Aspire T690
AcerPower FH/SK50
Service Guide

Service guide files and updates are available on the AIPG/CSD web; for more information, please refer to http://csd.acer.com.tw

PRINTED IN TAIWAN

Revision History

Please refer to the table below for the updates made on Aspire T690 and AcerPower FH/SK50 service guide.

Date	Chapter	Updates

Copyright

Disclaimer

Conventions

The following conventions are used in this manual:

SCREEN MESSAGES	Denotes actual messages that appear on screen.
NOTE	Gives bits and pieces of additional information related to the current topic.
WARNING	Alerts you to any damage that might result from doing or not doing specific actions.
CAUTION	Gives precautionary measures to avoid possible hardware or software problems.
IMPORTANT	Reminds you to do specific actions relevant to the accomplishment of procedures.

Preface

Before using this information and the product it supports, please read the following general information.

1. This Service Guide provides you with all technical information relating to the BASIC CONFIGURATION decided for Acer's "global" product offering. To better fit local market requirements and enhance product competitiveness, your regional office MAY have decided to extend the functionality of a machine (e.g. add-on card, modem, or extra memory capability). These LOCALIZED FEATURES will NOT be covered in this generic service guide. In such cases, please contact your regional offices or the responsible personnel/channel to provide you with further technical details.

2. Please note WHEN ORDERING FRU PARTS, that you should check the most up-to-date information available on your regional web or channel. If, for whatever reason, a part number change is made, it will not be noted in the printed Service Guide. For ACER-AUTHORIZED SERVICE PROVIDERS, your Acer office may have a DIFFERENT part number code to those given in the FRU list of this printed Service Guide. You MUST use the list provided by your regional Acer office to order FRU parts for repair and service of customer machines.

System Specifications

Features

Processor

- ❑ Socket Type : Intel Socket T LGA 775 pin
- ❑ Processor Type : Intel Prescott 775/Smithfield/Cedar Mill/Presler/Conroe   FSB 533/800

Chipset

- ❑ Intel 946GZ+ICH7

PCB

- ❑ Form Factor : Mirco ATX
- ❑ Size (Max.) : 244mm x 244mm

Memory

- ❑ Memory Type : DDRII unbuffered SDRAM module support
- ❑ No. of Channel (Dual/Signal) : Dual channel should be enabled always when plug-in 2 same memory size DDRII memory module
- ❑ Socket Type : un-buffered 240 pin DIMM socket
- ❑ DIMM Slot : 2

Graphics

- ❑ Onboard graphic solution: Intel 946GZ integrated graphics device solution
- ❑ Dual View function support
- ❑ One VGA port on rear

PCI

- ❑ One PCI Express x16 slot
- ❑ One PCI Express x1 slot
- ❑ Two PCI 2.3 Slots

FDD

- ❑ Slot Quantity : 1
- ❑ Support 1.44MB 3.5" Devices

IDE

- ❑ One 40 pin PATA IDE slot
  - ❑ Transfer rate support:
    - ❑ PIO mode: 0/1/2/3/4
    - ❑ ATA mode: 33/66/100 port supported
  - ❑ Storage type support : HDD/CD-ROM/CD-RW/DVD-ROM/DVD-RW/DVD+RW/DVD Dual/ DVD SuperMultiPlus

❏ 4 pin SATA IDE connector

   ❏ Transfer rate support:

      ❏ 1.5GB/s and 3.0 GB/s

   ❏ Storage type support : HDD/CD-ROM/DVD-ROM/DVD-RW/DVD+RW/DVD Dual/DVD SuperMultiPlus

Audio

❏ Audio Type : HD Codec

❏ Audio Channel : 7.1 channel

❏ Audio Controller /Codec : Realtek ALC888(co-lay with ALC883)

❏ Support SPDIF out/in

❏ Audio Connectors/Headers:

   ❏ Rear 6 jack follow HD audio definition

   ❏ Microphone In

   ❏ Headphone Out

   ❏ S/PDIF header

   ❏ CD-In

   ❏ AUX-In

LAN

❏ Type : Realtek 8100C Gigabit Ethernet controller

❏ Supports 10/100/1000MB Ethernet environment

IEEE 1394

❏ IEEE 1394 Controller : TI TSB43AB22AG4

❏ IEEE 1394 Port : One rear 6pin IEEE 1394 port

❏ One header on board

USB

❏ Controller : Intel ICH7

❏ USB Type : 2.0/1.1

❏ Connectors Quantity: 8

   ❏ Real Panel : 4

   ❏ Onboard header: 4 for front daughter board, 4 for rear I/O

❏ Standard Intel FPIO pin definition

BIOS

❏ BIOS Type : Phoenix-Award BIOS

❏ 4MB Flash BIOS

❏ Award PnP BIOS compatible with SM BIOS 2.3

❏ ACPI, SMBIOS 2.3, Green and Boot Block.

❏ Provides DMI 2.0, WFM 2.0, WOL, and SM Bus for system management.

I/O Connector

❑ Controller : Super I/O ITE 8718

Rear I/O Connector

❑ 1 PS/2 Keyboard Port, 1 PS/2 Mouse Port

❑ 1 Parallel Port, 1 Serial Port

❑ 1 VGA(CRT) Port

❑ 1 LAN Port

❑ 4 USB Ports for non-1394 sku; 4 USB ports + IEEE1394 port for 1394 sku

❑ 7.1 channel phone jack

Onboard Connector

❑ 1 CPU socket

❑ 2 Memory slots

❑ 1 PCI Express x16 slot

❑ 1 PCI Express x1 slot

❑ 2 PCI slots

❑ 1 FDD connector

❑ 1 PATA IDE slot

❑ 4 SATA IDE connectors

❑ 3 2*5 pin Intel FPIO sepcification USB pin connectors.

❑ 1 2*5 pin Intel FPIO spec. microphone in/headphone out connector

❑ 1 2*5 pin serial port connector

❑ 1 CD-IN 4pin connector (CD-ROM Audio Input)

❑ 1 S/PDIF out 4pin jumper

❑ 1 4pin CPU Fan connector

❑ 1 3pin system fan connector with 3pin system fan co-lay

❑ 1 24pin ATX interface PS3/PS2 SPS connector

❑ 1 2*7 pin front panel IO header

❑ 2 reserved 2pin GPIO jumper

❑ 1 onboard buzzer

❑ 1 1394 header

❑ Color management for on board connecter

Power Supply

❑ PSP Type : 300W

Mainboard Placement
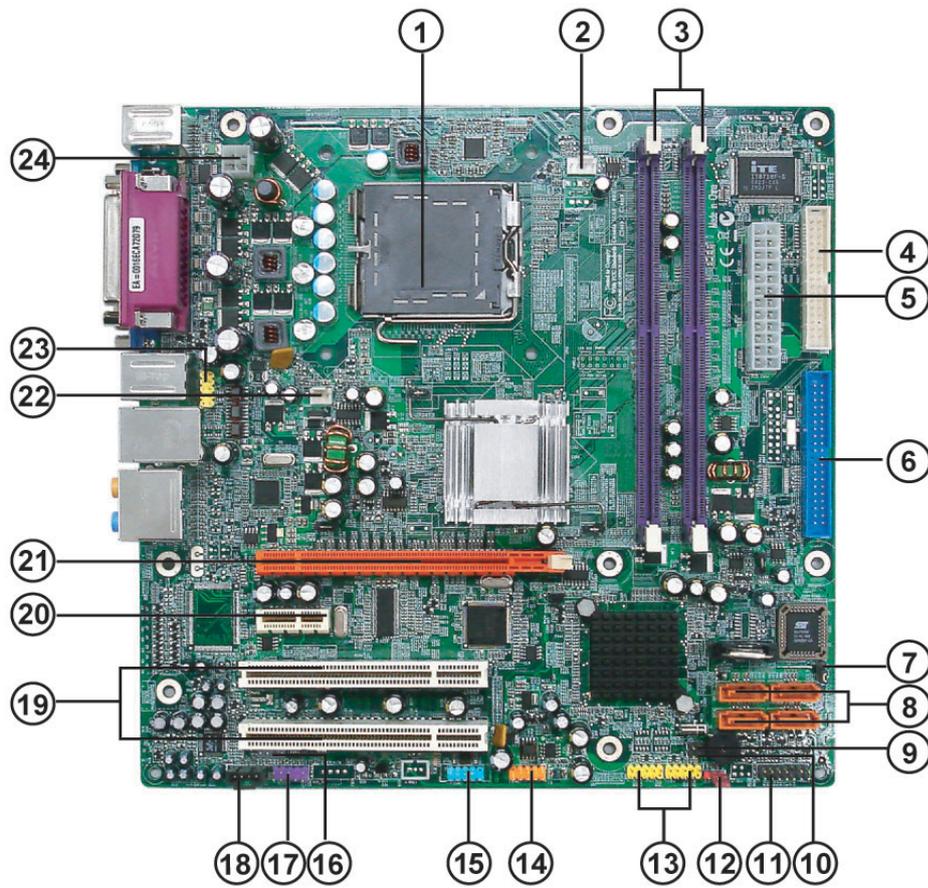
No.	Name	Description
1	CPU Socket	LGA775 socket for Intel Core^{TM}2 Duo/Pentium D/Pentium 4/Celeron D CPUs
2	CPU_FAN1	CPU cooling fan connector
3	DIMM1~2	DDR2 240 pin SDRAM slots
4	FDD1	Floppy diskette drive connector
5	ATX1	Standard 24pin ATX power connector
6	IDE1	Primary IDE channel
7	BIOS_WP	BIOS flash protect jumper
8	SATA1~4	Serial ATA connectors
9	JP2	Jumper
10	JP1	Jumper
11	PANEL1	Front panel switch/LED header
12	CLR_CMOS1	Clear CMOS jumper
13	USB3~4	Front panel USB headers
14	1394A1	Onboard 1394a header
15	COM2	Onboard Serial port header
16	SPDIF	SPDIF out header
17	AUDIO2	Front Panel Audio header

No.	Name	Description
18	CD_IN1	Analog audio input connector
19	PCI1~2	32 bit add-on card slot
20	PCIEX1	PCI Express x1 slot
21	PCIEX16	PCI Express x16 slot
22	SYS_FAN1	System fan connector
23	R_USB	Front Panel USB header
24	ATX12V1	Auxiliary 4pin power connector

Block Diagram

PCI LAN   ICH7
ALC888
SIZE : Max 2GB (Four 512Mb X 8 Double-Sided DEVICES)

DEVICE	IDSEL	INT#	REQ#	GNT#
PCI1	17	C/D/E/F	PREQ-0	PGNT-0
PCI2	18	D/E/F/G	PREQ-1	PGNT-1
1394	19	E	PREQ-2	PGNT-2
LAN	20	F	PREQ-3	PGNT-3

INTEL
**P4 Processor
PSC, Tejas -**
LGA 775 pin

BW : 4.1GB/s @ FSB : 533MHz & Freq : 133MHz
BW : 6.4GB/s @ FSB : 800MHz & Freq : 200MHz

BW : 10.7GB/s @ DDR2 :533/667MHz

Analong Display
RAMDAC: 400MHz
Resolutions Up To 2048x1536@75Hz

VGA (G only)

INTEL
946GZ
1210pin FC-BGA

DDIMM1: DDR2 Socket 240P

PCIEx16

DDIMM2 : DDR2 Socket 240P

BW : 2GB/s (Support Lsoch)

USB V2.0

PCIEX1

USB1 2 ports | USB2 2 ports | USB3 2 ports | USB4 2 ports | USBLAN 8 ports

INTEL
ICH7
609pin EBGA

PCIEx1 LAN
BMC5786

USBLAN
RJ45

IDE1 40pin

Up to Ultra ATA/100
Two IDE Channel

BW : 133MB/s @Freq : 33MHz

PCI1 Slot 120pin @ AD17
PCI2 Slot 120pin @ AD18

Mic In
Line Out
Line In
CEN/BAS
SURRON
SID SURRON

Audio Codec
ALC888

AC' 97 & Lan I/F

LPC bus

intel
FWH
32pin PLCC

TI 1394
TSB43AB22

RTL
8100C

SATA1 7Pin
SATA2 7pin
SATA3 7Pin
SATA4 7pin

BW : 150MB/s

ITE 8718
Super I/O
128pin PQFP

USBLAN
RJ45

PCB : 244 x 244 mm ; 4 layers

Aspire T690 Front Panel

The computer's front panel consists of the following:

Label	Description
1	Optical drive
2	Floppy disk drive
3	Power button
4	Speaker or headphone jack
5	Microphone jack
6	USB ports

Aspire T690 Rear Panel
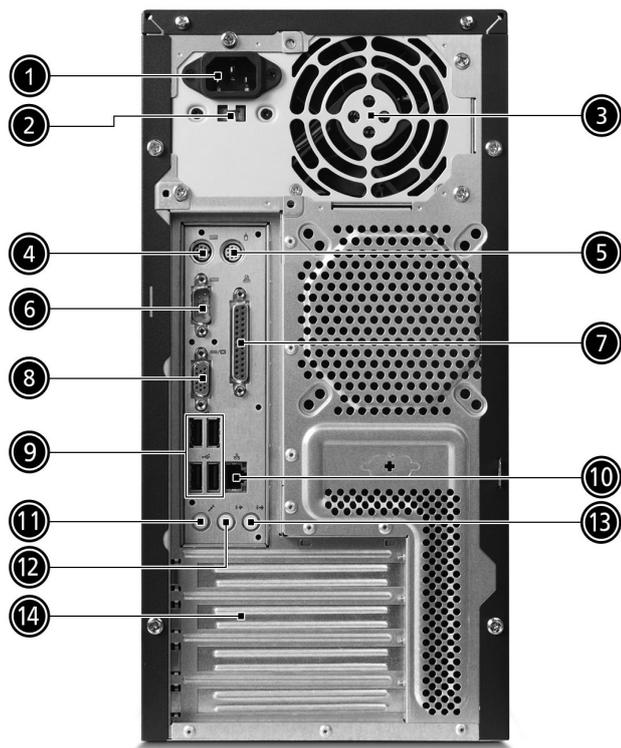
No.	Description	No.	Description
1	Power cord socket	2	Voltage selector switch
3	Fan aperture	4	PS/2 keyboard connector
5	PS/2 mouse connector	6	Serial port
7	Printer connector	8	Monitor connector
9	USB 2.0 ports	10	RJ-45 Ethernet connector
11	Microphone jack	12	Line-out Jack
13	Line-in jack	14	Extension card slots

AcerPower FH Front Panel
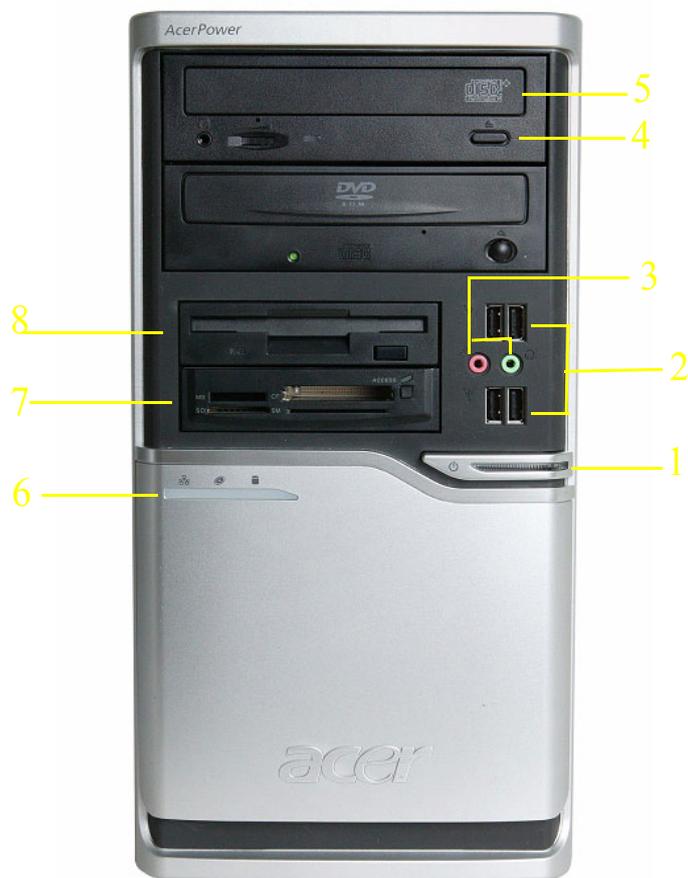
Label	Description
1	Power-Button
2	USB ports
3	Microphone-in & Speaker-out/Line-out Port
4	Optical drive eject button
5	Optical drive
6	Indicators
7	Card reader
8	HDD

