FA-PC VPC Series

Space-Saving Model

VPC-1500

User's Manual

CONTEC CO., LTD.

Table of contents

Chapter 1 Introduction

The VPC-1500 series is a BTO industrial PC that is equipped with either an Intel® Core2Duo E8400 (3.0GHz), or Celeron440 (2.0GHz). The Intel® Q45 chipset with DDR3 memory (2GB to 4GB) provides a system with extreme computing and graphics performance. These products feature a variety of interfaces, including 6 USB ports (Front: 2, Rear: 4), 2 1000BASE-T ports, 4 RS-232c port and 1 parallel port. These units are ideal for a wide range of embedded applications, such as control devices and information terminals based on general-purpose PC OSes. This series provides carefree use under harsh working conditions such as FA, achieving superb environmental resistance and a long-term stable supply due to careful selection of parts such as embedded CPUs and chipsets.

The chassis of the VPC-1500 series is available in the following two colors.

Base Model

VPC-1500 Black

VPC-1500 Ivory

◆Basic performance

- **Intel(R)Core2Duo is installed** (※Core2Duo Model)
  Embedding a high-performance CPU, the VPC-1500 series has achieved lower prices.
- **Intel(R)Q45 Chipset is adopted**
  Employing an embedded-style chipset, the VPC-1500 series has achieved a long-term stable supply.
- **It Corresponds to mirroring(RAID1)**
  It is possible to have mirroring configurations, enabling redundant systems with the following RAIDs.
  [Software RAID]
  It is possible to have software mirroring configuration by employing ICH10DO at the southbridge. However, it can not hot-swap.
  [Hardware RAID]
  Because option : Mirror card is choiced, it is possible to have Hardware mirroring configurations. This can hot-swap.
- **Suitable chassis for embedded applications**
  Taking advantage of our rich experience, the VPC-1500 series is designed with optimization for heat dissipation, operating vibration dampening and consideration for scalability.
- **Supports high-speed high-capacity memory**
  The VPC-1500 series supports DDR3 SDRAM DIMM modules (2GB to 4GB in total) designed for high-speed transfer speed, flexibly addressing memory-consuming applications such as image processing.

◆Commodity model

VPC-1500 Model rule

・Model name

VPC-1500

・Type name

W	S	C1	1	1	0	0	1	0	0	0	0	0	0	0
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	

① Chassis
- W : Ivory
- B : Black

② Power
- S : Made in China
- H : Made in Japan

③ CPU
- C1 : Celeron 440 (2.0GHz FSB 800MHz)
- D1 : Core2Duo E8400 (3.0GHz FSB 1333MHz)

④ Memory
- 7 : PC-10600 DDR3 1GB(1GB×1)
- 8 : PC-10600 DDR3 2GB(1GB×2)
- 9 : PC-10600 DDR3 2GB(2GB×1)
- A : PC-10600 DDR3 4GB(2GB×2)

⑤ Hard disk (SATA1)
- 0 : None
- 2 : 250GB 3.5inch HDD(SATA)
- C : 2TB 3.5inch HDD(SATA)

⑥ Hard disk (SATA2)
- 0 : None
- 2 : 250GB 3.5inch HDD(SATA)
- C : 2TB 3.5inch HDD(SATA)

⑦ Mirroring
- 0 : None
- R : Software Mirroring
- H : Hardware Mirroring

⑧ Optics system drive
- 1 : DVD Super Multi Drive
- 2 : DVD Super Multi Drive (With writing software)

⑨ Operating system
- 0 : None
- 2 : Windows XP Professional Japanese
- 3 : Windows 7 Professional Japanese
- A : Windows 2000 Professional Multilanguage(JPN/ENG/CH
- B : Windows XP Pfofessional Multilanguage(JPN/ENG/CHS)
- C : Windows XP Embedded Multilanguage(JPN/ENG/CHS)

⑩ Keyboard
- 0 : None
- 1 : Japanese 109 Keyboard (PS/2)
- A : English 104 Keyboard (PS/2)

⑪ Mouse
- 0 : None
- 1 : Mouse (PS/2)

⑫ Stand
- 0 : None
- W : Horizontal installation bracket
- T : Vertical stand

⑬ Reserve

⑭ Onsite Maintenance Service
- 0 : None
- 2 : Onsite maintenance service of two years
- 3 : Onsite maintenance service of three years

◆Supported OS

- Windows XP Professional
- Windows XP Embedded
- Windows 7 Professional

Customer support

CONTEC provides the following support services for you to use CONTEC products more efficiently and
comfortably.

◆Web Site

Japanese　http://www.contec.co.jp/
English　http://www.contec.com/
Chinese　http://www.contec.com.cn/

■Latest product information

CONTEC provides up-to-date information on products.
CONTEC also provides product manuals and various technical documents in the PDF.

■Note! For product information

Contact your retailer if you have any technical question about a CONTEC product or need its price,
delivery time, or estimate information.

◆Limited One-Year Warranty

CONTEC products are warranted by CONTEC CO., LTD. to be free from defects in material and workmanship for up to one year from the date of purchase by the original purchaser.
Repair will be free of charge only when this device is returned freight prepaid with a copy of the original
invoice and a Return Merchandise Authorization to the distributor or the CONTEC group office, from
which it was purchased.
This warranty is not applicable for scratches or normal wear, but only for the electronic circuitry and
original products. The warranty is not applicable if the device has been tampered with or damaged
through abuse, mistreatment, neglect, or unreasonable use, or if the original invoice is not included, in
which case repairs will be considered beyond the warranty policy.

◆How to Obtain Service

For replacement or repair, return the device freight prepaid, with a copy of the original invoice. Please
obtain a Return Merchandise Authorization number (RMA) from the CONTEC group office where you
purchased before returning any product.
* No product will be accepted by CONTEC group without the RMA number.

◆Liability

The obligation of the warrantor is solely to repair or replace the product. In no event will the warrantor
be liable for any incidental or consequential damages due to such defect or consequences that arise from
inexperienced usage, misuse, or malfunction of this device.

Safety precaution

Understand the following definitions and precautions to use the product safely.

◆Safety infomation

This document provides safety information using the following symbols to prevent accidents resulting in
injury or death and the destruction of equipment and resources. Understand the meanings of these labels
to operate the equipment safely.

⚠ DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

◆Handling precautions

CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

- Do not use or store the product in a location exposed to extremely high or low temperature or susceptible to rapid temperature changes.
  Example ・Exposure to direct sun
  ・In the vicinity of a heat source
- Do not use the product in extremely humid or dusty locations. It is extremely dangerous to use the product with its interior penetrated by water or any other fluid or conductive dust. If the product must be used in such an environment, install it on a dust-proof control panel, for example.
- Avoid using or storing the device in locations subject to shock or vibration.
- Do not use the product in the vicinity of devices that generate strong magnetic force or noise.
  Such devices will cause this device to malfunction.
- Do not use or store the product in the presence of chemicals.
- To clean, wipe it gently with a soft cloth dampened with either water or mild detergent.
  Do not use chemicals or a volatile solvent, such as benzene or thinner, to prevent pealing, discoloration of the paint, or deterioration of resin.
- As continuous operation of the equipment may shorten the life of the hard disk drive, use it in stand-by mode.
- Be sure to unplug the power cable from a wall outlet before plugging or unplugging a extension board or any connector.
- CONTEC reserves the right to refuse to service a product modified by the user.
- In the event of failure or abnormality (foul smells or excessive heat generation), unplug the power cord immediately and contact your retailer.
- Use an AC cable suitable for your supply voltage and outlet/plug. (The supplied cable is for 125V AC.
- The hard disk must be replaced when the power of the main unit is off. It is not hot-swappable. Removing the hard disk during operation may damage the system. (However, hardware raid is excluded.)
- Component Life:
  (1)Power·····During continuous operation at 40℃, the assumed life is about four years (vertical installation). However, it may be shortened due to operating temperature (high temperatures).
  (2)Battery···The internal calendar clock and CMOS RAM are backed by a Lithium primary battery. The backup time at a temperature of 25° C with the power disconnected is 10 years or more.
  * Replacement of expendables is handled as a repair (there will be a charge).
- To connect with peripherals, use a grounded, shielded cable.
- Do not use a UPS (uninterruptible power supply) with square-wave output, as connecting it may damage the system.
- Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.
- Abandon a used battery appropriately according to the instruction of the municipality.

FCC PART 15 Class A Notice

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in commercial environment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference at his own expense.

WARNING TO USER

Change or modifications not expressly approved the manufacturer can void the user's authority to operate this equipment.

Copyright

⚠ CAUTION

The latest version manual downloads from CONTEC web site.

Chapter 2 About the product

Specification

Functional specification

Main board Specification	
CPU※1	・Core2Duo E8400 ---------- 3.0GHz/FSB1333MHz ・Celeron440 ---------- 2.0GHz/FSB800MHz
Chipset	Intel(R) Q45 / ICH10DO
BIOS ROM	Award BIOS
Memory※1	2GB (1024MB×1) ,4GB (2048MB×2) DDR3 SDRAM PC3-10600
Display functional	Intel Q45 Integrated GMA 4500 Graphics
Hard disk drive※1	・SATAⅡ 3.5”HDD 250GB/2TB (Software/Hardware)RAID1 ・SATAⅡ 3.5”HDD 250GB/2TB ×1 or ×2
Optical drive	DVD super multi drive Max. reading speed DVD-ROM x8, CD-ROM x24 Max. writing speed DVD+/-R x8, DVD+/-R-DL x8, DVD-RW x6, DVD+R x8, DVD-RAM x5, CD-R x24, CD-RW x24
VGA	Analog RGB(D-SUB 15Pin)
USB port	Front 2 port Rear 4 port
PS/2 port	2 port (Keyboard/Mouse)
Audio	HDAC/ALC883 CODEC (7.1+2CH audio codec)
Sirial	RS-232C D-SUB 9pin×4
Parallel	D-SUB 25pin×1
LAN port	10BASE-T/100BASE-TX/1000BASE-T RJ45×2
Degital I/O	Front：LED output x2 ※4 Rear：output x2、Input x2 (Software API support、User application)
RAS function	WDT：1sec～255sec (Resetting operation by end) Remote reset／Remote power on External input signal Software RAS function (Fan rotation、temperature、Voltage data reading)
Extended slot (Free)	PCI x3 (3) ※5 ※6 Installation max. dimension：176.41mm(L)×106.68mm(H)
OS※1	・WindowsXP Professional ・Windows7 Professional ・WindowsXP Embedded
Stand※2	Mount Bracket
Physical dimensions(mm)／Weight	115(W) x 415(D) x 310(H) (No protrusions) ／About 8Kg※3
Power	270W ATX Power (90-264VAC(47-63Hz) Automatic input switch)

※1 Implement and install the options you selected.

※2 Install the options you selected.

※3 Only the weight of the main unit. It weighs about 8.4kg in RAID configuration.

※4 Front LED ×2 are used by option of hardware raid utility.

※5 The extension board that connects the cable for the height of the connector toexceed 10mm cannot use upper row / the lower extended slot.

※6 You can not be used ECH(PCI)BE-F13A and ECH(PCI)BE-H13A of PCI bus extension chassis made by CONTEC.

Ambient specification

Operating temperature／humidity		5～40℃／20～80%RH (No condensation)
Storage temperature／humidity		-20℃～60℃／5～80%RH (No condensation)
Floating dust particles／Corrosive gases		Not to be excessive／None
Line-noise resistance	Static electricity resistance	Contact discharge ／±4KV(EN61000-4-2Level2,IEC1000-4-2 Level2) Atmospheric discharge ／±8KV(EN61000-4-2Level3,IEC1000-4-2 Level3)
	Line noise	AC line／2KV,Signal line／1KV (EN61000-4-4Level3,IEC1000-4-4Level3)
Vibration resistance	Sweep resistance	10～57Hz／semi-amplitude 0.015m 57～150Hz／0.2G 40 min each X,Y, and Z directions (JIS C0040 compliant、IEC68-2-6 compliant)
Impact resistance		10G, half-sine shock for 11 ms in X,Y, and Z directions (JIS C0041 compliant, IEC68-2-27 compliant)
Standard		RoHS EMC (EN55022、EN61000-6-2) and LVD (EN60950-1)

(注) Do not use under environmental conditions beyond normal specifications. The system may malfunction.

