<b>System clock</b>	33.3 MHz (PCI) 8.25 MHz (ISA)	33.3 MHz (PCI) 8.25 MHz (ISA)	33.3 MHz (PCI) 8.25 MHz (ISA)
<b>Overdrive<sup>1</sup> BPODPMT*****</b>	N/A	N/A	N/A
<b>Operating voltage</b>	VIO = 3.3V VCORE = 2.8V		
<b>Internal cache of the processor</b>	16kB, 4-way for data 16kB, 4-way for code		
<b>Co-processor</b>	On-chip floating-point unit		

1) OverDrive CPU upgrade path recommended by Intel. Overdrives are not available from FUJITSU ICL Computers LTD.

## General

General	e452/XXX (E1) e652/XXX (VF, G1)	x453/XXX (F2, F6) x653/XXX (H2, H4 & H6)  w/o on- board audio	x453/XXX (F1 & F5)	x653/XXX (H1 & H5)	x453/XXXs (F3)  x453/XXX w/o on- board graphics (F7)	x653/XXXs (H3)  x653/XXX w/o on- board graphics (H7)
<b>Socket type</b>	321 pin ZIF socket type 7					
<b>System board</b>	AC41683 AC41730	AC41692 AC41703	AC41677	AC41677	AC41691	AC41691
<b>Used on (structure)</b>	E1, VF & G1	F2, H2 & H4	F1	H1	F3	H3
<b>System board</b>	-	AC41696 AC41734 (AC41706)	AC41694 AC41733	AC41694 AC41733	AC41695	AC41695
<b>Used on (structure)</b>	-	F6, H6	F5	H5	F7	H7
<b>BIOS ID</b>	58	56				
<b>Second level cache</b>	256 kB pipeline burst synchronou s, Direct mapped, write-back	256 kB (512 kB on AC41734) pipeline burst synchronou s, Direct mapped, write-back	256 kB (512 kB on AC41733) pipeline burst synchronous, Direct mapped, write-back		512kB pipeline burst synchronous, Direct mapped, write-back	
<b>Video</b>	ATI 264VT2 based PCI controller on the system board with 1MB of EDO RAM	ATI 264VT2 (VT3 on AC41696, AC41706 & AC41734) based PCI controller on the system board with 1MB (2MB on AC41703, AC41696 & AC41734) of SGRAM	ATI 264VT2 (VT3 on AC41694 & AC41733) based PCI controller on the system board with 2MB of SGRAM		Matrox millennium PCI bus video adapter board with 4MB WRAM	
<b>ATI AMC (1.0)</b>	No	Yes			No	
<b>On-board audio</b>	No	No	Crystal 4236 (4236B on AC41694 & AC41733) based PnP controller on the system board		Crystal 4236 (4236B on AC41695) based PnP controller on the system board	
<b>USB</b>	Support for two USB channels, additional HW needed	Two USB ports on the system board				
<b>DMI</b>	Yes	Yes	Yes	Yes	Yes	Yes

Continued...

<b>General</b>	e452/XXX (E1) e652/XXX (VF, G1)	x453/XXX (F2, F6) x653/XXX (H2, H4 & H6)  w/o on-board audio	x453/XXX (F1 & F5)	x653/XXX (H1 & H5)	x453/XXXs (F3)  x453/XXX w/o on-board graphics (F7)	x653/XXXs (H3)  x653/XXX w/o on-board graphics (H7)
<b>Power master</b>	Version 4.0 (virtually off)					
<b>Instant On</b>	Yes (Virtually off)					
<b>Theft prevention</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>HD silencer</b>	No	Yes	Yes	Yes	Yes	Yes
<b>"On.board" LAN module</b>	No	10/100Mb PCI ethernet-module as factory option				10/100Mb PCI ethernet-module
<b>SCSI</b>	Optional Adaptec 1510B	Optional Adaptec 1510B or Adaptec 2940U				Adaptec 2940U
<b>General</b>	e452/XXX (E1) e652/XXX (VF, G1)	x453/XXX (F2, F6) x653/XXX (H2, H4 & H6)  w/o on-board audio	x453/XXX (F1 & F5)	x653/XXX (H1 & H5)	x453/XXXs (F3)  x453/XXX w/o on-board graphics (F7)	x653/XXXs (H3)  x653/XXX w/o on-board graphics (H7)
<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 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 connectors  (Fail safe, with 16 byte FIFO)	Two 16C550 compatible serial ports, with 9-pin male connectors  (Fail safe, with 16 byte FIFO)
<b>Serial infrared support</b>	Yes, needs additional HW					
<b>IDE disks</b>	850MB 1.2GB	850MB 1.2GB 1.6GB 2.0GB	1.2GB 1.6GB 2.0GB 3.0GB	2.0GB	2.0GB 3.0GB 3.2GB 6.4GB	No
<b>SCSI disks</b>	No	No	No	No	No	2.0GB 4.0GB