AcerPower FH Rear Panel
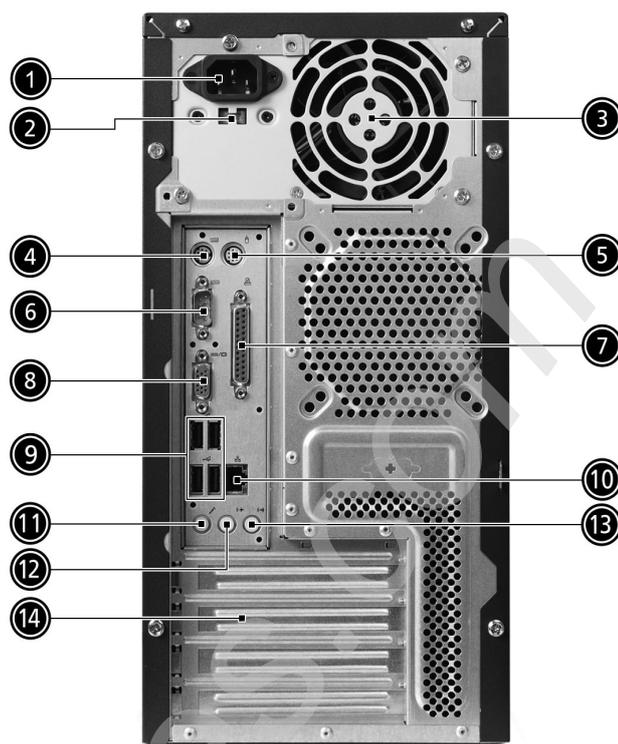
No.	Description	No.	Description
1	Power cord socket	2	Voltage selector switch
3	Fan aperture	4	PS/2 keyboard connector
5	PS/2 mouse connector	6	Serial port
7	Printer connector	8	Monitor connector
9	USB 2.0 ports	10	RJ-45 Ethernet connector
11	Microphone jack	12	Line-out Jack
13	Line-in jack	14	Extension card slots

System Peripherals

The Aspire S Series computer consist of the system itself, and system peripherals, like a mouse, keyboard and a set of speakers (optional). This section provides a brief description of the basic system peripherals.

Mouse (PS/2 or USB, manufacturing option)

The included mouse is a standard two-button wheel mouse. Connect the mouse to the PS/2 mouse port or USB port on the back panel of the system.

Keyboard (PS/2 or USB, manufacturing option)

Connect the keyboard to the PS/2 keyboard port or USB port on the back panel of the system.

Speakers

For systems bundled with speakers, before powering on the system, connect the speaker cable to the audio out (external speaker) port on the back panel of the system.

For more detailed information about the speakers, please refer to the included operating instructions.

NOTE: speakers are optional and the appearance might be different depending on the actual product.

Acer eRecovery

Acer eRecovery is a tool to quickly backup and restore the system. Users can create and save a backup of the current system configuration to hard drive, CD, or DVD.

Acer eRecovery consists of the following functions:

1. Create backup
2. Restore from backup
3. Create factory default image CD
4. Re-install bundled software without CD
5. Change Acer eRecovery password

Create backup

Users can create and save backup images to hard drive, CD, or DVD.

1. Boot to Windows XP
2. Press **<Alt>+<F10>** to open the Acer eRecovery utility.
3. Enter the password to proceed. The default password is six zeros.
4. In the Acer eRecovery window, select **Recovery settings** and click **Next**
5. In the Recovery settings window, select **Backup snapshot image** and click **Next**.
6. Select the backup method.

   ❑ Use **Backup to HDD** to store the backup disc image on drive D:.

   ❑ **Backup to optical device** to store the backup disc image on CD or DVD (only available on systems that include an optical disc burner).

7. After choosing the backup method, click **Next**.

Follow the instruction on screen to complete the process.

Restore from backup

Users can restore backup previously created (as stated in the **Create backup** section) from hard drive, CD, or DVD.

1. Boot to Windows XP.
2. Press **<Alt>+<F10>** to open the Acer eRecovery utility.
3. Enter the password to proceed. The default password is six zeros.
4. In the Acer eRecovery window, select **Recovery actions** and click **Next**.
5. Select the desired restore action and follow the onscreen instructions to complete the restore process.

Create factory default image CD

When the System CD and Recovery CD are not available, you can create them by using this feature.

1. Boot to Windows XP.
2. Press **<Alt>+<F10>** to open the Acer eRecovery utility.
3. Enter the password to proceed. The default password is six zeros.
4. In the Acer eRecovery window, select **Recovery settings** and click **Next**.
5. In the Recovery settings window, select **Burn image to disc** and click **Next**.
6. In the Burn image to disc window, select **01. Factory default image** and click **Next**.

7. Follow the instructions on screen to complete the process.

Re-install bundled software without CD

Acer eRecovery stores pre-loaded software internally for easy driver and application re-installation.

1. Boot to Windows XP.
2. Press **<Alt>+<F10>** to open the Acer eRecovery utility.
3. Enter the password to proceed. The default password is six zeros.
4. In the Acer eRecovery window, select Recovery actions and click **Next**.
5. In the Recovery settings window, select **Reinstall applications/drivers** and click **Next**.
6. Select the desired driver/application and follow the instructions on screen to re-install.

At first launch, Acer eRecovery prepares all the needed software and may take few seconds to bring up the software content window.

Change Password

Acer eRecovery and Acer disc-to-disc recovery are protected by a password that can be changed by the user. Follow the steps below to change the password in Acer eRecovery.

1. Boot to Windows XP.
2. Press **<Alt>+<F10>** to open the Acer eRecovery utility.
3. Enter the password to proceed. The default password is six zeros.
4. In the Acer eRecovery window, select **Recovery settings** and click **Next**.
5. In the Recovery settings window, select **Password**: **Change Acer eRecovery password** and click **Next**.
6. Follow the instructions on screen to complete the process.

Acer disc-to-disc recovery

Restore without a Recovery CD

This recovery process helps you restore the C: drive with the original software content that is installed when you purchase your notebook. Follow the steps below to rebuild your C: drive. (Your C: drive will be reformatted and all data will be erased.) It is important to back up all data files before you use this option.

1. Restart the system.
2. While the Acer logo is showing, press <Alt>+<F10> at the same time to enter the recovery process.
3. The message "The system has password protection. Please enter 000000:" is displayed.
4. Enter six zeros and continue.
5. The Acer Recovery main page appears.
6. Use the arrow keys to scroll through the items (operating system versions) and press <Enter> to select.

Multilingual operating system installation

Follow the instructions to choose the operating system and language you prefer when you first power-on the system.

1. Turn on the system.
2. Acer's multilingual operating system selection menu will pop-up automatically.
3. Use the arrow keys to scroll to the language version you want. Press <Enter> to confirm your selection.
4. The operating system and language you choose now will be the only option for future recovery operations.
5. The system will install the operating system and language you choose.

Hardware Specifications and Configurations

Processor

Item	Specification
Type	Intel Prescott 775/Smithfield/Cedar Mill/Presler/Conroe
Socket	Socket T LGA 775 pin
Speed	System bus total up to 20.8GB/s
FSB	533/800 MHz

BIOS

Item	Specification
BIOS code programmer	Award
BIOS version	v6.0
BIOS ROM type	Flash ROM
BIOS ROM size	4MB
BIOS ROM package	32-pin DIP package
Support protocol	ACPI 2.0, APM 1.2, SMBIOS 2.3, WFM support, ASD 1.03, PXE boot ROM, PCI 2.3
Boot from CD-ROM feature	Yes
Support to LS-120 FDD drive	Yes
Support to BIOS boot block feature	Yes

NOTE: The BIOS can be overwritten/upgraded by using the flash utility.

BIOS Hotkey List

Hotkey	Function	Description
Delete	Enter BIOS Setup Utility	Press while the system is booting to enter BIOS Setup Utility.

Main Board Major Chips

Item	Controller
NorthBridge	Intel 946GZ
SourthBridge	Intel ICH7
AGP controller	Intel 946GZ
Super I/O controller	ITE8718
Audio controller	ALC888
LAN controller	Realtek 8100C
HDD controller	ICH7
Keyboard controller	ITE8718

System Memory

Item	Specification
Memory slot number	2 slot
Support memory size per socket	256MB to 1GB
Support maximum memory size	2GB
Support memory type	DDR2 SDRAM
Support memory interface	DDR2 667/533
Support memory voltage	1.8V
Support memory module package	240-pin DIMM
Support to parity check feature	Yes
Support to Error Correction Code (ECC) feature	ECC checking with double-bit detect and single-bit correct
Memory module combinations	You can install memory modules in any combination as long as they match the specifications.

NOTE: Dual channel should be enabled always when plug-in 2 same memory size DDRII memory module.

Cache Memory

Item	Specification
First-Level Cache Configurations	
Cache function control	Enable/Disable by BIOS Setup
Second-Level Cache Configurations	
L2 Cache RAM type	PBSRAM
L2 Cache RAM size	up to 1MB per core(exclusive)
L2 Cache RAM speed	One-half the processor core clock frequency
L2 Cache function control	Enable/Disable by BIOS Setup
L2 Cache scheme	Fixed in write-back

Video Interface

Item	Specification
Video controller	Intel ICH7
Video controller resident bus	PCIE
Video Interface	x16
AGP Slot	1

Audio Interface

Item	Specification
Audio controller	ICH7
Audio controller Type	AC'97, ALC888
Audio Channel	7.1ch
Audio function control	Enable/disable by BIOS Setup

Audio Interface

Item	Specification
Mono or stereo	Stereo
Resolution	support up to 24 bit
Compatibility	Sound Blaster Pro/16 compatible
	Mixed digital and analog high performance chip
	Enhanced stereo full duplex operation
	High performance audio accelerator and AC'97 support
	Full native DOS games compatibility
	Virtual FM enhances audio experience through real-time FM-to-Wavetable conversion
	MPU-401(UART mode) interface for wavetable synthesizers and MIDI devices
	Integrated dual game port
	Meets AC'97and WHQL specifications
Music synthesizer	Yes, internal FM synthesizer
Sampling rate	DACs: 44.1k/48k/96k/192k Hz
	ADCs: 44.1k/48k/96k Hz
MPU-401 UART support	Yes
Microphone jack	Supported
Headphone jack	Supported

IDE Interface

Item	Specification
IDE controller	Intel ICH7
IDE controller resident bus	PCI bus
Number of IDE channel	1
Support IDE interface	E-IDE (up to PIO mode-4 and Ultra DMA 33/66/100/133), ANSIS ATA rev.3.0 ATAPI
Support bootable CD-ROM	Yes

Floppy disk drive Interface

Item	Specification
Floppy disk drive controller	ITE8718
Floppy disk drive controller resident bus	LPC bus
Support FDD format	should support 1.44MB/3mode 3.5" Devices

Parallel Port

Item	Specification
Parallel port controller	ITE8718
Parallel port controller resident bus	ISA bus
Number of parallel ports	1
Support ECP/EPP	Bi-directional SPP / ECP / EPP V1.7&V1.9
Connector type	25-pin D-type female connector
Parallel port function control	Enable/disable by BIOS Setup

Serial Port

Item	Specification
Serial port controller	ITE8718
Serial port controller resident bus	ISA bus
Number of serial port	2
16550 UART support	Yes
Connector type	9-pin D-type female connector
Features	Support IrDA1.0/ASKIR protocols, smart card reader protocols

USB Port

Item	Specification
Universal HCI	USB 2.0
USB Class	Support legacy keyboard for legacy mode
USB Number	support up to 8 ports

Environmental Requirements

Item	Specifications
Temperature	
Operating	+5°C ~ +35°C
Non-operating	-20 ~ +60°C (Storage package)
Humidity	
Operating	15% to 80% RH
Non-operating	10% to 90% RH
Vibration	
Operating (unpacked)	5 ~ 500 Hz:2.20g RMS random, 10 minutes per axis in all 3 axes 5 ~500 Hz: 1.09g RMS random, 1 hour per axis in all 3 axes

Power Management

Devices	S1 (Idle)	S3 (Suspend to RAM)	S4 (Suspend to Dlsk)	S5 (Shut Down)
Power Button	Enabled	Enabled	Enabled	Disabled

Power Management

Devices	S1 (Idle)	S3 (Suspend to RAM)	S4 (Suspend to Disk)	S5 (Shut Down)
USB Keyboard	Enabled	Enabled	Disabled	N/A
LAN	Disabled	Disabled	Disabled	Disabled
RTC	Disabled	Enabled	Disabled	Disabled
Modem (Ring)	Disabled	Disabled	Disabled	N/A

Power Management Function (ACPI support function)

Device Standby Mode

❑ Independent power management timer for hard disk drive devices
(0-15 minutes, time step=1 minute).

❑ Hard disk drive goes into Standby mode (for ATA standard interface).

❑ Disable V-sync to control the VESA DPMS monitor.

❑ Resume method: device activated (Keyboard for DOS, keyboard & mouse for Windows).

❑ Resume recovery time: 3-5 sec.

Global Standby Mode

❑ Global power management timer (2-120 minutes, time step=10 minute).

❑ Hard disk drive goes into Standby mode (for ATA standard interface).

❑ Disable H-sync and V-sync signals to control the VESA DPMS monitor.

❑ Resume method: Return to original state by pushing external switch button, modem ring in,
keyboard and mouse for APM mode.

❑ Resume recovery time: 7-10 sec.

Suspend Mode

❑ Independent power management timer (2-120 minutes, time step=10 minutes) or pushing external
switch button.

❑ CPU goes into SMM.

❑ CPU asserts STPCLK# and goes into the Stop Grant State.

❑ LED on the panel turns amber colour.

❑ Hard disk drive goes into SLEEP mode (for ATA standard interface).

❑ Disable H-sync and V-sync signals to control the VESA DPMS monitor.

❑ Ultra I/O and VGA chip go into power saving mode.

❑ Resume method: Return to original state by pushing external switch button, modem ring in,
keyboard and mouse for APM mode.

❑ Return to original state by pushing external switch button, modem ring in and USB keyboard for
ACPI mode.

ACPI

❑ ACPI specification 1.0b.

❑ S0, S1, S3 and S5 sleep state support.

❑ On board device power management support.

❑ On board device configuration support.

System Utilities

About the Setup Utility

The computer uses the latest Award BIOS with support for Windows Plug and Play. The CMOS chip on the main board contains the ROM setup instructions for configuring the main board BIOS.

The BIOS Setup Utility displays the system's configuration status and provides you with options to set system parameters. The parameters are stored in battery-backed-up CMOS RAM that saves this information when the power is turned off. When the system is turned back on, the system is configured with the values you stored in CMOS.

The BIOS Setup Utility enables you to configure:

❑ Hard drives, diskette drives and peripheral

❑ Video display type and display options

❑ Password protection from unauthorized use

❑ Power Management features

The settings made in the Setup Utility affect how the computer performs. Before using the Setup Utility, ensure that you understand the Setup Utility options.

The Standard Configuration

A standard configuration has already been set in the Setup Utility. However, we recommend that you read this chapter in case you need to make any changes in the future.