Option Mirror card specification

Item	Specification
Number of connected drivers	2
RAID level	1
Storage capacity	Max. 2TB
Cache memory size	1MB
Host interface	S-ATA interface Max. data transfer rate : 3Gbps
Drive interface	S-ATA interface Max. data transfer rate : 3Gbps
Range of power-supply voltage	4.75VDC～5.25VDC
Current consumption	1.0A
Physical dimensions (L×W)	96mm × 98.2mm
Weight	42g

Physical dimensions

VPC-1500

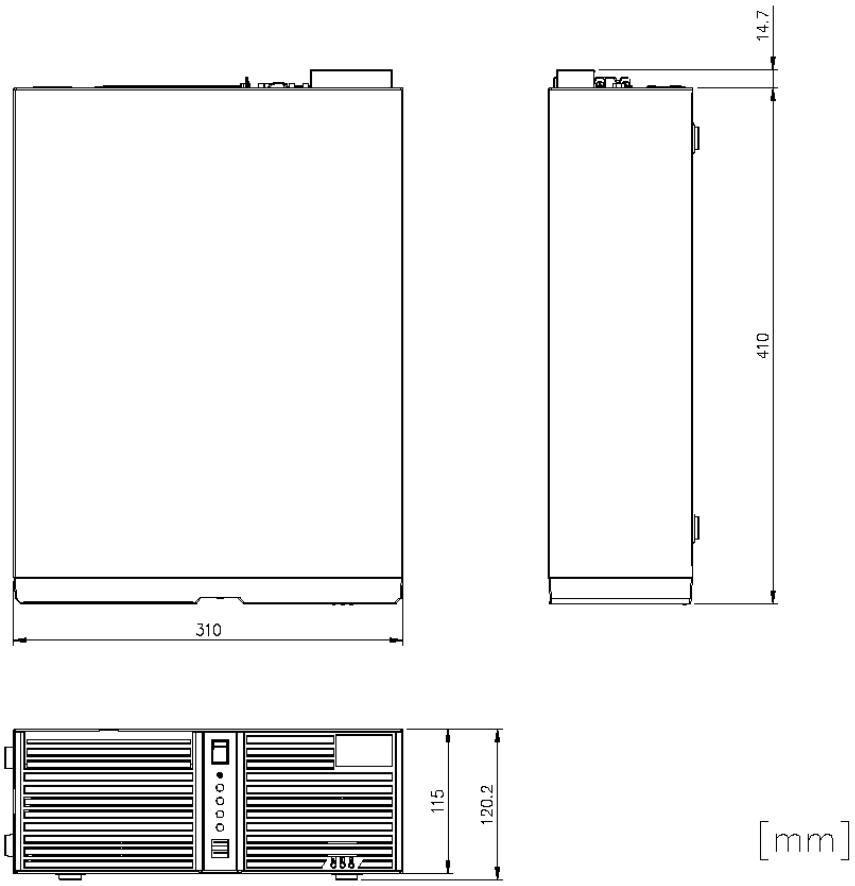


Figure 2.1 VPC-1500

At installation the wall mount stand of VPC-1500

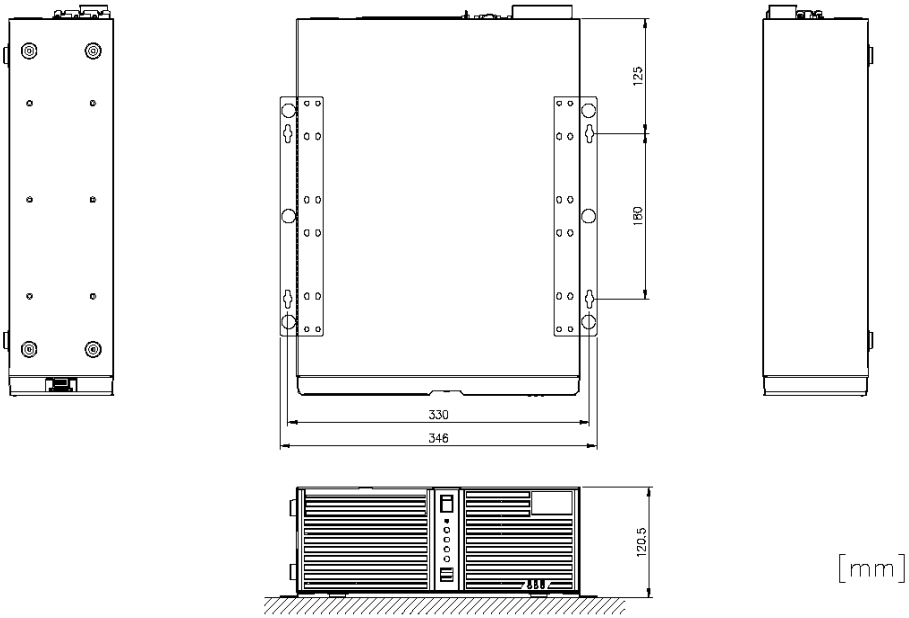


Figure 2.2 At installation the wall mount stand of VPC-1500

At installation the vertical stand of VPC-1500

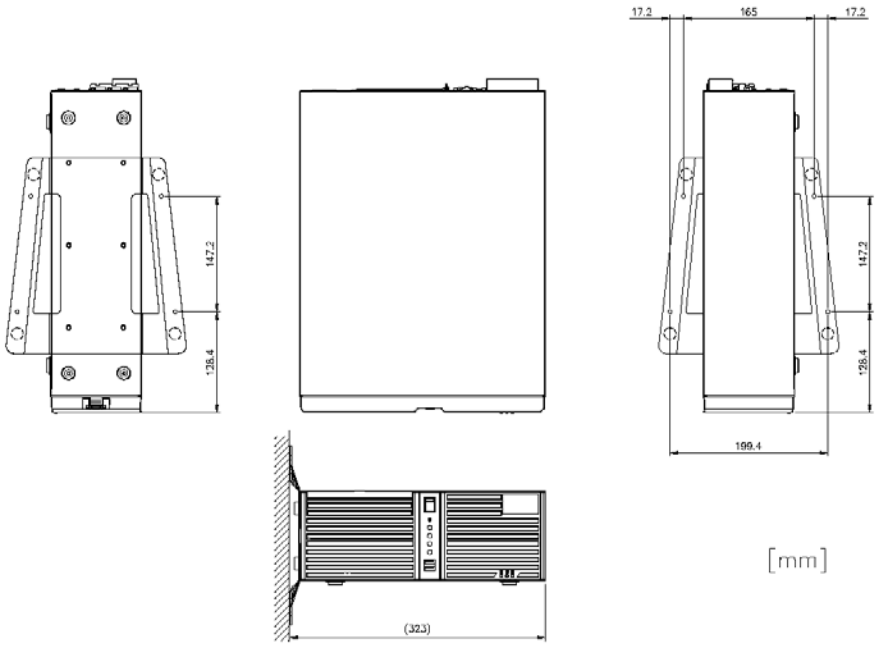


Figure 2.3 At installation the vertical stand of VPC-1500

Keyboard specification

Item		Specification
Mechanical spesification	Key array	Japanese 109 key, English 104 key
	Key switch	Membrane switch
	Length of cable(mm)	1500±100
Electrical specification	Power	DC5V±0.25V, 100mA (MAX)
	Interface	Clock cycle serial (PS/2)
	Connector	PS/2 (mini-DIN6pin male)
Environment specification	Dustproof/Waterproof/Dripproof	Non-correspondence
Color		Ivory

※VPC-1500 option

Mouse specification

Item		Specification
Electrical specification	Operation voltage	DC +5V (±0.5V)
	Max. current consumption	25mA
Physical specification	Interface (Connector)	PS/2 (mini-DIN6pin male)
	Body color	White
	Button	3 Piece (One piece on the insideisa wheel.)
	Number of wheels	1 Piece
	Length of cable	1850mm (±50mm)
	Physical dimensions (H x D x W)	39.5mm x 117mm x 62.1mm
Tracking	Resolution	400dpi
	Max. tracking speed	250mm/sec
Environment specification	Dustproof/Waterproof/Dripproof	Non-correspondence

※VPC-1500 option

Chapter 3 Hardware setup

Before Using the VPC-1500 for the First Time

Follow the next steps to set up the VPC-1500.

STEP1 Install Hard disk, Memory (DIMM) packaging, CD-ROM, DVD Multi drive packaging, and set Jumper switches.
By referring to the information in this chapter, set the VPC-1500.

STEP2 Connect cables.
Connect the cable of necessary external devices, such as Printer and CRT, to this product using appropriate cables.

STEP3 Tuen on the Power
After venifying that you have correctly steps 1 and 2, turn on the power. If you find any abnormality after turning on the power, turn it off and check to see if the setup has been performed properly.

STEP4 BIOS Setup
By referring to Chapter 4, setup BIOS. This setup requires a keyboard and a display.

※ Before using the VPC-1500, be sure to execute “Load Optimized Defaults” to initialize the BIOS settings to their default values.
(See Chapter 4, “Exit Menu”.)

⚠CAUTION

If your VPC-1500 is a Windows preinstalled model, be sure to connect the keyboard and mouse to it before turning the poer on for the first time.

Hardware setup

- Before you start, be sure that the power is turned off.
- For internal hard disk models, ensure that physical jolts are avoided.
- Remove only those screws that are explained. Do not move any other screw.

◆Removing the top cover and drive bay

(1) Remove the top cover.

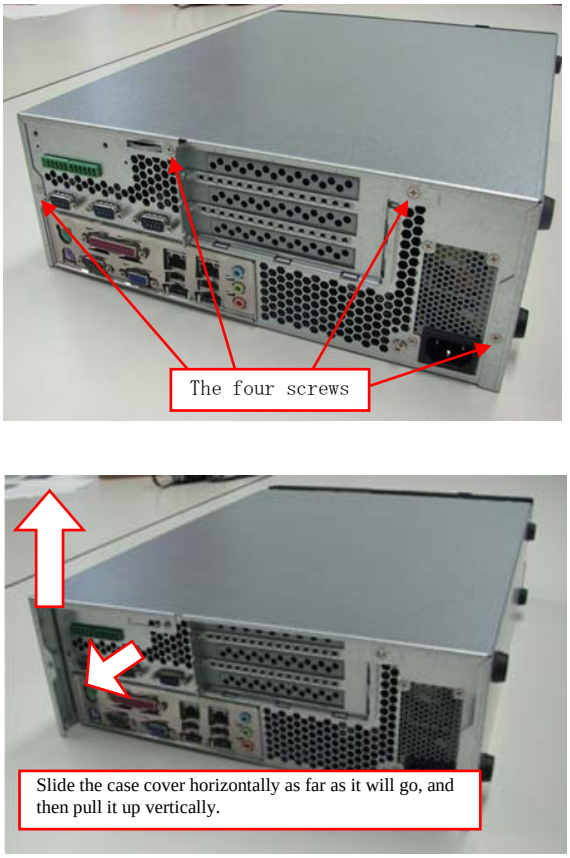


Figure 3.1 Removing the top cover

(2) Open the Front Cover.

Figure 3.2 Opening the front cover

(3) Remove the bracket for the riser card.

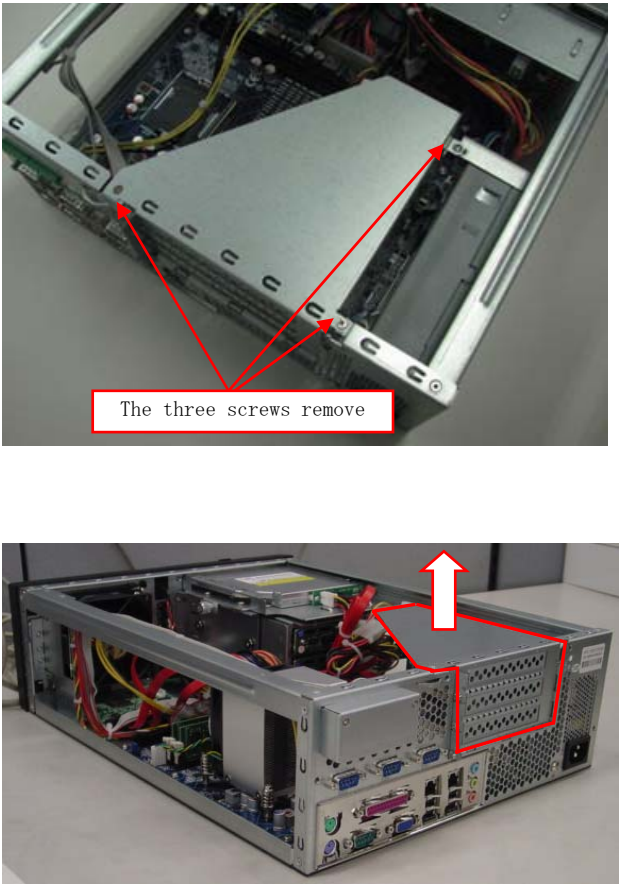


Figure 3.3 Removing the riser card bracket

◆Locations and settings of internal connectors and jumpers

Once you have removed the case cover, the bracket for the riser card, and the drive bay unit, you will be able to see the connectors and jumpers as illustrated below.