## Architecture &amp; configuration

	e452/e652	453	653
<b>Chip set</b>	Intel 430VX		
<b>Memory banks</b>	2, with EDO support	2, with EDO and SDRAM support	2, with EDO and SDRAM support
<b>SIMM modules/bank</b>	2	NA	NA
<b>DIMM modules/bank</b>	NA	1	1
<b>BIOS</b>	128 kB (1 Mb) Boot Block Flash RAM, FUJITSU ICL Platform with Plug and Play functions	256 kB (2 Mb) Boot Block Flash RAM, FUJITSU ICL Platform with Plug and Play functions	256 kB (2 Mb) Boot Block Flash RAM, FUJITSU ICL Platform with Plug and Play functions
<b>Keyboard controller</b>	Industry standard (AMI)		
<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 mode 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) 2*ISA (16b) AC41698  2*PCI (32b), 1*PCI/ISA (32/16b) 1*ISA (16b) (AC41699)	x453/XXX with ethernet module 1*PCI (32b), 1*PCI/ISA (32/16b) 2*ISA (16b) AC41698 x453/XXX w/o ethernet module, all the x453/XXXs models and all the x453/XXX w/o on-board graphics (F7) 2*PCI (32b), 1*PCI/ISA (32/16b) 1*ISA (16b) (AC41699)	3*PCI (32b) 3*ISA (16b) (AC41637)
	e652 ————— ↑		
	<b>NOTE ! :</b> The lowest slot can not take full length boards, maximum length of board is 170mm.		
<b>Power supply</b>	120W 115/230V, 48Hz to 63Hz (AF81069 AF81067)	120W 115/230V, 48Hz to 63Hz (AF81067 optionally AF81069)	200W 115/230V, 48Hz to 63Hz (AF81053)
	e652 ————— ↑		
	All power supplies have the monitor outlet connected directly to the mains voltage (without power switch)		
<b>Fan</b>	One fan (in the PSU) to suck the air through the unit. The rotation speed of the Fan is temperature controlled. The control logic is on the system board		
<b>Dimensions / Width</b>	368mm	368mm	205mm
<b>Height</b>	112mm	112mm	340mm (350mm with stand)
<b>Depth</b>	432mm	432mm	440mm
<b>Weight</b>	8 to 12kg	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 - 0C8FFF	4	VGA BIOS extension for VT3, Free for VT2	Yes/No <sup>(2)</sup>
0C9000 - 0DFFFF	92	Free	No
0E0000 - 0EFFFF	60	Free <sup>(1)</sup>	No
0EF000 - 0EF7FF	2	Reserved for the CPU memory management	No
0EF800 - 0EFFFF	2	Plug & Play Bios Area <sup>(4)</sup>	Yes
0F0000 - 0FFFFF	64	System BIOS	Yes
100000 - TOM <sup>(3)</sup>			Yes
81000000 - 8100FFFF		Fast ethernet module	No
81100000 - 811FFFFF		Fast ethernet module	No
C0000000 - C0FFFFFF		On-board VGA graphics	No

- (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) See Tips & Hints to configure Memory Manager

## Memory configurations e-series

Bank 0	Bank 1	Total memory
2 * 4MB SIMM (EDO)		8MB
2 * 4MB SIMM (EDO)	2 * 4MB SIMM (EDO)	16MB
2 * 8MB SIMM (EDO)		16MB
2 * 4MB SIMM (EDO)	2 * 8MB SIMM (EDO)	24MB
2 * 8MB SIMM (EDO)	2 * 8MB SIMM (EDO)	32MB
2 * 16MB SIMM (EDO)		32MB
2 * 4MB SIMM (EDO)	2 * 16MB SIMM (EDO)	40MB
2 * 8MB SIMM (EDO)	2 * 16MB SIMM (EDO)	48MB
2 * 32MB SIMM (EDO)		64MB
2 * 16MB SIMM (EDO)	2 * 16MB SIMM (EDO)	64MB
2 * 8MB SIMM (EDO)	2 * 32MB SIMM (EDO)	80MB
2 * 16MB SIMM (EDO)	2 * 32MB SIMM (EDO)	96MB
2 * 32MB SIMM (EDO)	2 * 32MB SIMM (EDO)	128MB