This Setup Utility should be used:

❑ when changing the system configuration

❑ when a configuration error is detected and you are prompted to make changes to the Setup Utility

❑ when trying to revolve IRQ conflicts

❑ when making changes to the Power Management configuration

Entering the Setup Utility

When you power on the system, BIOS enters the Power-On Self-Test (POST) routines. POST is a series of built-in diagnostics performed by the BIOS. After the POST routines are completed, the following message appears: `Press DEL to enter SETUP`

Press the delete key to have access to the BIOS Setup Utility.

NOTE: If the message disappears before you respond and you still want to enter Setup, restart the system by turning it OFF and On. You may also restart the system by simultaneously pressing [Ctrl + Alt + Delete].

▶ Product Information	▶ PC Health Status
▶ Standard CMOS Features	▶ Frequency/Voltage Control
▶ Advanced BIOS Features	Load Optimized Defaults
▶ Advanced Chipset Features	Set Supervisor Password
▶ Integrated Peripherals	Set User Password
▶ Power Management Setup	Save & Exit Setup
▶ PnP/PCI Configurations	Exit Without Saving
Esc: Quit F10: Save & Exit Setup	↑↓ → ← : Select Item
Time, Date, Hard Disk Type...	

BIOS Navigation Keys

The BIOS navigation keys are listed below:

❑   **ESC**: Exits the current menu.

❑   ⬆⬇⬅➡: Scrolls through the items on a menu.

❑   +/-/**PU**/**PD**: Modifies the selected field's values.

❑   **F10**: Saves the current configuration and exits setup.

❑   **F1**: Displays a screen that describes all key functions.

❑   **F5**: Loads previously saved values to CMOS.

❑   **F7**: Loads an optimum set of values for peak performance.

Using BIOS

When you start the Setup Utility, the main menu will appear. The main menu of the Setup Utility displays a list of the options that are available. A highlight indicates which options is currently selected. Use the cursor arrow keys to move the highlight to other options. When an option is highlighted, execute the option by pressing <Enter>.

Some options lead to pop-up dialog box that prompt you to verify that you want to execute that option. Other options lead to dialog boxes that prompt you for information.

Some options (marked with a triangle) lead to submenus that enable you to change the values for that option. Use the cursor arrow keys to scroll through the items in the submenu.

In this chapter, default values are enclosed in parenthesis. Submenu items are denoted by a triangle.

Product Information

This option displays basic information about the system.

Phoenix-AwardBIOS CMOS Setup Utility
Product Information

Product Name	AST690/APFH/APSK50	Item Help
System S/N	R01-A0	
Main Board ID	E946GZ	
Main Board S/N		Menu Level ▶
System BIOS Version	R01-A0	
SMBIOS Version	2.3	
BIOS Release Date	Jul 27, 2006	

↑↓→←:Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❑ **Product Names**: Displays the model name of your system.

❑ **System S/N**: Displays your system's serial number.

❑ **Main Board ID**: Displays the ID number of the main board.

❑ **Main Board S/N**: Displays the serial number of the main board.

❑ **System BIOS Version**: Specifies the version of the BIOS utility.

❑ **SMBIOS Version**: The System Management Interface (SM) BIOS allows you to check your system hardware components without actually opening your system. Hardware checking is done via software during start up. This parameter specifies the version of the SMBIOS utility installed in your system.

❑ **BIOS Release Date**: Displays the BIOS latest release date.

Standard CMOS Features

Select Standard CMOS Features from the main menu to configure some basic parameters in your system.

Phoenix-AwardBIOS CMOS Setup Utility
Standard CMOS Features

		Item Help
Date (mm:dd:yy) Sun, Jan 1 2006		
Time (hh:mm:ss) 9 : 33 : 26		
▶ IDE Channel 0 Master	[None]	Menu Level ▶
▶ IDE Channel 0 Slave	[LITE-ON DVD SOHD-16F]	
▶ IDE Channel 1 Master	[None]	Change the day, month,
▶ IDE Channel 1 Slave	[None]	year and century
▶ IDE Channel 2 Master	[ST3160612AS]	
▶ IDE Channel 2 Slave	[None]	
▶ IDE Channel 3 Master	[None]	
▶ IDE Channel 3 Slave	[None]	
Video	[EGA/VGA]	
Halt On	[All , But Keyboard]	
Base Memory	640K	
Extended Memory	65535K	
Total Memory	1024K	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❏ **Date and Time**: This item shows the current date and time set on the computer. If you are running a Windows OS, these items are automatically updated whenever you make changes to the Windows Date and Time Properties utility.

❏ **IDE Devices (none)**: Your computer has one IDE channel and can be installed with one or two devices (Master and Slave). Use this item to configure each device on the IDE channel. This main board features four SATA connectors supporting four SATA drives. SATA refers to Serial ATA (Advanced Technology Attachment), the standard interface for the IDE hard drives which are currently used in most PCs.

Phoenix-AwardBIOS CMOS Setup Utility
IDE Channel 0 Maser

		Item Help
IDE HDD Auto-Detection	[Press Enter]	
IDE Channel 0 Master	[Auto]	Menu Level ▶ ▶
Access Mode	[Auto]	
		To auto-detect the
Capacity	0 MB	HDD's size, head... on
		this channel
Cylinder	0	
Head	0	
Precomp	0	
Landing Zone	0	
Sector	0	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❑ **IDE HDD Auto-Detection**: Press <Enter> while this item is highlighted to prompt the Setup Utility to automatically detect and configure an IDE device on the IDE channel.

NOTE: Press <Enter> while this item is highlighted to prompt the Setup Utility to automatically detect and configure an IDE device on the IDE channel.

❑ **IDE Channel 0/1/2/3 Master/Slave IDE/Extended IDE Drives (Auto)**: Leave this item Auto to enable the system to automatically detect and configure IDE devices on the channel. If it fails to find a device, change the value to Manual and then manually configure the drive by entering the properties of the drive in the items described below. Please note that if you choose IDE channel 2/3 Master, the item may change to Extended IDE drive.

❑ **Access Mode**: This item defines ways that can be used to access IDE hard disks such as LBA (Large Blocking Addressing). Leave this value Auto and the system will automatically decide the fastest way to access the hard disk drive. If you choose IDE channel 2/3 Master, the item only has Large and Auto.

❑ **Video (EGA/VGA)**: This item defines the video mode of the system. This main board has a built-in VGA graphics system. You must leave this item at the default value.

❑ **Halt On (All but Keyboard)**: This item defines the operation of the system POST (Power-On Self-Test) routine. You can use this item to select which types of errors in the POST are sufficient to halt the system.

❑ **Base Memory, Extended Memory, and Total Memory**: This items are automatically detected by the system at start up time. These are display-only fields. You can not make changes to these fields.

Advanced BIOS Features

The following screen shows the Advanced BIOS Features.

```
                    Phoenix-AwardBIOS CMOS Setup Utility
                          Advanced BIOS Features
┌─────────────────────────────────────────────────┬──────────────────────┐
│  ▶ CPU Feature                    [Press Enter] ▲ │                      │
│  ▶ Hard Disk Boot Priority        [Press Enter] │ │     Item Help        │
│    Virus Warning                  [Disabled]    │ │                      │
│    CPU L1 & L2 Cache              [Enabled]     │ │   Menu Level   ▶     │
│    Hyper-Threading Technology     [Enabled]     │ │                      │
│    Quick Power On Self Test       [Enabled]     │ │                      │
│    First Boot Device              [Floppy]      │ │                      │
│    Second Boot Device             [Hard Disk]   │ │                      │
│    Third Boot Device              [CDROM]       │ │                      │
│    Boot Other Device              [Enabled]     │ │                      │
│    Boot Up NumLock Status         [On]          │ │                      │
│    Gate A20 Option                [Fast]        │ │                      │
│    Typematic Rate Setting         [Disabled]    │ │                      │
│  X Typematic Rate (Chars/Sec0     6             │ │                      │
│  X Typematic Delay (Msec)         250           │ │                      │
│    Security Option                [Setup]       │ │                      │
│  X APIC Mode                      Enabled       │ │                      │
│    MPS Version Control For OS     [1.4]         │ │                      │
│    OS Select For DRAM > 64MB      [Non-OS2]   ▼ │ │                      │
└─────────────────────────────────────────────────┴──────────────────────┘
```

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
            F5:Previous Values   F7:Optimized Defaults

❑   **CPU Features (Press Enter)**: Please note that this function is only available for Prescott CPUs. Scroll to this item and press <Enter> to view the following screen.
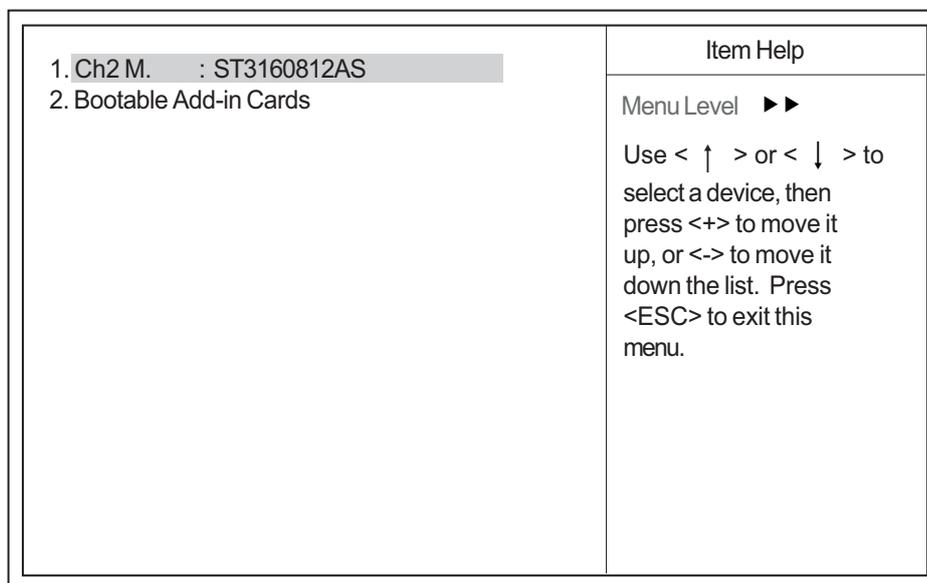
```
                    Phoenix-AwardBIOS CMOS Setup Utility
                                CPU Feature
┌─────────────────────────────────────────────────┬──────────────────────┐
│    Delay Prior to Thermal         [16 Min]        │                      │
│    Thermal Management             [Thermal Monitor 1]   Item Help        │
│  X TM2 Bus Ratio                   12 X           │                      │
│  X TM2 Bus VID                     1.2000V        │   Menu Level  ▶▶     │
│    Limit CPUID MaxVal             [Disabled]      │                      │
│    CPU Enhanced Halt (C1E)        [Auto]          │                      │
│    Execute Disable Bit            [Enabled]       │                      │
│                                                   │                      │
│                                                   │                      │
│                                                   │                      │
│                                                   │                      │
│                                                   │                      │
│                                                   │                      │
│                                                   │                      │
│                                                   │                      │
│                                                   │                      │
│                                                   │                      │
│                                                   │                      │
└─────────────────────────────────────────────────┴──────────────────────┘
```

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
            F5:Previous Values   F7:Optimized Defaults

❏ **Delay Prior to Thermal (16 Min)**: This item enables you to set the delay time before the CPU enters auto thermal mode.

❏ **Thermal Management (Thermal Monitor 1)**: This item displays CPU's temperature and enables you to set a safe temperature to Prescott CPU.

❏ **TM2 Bus Ratio (12X)**: This item represents the frequency (bus ratio) of the throttled performance state that will be initiated when the on-die sensor goes from not hot to hot.

❏ **TMS Bus VID (1.2000V)**: This item represents the voltage of the throttled performance state that will be initiated when the on-die sensor goes from not hot to hot.

❏ **Limit CPUID MaxVal (Disabled)**: This item can support Prescott CPUs for old OS. Please note that under NT4.0, it must be set **Enabled** while under WinXP, it must be set **Disabled**.

❏ **Execute Disable Bit (Enabled)**: This item is a security feature that helps you protect your CPU and operating system against malicious software executing code. This item is available when CPU supports the feature.

❏ **Hard Disk Boot Priority (Press Enter)**: Scroll to this item and press <Enter> to view the following screen.

Phoenix-AwardBIOS CMOS Setup Utility
Hard Disk Boot Priority

```
┌─────────────────────────────────────────┬──────────────────────┐
│                                          │      Item Help       │
│  1. Ch2 M.     : ST3160812AS             ├──────────────────────┤
│  2. Bootable Add-in Cards                │ Menu Level   ▶ ▶     │
│                                          │                      │
│                                          │ Use < ↑ > or < ↓ > to│
│                                          │ select a device, then│
│                                          │ press <+> to move it │
│                                          │ up, or <-> to move it│
│                                          │ down the list.  Press│
│                                          │ <ESC> to exit this   │
│                                          │ menu.                │
│                                          │                      │
│                                          │                      │
│                                          │                      │
│                                          │                      │
│                                          │                      │
└─────────────────────────────────────────┴──────────────────────┘
```

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❏ **Virus Warning (Disabled)**: This item is used to enable or disable virus warning function.

❏ **CPU L1 & L2 Cache (Enabled)**: All processors that can be installed in this main board use internal level 1 (L1) and external level 2 (L2) cache memory to improve performance. Leave this item at the default value for better performance.

❏ **Hyper-Threading Technology (Enabled)**: This item is only available when the chipset supports Hyper-Threading and you are using a Hyper-Threading CPU.

❏ **Quick Power On Self Test (Enabled)**: Enable this item to shorten the power on testing (POST) and have your system start up faster. You might like to enable this item after you are confident that your system hardware is operating smoothly.

❏ **First/Second/Third Boot Device (Floppy/Hard Disk/CD ROM)**: Use these three items to select the priority and order of the devices that your system searches for an operating system at start-up time.

❏ **Boot Other Device (Enabled)**: When enabled, the system searches all other possible locations for an operating system if it fails to find one in the devices specified under the First, Second and

Third boot devices.

❑ **Boot Up NumLock Status (On)**: This item defines if the keyboard NumLock key is active when your system is started.

❑ **Gate A20 Option (Fast)**: This item defined how the system handles legacy software that was written for an earlier generation of processors. Leave this item at the default value.

❑ **Typematic Rate Setting (Disabled)**: If this item is enabled, you can use the following two items to set the typematic rate and the typematic delay settings for your keyboard.

   ❑ **Typematic Rate (Chars/Sec)**: Use this item to define how many characters per second are generated by held-down key.

   ❑ **Typematic Delay (Msec)**: Use this item to define how many milliseconds must elapse before a held-down key begins generating repeat characters.

❑ **Security Option (Setup)**: If you have installed password protection, this item defines if the password is required at system start up, or if it is only required when a user tries to enter the Setup Utility.

❑ **APIC Mode (Enable)**: This item allows you to enable or disable the APIC (Advanced Programmable Interrupt Controller) mode. APIC provides symmetric multi-processing (SMP) for systems, allowing support for up to 60 processors.

❑ **MPS Version Control For OS (1.4)**: This item displays MPS version control for OS.

❑ **OS Select For DRAM > 64MB (Non-OS2)**: This item is only required if you have installed more than 64MB of memory and you are running the OS/2 operating system. Otherwise, leave this item at the default.

❑ **HDD S.M.A.R.T Capability (Disabled)**: When you enable HDD SMART (Self-Monitoring, Analysis and Reporting Technology) Capability, these new BIOSes will automatically check the hard disk's SMART status at boot-up.

❑ **Report No FDD For WIN 95 (Disabled)**: Set this item to the default if you are running a system with no floppy drive and using Windows 95. This ensures compatibility with the Window 95 logo certification.

❑ **Silent Boot (Enabled)**: If enabled, BIOS will show a full screen logo at boot. If disabled, BIOS will set the initial display mode to BIOS and show the diagnostic POST screen at boot.

❑ **Small Logo (EPA) Show (Disabled)**: This item enabled or disables the display of the EPA logo during boot.

❑ **Configuration Table (Disabled)**: Use this item to show summary screen.

Advanced Chipset Features

These items define critical timing parameters of the main board. You should leave the items on this page at their default values unless you are very familiar with the technical specifications of your system hardware. If you change the values incorrectly, you may introduce fatal errors or recurring instability into your system.