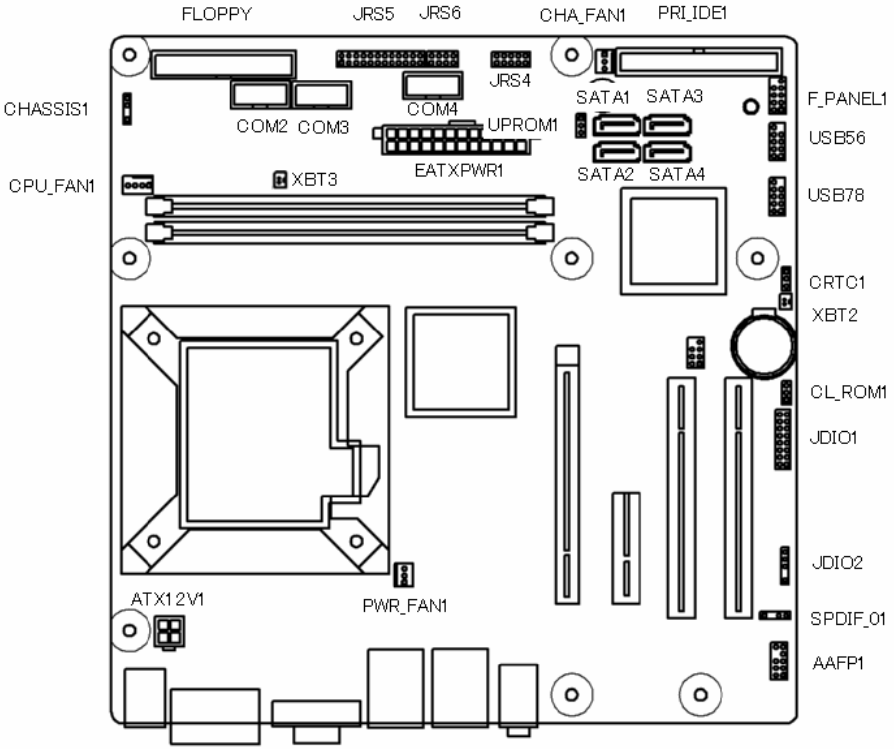


Figure 3.4 Locations and setting of jumpers and connectors inside the top cover

Table 3.1 Jumper setting

Name	Function	Factory Setting	Reference page	Remarks
CHASSIS1	Chassis Intrusion Connector	3-4 Short	19	
CLROM1	Clear CMOS	1-2 Short	19	
CLRTC1	Clear ROM	1-2 Short	20	
JRS4	Serial Port Setting	1-2 Short	20	
JRS5	Serial Port Setting	2-4, 3-5, 8-10, 9-11, 14-16, 15-17, 20-22, 21-23 Short	20	
JRS6	Serial Port Setting	OPEN	-	

Table 3.2 Connector list

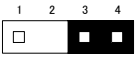
Name	Function	Remarks	Name	Function	Remarks
ATX12V1	ATX 12V power supply connector		F_PANEL1	Front panel connector	
EATXPWR1	ATX 24Pin power supply connector		USB56 USB78	Internal USB 5, 6 connector Internal USB 7, 8 connector	
FLOPPY	Floppy disk connector		JDIO1	Degital I/O connector	
PRI_IDE1	Primary IDE connector		JDIO2	Sirial connector ※3	
SATA1-4	Serial ATA 1/2/3/4 connector		SPDIF01	SPDIF connector	
COM2-4	Serial Port 2/3/4 connector		AAFP1	Internal Audio connector	
XBT2	CMOS Battery connector		PWR_FAN1	Chassis FAN connector	

◆Jumper setting

■Chassis Intrusion : CHASSIS1

Use the factory default settings.

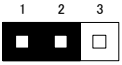
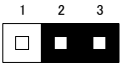
Table 3.3 CHASSIS1 setting

CHASSIS1	Function
	State usually (Factory default setting)

■CMOS clear setting : CLRTC

CMOS Clear will reset the contents of the CMOS to initial BIOS values. Clearing the CMOS will not reset the clock.

Table 3.4 CMOS clear setting

CLRTC	Function
	State usually (Factory default setting)
	CMOS clear

⚠CAUTION

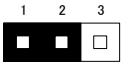
Always set CMOS Clear with the AC cable unplugged, and before reconnecting the power, restore it to its normal setting.

Clearing the CMOS while the power is connected may damage the board.

■ROM clear setting : CLROM1

As this is a system-reserved jumper, its setting cannot be changed.
Use the factory default settings.

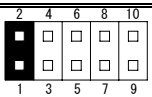
Table 3.5 ROM clear setting

CLROM1	Function
	State usually (Factory default setting)

■Serial port setting : JRS4

As this is a system-reserved jumper, its setting cannot be changed.
Use the factory default settings.

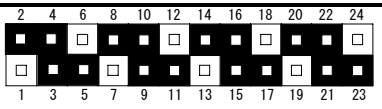
Table 3.6 JRS4 setting

JRS4	Function
	State usually (Factory default setting)

■Serial port setting : JRS5

As this is a system-reserved jumper, its setting cannot be changed.
Use the factory default settings.

Table 3.7 JRS5 setting

JRS5	Function
	State usually (Factory default setting)

■Attach the hard disk

(1) Remove the 3.5inch bay from the drive bay.

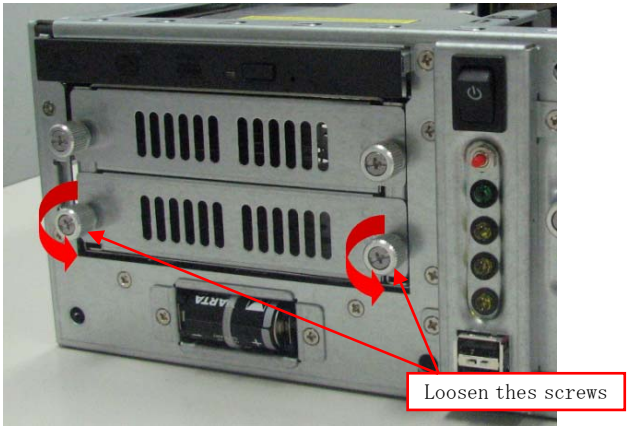


Figure3.5 Remove the drive bay

(2) Attch the HDD in the removed 3.5inch bay.

①How to attch the 3.5inch HDD

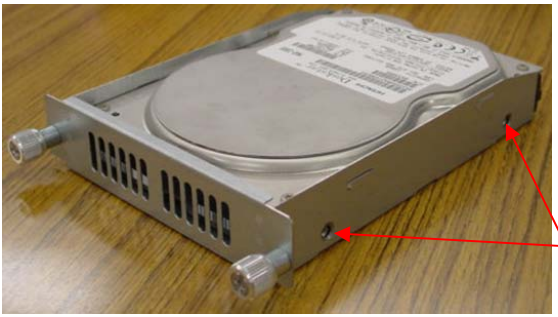


Figure3.6 Attach the 3.5inch HDD in the bay

②How to attch the 2.5inch HDD

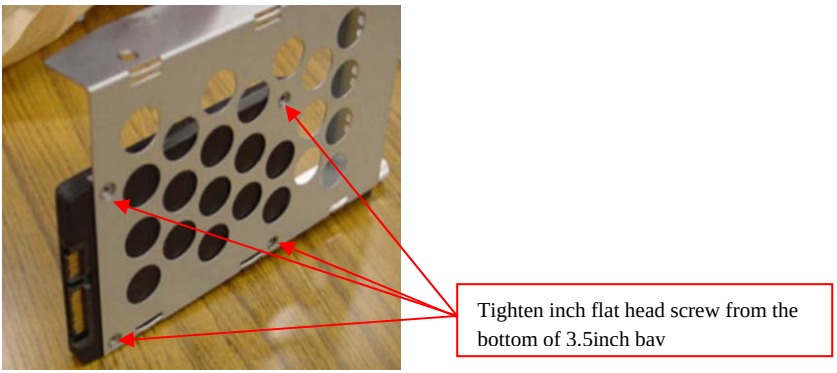
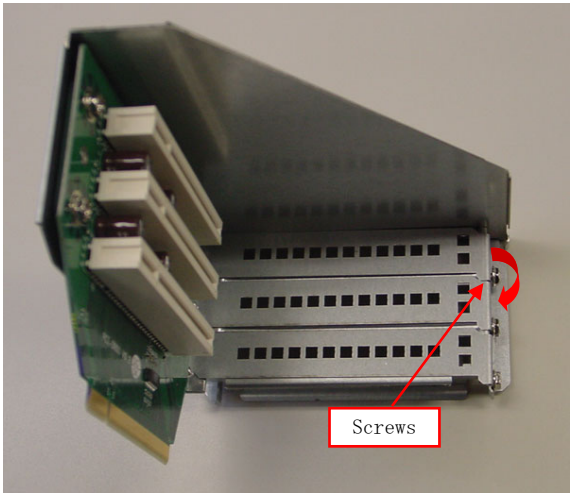


Figure3.7 Attach the 2.5inch HDD in the bay

(3) Attach the 3.5inch bay by reversing the removal procedure.

■Attach the extension board

(1) Remove the slot cover from the removed riser card.



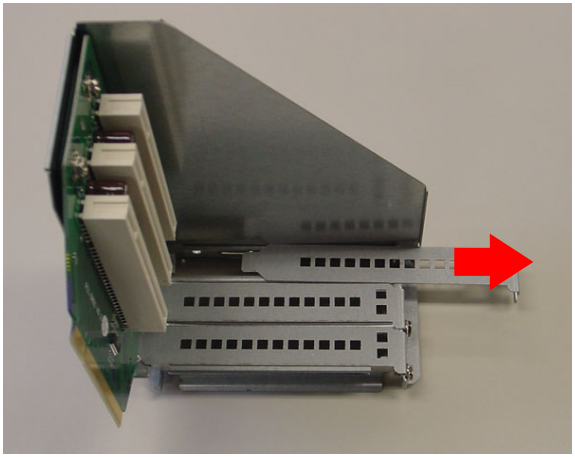
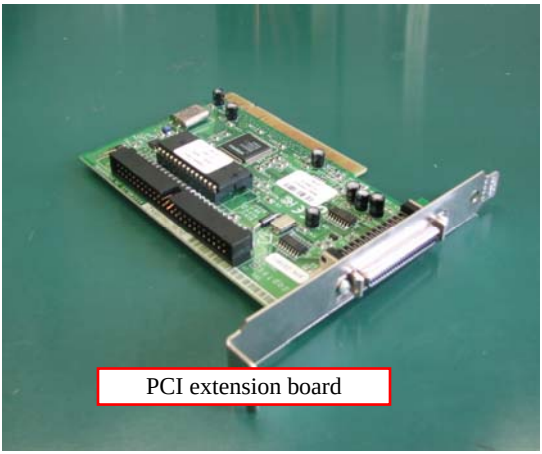


Figure 3.8 Remove the slot cover

(2) Install a PCI extension board.



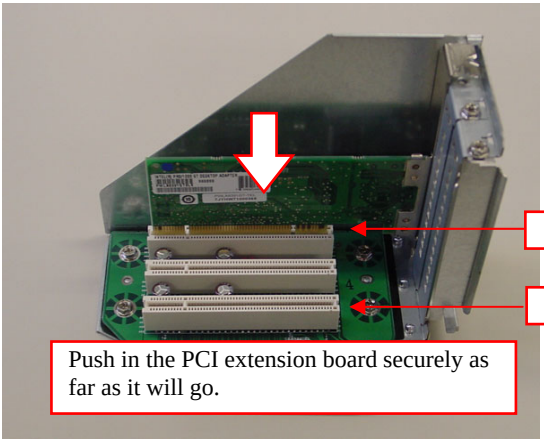


Figure 3.9 Attach the expansion board

(3) Tighten screws and install the riser card bracket in the case.

⚠CAUTION

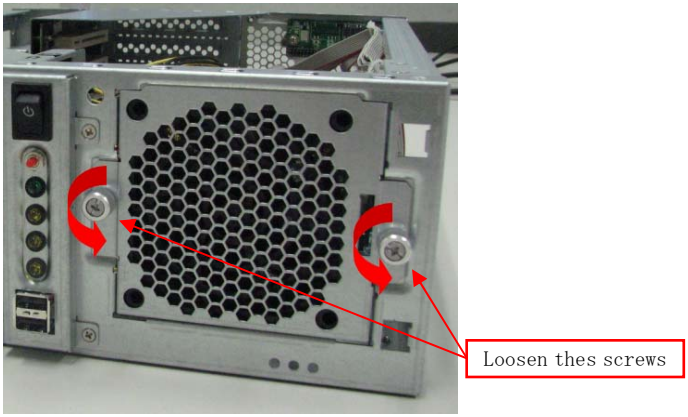
Please install it very carefully might interface with the bend of various cables in the case when you install it according to the size of the extension board that installs it.

■Maximum dimensions of boards that can be installed:

174mm(L)×106mm(H)

■Replacing the front fan unit and fan filter

(1) Remove the front fan unit from the case.



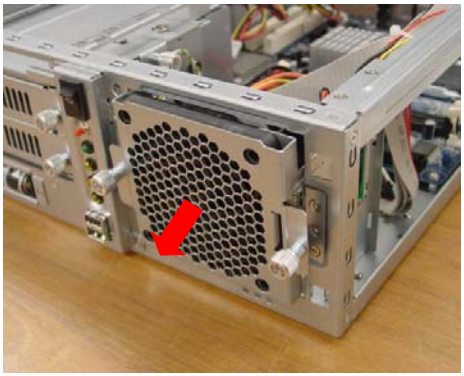


Figure 3.10 Remove the front fan unit

(2) Remove the fan filter unit from the fan unit.

Figure 3.11 Remove the fan filter unit

(3)Remove the fan filter.

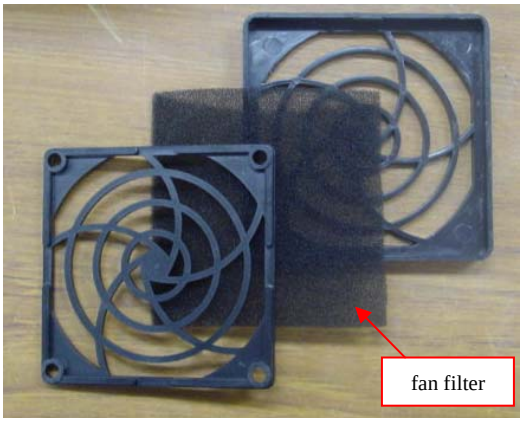


Figure 3.12 Remove the fan filter

(4) Prepare the replacement fan filter and attach it by reversing the removal procedure.

(5) Remove the fan from the fan unit.