## SIMM recommendations (e-series)

SIMM size (MB)	Description	Speed	Voltage	Type	Pins	Module	Kit code	Note
4	1M*32	60ns	5V	EDO	72	AF33800C	PL060141	AC41683,
8	2M*32	60ns	5V	EDO	72	AF33810C	PL060142	AC41730,
16	4M*32	60ns	5V	EDO	72	AF33802C	PL060143	AC41741 &
32	8M*32	60ns	5V	EDO	72	AF33803C	PL060144	AC41743
4	1M*32	60ns	5V	EDO	72	AF33800G	N/A	AC41730,
8	2M*32	60ns	5V	EDO	72	AF33810G	N/A	AC41741 &
16	4M*32	60ns	5V	EDO	72	AF33802G	N/A	AC41743
32	8M*32	60ns	5V	EDO	72	AF33803G	N/A	

### Explanations of the terms :

- Speed:** This is the slowest access speed that can be used. When using SIMMs with faster access speeds, the chipset is still 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. The kit includes two (2) SIMMs.

## Memory configurations x- & xs-series

Bank 0	Bank 1	Total memory	Note
1 * 8MB DIMM (EDO or SDRAM)	-	8MB	See list of available DIMM modules
1 * 8MB DIMM (EDO or SDRAM)	1 * 8MB DIMM (EDO or SDRAM)	16MB	
1 * 16MB DIMM (EDO or SDRAM)	-	16MB	
1 * 32MB DIMM (EDO or SDRAM)	-	32MB	
1 * 16MB DIMM (EDO or SDRAM)	1 * 16MB DIMM (EDO or SDRAM)	32MB	
1 * 8MB DIMM (EDO or SDRAM)	1 * 32MB DIMM (EDO or SDRAM)	40MB	
1 * 16MB DIMM (EDO or SDRAM)	1 * 32MB DIMM (EDO or SDRAM)	48MB	
1 * 64MB DIMM (EDO)	-	64MB	
1 * 32MB DIMM (EDO or SDRAM)	1 * 32MB DIMM (EDO or SDRAM)	64MB	
1 * 32MB DIMM (EDO or SDRAM)	1 * 64MB DIMM (EDO)	96MB	
1 * 64MB DIMM (EDO)	1 * 64MB DIMM (EDO)	128MB	

If SDRAM and EDO RAM DIMMs are used at the same time, it is recommended that SDRAM is installed in BANK 0.

## DIMM recommendations

### 2-clock, 4-clock & EDO DIMMs

DIMM size (MB)	Description	Speed	Voltage	Type	Clock lines	Pins	Module	Kit code	Note
32	4 M * 64	60 ns	3.3 V	EDO	-	168	AF33822	PL060157	For all the boards
64	8 M * 64	60 ns	3.3V	EDO	-	168	AF33823	PL060136	
8	1 M * 64	66MHz	3.3V	SDRAM	2	168	AF33830	N/A	AC41677/
16	2 M * 64	66MHz	3.3V	SDRAM	2	168	AF33831	PL060129	691/692/
32	4 M * 64	66MHz	3.3V	SDRAM	2	168	AF33832	PL060130	703
8	1 M * 64	66MHz	3.3V	SDRAM	4	168	AF33840	N/A	AC41694/
16	2 M * 64	66MHz	3.3V	SDRAM	4	168	AF33841	PL060149	695/696/
32	4 M * 64	66MHz	3.3V	SDRAM	4	168	AF33842	PL060150	706/733/734

#### Explanations of the terms :

**Speed:** For EDO mode DIMMs this is the slowest access speed (in nano seconds) that can be used. and for SDRAMs the slowest clock speed (in Mega Hertz).