Phoenix-AwardBIOS CMOS Setup Utility
Advanced Chipset Feature

```
   System BIOS Cacheable              [Enabled]          Item Help
   Video BIOS Cacheable               [Disabled]
   Memory Hole At 15M-16M             [Disabled]         Menu Level    ▶
 ▶ PCI Express Root Port Func         [Press Enter]

   ** VGA Setting **
   PEG/Onchip VGA Control             [Auto]
   On-Chip Frame Buffer Size          [ 8MB]
   DVMT Mode                          [DVMT]
   DVMT/FIXED Memory Size             [ 128MB]
```

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❏ **System BIOS Cacheable (Enable)**: This item allows the system to be cached in memory for faster execution. Enable this item for better performance.

❏ **Video BIOS Cacheable (Disabled)**: This item aims to further boost the performance of a shadowed video BIOS by caching it using the processor's Level 2 cache.

❏ **Memory Hole At 15M-16M (Disable)**: In order to improve performance, certain space in memory can be reserved for ISA cards. This memory must be mapped into the memory space below 16MB.

❑ **PCI Express Root Port Func (Press Enter)**: Scroll to this item and press <Enter> to view the following screen.

Phoenix-AwardBIOS CMOS Setup Utility
PCI Express Root Port Func
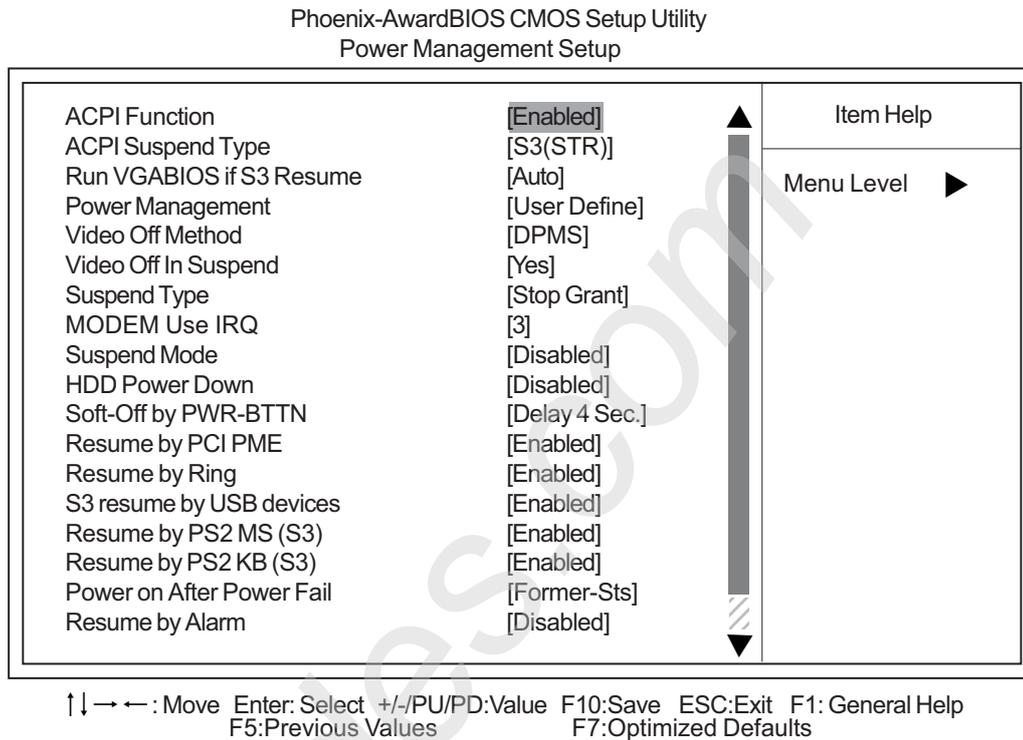
PCI Express Port 1	[Auto]	Item Help
PCI Express Port 2	[Auto]	
PCI Express Port 3	[Auto]	Menu Level ▶ ▶
PCI Express Port 4	[Auto]	
PCI Express Port 5	[Auto]	
PCI Express Port 6	[Auto]	
PCI-E Compliancy Mode	[v1.0a]	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❑ **PCI-E Compliancy Mode (1.0a)**: This item allows you to select the PCI-E Compliancy mode.

❑ **PEG/Onchip VGA Control (Auto)**: This item allows you to control the PEG or on-chip VGA.

❑ **On-Chip Frame Buffer Size (8MB)**: This item controls the amount of system memory that is allocated to the integrated graphics processor when the system boots up.

❑ **DVMT Mode (DVMT)**: this item allows you to select the DVMT operating mode.

❑ **PEG/On-chip VGA Control (128MB)**: This item allows you to adjust the shared memory size.

Integrated Peripherals

These options display items that define the operation of peripheral components on the system's input/output ports.

Phoenix-AwardBIOS CMOS Setup Utility
Integrated Peripherals

		Item Help
▶ OnChip IDE Device	[Press Enter]	
▶ Onboard Device	[Press Enter]	Menu Level ▶▶
▶ SuperIO Device	[Press Enter]	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❑ **Onboard Device (Press Enter)**: Scroll to this item and press <Enter> to view the following screen.

Phoenix-AwardBIOS CMOS Setup Utility
Onboard Device

			Item Help
IDE HDD Block Mode		[Enabled]	
IDE DMA transfer access		[Enabled]	
OnChip Primary PCI IDE		[Enabled]	Menu Level ▶▶
IDE Primary Master	PIO	[Auto]	
IDE Primary Slave	PIO	[Auto]	If your IDE hard drive
IDE Primary Master	UDMA	[Auto]	supports block mode
IDE Primary Slave	UDMA	[Auto]	select Enabled for
OnChip Secondary PCI IDE		[Enabled]	automatic detection of
IDE Secondary Master	PIO	[Auto]	the optimal number of
IDE Secondary Slave	PIO	[Auto]	block read/writes per
IDE Secondary Master	UDMA	[Auto]	sector the drive can
IDE Secondary Slave	UDMA	[Auto]	support
*** On-Chip Serial ATA Setting ***			
OnChip Serial ATA		[Enabled]	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❑ **IDE HDD Block Mode (Enabled)**: If your IDE hard drive supports block mode, select Enabled for automatic detection of the optimal number of block read/write per sector that the drive can support.

❑ **IDE DMA transfer access (Enabled)**: This item allows you to enable the transfer access of the IDE DMA then burst onto the PCI bus and nonburstable transactions do not.

❑ **OnChip Primary/Secondary PCI IDE (Enabled)**: Use these items to enable or disable the PCI IDE channels that are integrated on the main board.

❑ **Primary/Secondary Master/Slave UltraDMA (Auto)**: Enable this item if you plan to use a mouse connected through the USB port in a legacy operating system (such as DOS) that does not support Plug and Play.

❑ **OnChip Serial ATA (Enabled)**: Use this item to enable or disable the on-chip serial ATA.

❑ **Onboard Device (Press Enter)**: Scroll to this item and press <Enter> to view the following screen.

Phoenix-AwardBIOS CMOS Setup Utility
Onboard Device

		Item Help
USB Controller	[Enabled]	
USB 2.0 Support	[Enabled]	
USB Keyboard Support	[Disabled]	Menu Level ▶▶
USB Mouse Support	[Disabled]	
Onboard Audio Device	[Enabled]	
Onboard IEEE1394 Controller	[Enabled]	
Onboard GLAN Device	[Enabled]	
Onboard Lan Boot ROM	[Enabled]	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❑ **USB Controller (Enabled)**: Enables or disables the onboard USB controller. We recommend users keep the default value. It might cause the USB devices not to work properly if you disable this item.

❑ **USB 2.0 Support (Enabled)**: This item enables or disables the onboard USB 2.0 controller.

❑ **USB Keyboard Support (Disabled)**: Enable this item if you want to use a keyboard connected through the USB port in a legacy operating system (such as Dos) that does not support Plug and Play.

❑ **USB Mouse Support (Enabled)**: Enable this item if you want to use a mouse connected through the USB port in a legacy operating system (such as DOS) that does not support Plug and Play.

❑ **Onboard Audio Device (Enabled)**: Use this item to enable or disable the onboard audio device.

❑ **Onboard IEEE 1394 Controller (Enabled)**: This item allows you to control the onboard IEEE 1394 controller.

❑ **Onboard GLAN Device (Enabled)**: Use this item to enable or disable the onboard GLAN device.

❑ **Onboard Lan Boot ROM (Enabled)**: Use this item to enable or disable the booting from the onboard LAN or a network add-in card with a remote boot TOM installed.

❑ **Super IO Device (Press Enter)**: Scroll to this item and press <Enter> to view the following screen.

Phoenix-AwardBIOS CMOS Setup Utility
Super IO Device

Onboard FDC Controller	[Enabled]	Item Help
Onboard Serial Port 1	[3F8/IRQ4]	
Onboard Serial Port 2	[2F8/IRQ3]	
Onboard Parallel Port	[378/IRQ7]	Menu Level ►►
Parallel Port Mode	[SPP]	
X ECP Mode Use DMA	3	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save   ESC:Exit   F1: General Help
F5:Previous Values   F6:Fail-Safe Defaults   F7:Optimized Defaults

❑ **Onboard FDC Controller (Enabled)**: Select Enabled if your system has a floppy disk controller (FDC) installed on the main board. If you install an add-in FDC or the system has no floppy drive, select Disabled in this field.

❑ **Onboard Serial Port 1/2 (3F8/IRQ4/2F8/IRQ3)**: These options are used to assign the I/O address and interrupt request (IRQ) for onboard serial port 1 and port 2.

❑ **Onboard Parallel Port (378/IRQ7)**: This option is used to assign the I/O address and interrupt request (IRQ) for the onboard parallel port.

❑ **Parallel Port Mode (SSP)**: Enables you to set the data transfer protocol for your parallel port. There are four options: SPP (Standard Parallel Port), EPP (Enhanced Parallel Port), ECP (Extended Capabilities Port), and ECP + EPP.

❑ **ECP Mode Use DMA (3)**: When the onboard parallel port is set to ECP mode, the parallel port can use DMA 3/1.

Power Management Setup

This option lets you control system power management. The system has various power-saving modes including powering down the hard disk, turning off the video, suspending on RAM, and software power down that allows the system to be automatically resumed by certain events.

Phoenix-AwardBIOS CMOS Setup Utility
Power Management Setup

ACPI Function	[Enabled]		Item Help
ACPI Suspend Type	[S3(STR)]		
Run VGABIOS if S3 Resume	[Auto]		Menu Level ▶
Power Management	[User Define]		
Video Off Method	[DPMS]		
Video Off In Suspend	[Yes]		
Suspend Type	[Stop Grant]		
MODEM Use IRQ	[3]		
Suspend Mode	[Disabled]		
HDD Power Down	[Disabled]		
Soft-Off by PWR-BTTN	[Delay 4 Sec.]		
Resume by PCI PME	[Enabled]		
Resume by Ring	[Enabled]		
S3 resume by USB devices	[Enabled]		
Resume by PS2 MS (S3)	[Enabled]		
Resume by PS2 KB (S3)	[Enabled]		
Power on After Power Fail	[Former-Sts]		
Resume by Alarm	[Disabled]		

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❑ **ACPI Function (Enabled)**: Use this item to enable or disable the ACPI function.

❑ **ACPI Suspend Type (S3(STR))**: Use this item to define how your system suspends. In the default, S3 (STR), the suspend mode is a suspend on RAM, i.e., the system shuts down with the exception of a refresh current to the system memory.

❑ **Run VGA BIOS if S3 Resume (Auto)**: This item allows the system to initialize the VGA BIOS from S3 (Suspend on RAM) sleep state.

❑ **Power Management (User Define)**: Use this item to enable or disable a power management scheme. If you enable power management, you can use the items below to set the power management operation.

❑ **Video Off Method**: This item defines how the video is powered down to save power. This item is set for DPMS (Display Power Management Software) by default.

❑ **Suspend Type (Stop Grant)**: If this item is set to the default Stop Grant, the CPU will go into Idle Mode during power saving power.

❑ **Modem Use IRQ (3)**: If you want an incoming call on a modem to automatically resume the system from a power-saving mode, use this item to specify the interrupt request line (IRQ) that is used by the modem. You might have to connect the fax/modem to the main board Wake On Modem connector for the feature to work.

❑ **Suspend Mode (Disabled)**: This item allows you to enable or disable the suspend mode.

❑ **HDD Power Down (Disabled)**: The IDE hard drive will spin down if it is not accessed within a specified length of time.

❑ **Soft-Off by PWR-BTTN (Instant-Off)**: Under ACPI (Advanced Configuration and Power Management Interface) you can create a software power down. In a software power down, the system can be resumed by Wake Up Alarms. This item lets you install a software power down that is controlled by the power button on your system. If the item is set for Instant-Off, then the power button causes a software power down. If the item is set for Delay four Sec., then you have to hold

the power button down for four seconds to cause a software power down.

❑ **Resume by PCI PME (Enabled)**: This item specifies whether the system will be awakened from power-saving modes when activity or input signal of the specified hardware peripheral or component is detected.

❑ **Resume by Ring (Enabled)**: An input signal on the serial Ring indicator (RI) line (in other words, an incoming call on the modem) awakens the system from soft off state.

❑ **S3 resume by USB devices (Disabled)**: This option allows the activity of the USB devices (keyboard and mouse) to wake up the system from S3 sleep state.

❑ **Resume by PS2 MS/KS (S3) (Disabled)**: Enable or disable the function of waking up the system by the mouse/keyboard activity.

❑ **Power on After Power fail (Off)**: This item enables your computer to automatically restart or return to its last operating status after power returns from a power failure.

❑ **Resume by Alarm (Disabled)**: When it is set to Enabled, additional fields become available and you can set the data (day of the month), hour, minute and second to turn on your system. When it is set to zero for the day of the month, the alarm will power on your system every day at the specified time.

❑ ****Reload Global Timer Events****: Global Timer (power management) events are I/O events whose occurrence can prevent the system from entering a power saving mode or can awaken the system from such a mode. In effect, the system remains alert for anything that occurs to a device that is configured as Enabled, even when the system is in a power-down mode.

❑ **Primary/Secondary IDE 1/0 (Disabled)**: When these items are enabled, the system will restart the power-saving timeout counters when any activity is detected on any of the drives or devices on the primary or secondary IDE channels.

❑ **FDD, COM, LPT Port (Disabled)**: When this item is enabled, the system will restart the power-saving timeout counters when any activity is detected on the floppy disk drive, serial ports, or the parallel port.

❑ **PCI PIRQ[A-D]# (Disabled)**: When this item is enabled, any activity from one of the listed devices wakes up the system.

PnP/PCI Configurations

This options configure how PnP (Plug and Play) and PCI expansion cards operate in your system. Both the ISA and PCI buses on the main board use system IRQs (Interrupt ReQuests) and DMAs (Direct Memory Access). You must set the IRQ and DMA assignments correctly through the PnP/PCI Configurations Setup utility for the main board to work properly. Selecting PnP/PCI Configurations on the main board program screen displays this menu:

```
                        Phoenix-AwardBIOS CMOS Setup Utility
                              PnP/PCI Configurations

      Init Display First          [PCI Slot]              Item Help
      Reset Configuration Data     [Disabled]
                                                     Menu Level      ►
      Resources Controlled By      [Auto(ESCD)]
    X IRQ Resources                Press Enter

      PCI/VGA Palette Snoop        [Disabled]
      Assign IRQ For USB           [Auto]
      INT Pin 1 Assignment         [Auto]
      INT Pin 2 Assignment         [Auto]
      INT Pin 3 Assignment         [Auto]
      INT Pin 4 Assignment         [Auto]
      INT Pin 5 Assignment         [Auto]
      INT Pin 6 Assignment         [Auto]
      INT Pin 7 Assignment         [Auto]
      INT Pin 8 Assignment         [Auto]

      ** PCI Express relatvie items**
      Maximum Payload Size         [4096]

   ↑↓ → ← : Move  Enter: Select  +/-/PU/PD:Value  F10:Save  ESC:Exit  F1: General Help
          F5:Previous Values                F7:Optimized Defaults
```

❑   **Init Display First (PCI Slot)**: This item allows you to choose the primary display card.