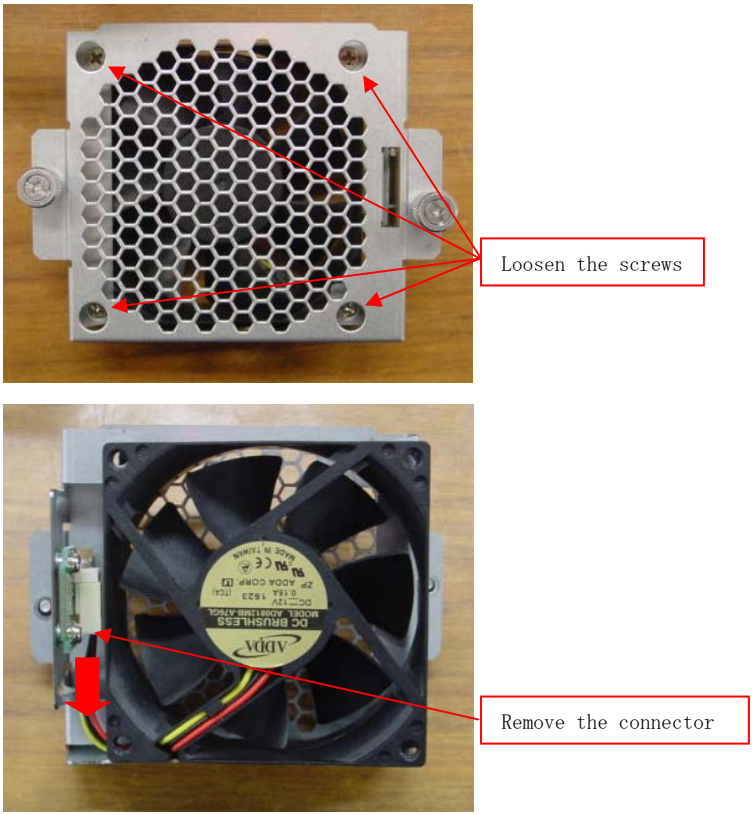


Figure 3.13 Remove the fan

(6) Remove the fan from fan unit.

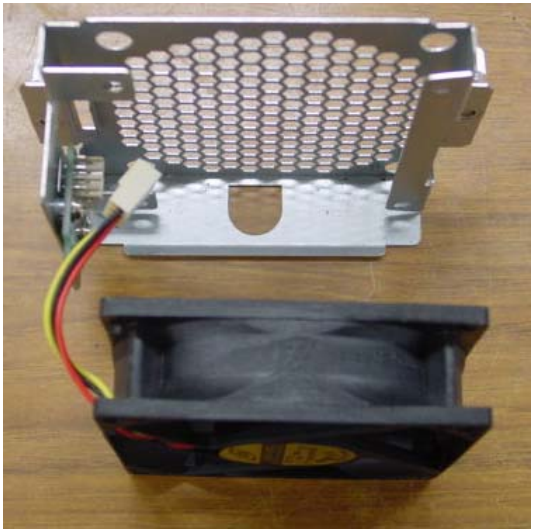


Figure 3.14 Remove the fan

(7) Prepare the replacement fan and attach it by reversing the removal procedure.

■Replacing the CMOS battery

(1) Remove the screws from the CMOS battery bracket.

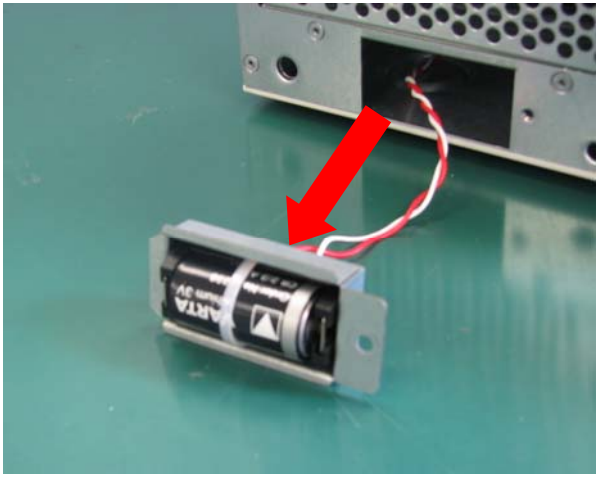


Figure 3.15 Remove the CMOS battery bracket

(2) Cut the lock anchoring the battery and remove the battery.

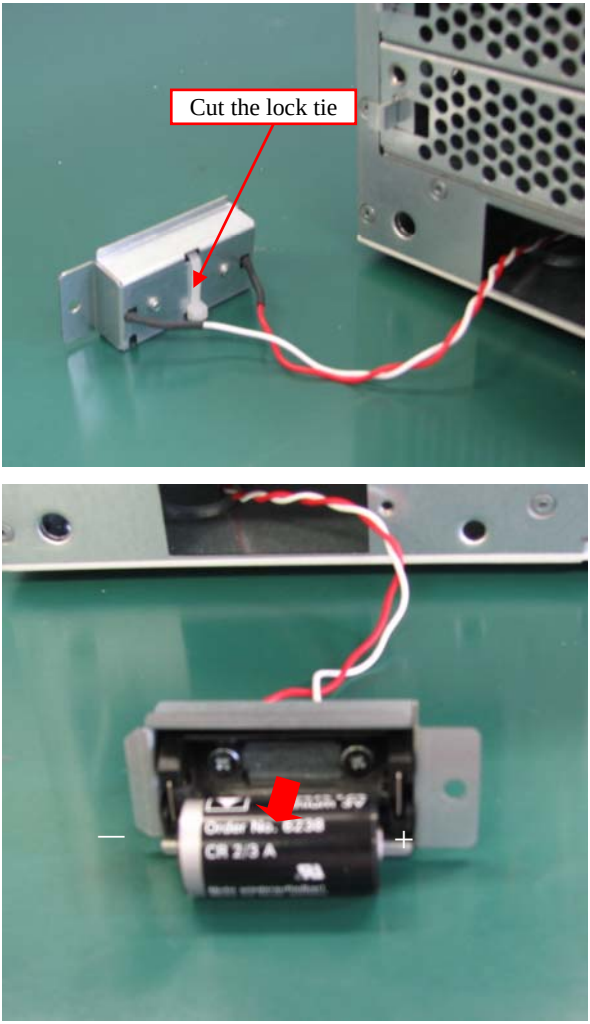


Figure 3.16 Remove the CMOS battery

(3) Prepare the replacement CMOS battery and attach it by reversing the removal procedure.

Confirm the positive poles and negative poles, and insert the battery.

Figure 3.17 Attach the CMOS battery

■CMOS Battery Specification

Type : CR2/3A

Voltage : 3V

Capacity : 1350 mAh

■Option: Attach the vertical stand

(1) Secure with six screws attached to the side of the case.

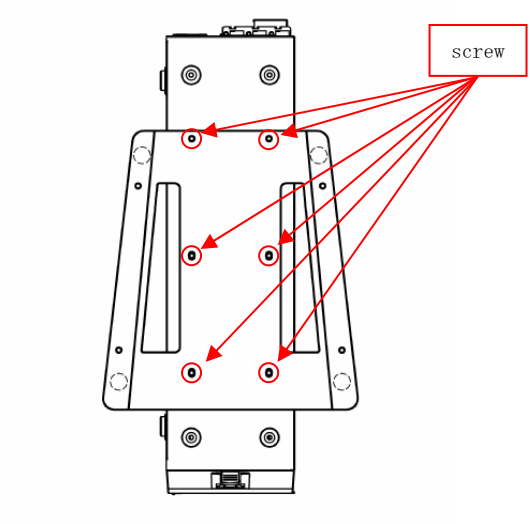


Figure 3.18 Attach the vertical stand

■Option: Attach the horizontal installation bracket

(1) Secure with six screws attached to the bottom of the case.

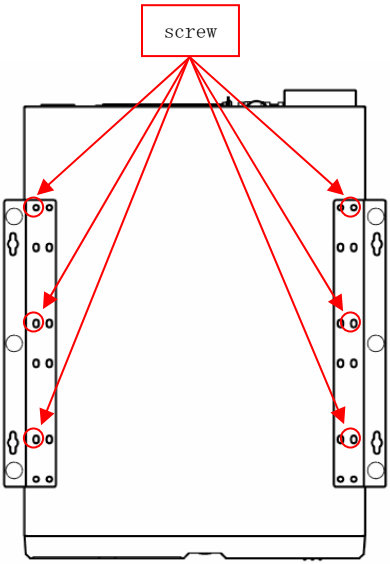


Figure 3.19 Attach the horizontal installation bracket

■Installation requirements

In order to enjoy reliable use of the VPC-1500 series, maintain the following conditions.

(1) Installable directions

Installation should be done according to the following directions.

Installation should not be done any other way.

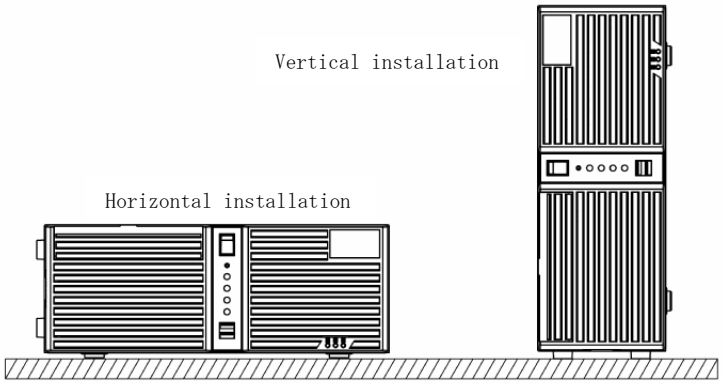


Figure 3.20 Installable direction

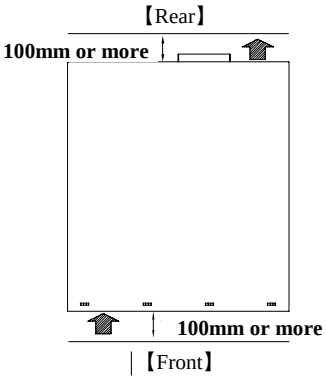
(2) Space between the main unit and its surroundings

The main unit of the VPC-1500 series is equipped with air vents and fans for regulating temperature.

In order to ensure space for air vents and cables, keep a distance of 100mm or further between the front/rear and surrounding equipment, walls, etc.

Note that in the installation location, air must be able to circulate.

The unit cannot be used in an enclosed space.



※ The arrow is a flow of air.

Figure 3.21 Installation condition

Chapter 4 BIOS setup

BIOS setup sets various setting during startup. When using the system for the first time, besure to run BIOS setup. Once set up, the specified details will be backed up.

⚠CAUTION

Do not change items not described in this document.
The system may become unstable and may not start up.

◆Starting the setup screen

When you turn on the power to the system, if the system is functioning normally, the "Press DEL to enter SETUP" screen appears. Then press the <DEL> key. After a few seconds, a setup utility can be started.

```
Phoenix - AwardBIOS v6.00PG, An Energy Star Ally
Copyright © 1984-2009, Phoenix Technologies, LTD

VPC-1500 BIOS Ver1.00 CONTEC Co.,Ltd.

Main   Processor   : Intel(R) Core™2 Duo 2.99GHz(333x9.0)
Memory   Testing   : 4092864K OK+ 32M shared memory
CPU Brand Name : Intel(R)  Core(TM)2 Duo CPU        E8400 @ 3.00GHz
EM64T CPU

    Memory Frequency For DDR3 1066   (Dual Channel Mode)




Press DEL to enter SETUP
04/07/2011-Eaglelake-0A79WCL9C-00
```

Figure 4.1 Initial screen

◆Key operation

This section provides a list of major key-bound functions during setup.

Table 4.1 Key operation list

Key	Function
Up Arrow	Move to the previous item
Down Arrow	Move to the next item
Left Arrow	Move to the item on the left (menu bar)
Right Arrow	Move to the item on the right (menu bar)
ESC	Main Menu : Quit without saving changes Submenus : Exit Current page to the next higher level menu
Move Enter	Move to the item you desired
PgUp key	Increase the numeric value or make changes
PgDn key	Decrease the numeric value or make changes
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
ESC key	Main Menu : Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu : Exit current page and return to Main Menu
F1 key	General help on Setup navigation keys
F5 key	Load previous values from CMOS
F6 key	Load the fail-safe defaults from BIOS default table
F7 key	Load the optimized defaults
F10 key	Save all the CMOS changes and exit

◆Main window

When you start the setup utility, the main window appears.

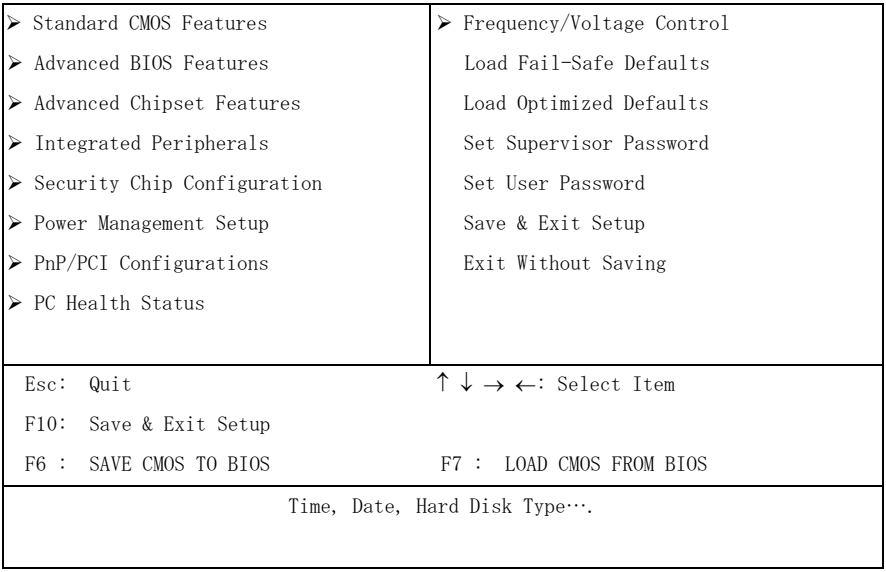


Figure 4.2 Example of main window screen

1. The cursor keys <↑>, <↓>, <→>, <←> allow you to navigate through menu items and the <Enter> key allows you to choose among them.
2. After pressing the <F10> key, you can save the current settings by pressing the <Enter> key or the <Y> key.