**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. The kit includes one (1) DIMM.

## 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)
<b>Master</b>	<b>Slave</b>	
(CTRL1)	(CTRL2)	
	CH 0	Crystal Audio (PnP)
	CH 1	Crystal Audio (PnP)
	CH 2	Diskette drive controller
	CH 3	
CH 4		Cascading slave to master
CH 5		
CH 6		
CH 7		

## 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
NMI	Parity error (System memory does not have parity checking)
<b>Master (Controller 1)</b>	
IRQ0	Timer output 0 (internal)
IRQ1	Keyboard controller
IRQ2	Interrupt from slave
IRQ3	COM2
IRQ4	COM1
IRQ5	Crystal Audio (PnP)
IRQ6	Diskette drive controller
IRQ7	LPT1
<b>Slave (Controller 2)</b>	
IRQ8	Real-time Clock
IRQ9	Crystal Audio (PnP)
IRQ10	Fast ethernet module
IRQ11	USB
IRQ12	PS/2-type mouse device
IRQ13	Math co-processor error
IRQ14	Primary IDE interface
IRQ15	Secondary IDE interface

## 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
120 - 127	Crystal audio (PnP) by default
170 - 177	Secondary IDE interface
1F0 - 1F7	Primary IDE interface
200 - 207	Crystal audio (PnP) by default
220 - 22F	Crystal audio (PnP) by default
278 - 27B	Parallel port 2 (LPT 2)
<b>278 - 27F</b>	<b><i>Parallel port 2 (LPT 2), EPP mode</i></b>
2F8 - 2FF	Serial port 2 (COM2)
330 - 331	Crystal audio (PnP) by default
378 - 37B	Parallel port 1 (LPT1)
<b>378 - 37F</b>	<b><i>Parallel port 1 (LPT1), EPP mode</i></b>
388 - 38B	Crystal audio (PnP) by default
3B0 - 3DF	ErgoGrafix
3F0 - 3F7	Diskette drive controller
3F8 - 3FF	Serial port 1 (COM1)

**I/O channel addresses 500 to FFFF**

Hex range	Device
534 - 537	Crystal audio (PnP) by default
678 - 67A	Parallel port 2 (LPT 2), ECP mode
778 - 77A	Parallel port 1 (LPT 1), ECP mode
820 - 828	Fujitsu ICL configuration registers (default)
830 - 838	Fujitsu ICL configuration registers (alternative)
840 - 848	Fujitsu ICL configuration registers (alternative)
CF8-CFF	PCI Host Bridge
8020 - 803F	USB
8040-805F	Fast ethernet module
A100-A1FF	ErgoGrafix

**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	120W (4 slot) AF81069/AF81067	200W (6 slot) AF81053
Input voltage	180-264/90-132V	
Input frequency	48Hz to 63Hz	
Max power input (w/o monitor)	175W	280W
Max power output	120W	200W
Max output current :		
+3.4V	14A	20A
+5V	17A	20A
-5V	0,3A	0,5A
+12V	4A	8A
-12V	0,6A	0,5A
+5VSB	20mA	20mA
Max ground leakage current		
115V/60Hz	250µA	450µA
230V/50Hz	450µA	750µA

### Air circulation

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

### Power consumption

System unit	Memory (RAM-Cache-Video)	Mass memories	Average Power Consumption	Power Save Mode*
e452/120	32 + 256 + 2	CD + 2 GB	40 W	23.8 W
e452/200	32 + 256 + 2	CD + 2 GB	47.1 W	24.8 W
e452/233 (MMX)	16 + 256 + 2	CD + 2 GB	53.8 w	28 w
x453/120	16 + 256 + 2	CD + 2 GB	46.5 W	25.5 W
x453/166	16 + 256 + 2	CD + 2 GB	46.3 W	25.8 W
x453/200	16 + 256 + 2	CD + 2 GB	50.2 W	26.1 W
x453/200 (MMX)	16 + 256 + 2	CD + 2 GB	54.5 W	32.7 W
x453/233 (MMX)	32 + 256 + 2	CD + 2 GB	57.3 W	31 W
x653/166	16 + 256 + 2	CD + 1 GB	47 W	28.6 W
x653/200	16 + 256 + 2	CD + 1 GB	51.8 W	28.9 W
x453/166s	16 + 512 + 4	CD + 1.2 GB	47.5 W	28.7 W
x453/200s	16 + 512 + 4	CD + 1.2 GB	51 W	29.2 W
x653/200s	32 + 512 + 4	CD + 4 GB	71 W	53.1 W

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