❑   **Reset Configuration Data (Disabled)**: If you enable this item and restart the system, any Plug and Play configuration data stored in the BIOS Setup is cleared from memory.

❑   **Resources Controlled by (Auto (ESCD))**: You should leave this item at the default Auto (ESCD). Under this setting, the system dynamically allocates resources to Plug and Play devices as they are required.

  ❑   **IRQ Resources**: In the IRQ Resources submenu, if you assign an IRQ to Legacy ISA, then that Interrupt Request Line is reserved for a legacy ISA expansion card. Press <Esc> to close the IRQ Resources submenu. In the Memory Resources submenu, use the first item Reserved Memory Base to set the start address of the memory you want to reserve for the ISA expansion card. Use the section item Reserved Memory Length to set the amount of reserved memory. Press <Esc> to close the Memory Resources submenu.

❑   **PCI/VGA Palette Snoop (Disabled)**: This item is designed to overcome problems that can be caused by some non-standard VGA cards. This board includes a built-in VGA system that does not require palette snooping so you must leave this item disabled.

❑   **Assign IRQ for USB (Enabled)**: This item enables or disables IRQ allocation for the USB.

❑   **INT Pin 1-8 Assignment (Auto)**: Identifies the interrupt request (IRQ) line assigned to a device connected to the PCI interface of the system.

❑   **Maximum Payload Size (4096)**: This item specifies the maximum TLP payload size for the PCI Express devices. The unit is byte.

PC Health Status

On the main boards that support hardware monitoring, this item lets you monitor the parameters for critical voltages, temperatures, and fan speeds.

Phoenix-AwardBIOS CMOS Setup Utility
PC Health Status

		Item Help
Smart Fan Control	[Enabled]	
CPU Warning Temperature	[70°C/158°F]	Menu Level ▶
Vcore	1.20V	
+3.3V	3.37V	
+5V	4 .94V	
+12V	11.45V	
5V SB	4.94V	
Current CPU Temperature	36°C	
Current System Temperature	30°C	
Current CPU fan Speed	0 RPM	
Current System fan Speed	0 RPM	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults

❑ **Smart Fan Control (Enabled)**: This item enables or disables the Smart fan function, when it is set at certain temperature, the PWN value will reach the certain value accordingly, and we can adjust the CPU fan speed by PWN.

❑ **CPU Warning Temperature (70ºC/158ºF)**: Enable you to manually set the warning temperature of the system.

❑ **System Component Characteristics**: These field provide you with information about the systems.

Frequency Control

This item enables you to set the clock speed and system bus for your system. The clock speed and system bus are determined by the kind of processor you have installed in your system.

Phoenix-AwardBIOS CMOS Setup Utility
Frequency Control

CPU Clock Ratio	[17X]	Item Help
		Menu Level ▶

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1: General Help
F5:Previous Values   F7:Optimized Defaults
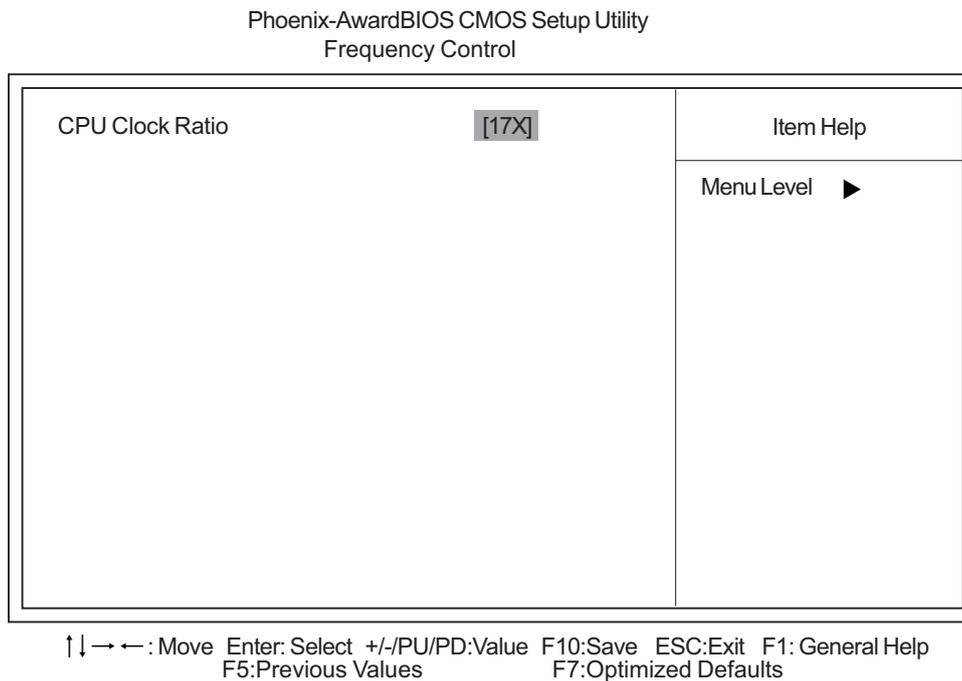
❑ **CPU Clock Ratio (25X)**: Enables you to set the CPU clock.

Load Fail-Safe Defaults Option

This option opens a dialog box that lets you install fail-safe defaults to all appropriate items in the Setup Utility: Press <Y> and the <Enter> to install the defaults. Press <N> and then <Enter> to not install the defaults. The Fail-Safe defaults place no great demands on the system and are generally stable. If your system does not function correctly, try to install the Fail-Safe Defaults as a first step for making your system work properly again. If you only want to install Fail-Safe Defaults for a specific option, select and display that option, and then press <F6>.

Load Optimized Defaults Option

This option opens a dialog box that lets you install optimized defaults for all appropriate items in the Setup Utility. Press <Y> and then <Enter> to install the defaults. Press <N> and then <Enter> to not install the defaults. The optimized defaults place demands on the system that may be greater than the performance level of the components, such as the CPU and the memory. You can cause fatal errors or instability if you install the optimized defaults when your hardware does not support them. If you only want to install setup defaults for a specific option, select and display that option, and then press <F7>.

NOTE: Please remain the factory BIOS default setting of **Load optimized Defaults** when you install Operation System onto the unit.

Set Supervisor/User Password

Type the password, up to eight characters and press <Enter>. The new password will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the new password again and press <Enter>. You may also press <Esc> to abort the selection.

To disable password, just press <Enter> when you are prompted to enter password. A message will confirm the password being disabled. Once the password is disabled, the system will boot and you can enter BIOS Setup freely.

If you have selected **System** in **Security Option** of **BIOS Features Setup** menu, you will be prompted for the password every time the system reboots or any time you try to enter BIOS Setup.

If you have selected **Setup** in **Security Option** from **BIOS Features Setup** menu, you will be prompted for the password only when you enter BIOS Setup.

Supervisor Password has higher priority than User Password, You can use Supervisor Password when booting the system or entering BIOS Setup to modify all settings. Also you can use User Password when booting the system or entering BIOS Setup but can not modify any setting if Supervisor Password is enabled.

Save & Exit Setup

Highlight this item and press <Enter> to save the changes that you have made in the Setup Utility and exit the Setup Utility. When the Save and Exit dialog box appears, press <Y> to save and exit, or press <N> to return to the main menu.

Exit without Saving

Highlight this item and press <Enter> to discard any changes that you have made in the Setup Utility and exit the Setup Utility. When the Exit without Saving dialog box appears, press <Y> to discard changes and exit, or press <N> to return to the main menu.

NOTE: If you have made settings that you do not want to save, use the **Exit with Saving** item and press <Y> to discard any changes you have made.

Machine Disassembly and Replacement

To disassemble the computer, you need the following tools:

❑   Wrist grounding strap and conductive mat for preventing electrostatic discharge.

❑   Wire cutter.

❑   Phillips screwdriver (may require different size).

NOTE: The screws for the different components vary in size. During the disassembly process, group the screws with the corresponding components to avoid mismatches when putting back the components.

General Information

Before You Begin

Before proceeding with the disassenbly procedure, make sure that you do the following:

1. Turn off the power to the system and all peripherals.

2. Unplug the AC adapter and all power and signal cables from the system.

Disassembly Procedure

This section tells you how to disassemble the system when you need to perform system service. Please also refer to the disassembly video, if available.

CAUTION: Before you proceed, make sure you have turned off the system and all peripherals connected to it.

Aspire T690 Standard Disassembly Process

1. Open the computer.
　　1-1. Place the system unit on a flat, steady surface.

　　1-2. Turn the housing down, release the Lock-handle then slide the left side door
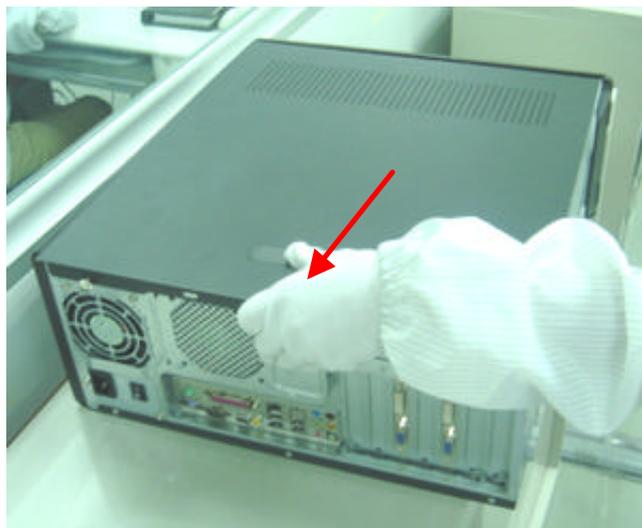
2. Disconnect the cables.
　　2-1. Disconnect the AUDIO cable.

2-2. Disconnect the USB and Front LED ASSY cables.

Front LED ASSY cable USB Cable

Card-reader Cable
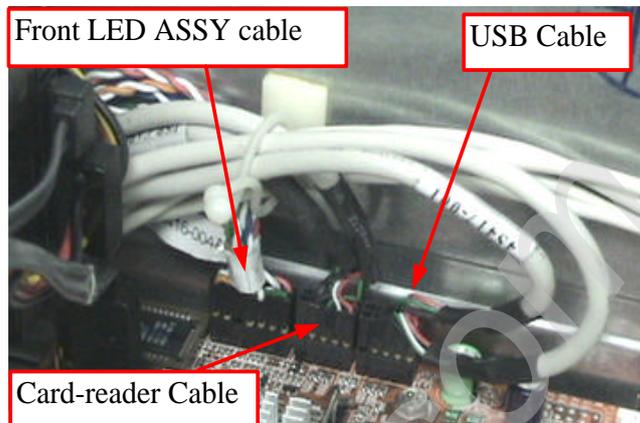
2-3 . Disconnect the PA and PD power-cable from the MB connector.

PA power-connector PD power-connector
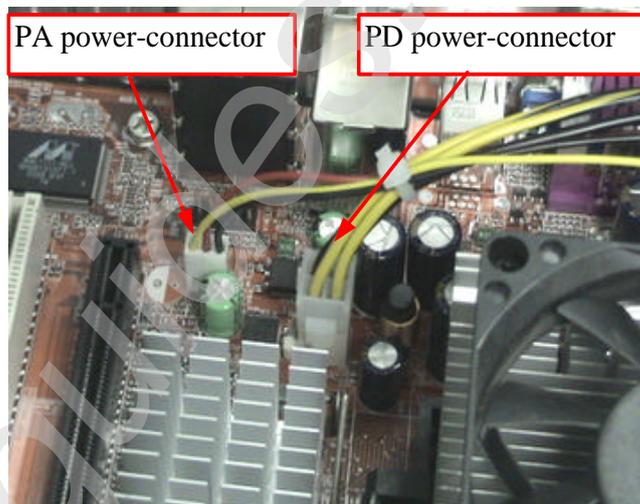
2-4 . Disconnect the P1 power-cable and ODD data cable from the MB connector.
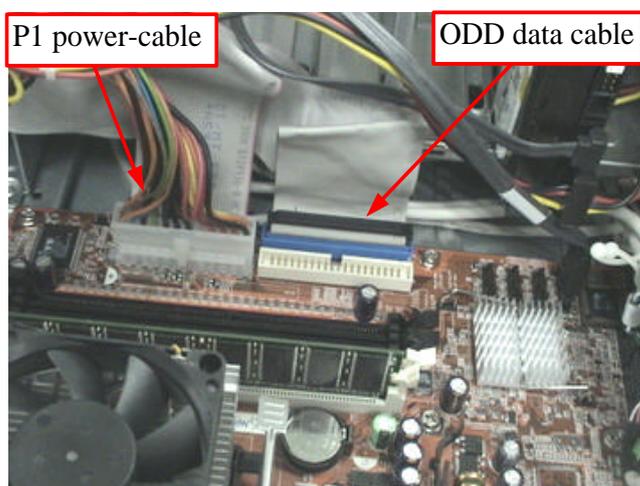
P1 power-cable ODD data cable

2-5 . Disconnect FDD data cable from the MB connector.
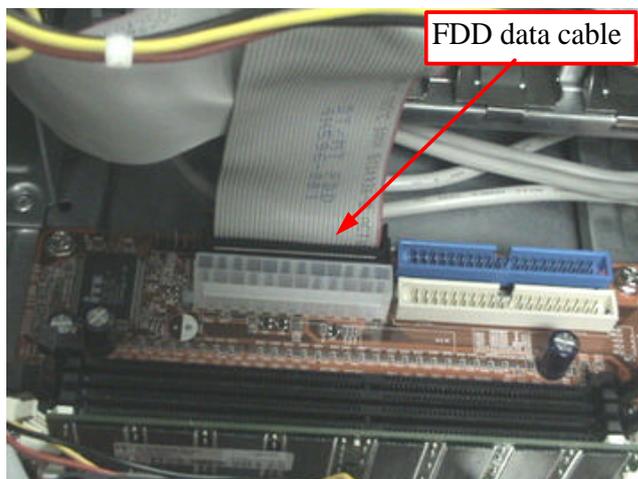
FDD data cable

2-6 . Disconnect the ODD data cable and power-cable from the rear of ODD.

ODD data cable   ODD power-cable
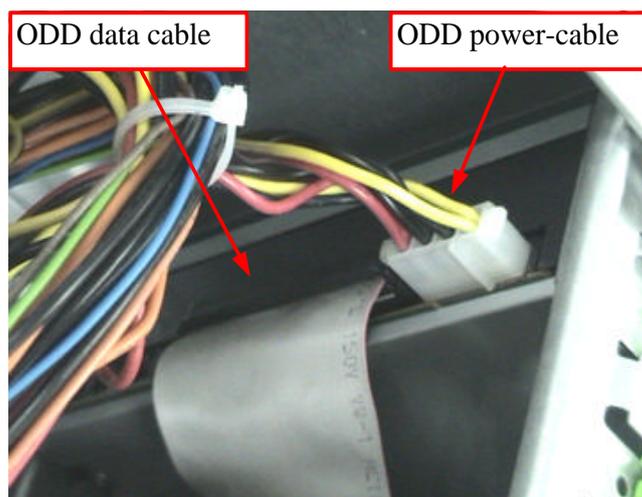
2-7 . Disconnect the FDD data cable and power-cable from the rear of FDD.