◆Setting of the date and time

In order to set the date and time of the calendar clock on the VPC-1500 series, follow the following steps.

1. Select “Standard CMOS Features” menu from the setup screen.
2. Select date (Date:) items by pressing the <Page Up> and <Page Down> keys. You can navigate through items by pressing the cursor keys <←>, <→>.
3. Save setup changes with “Save & Exit Setup” (pressing the <F10> key) and exit.

◆Setting of the start password

After setting a startup password, you must enter the password when you boot the system and run setup.

The password can protect system information and files, limiting their use by other users.

CAUTION

Once you register a password, you will not able to clear password features without the password. Pay careful enough attention in handling your password.

1. Select “Advanced BIOS Features” menu from the setup screen.
2. For “Security Option”, select “Setup” or “System”.

Setting of the security Option	Operation
Setup	CMOS setup is protected by a password.
System	In addition to the above, system boot is protected by a password.

3. For “Set User Password”, press the <Enter> key and enter a password.
4. Save setup changes with “Save & Exit Setup” and exit.

In addition to User Passwords, you can also set an Administrator Password. Operation during CMOS setup differs as follows, although operation at system startup is the same.

Setting of the password	Operating at the CMOS setup
User	You can access all settings, but you cannot modify any setting other than removing your password.
Administrator	You can change all settings.

◆Release of setted the password

With the Setup Password set, items whose contents cannot be changed in the CMOS Setup appear. Before changing settings in the CMOS Setup, always remove the User Password. (Although the method for doing this is the same as setting a password, when you enter the password, press the <Enter> key without entering anything, and the password will be removed. Removing the Administrator Password works the same way.)

◆Changing to the device boot order

It is possible to change device boot order.

Advanced BIOS Features

		Item Help
➢ CPU Feature	[Press Enter]	
➢ Hard Disk Boot Priority	[Press Enter]	Menu Level ➢
Virus Warning	[Disabled]	
CPU L3 Cache	[Enabled]	
Quick Power On Self Test	[Enabled]	
USB Device Wait	[Disabled]	
First Boot Device	[CDROM]	
Second Boot Device	[Hard Disk]	
Third Boot Device	[Disabled]	
Boot Other Device	[Enabled]	
Swap Floppy Drive	[Disabled]	
Boot Up Floppy Seek	[Disabled]	
Boot Up NumLock Status	[On]	
Gate A20 Option	[Fast]	
Typematic Rate Setting	[Disabled]	
x Typematic Rate (Chars/Sec)	6	
x Typematic Delay (Msec)	250	
Security Option	[Setup]	
APIC Mode	[Enabled]	

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

1. Select “Advanced BIOS Features” menu from the main window.
2. Change the settings for “First Boot Device”, “Second Boot Device”, and “Third Boot Device”.
3. In order to assign top priority to booting from the CD-ROM, move the cursor to the item to the right of “First Boot Device” and change the setting to “CDROM”. (Confirm your choice and setting by pressing the <Enter> key.)
4. After setting the desired order, press the <Esc> key and return to the Main window.
5. Save setup changes with “Save & Exit Setup” and exit.

⚠CAUTION

The software RAID, you must select “P0-Optiarc DVD” in place of “CDROM” for the device name.

◆ Selecting to the IDE device

OnChip IDE Device

IDE HDD Block Mode	[Enabled]	Item Help
IDE DMA transfer access	[Enabled]	Menu Level ➢
IDE Primary Master PIO	[Auto]	
IDE Primary Slave PIO	[Auto]	
IDE Primary Master UDMA	[Auto]	
IDE Primary Slave UDMA	[Auto]	
On-Chip Secondary PCI IDE	[Enabled]	
IDE Secondary Master PIO	[Auto]	
IDE Secondary Slave PIO	[Auto]	
IDE Secondary Master UDMA	[Auto]	
IDE Secondary Slave UDMA	[Auto]	
SATA Mode	[IDE]	
LEGACY Mode Support	[Disabled]	

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

1. Select “Integrated Peripherals” menu from the main window.
2. Select “OnChip IDE Device” menu from “Integrated Peripherals” windows.
3. Change the settings for “SATA Mode” from “OnChip IDE Device” window. (Options are “IDE”, “RAID”, and “AHCI”, but AHCI mode is not supported.)
4. After setting the desired order, press the <Esc> key and return to the Main window.
5. Save setup changes with “Save & Exit Setup” and exit.

◆ Setting for the power on (AT power operation) by the AC power-supply turning on

SuperIO Device

Onboard FDC Controller	[Enabled]	Item Help
Onboard Serial Port 1	[3F8/IRQ4]	Menu Level ➢
Onboard Serial Port 2	[2F8/IRQ3]	
Onboard Serial Port 3	[2A0]	
Serial Port 3 Use IRQ	[IRQ10]	
Onboard Serial Port 4	[2A8]	
Serial Port 4 Use IRQ	[IRQ11]	
UART Mode Select	[Normal]	
x RxD , TxD Active	Hi,Lo	
x IR Transmission Delay	Enabled	
x UR2 Duplex Mode	Half	
x Use IR Pins	IR-Rx2Tx2	
Onboard Parallel Port	[378/IRQ7]	
Parallel Port Mode	[SPP]	
x EPP Mode Select	EPP1.7	
x ECP Mode Use DMA	3	
PWRON After PWR-Fail	[Off]	

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

1. Select “Integrated Peripherals” menu from the main window.
2. Select “SuperIO Device” menu from “Integrated Peripherals” windows.
3. Change “On” the settings for “PWRON After PWR-Fall” from “SuperIO Device” window.
4. After setting the above-mentioned 3, press the <Esc> key and return to the Main window.
5. Save setup changes with “Save & Exit Setup” and exit.

◆Factory default setting

This section describes the CMOS Setup Utility's factory default settings.

By selecting "Load Optimized Defaults" in the Main window of the CMOS Setup Utility, you can restore our factory settings. For operational instructions, follow the following steps.

1. Select "Load Optimized Defaults" menu from the setup screen.
2. You are prompted to confirm that you are restoring to initial conditions. Press the <Y> and <Enter> keys.
3. Save setup changes with "Save & Exit Setup" and exit.

The following section describes parameters for the factory default settings of each setting in the CMOS Setup Utility.

⚠CAUTION

Do not change settings other than the CMOS Setup Utility settings specifically described in this document. The OS may not function normally otherwise.

We assume no responsibility for trouble caused by changing settings other than the CMOS Setup Utility settings specified.

■Standard CMOS Features

Date (mm:dd:yy)	***, *** ** ****	Item Help
Time (hh:mm:ss)	** : ** : **	Menu Level ➢
➢ IDE Channel 0 Master	[None]	
➢ IDE Channel 0 Slave	[None]	
➢ IDE Channel 1 Maste	[None]	
➢ IDE Channel 1 Slave	[None]	
➢ IDE Channel 2 Maste	[None]	
Drive A	[None]	
Drive B	[None]	
Video	[EGA/VGA]	
Halt On	[All , But Disk/Key]	
Base Memory	639K	
Extended Memory	4091904K	
Total Memory	4091904K	

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

※ As the Standard CMOS features differ according to date and PC configuration, the above figure is a sample.

■Advanced BIOS Features

➢ CPU Feature	[Press Enter]	Item Help
➢ Hard Disk Boot Priority	[Press Enter]	Menu Level ➢
Virus Warning	[Disabled]	
CPU L3 Cache	[Enabled]	
Quick Power On Self Test	[Enabled]	
USB Device Wait	[Disabled]	
First Boot Device	[CDROM]	
Second Boot Device	[Hard Disk]	
Third Boot Device	[Disabled]	
Boot Other Device	[Enabled]	
Swap Floppy Drive	[Disabled]	
Boot Up Floppy Seek	[Disabled]	
Boot Up NumLock Status	[On]	
Gate A20 Option	[Fast]	
Typematic Rate Setting	[Disabled]	
x Typematic Rate (Chars/Sec)	6	
x Typematic Delay (Msec)	250	
Security Option	[Setup]	
APIC Mode	[Enabled]	
MPS Version Control For OS	[1.4]	
OS Select For DRAM > 64MB	[Non-OS2]	
Console Redirection	Disabled	
x Baud Rate	19200	
Agent after boot	Enabled	
Report No FDD For WIN 95	[Yes]	
Small Logo(EPA) Show	[Disabled]	
ASF support	[Enabled]	
DMI Event Log	[Enabled]	
Clear All DMI Event Log	[No]	
View DMI Event Log	[Enter]	
Mark DMI Events as Read	[Enter]	
Event Log Capacity	Space Available	
Event Log Validity	Valid	

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

●CPU Feature

PPM Mode	[Native Mode]	Item Help
Limit CPUID MaxVal	[Disabled]	Menu Level ➢
C1E Function	[Disabled]	
Execute Disable Bit	[Enabled]	
Virtualization Technology	[Disabled]	
SMRR	[Disabled]	
Core Multi-Processing	[Enabled]	

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

●Hard Disk Boot Priority

1. Bootable Add-in Cards	Item Help
	Menu Level ➢

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

※ As values differ according to your PC environment, the above is a sample.

■Advanced Chipset Features

System BIOS Cacheable	[Enabled]	Item Help
Memory Hole At 15M-16M	[Disabled]	Menu Level ➢
➢PCI Express Root Port Func	[Press Enter]	
➢Advanced Fan Speed Contorl	[Press Enter]	
Disable MCHBAR MMIO	[Enabled]	
VT-d	[Disabled]	
➢Intel AMT Configuration	[Press Enter]	
＊＊ VGA Setting ＊＊		
PEG/Onchip VGA Control	[Auto]	
On-Chip Frame Buffer Size	[32MB]	
DVMT Mode	[Enabled]	
Total GFX Memory	[128MB]	
PAVP Mode	[Lite]	

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

●PCI Express Root Port Func

PCI Express Port 1	[Auto]	Item Help
PCI Express Port 2	[Auto]	Menu Level ➢
PCI Express Port 3	[Auto]	
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 F6: Fail-safe defaults F7: Optimized Defaults

●Advanced Fan Speed Control

Fan1 Speed Monitor	[Enabled]	Item Help
Fan2 Speed Monitor	[Enabled]	Menu Level ➢
Fan3 Speed Monitor	[Enabled]	

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

●Intel AMT Configuration

AMT BIOS Support	[Disabled]	Item Help
SOL Support	Enabled	Menu Level ➢
IDE-R Support	Enabled	
Platform Mng Selection	Intel AMT	
QST Support	Disabled	
Danbury Technology	Disabled	
OEM Flag BIT0	[Disabled]	
OEM Flag BIT1	[Disabled]	
OEM Flag BIT2	[Disabled]	

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

■Integrated Peripherals

➢ OnChip IDE Device	[Press Enter]	Item Help
➢ Onboard Device	[Press Enter]	Menu Level ➢
➢ SuperIO Device	[Press Enter]	
➢ USB Device Setting	[Press Enter]	

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

●OnChip IDE Device

IDE HDD Block Mode	[Enabled]	Item Help
IDE DMA transfer access	[Enabled]	Menu Level ➢
IDE Primary Master PIO	[Auto]	
IDE Primary Slave PIO	[Auto]	
IDE Primary Master UDMA	[Auto]	
IDE Primary Slave UDMA	[Auto]	
On-Chip Secondary PCI IDE	[Enabled]	
IDE Secondary Master PIO	[Auto]	
IDE Secondary Slave PIO	[Auto]	
IDE Secondary Master UDMA	[Auto]	
IDE Secondary Slave UDMA	[Auto]	
SATA Mode	[IDE]	
LEGACY Mode Support	[Disabled]	

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

●Onboard Device

Onboard LAN	[Enabled]	Item Help
		Menu Level ➢

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

●SuperIO Device

Onboard FDC Controller	[Enabled]	Item Help
Onboard Serial Port 1	[3F8/IRQ4]	Menu Level ➢
Onboard Serial Port 2	[2F8/IRQ3]	
Onboard Serial Port 3	[2A0]	
Serial Port 3 Use IRQ	[IRQ10]	
Onboard Serial Port 4	[2A8]	
Serial Port 4 Use IRQ	[IRQ11]	
UART Mode Select	[Normal]	
x RxD , TxD Active	Hi,Lo	
x IR Transmission Delay	Enabled	
x UR2 Duplex Mode	Half	
x Use IR Pins	IR-Rx2Tx2	
Onboard Parallel Port	[378/IRQ7]	
Parallel Port Mode	[SPP]	
x EPP Mode Select	EPP1.7	
x ECP Mode Use DMA	3	
PWRON After PWR-Fail	[Off]	

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

●USB Device Setting

USB 1.0 Controller	[Enabled]	Item Help
USB 2.0 Controller	[Enabled]	Menu Level ➢
USB Operation Mode	[High Speed]	
USB Keyboard Function	[Enabled]	
USB Mouse Function	[Enabled]	
USB Storage Function	[Enabled]	
*** USB Mass Storage Device Boot Setting ***		

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

■Security Chip Configuration

		Item Help
LT/TXT Initialization	[Disabled]	Menu Level ➢
Reset TPM Flag	[Disabled]	
TPM Support	[Disabled]	
TPM Current Status	Disabled & Deactivated	
x TPM Status	No change	

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

■Power Management Setup

		Item Help
➢PCI Express PM Function	[Press Enter]	Menu Level ➢
PCI Express PME	[Disabled]	
PCI Express WAKE	[Disabled]	
Power-Supply Type	[AT]	
ACPI Function	[Enabled]	
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	[Instant-Off]	
Wake-Up by PCI card	[Enabled]	
Power On by Ring	[Enabled]	
USB KB Wake-Up From S3	[Disabled]	
Resume by Alarm	[Disabled]	
x Date(of Month) Alarm	0	
x Time(hh:mm:ss) Alarm	0 : 0 : 0	
** Reload Global Timer Events **		
Primary IDE 0	[Disabled]	
Primary IDE 1	[Disabled]	
Secondary IDE 0	[Disabled]	
Secondary IDE 1	[Disabled]	

FDD,COM,LPT Port	[Disabled]	
PCI PIRQ[A-D]#	[Disabled]	
HPET Support	[Enabled]	
HPET Mode	[32-bit mode]	

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

●PCI Express PM Function

		Item Help
Root Port ASPM	[Disabled]	Menu Level ➢
DMI Port ASPM	[Disabled]	

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

■PnP/PCI Configuration

		Item Help
Init Display First	[PCI Slot]	Menu Level ➢
Reset Configuration Data	[Disabled]	
Resources Controlled By	[Auto(ESCD)]	
x IRQ Resources	Press Enter	
PCI/VGA Palette Snoop	[Disabled]	
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 relative items **		
Maximum Payload Size	[128]	

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

■PC Health Status

CPU Warning Temperature	[Disabled]	Item Help
Warning BEEP	[Disabled]	Menu Level ➢
CPU THRM-Throttling	[Disabled]	
Smart Fan1 Temperature	[50℃/122° F]	
Fan1 Tolerance Value	[1]	
Current System Temp.	34℃	
Current CPU Temp.	38℃	
Fan1 Speed	5869 RPM	
Fan2 Speed	2700 RPM	
Fan3 Speed	0 RPM	
Vcore	1.22V	
+12 V	12.15V	
+ 5 V	4.93V	
VBAT (V)	3.28V	
3VSB (V)	3.42V	

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

※ As values differ according to your PC environment, the above is a sample.

■Frequency/Voltage Control

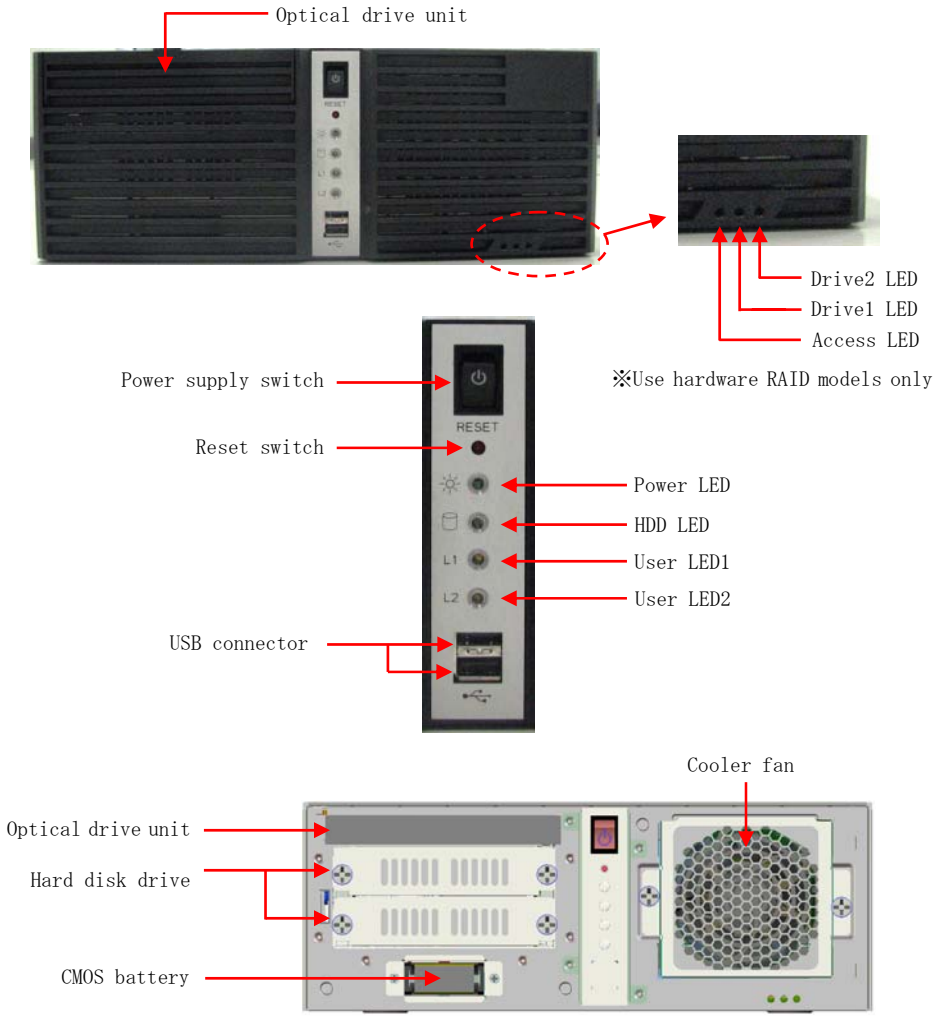
Spread Spectrum	[Enabled]	Item Help
		Menu Level ➢

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

Chapter 5 Each component function

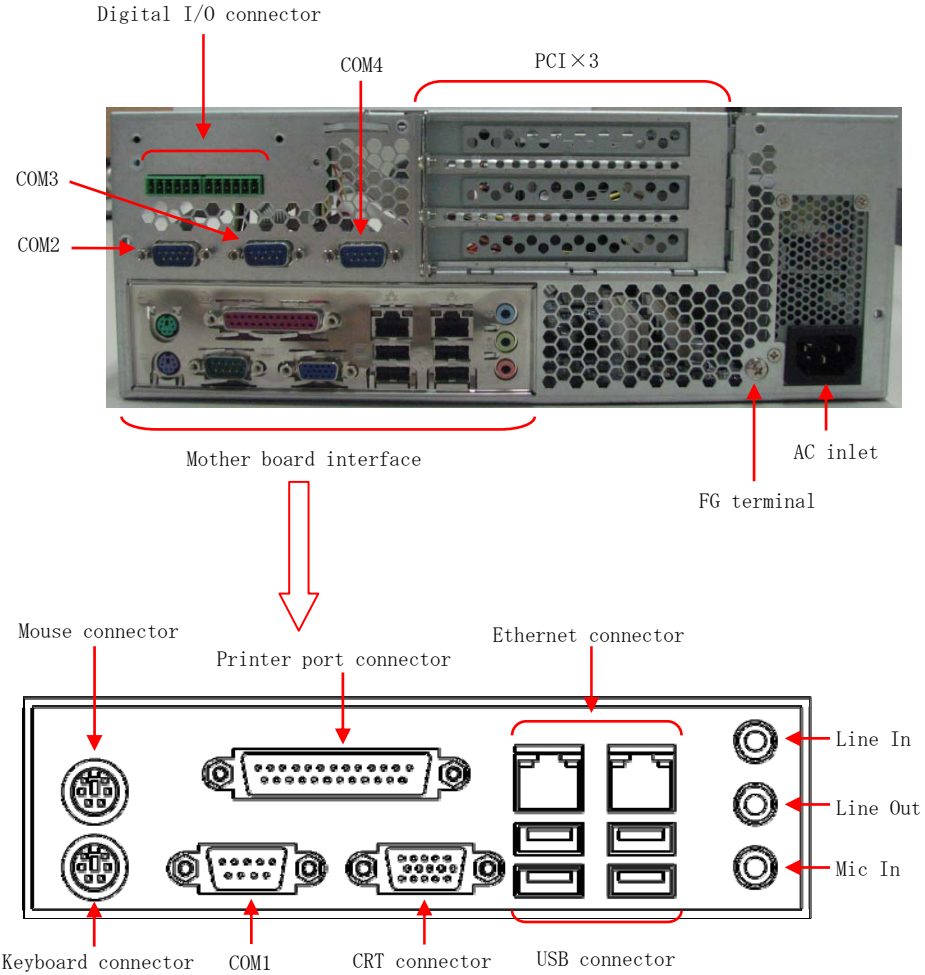
◆Component name

■VPC-1500 front view



※After removing the front face

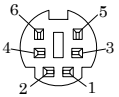
■VPC-1500 rear view



◆Keyboard interface

A connector for connecting a keyboard is provided. Connector name is KB(6Pin mini-DIN).

Table 5.1 Keyboard connector

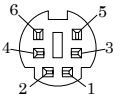


Pin No.	Function
1	K.B DATA
2	N.C.
3	GND
4	+5V
5	K.B CLOCK
6	N.C.

◆Mouse interface

A connector for connecting a mouse is provided. Connector name is MOUSE(6Pin mini-DIN).

Table 5.2 Mouse connector



Pin No.	Function
1	MOUSE DATA
2	N.C.
3	GND
4	+5V
5	MOUSE CLOCK
6	N.C.

◆Serial port interface

■RS-232C port (COM1,COM2,COM3,COM4)

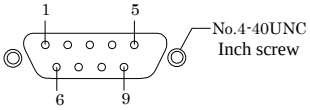
Four RS-232C-compliant serial port connectors are provided. Resources can be either assigned or reserved for each port independently through BIOS setup (see Chapter 4).

Table 5.3 SERIAL1, 2 I/O address、interrupt

COM	I/O Address	Interrupt
COM1	3F8h 2F8h 3E8h 2E8h	IRQ3 IRQ4
COM2	3F8h 2F8h 3E8h 2E8h	IRQ3 IRQ4
COM3	280h,288h 2A0h,2A8h	IRQ3,IRQ4 IRQ5,IRQ7 IRQ9,IRQ10 IRQ11,IRQ12
COM4	280h,288h 2A0h,2A8h	IRQ3,IRQ4 IRQ5,IRQ7 IRQ9,IRQ10 IRQ11,IRQ12

The factory default settings of the BIOS are as follows.
COM1(3F8h),IRQ4
CON2(2F8h),IRQ3
COM3(2A0h),IRQ10
COM4(2A8h),IRQ11

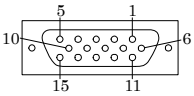
Table 5.4 Serial port connector

Connector	D-SUB 9 pin (MALE)		
			
Pin No.	Signal	Function	Direction
1	CD	Career detection	Input
2	RD	Receive data	Input
3	TD	Transmission data	Output
4	DTR	Data terminal ready	Output
5	GND	Signal ground	-----
6	DSR	Data set ready	Input
7	RTS	Transmission request	Output
8	CTS	Ready of sending	Input
9	RI	Ring indication	Input

◆CRT interface

A connector for connecting a CRT is provided. Connector name is VGA(15PinD-SUB).

Table 5.5 CRT connector



Pin No.	Function	Pin No.	Function
1	RED	9	N.C.
2	GREEN	10	GND
3	BLUE	11	D-DATA
4	N.C.	12	N.C.
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	D-DCLK
8	GND		

◆Printer port interface

One printer port interface is provided. Resources can be either assigned or reserved through BIOS setup (see Chapter 4).

Table 5.6 Printer port and I/O address

LPT	I/O Address	Interrupt	DMA
1	378	IRQ7	DMA 1 DMA 3
	278	IRQ5	
	3BC	IRQ7	

The factory default settings of the BIOS are as follows.

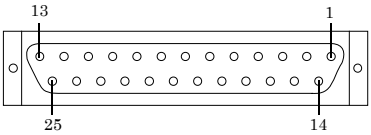
Mode:[SPP]、Base I/O address:[378]、Interrupt:[IRQ7]、DMA Channel:[DMA 3]

⚠CAUTION

I/O address [3BC] can be selected only in Modes [Output Only] and [Bi-Directional]. DMA Channel is used only in Mode [ECP].

Table 5.7 Printer port connector

Connector	D-SUB 25 pin (FEMALE)



Pin No.	Signal	Function	Direction	Pin No.	Signal	Function	Direction
1	-STRB	Data effective	Output	14	-AFEED	Automatic field	Output
2	D0	Data bit0	Output	15	-ERROR	Not use	Input
3	D1	Data bit1	Output	16	-INIT	Initialization	Output
4	D2	Data bit2	Output	17	-SELECT・IN	Possible for input	Output
5	D3	Data bit3	Output	18	GND	Ground	-
6	D4	Data bit4	Output	19	GND	Ground	-
7	D5	Data bit5	Output	20	GND	Ground	-
8	D6	Data bit6	Output	21	GND	Ground	-
9	D7	Data bit7	Output	22	GND	Ground	-
10	-ACK	Possible for recieve	Input	23	GND	Ground	-
11	BUSY	Busy	Input	24	GND	Ground	-
12	PE	Non-paper	Input	25	GND	Ground	-
13	SELECT	Select state	Input	-			

Fixed screw : No.4-40UNC inch screw

◆Reset switch

Push this button when resetting hardware.

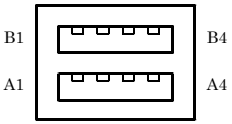
◆Power switch

Push this button at power-on. In order to turn off the power forcibly, hold it down for four seconds or longer.

◆USB port

Six USB interfaces are provided.