FDD power-cable   FDD data cable
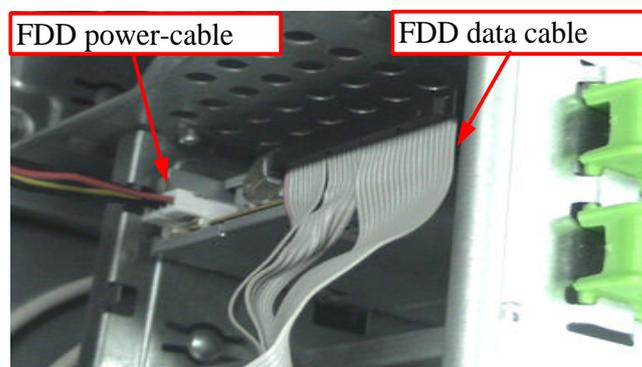
Standard Disassembly Process

2-8 . Disconnect the HDD data cable and power-cable from the rear of HDD and MB.
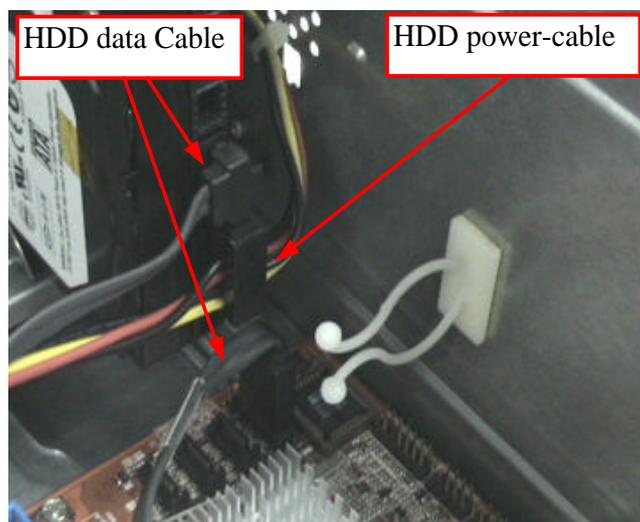
3. Detach the HDD, FDD and ODD.

    3-1. Rail the HDD-holder shown bellow, then take the HDD out from the chassis.
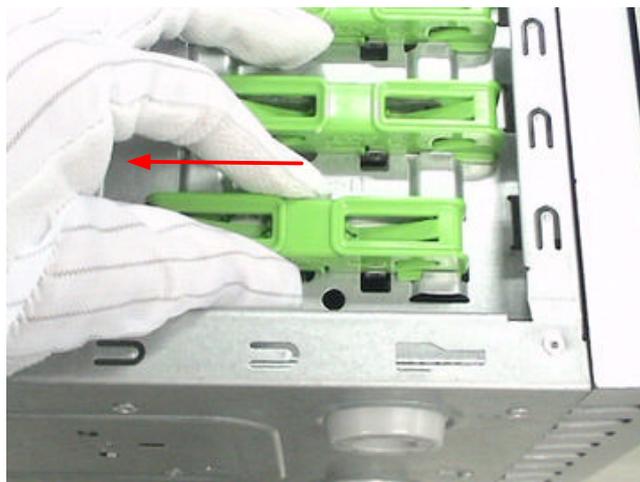
Standard Disassembly Process

3-2. Release the three latches on the front bezel, then remove the front bezel.
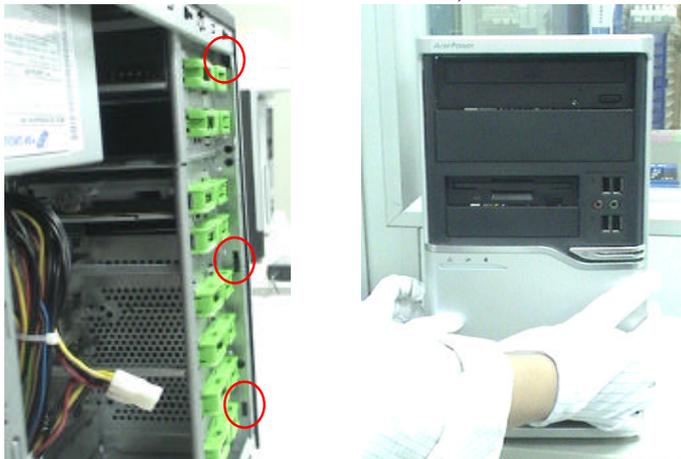
3-3. Rail the ODD-holder shown bellow, then take the ODD out from the chassis.
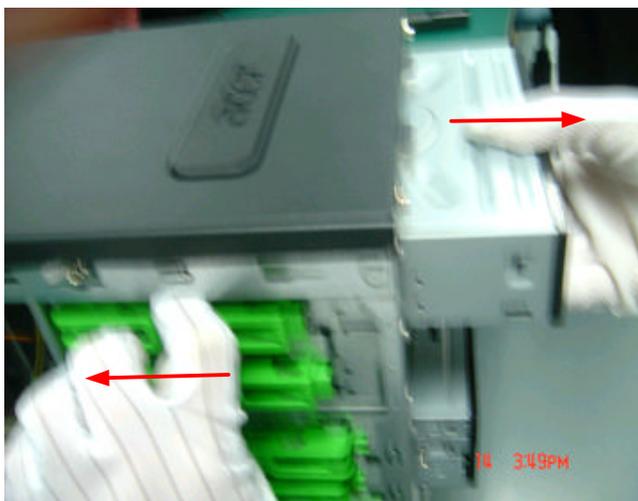
3-4. Rail the FDD-holder shown bellow, then take the FDD out from the chassis.
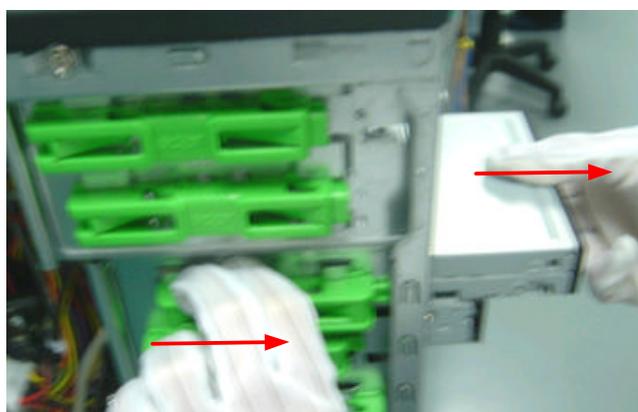
Standard Disassembly Process

3-5. Rail the Holder shown bellow, then take the Card-reader out from the chassis.
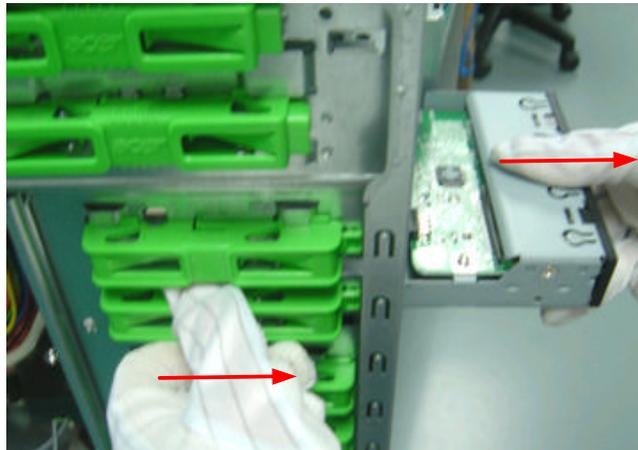
4. Detach the USB Module.
Release the screw shown bellow, then take off the USB module together with the USB&Audio cable.

5. Detach the CPU Cooler.
5-1. Disconnect the CPU Cooler power-cable shown bellow.
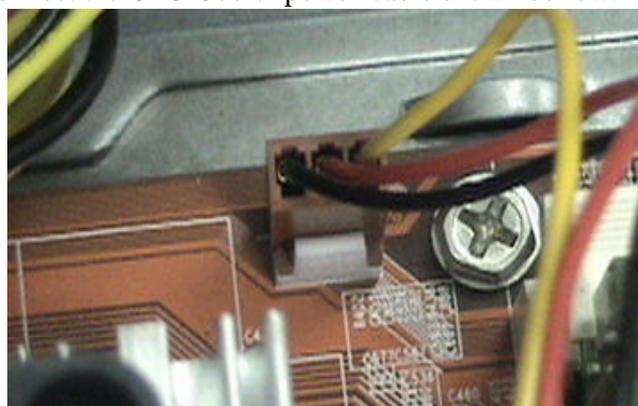
Standard Disassembly Process

5-2. Release the CPU Cooler Latch then remove it.

Before revolve the Latch

Pull the Latch afterward

After revolve the Latch
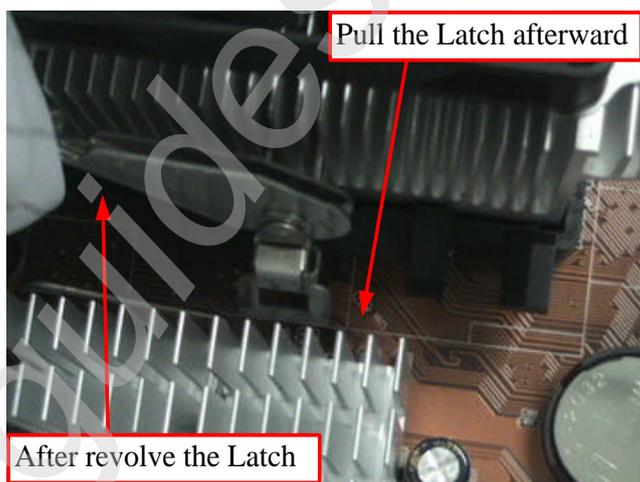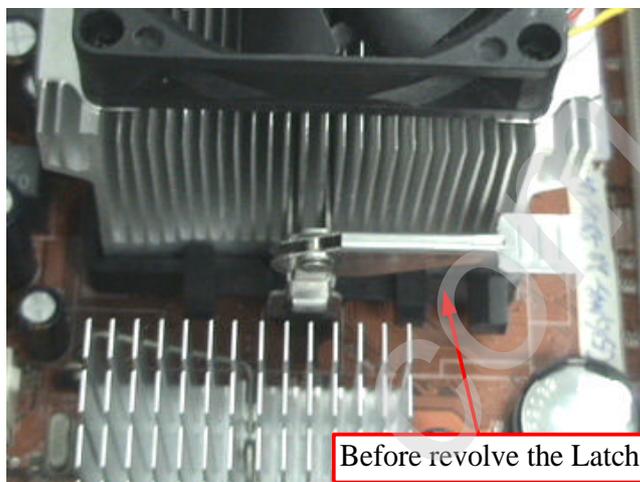
6. Remve the Memory.

Release the two latch shown bellow then remove the Memory.

Standard Disassembly Process

7. Remve the System Fan.

   Release the four screws shown bellow then take off the fan.
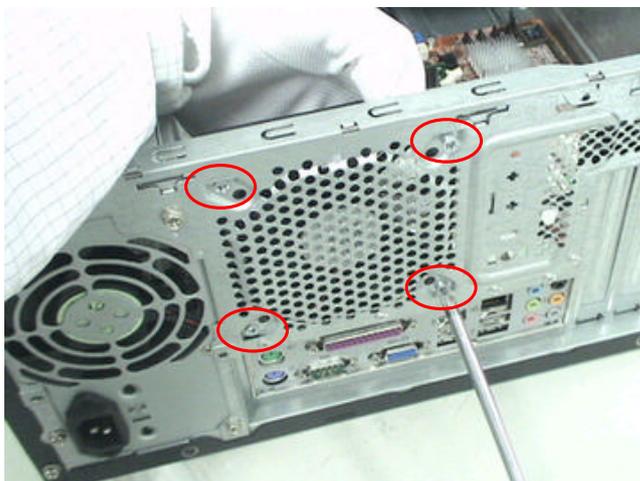
8. Remove the Motherboard.

   Release the eight screws shown bellow then take off the MB.
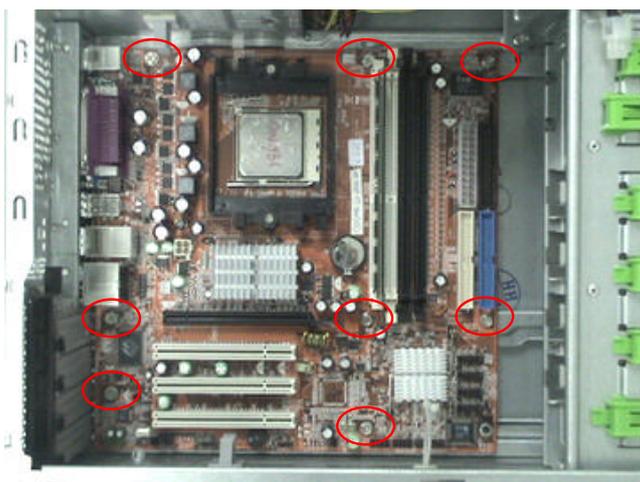
9. Remove the Power-supply.

   Release the four screws shown bellow then take off the Power-supply.

Standard Disassembly Process

10. Remove the CPU.

Release the CPU Latch on the Socket then remove the CPU.

Standard Disassembly Procedure

Opening the System

1. Place the system unit on a flat, steady surface.

2. Turn the housing down, slide the Lock-handle as shown , meanwhile slide the left side door out .
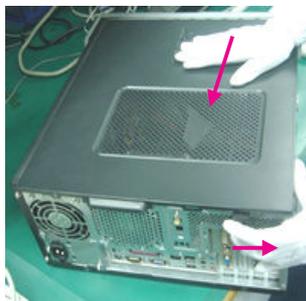
Remove the ADD ON Cards

1. Release the PCI-Lock as shown bellow, then remove it.

2. Release the VGA-slot Lock shown bellow, then pull out the VGA Card.

3. Remove the TV Tuner Card.

4. Remove the Modem card.

Remove the Cables

1. Disconnect the SPDIF and AUDIO cables.

AUDIO Cable

SPDIF Cable
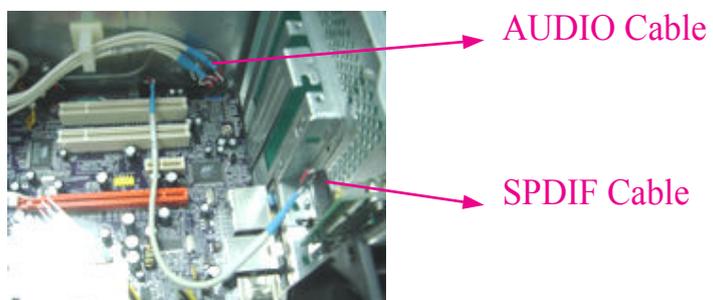
2. Disconnect the USB and Card-reader Cables.

USB Cable

Card-reader
Cable
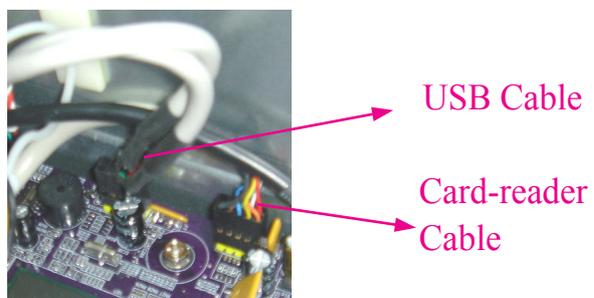
3. Disconnect 12V power cable " PD" and CPU fan power cable from the M/B.

12V power cable " PD"

CPU fan power cable

4. Disconnect the 4 Pin power cable "PE" from the master ODD, "PF" from the slave ODD.

5. Disconnect the ODD IDE cable from the master & slave ODD.

6. Disconnect the FDD data and power cable from the FDD.
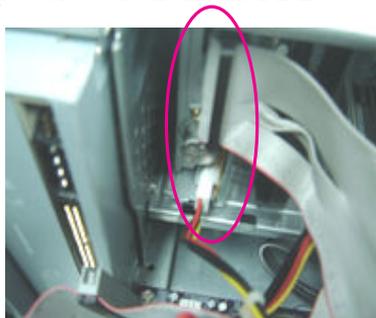
7. Disconnect the "PB" power cable from the master HDD, "PC" from the slave HDD.
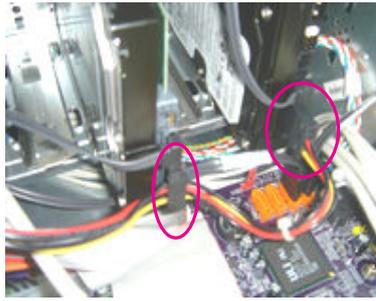
8. Disconnect the two HDD SATA cables from the HDDs and M/B connector.
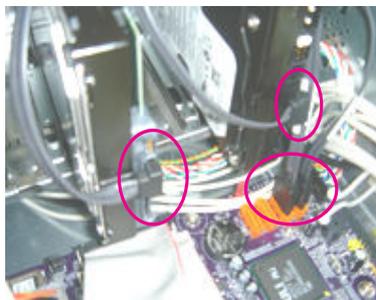
9. Disconnect the LED cable ASSY from the M/B Connector.