Table 5.8 USB connector



Pin No.	Function	Pin No.	Function
A1	USB0 Vcc	B1	USB1 Vcc
A2	USB0 -Data	B2	USB1 -Data
A3	USB0 +Data	B3	USB1 +Data
A4	USB0 GND	B4	USB1 GND

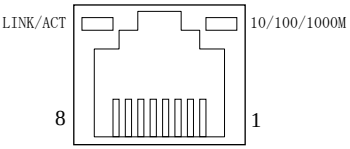
◆Ethernet

The VPC-1500 is equipped with two channels for Ethernet.

- Network type : 10BASE-T/100BASE-TX/1000BASE-T
- Transmission speed : 10M/100M/1000Mbps
- Max. network path length : 100m/segment
- Controller : Intel 82567 ×1, Realtek 8111D ×1

* 1000Mbps operation requires a cable of category 5E or greater.

Table 5.9 Ethernet connector

Connector type	RJ-45	
		
Pin No.	Signal name	Function
1	TD+	Transmission data(+)
2	TD-	Transmission data(-)
3	RD+	Receive data(+)
4	GND	Ground
5	GND	Ground
6	RD-	Receive data(-)
7	GND	Ground
8	GND	Ground

LEDs for display of network statuses

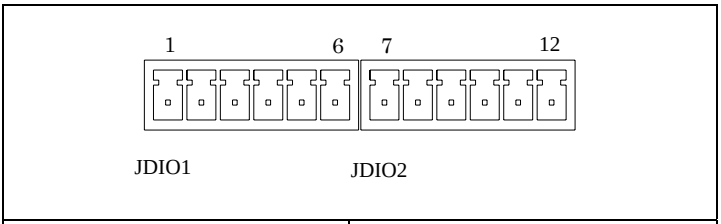
LINK/ACT LED : (Orange) Lighting at the normal connection.
(Orange) Blinking at the data transmission and receive.

10/100/1000M LED : Turning off at the 10M operation.
(Green) Lighting at the 100M operation.
(Orange) Lighting at the 1000M operation.

◆Digital I/O interface

This interface controls digital I/O with two rows of six pins (J2, J3).
Among the eight DIO pins, two output pins (O2, O3) are used for the user LED on the front.
The digital I/O interface is internally insulated.

Table 5.10 Digital I/O connector



JDIO1		JDIO2	
Pin No.	Signal	Pin No.	Signal
1	I0	7	O0
2	I1	8	O1
3	I2	9	O2 (Connected prohibition)
4	I3	10	O3 (Connected prohibition)
5	PWRON	11	COMPO
6	RST	12	COMPI

1) I0～I3 (JDIO1 Pin No. 1～4)

Input signal : You can input Input0, Input1, Input2, and Input3.

2) O0～O3 (JDIO2 Pin No. 7～10)

Output signal : You can output Output0, Output1, Output2, and Output3.

※You can not use Output2,3 because they are used for the user LED on the front.

3) PWRON,RST (JDIO1 Pin No.5,6)

Short-circuiting PWRON and GND or RST and GND triggers the same operation as pushing the Power button or Reset button on the front.

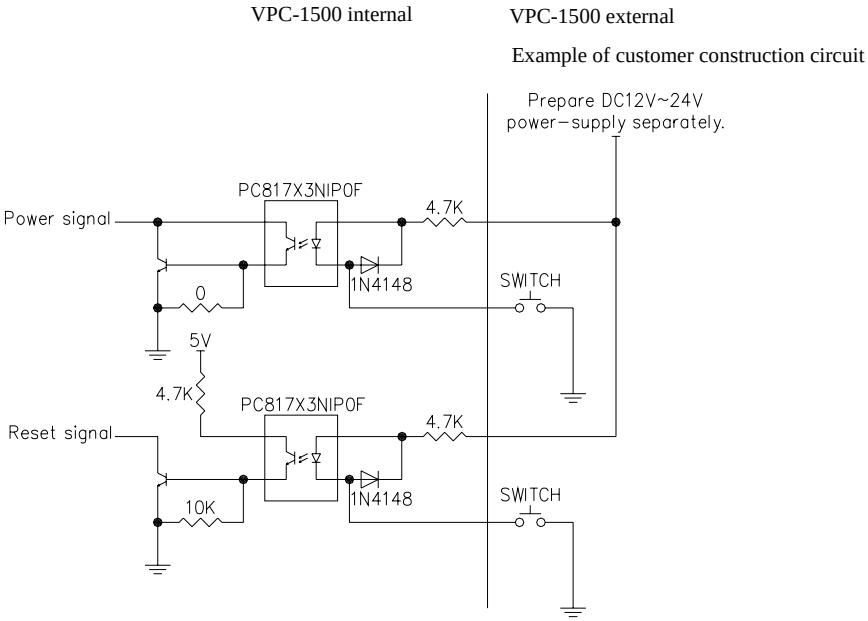
※However, the power-supply from the outside is necessary.

4) COMPO,COMPI (JDIO2 Pin No.11,12)

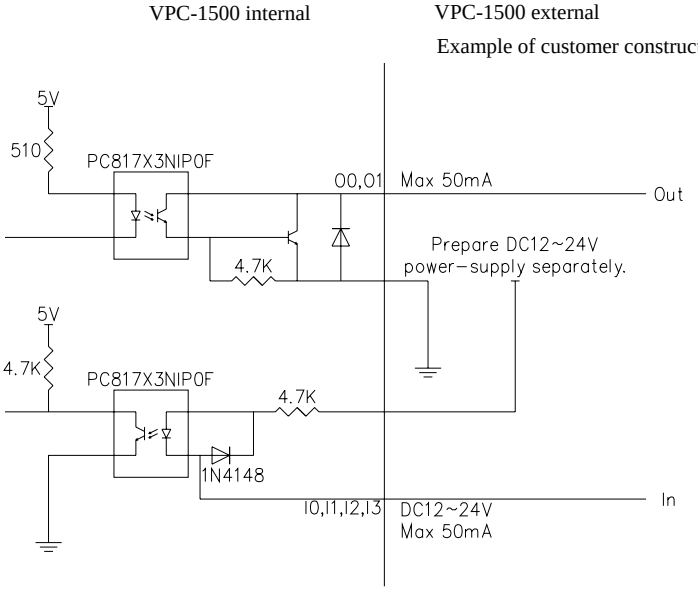
These are used for the power-supply from the outside.

COMPO is GND and COMPI is VCC.

Internal equivalent circuit chart of the remote power and the remote reset



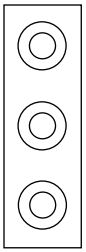
External I/O connection VPC-1500 internal equivalent circuit diagram



◆Audio interface

The Audio interface. is provided.

Table 5.11 Audio connector



Pin No.	Signal name
Blue	Line-In
Green	Line-Out
Pink	Mic-In

Chapter 6 Software utirity

This chapter describes the driver DVD included with the VPC-1500 series. This driver DVD includes drivers and software necessary for the VPC-1500 series.

This driver DVD does not provide Autorun functionality. Install drivers and software manually through Windows Explorer after inserting this driver DVD into the CD/DVD-ROM drive.

⚠CAUTION

The contents of the driver DVD are subject to change without prior notice.

Pre-installed models are not accompanied by a driver DVD, and instead store driver DVD data on a recovery DVD. A driver DVD is included with models that come without an OS.

◆Driver DVD

The directory structure of the driver DVD is shown below. The same directory is also found on the recovery DVDs of pre-installed models.

```
OEM
  ├──Documents
  ├──Drivers          ← Pre-installed models have these installed in the OS.
  |     ├──Audio
  |     ├──Chipset
  |     ├──Lan
  |     ├──Raid
  |     └──Vga
  ├──IO-Lib           ← Pre-installed models haven't these installed in the OS.
  ├──TinyRAS          ← Pre-installed models haven't these installed in the OS.
  └──HWRAID           ← Pre-installed models haven't these installed in the OS.
```

- Documents : A copy of this information is stored here.
- Drivers : Versions of the installation files for the chipset, graphics, LAN, audio, and security chip drivers are included separately for Windows 2000, Windows XP and Windows Vista.
- IO-Lib : Install file of general purpose I/O driver is stored here.
- TinyRAS : Install file of RAS tool is stored here.
- HWRAID : Install file of hardware raid tool tool is stored here.

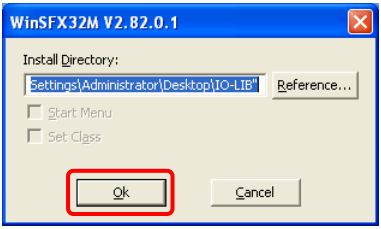
◆Various drivers

Install chipset, graphics, LAN, audio, and security chip drivers in the “Drivers” folder. Since the driver to install depends on which OS is used, install the drivers appropriate for your OS.

◆IO-Lib

The general purpose I/O driver can be installed using the “LZF826IO_312R.EXE” in the “IO-Lib” folder. Set it up according to the following procedure.

1. Extracting the file
   Specify the destination for extracted files in the following screen and select “OK”.

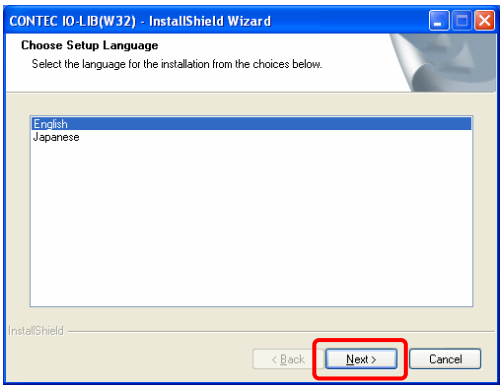


2. File Directory
   In the destination folder for the extracted files, files will be created using the following directory structure.

```
Specification folder
      ├──APIPAC
      ├──INF
      └──Readme
```

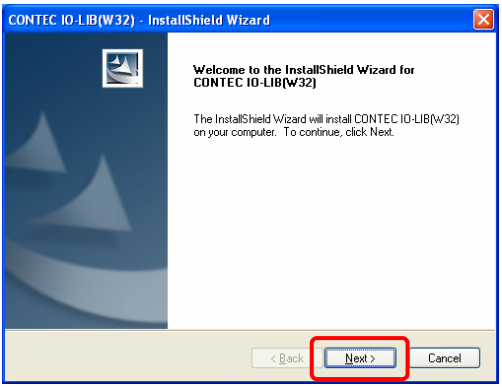
3. Install file
   Execute setup.exe in the subfolder “¥APIPAC¥Runtime¥IOLIB¥Disk1” within the specified folder.

4. Language select
   Select a language and click “Next”.



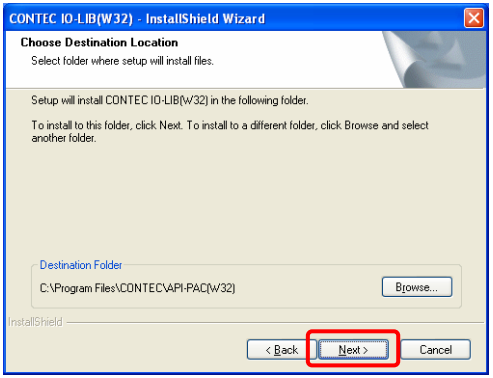
5. Setup

Click “Next”.



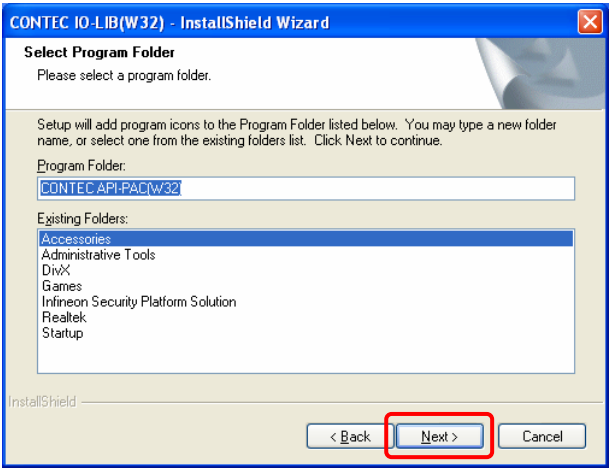
6. Choose destination location

Specify a destination folder for installation and click “Next”.



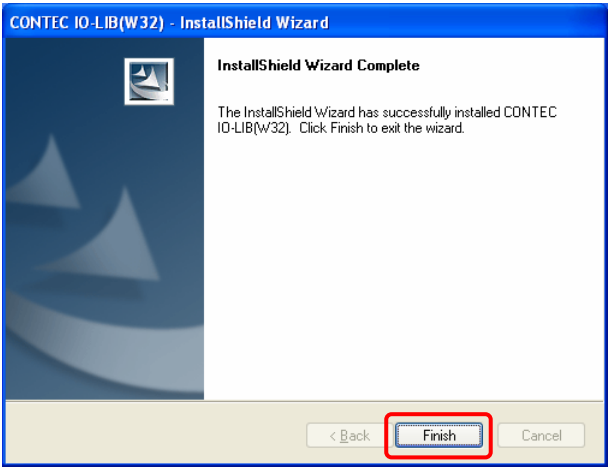
7. Program folder

After specifying the program folder, click “Next”.



8. Completion

Click “Finish”. After clicking “Finish”, restart the PC.