10. Disconnect the system fan power cable from the M/B Connector.

11. Disconnect the ODD&FDD IDE and P1 power cable from the M/B connector.

FDD cable

P1 power cable

ODD IDE cable
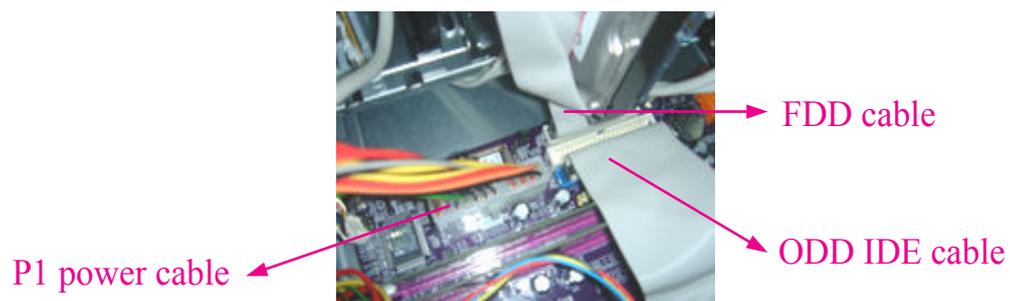
Remove the Memory

    Loose the DIMM Latch and pop out the two memory shown bellow.

Remove the Heatsink module.

    Loosen the four screws , then remove the Heatsink.

Remove the front bezel

    Release the three latches on the front bezel, then remove the front bezel.

Remove the CD-ROM, Floppy, Card-reader and HDD

1. Release the HDD-Holder, meanwhile pull the master HDD out of the chassis.
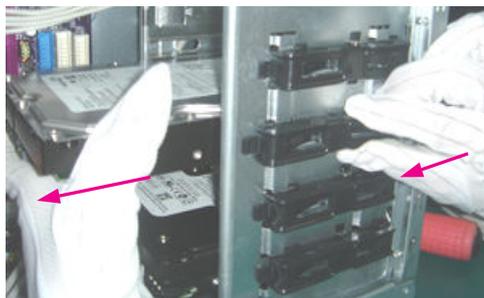
2. Release the HDD-Holder, meanwhile pull the slave HDD out of the chassis.

3. Release the FDD-Holder, meanwhile pull the Card-reader Module out of the chassis.
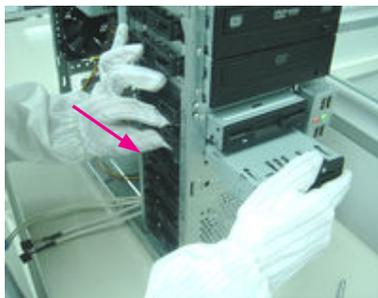
4. Release the FDD-Holder, meanwhile pull the Card-reader Module out of the chassis.

Release the ODD-Holder, meanwhile pull the Slave ODD out of the chassis, then the Master one.

Removing the USB Module

Remove the screw as shown bellow, detach the USB Module, then pull down the USB&Audio cable from the USB board.
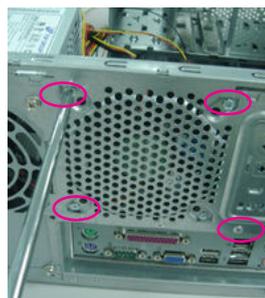
Removing the SPDIF Module

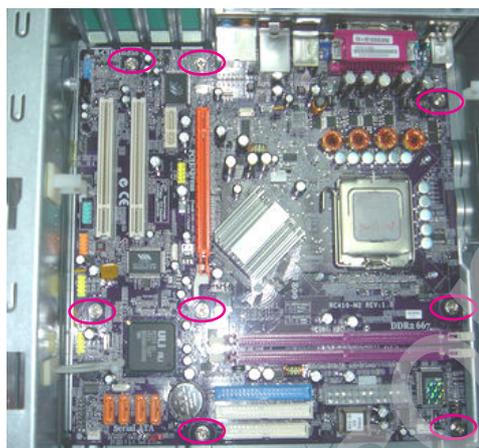Remove the screw as shown bellow and remove it.

Remove the System Fan

Remove the four screws and remove the system fan shown bellow.

Remove the Mainboard

Remove the eight screws and remove the Mainboard shown bellow.

Remove the Power-supply

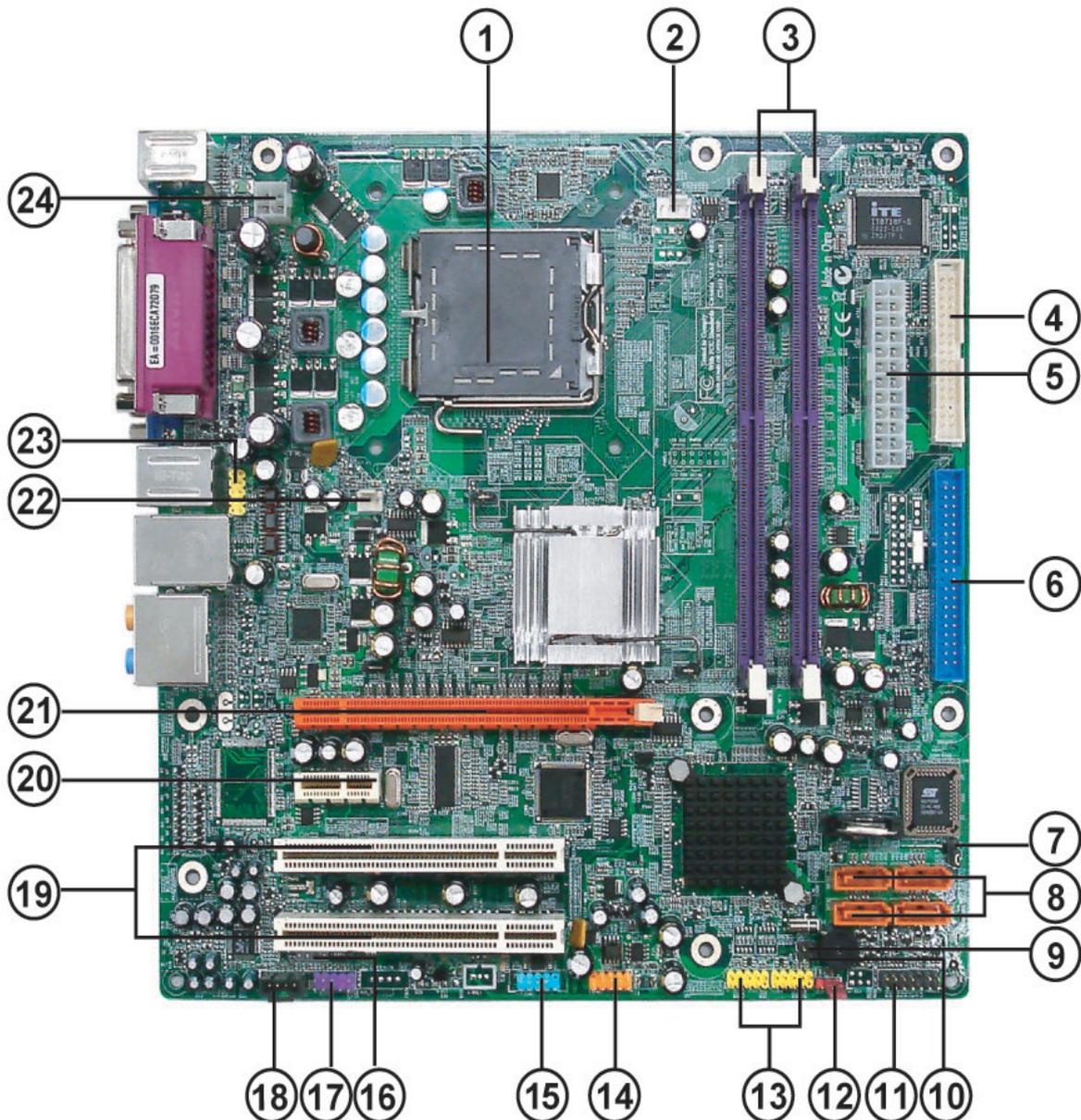Remove the four screws shown bellow and remove the Power-supply.

Troubleshooting

Please refer to generic troubleshooting guide for trougleshooting information relating to following topics:

❑ Power-On Self-Test (POST)

❑ POST Check Points

❑ POST Error Messages List

❑ Error Symptoms List

Jumper and Connector Information

Main Board Placement

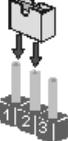| #	Label	Description	#	Label	Description
1	CPU Socket	LGA775 socket for Intel Core^{TM} Duo / Pentium D / Pentium 4 / Celeron D CPUs	2	CPU_FAN1	CPU cooling fan connector
3	DIMM1~2	DDR2 240 pin SDRAM slots	4	FDD1	Floppy diskette drive connector

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| #	Label	Description	#	Label	Description
5	ATX1	Standard 24-pin ATX power connector	6	IDE1	Primary IDE channel
7	BIOS_WP	BIOS flash protect jumper	8	SATA1~4	Serial ATA connectors
9	JP2	TBD	10	JP1	TBD
11	PANEL1	Front Panel switch/LED header	12	CLR_CMOS1	Clear CMOS jumper
13	USB3~4	Front Panel USB headers	14	1394a1	Onboard 1394a header
15	COM2	Onboard Serial port header	16	SPDIF	SPDIF out header
17	AUDIO2	Front Panel Audio header	18	CD_IN1	Analog audio input connector
19	PCI1~2	32-bit add-on card slots	20	PCIEX1	PCI Express x1 slot
21	PCIEX16	PCI Express x16 slot	22	SYS_FAN1	System fan connector
23	R_USB	Front Panel USB header	24	ATA12V1	Auxiliary 4-pin power connector

Jumper Setting

This section explains how to set jumpers for correct configuration of the main board.

Setting Jumper

Use the main board jumpers to set system configuration options. Jumpers with more than one pin are numbered. When setting the jumpers, ensure that the jumper caps are placed on the correct pins.

| Illustration	Description
SHORT **OPEN**	The illustrations show a 2-pin jumper. When the jumper cap is placed on both pins, the jumper is SHORT. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is OPEN.
	This illustration shows a 3-pin jumper. Pins 1 and 2 are SHORT.

Checking Jumper Settings
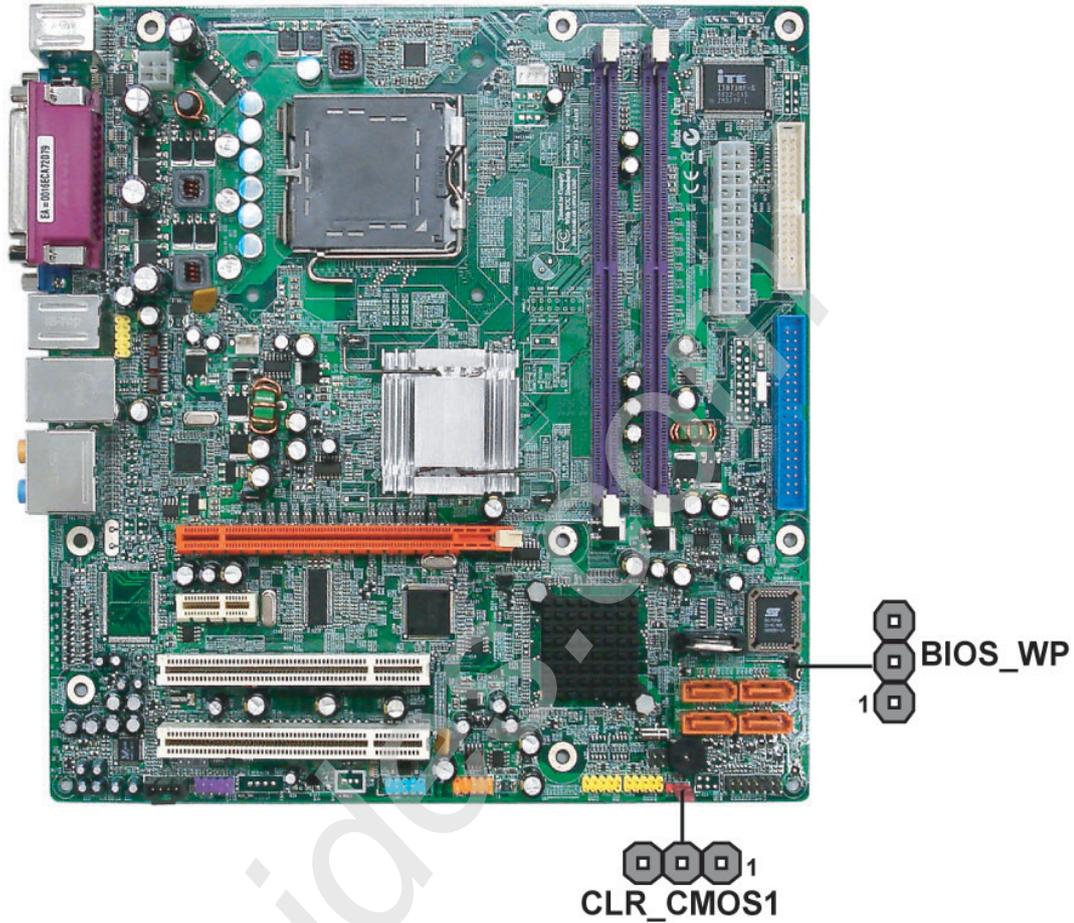
Jumper	Type	Description	Setting(Default)	Illustration
CLR_CMOS1	3-pin	CLEAR CMOS	1-2 : Normal 2-3 : Clear CMOS Before clearing the CMOS,make sure you have turned off the system.	
BIOS_WP	3-pin	BIOS PROTECT	1-2: Write 2-3: PROTECT	

Chapter 5

Connecting Components

1. Connect the CPU cooling fan cable to **CPU_FAN1**.

2. Connect the system cooling fan connector to **SYS_FAN1**.

3. Connect the case switches and indicator LEDs to the **PANEL1**.

4. Connect the standard power supply connector **ATX1**.

5. Connect the auxiliary case power supply connector to **ATX12V1**.
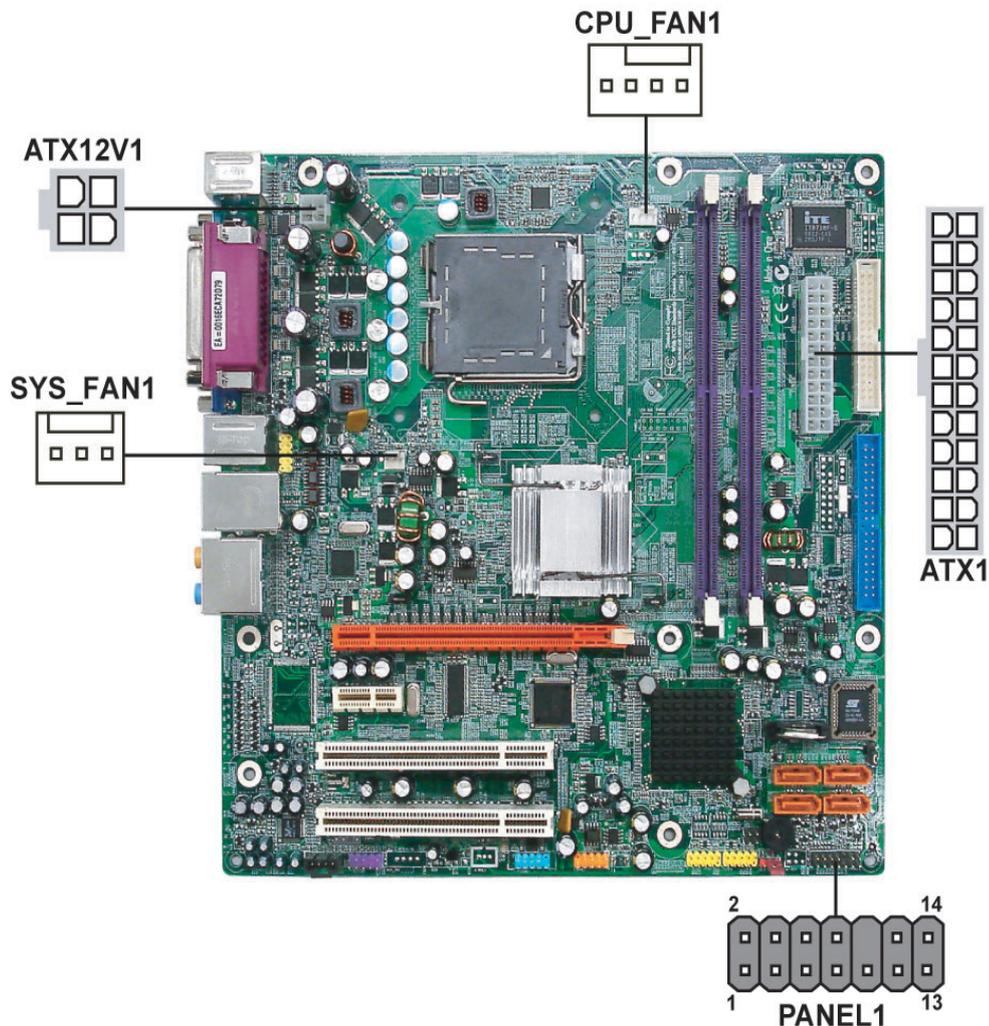
CPU_FAN1: CPU Fan Connector

Pin	Signal Name	Function
1	GND	System Ground
2	+12V	Power +12V
3	Sense	Sensor
4	Control	CPU FAN control

NOTE: Please note that the fan connector supports the CPU cooling fan of 1.1A ~ 2.2A (26.4W) at +12V.

SYS_FAN1: System Cooling Fan Connector

Pin	Signal Name	Function
1	GND	System Ground

SYS_FAN1: System Cooling Fan Connector

Pin	Signal Name	Function
2	+12V	Power +12V
3	Sense	Sensor

ATX1: ATX 24-pin Power Connector

Pin	Signal Name	Pin	Signal Name
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	Ground	15	Ground
4	+5V	16	PS_ON
5	Ground	17	COM
6	+5V	18	COM
7	Ground	19	COM
8	PWRGD	20	-5V
9	+5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	Ground

ATX12V1: ATX 12V Power Connector
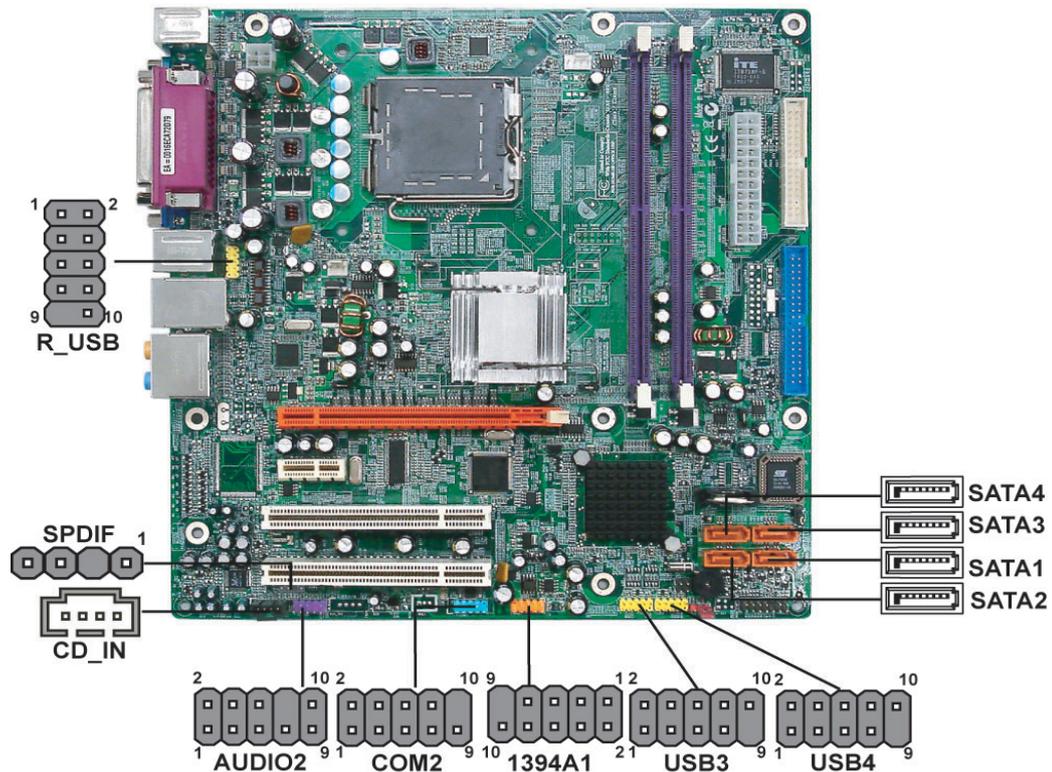
Pin	Signal Name
1	Ground
2	Ground
3	+12V
4	+12V

Front Panel Header

The front panel header (PANEL1) provides a standard set of switch and LED connectors commonly found on ATX or Micro ATX cases. Refer to the table below for information:

Illustration	Pin	Signal	Function	Pin	Signal	Function
14 □□ 13 ... 2 □□ 1 PANEL1	1	HDD_LED(+)	Hard disk LED(+)	2	Power LED (+)	Power LED (+)
	3	HDD_LED(-)	Hard disk LED(-)	4	Power LED (-)	Power LED (-)
	5	Reset_SW	Reset ground	6	PWR_SW	Power button signal
	7	Reset_SW	Reset signal	8	PWR_SW	Power button ground
	9	RSVD	Reserved	10	KEY	Key
	11	RSVD	Reserved	12	LAN LED(+)	LAN LED(+)
	13	RSVD	Reserved	14	LAN LED(-)	LAN LED(+)
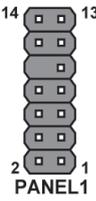
Connecting the Optional Devices

COM2: Onboard serial port header

Pin	Signal Name	Function
1	DCDB	Data Carrier Detect
2	SINB	Serial Input
3	SOUTB	UART B Serial Output
4	DTRB	UART B Data Terminal Ready
5	GND	Ground
6	DSRB	Data Set Ready
7	RTSB	RART B Request to Send
8	CTSB	Clear to Send
9	RI	Ring Indicator
10	Key	No pin

AUDIO2: Front Panel Audio Header

Pin	Signal Name
1	PORT 1L
2	GND
3	PORT 1R
4	PRESENCE#
5	PORT 2R
6	SENSE1_RETURN
7	SENSE_SEND
8	KEY
9	PORT 2L
10	SENSE2_RETURN

1394A1: Onboard IEEE 1394a header (optional)

Pin	Signal Name	Pin	Signal Name
1	TPA+	6	TPB-
2	TPA1-	7	+12V
3	GND	8	+12V
4	GND	9	Key
5	TPB+	10	GND

SATA1~4: Serial ATA connectors

Pin	Signal Name	Pin	Signal Name
1	Ground	5	RX-
2	TX+	6	RX+
3	TX-	7	Ground
4	Ground		

R_USB/USB3~4: Front Panel USB headers

| Pin	Signal Name	Function
1	USBPWR0	Front panel USB power
2	USBPWR1	Front panel USB power
3	USB_FP_P0-	USB port 0 negative signal
4	USB_FP_P1-	USB port 1 negative signal
5	USB_FP_P0+	USB port 0 positive signal
6	USB_FP_P1+	USB port 1 positive signal
7	GND	Ground
8	GND	Ground
9	Key	No pin
10	USB_FP_OC0	Overcurrent signal

NOTE: Make sure that the USB cable has the same pin assignment as indicated above. A different pin assignment may cause damage or system hang-up.

SPDIF: SPDIF out header

Pin	Signal Name	Function
1	+5VA	5V analog Power
2	Key	No pin
3	SPDIF	SPDIF digital output
4	GND	Ground

CD_IN1: Auxiliary In Connector

Pin	Signal Name	Function
1	AUX_R	AUX In right channel
2	GND	Ground
3	GND	Ground
4	AUX_L	AUX In left channel

Rear I/O Panel Connectors
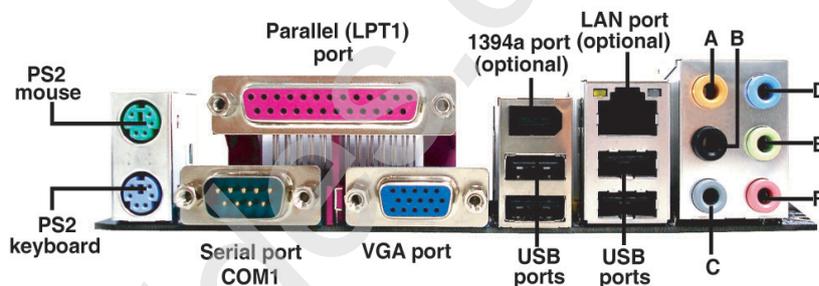
❑ PS2 Mouse: Use the PS/2 mouse port to connect a PS/2 pointing device.

❑ PS2 Keyboard: Use the PS/2 keyboard port to connect a PS/2 keyboard.

❑ Parallel Port (LPT1): Use LPT to connect printers or other parallel communication devices.

❑ Serial Port (COM1): Use the COM port to connect serial devices such as mice, fax, or modems.

❑ VGA Port: Connect your monitor to the VGA port.

❑ LAN Port (optional): Connect and RJ-45 jack to the LAN port to connect your computer to the network.

❑ 1394a Port (optional): Use the 1394a port to connect any fireware device.

❑ USB Ports: Use the USB ports to connect USB devices.

❑ Audio Ports: Use the audio jacks to connect audio devices The D port is for stereo line-in signal, while the F port is for microphone in signal. This main board supports 8-channel audio devices that correspond to the A, B, C, and E port respectively. In addition, all of the 3 ports, B, C, and E provide users with both right and left channels individually.

FRU (Field Replaceable Unit) List

This chapter gives you the FRU (Field Replaceable Unit) listing in global configurations of Aspire T690 and AcerPower FH_SK50. Refer to this chapter whenever ordering for parts to repair or for RMA (Return Merchandise Authorization).

IMPORTANT: Please note WHEN ORDERING FRU PARTS, that you should check the most up-to-date information available on your regional web or channel. For whatever reasons a part number change is made, it will not be noted in the printed Service Guide. For ACER-AUTHORIZED SERVICE PROVIDERS, your Acer office may have a DIFFERENT part number code to those given in the FRU list of this printed Service Guide. You MUST use the local FRU list provided by your regional Acer office to order FRU parts for repair and service of customer machines.

IMPORTANT: Please note that Acer Corporation sells only the parts listed in the following table. Please be reminded that though some parts are disassembled in Chapter 3 for demonstration purpose, Acer Corporation does not provide these parts.

NOTE: To scrap or to return the defective parts, you should follow the local government ordinance or regulations on how best to dispose it, or follow the rules set by your regional Acer office on how to return it.You can access to the website for the latest Parts version http://aicsl.acer.com.tw/spl/

NOTE: The final version of SPL will be released later.

Exploded Diagram
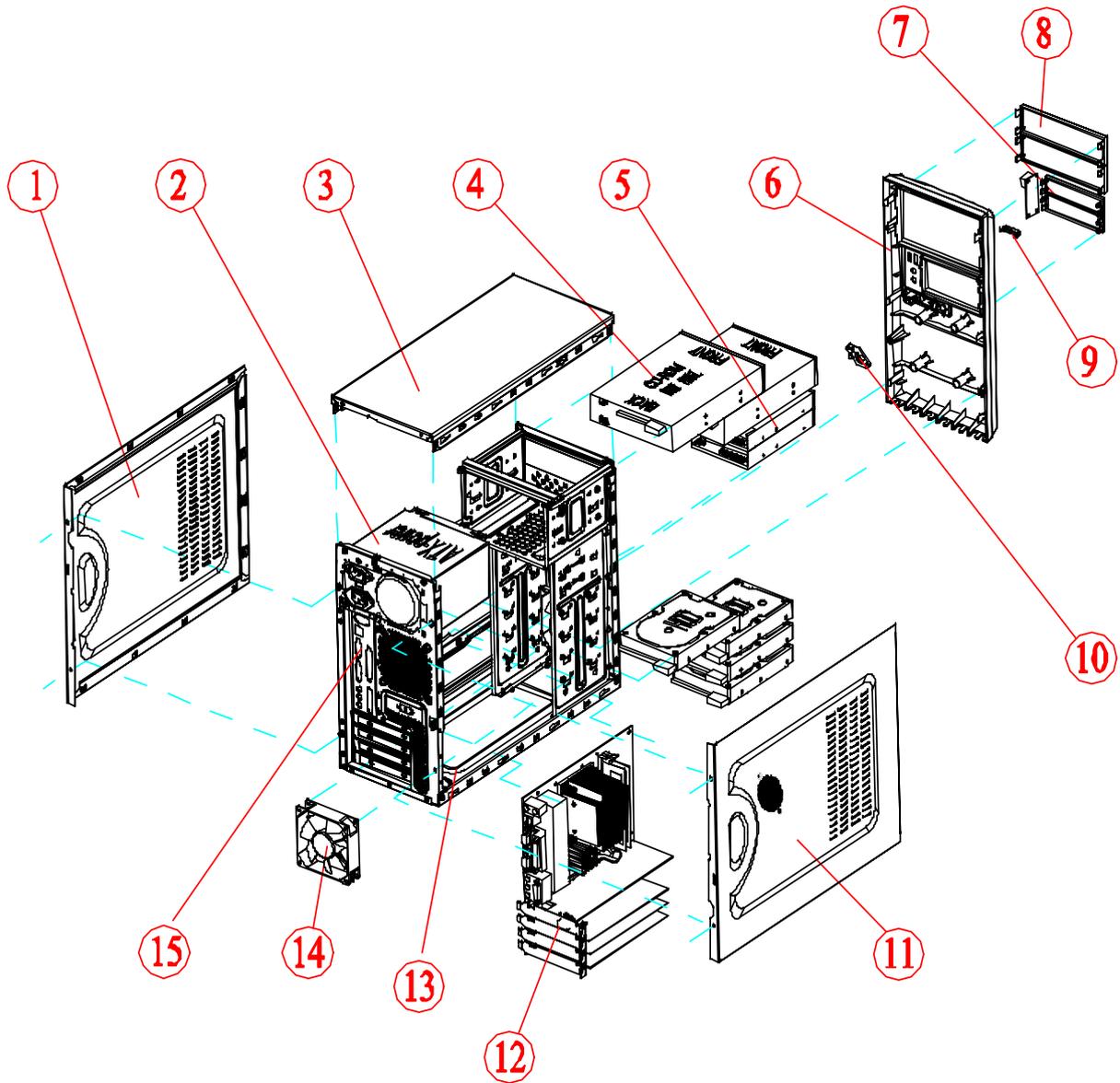
Item	Description
1	Right cover
2	Power supply
3	Top cover
4	Optical drive
5	FDD
6	Front bezel
7	3.5" cover
8	5.25" cover

Chapter 6

Item	Description
9	USB BKT
10	USB board
11	Left cover
12	Motherboard
13	CHASSIS
14	Fan
15	Rear IO

FRU List

The FRU list will be updated later.

Chapter 6