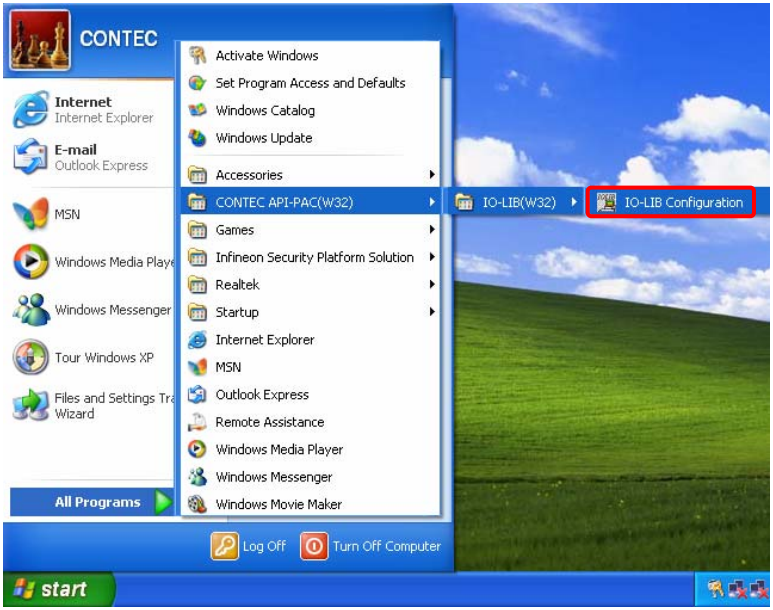


Install of IO-Lib has been completed.

Set it up according to the following procedure after IO-Lib installed.

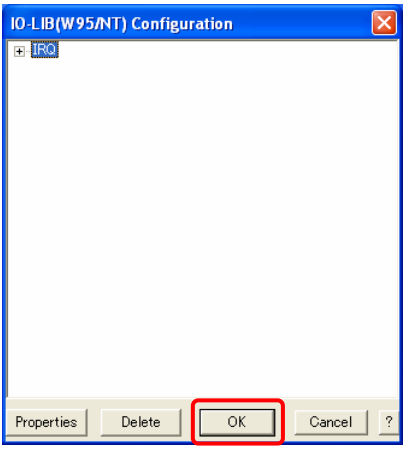
9. Starting the IO-Lib

Selects “Start menu” - “All Programs” - “CONTEC API-PAC(W32)” - “IO-LIB(W32)” - “IO-LIB Configuration” to start IO-Lib Configuration.

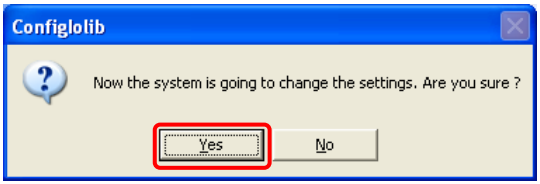


10. IO-Lib(W95/NT) Configuration

Click “OK”.



11. Set registration
Click “OK”.



12. Completion
Click “OK”. After clicking “OK”, restart the PC.

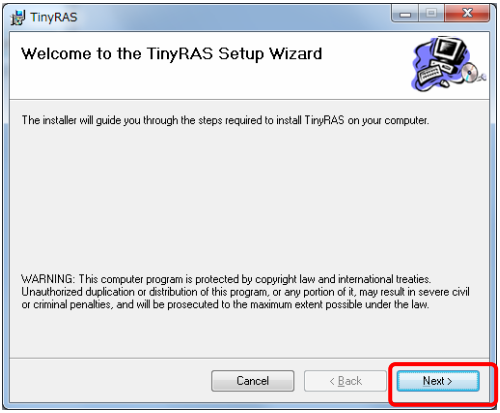
Setup of IO-Lib has been completed.

◆RAS tool

The RAS tool can be installed using the “TinySetup.msi” in the “TinyRAS” folder. Set it up according to the following procedure.

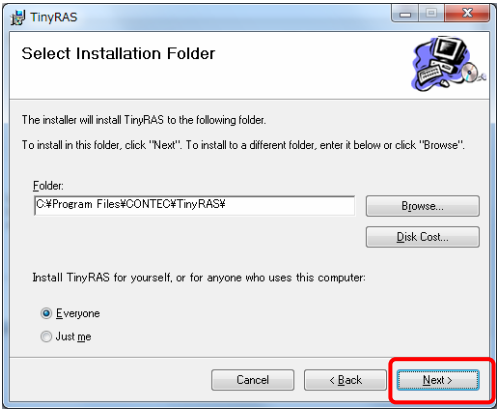
1. Setup

Click “Next”.



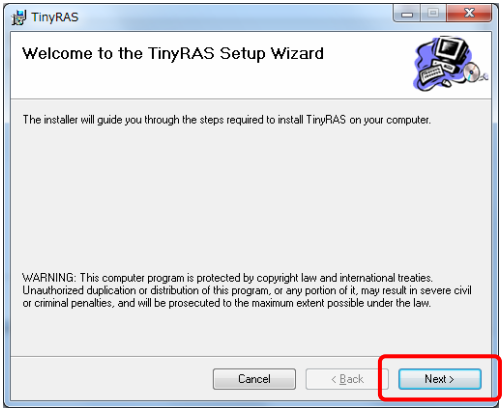
2. Select installation folder

Select the installation destination and one of the RAS user options. Click “Next”.



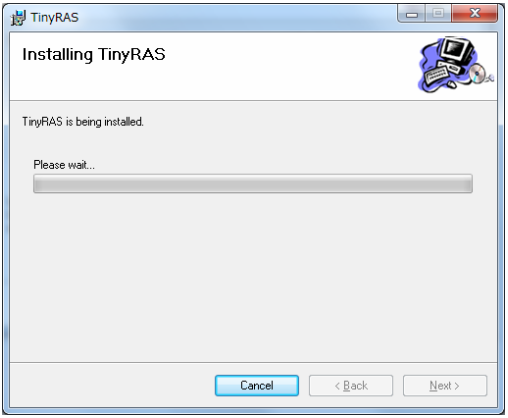
3. Confirm installation

Click “Next”.

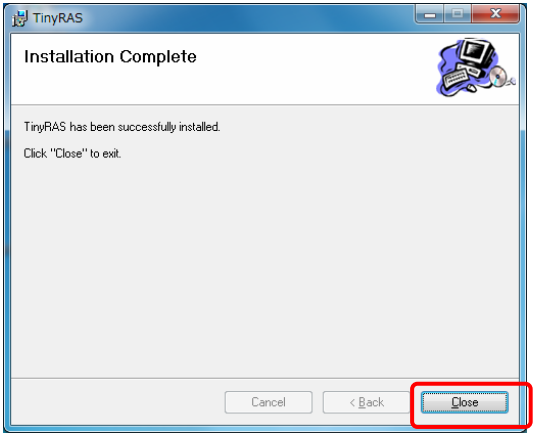


4. Install

Installation is in progress. Completion takes some time. Wait for a while.



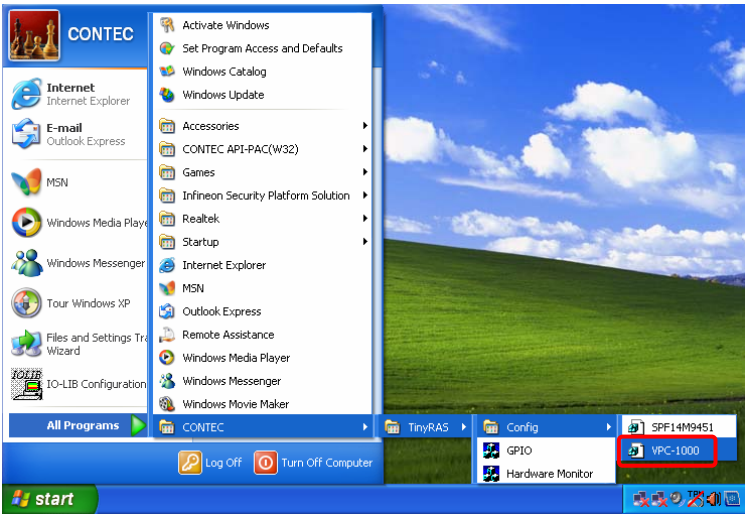
5. Completion
Click “Close”. After clicking “Close”, restart the PC.



Install of RAS tool has been completed.

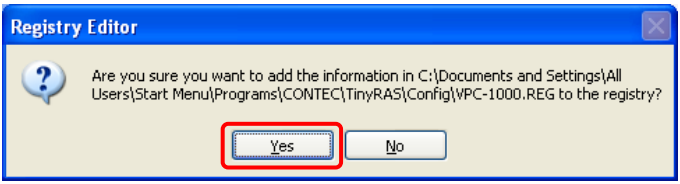
Set it up according to the following procedure after RAS tool installed.

6. Selecting the registry
Selects “Start menu” - “All Programs” - “CONTEC” - “TinyRAS” - “Config” - “VPC-1500” to execute the registry.



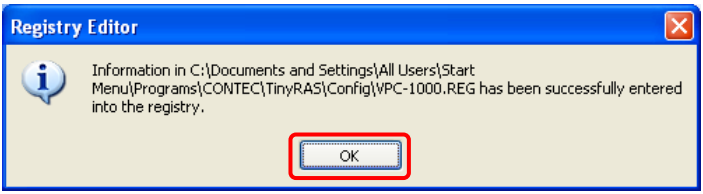
7. Registry addition

Click “Next”.



8. Completion

Click “OK”. After clicking “OK”, restart the PC.



Setup of RAS tool has been completed.

◆Hardware RAID monitoring tool

This sections describes the utility which monitors the status of HDDs connected to a mirror card. However, in order to use the utility described in this document, the following utilities need to have been installed in Windows.

・IO-Lib ← To install this utility, refer to this chapter “Software Utility”.

・TinyRAS ← To install this utility, refer to this chapter “Software Utility”.

⚠CAUTION

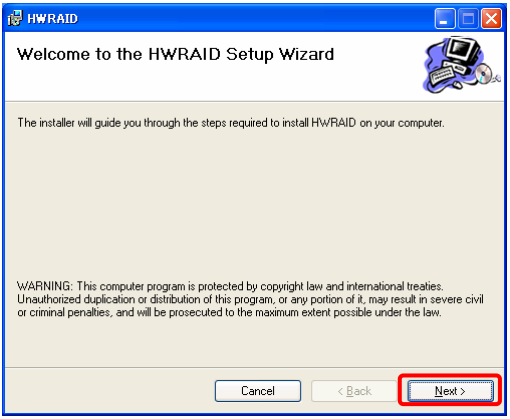
The latest version utirity downloads from CONTEC web site.

■Setup

The hardware raid monitoring tool can be installed using the “hwRaid.msi” in the “HWRAID” folder. Set it up according to the following procedure.

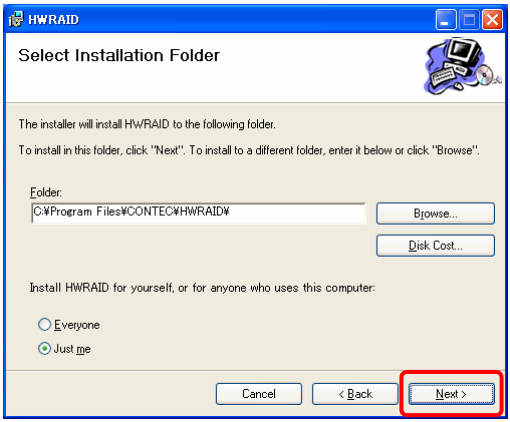
1. Setup

Click “Next”.



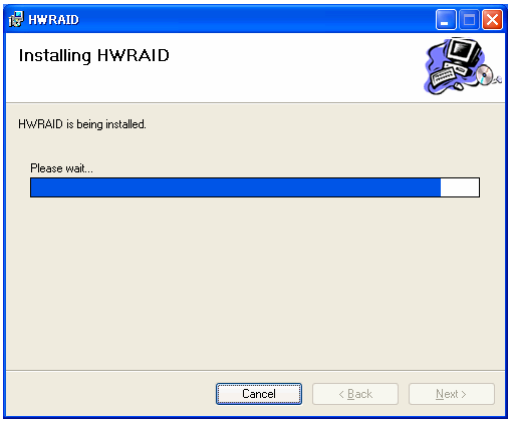
2. Select installation folder

Select the installation destination and one of the monitoring tool user options. Click “Next”.



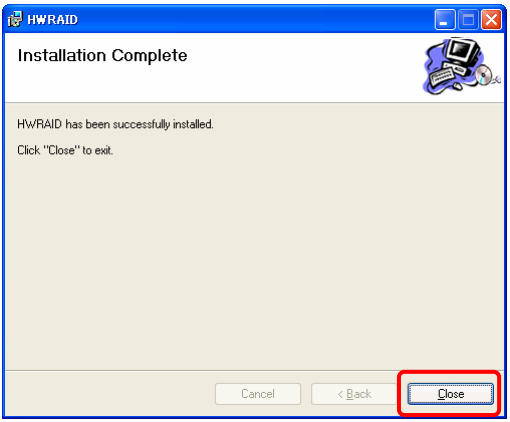
3. Install

Installation is in progress. Completion takes some time. Wait for a while.



4. Complete

Click “Close”. Click “Finish”. After clicking “Finish”, restart the PC.



Install of the monitoring tool has been completed.

■Specification

Table 6.1 Tool Functional Specification

	Function	Default operate	Setting range
Status supervision	Watch interval	10min	1 ～ 65535 (sec)
State notification	LED notification	None	Check・None
	Balloon notification	None	Check・None
	Dialog	None	Check・None
State record	Log	Event log	Event log・Text

[Limitations]

- ✓ It’s function depends on the user’s logon status. (It does not operate as a Windows service.)
- ✓ If a general-purpose I/O operation is performed by TinyRAS, operation of Lthe ED notification function is not guaranteed.
- ✓ If the time between occurrence of a status change and return to normal is within the monitoring cycle, the status will not be detected.
- ✓ The log output to an event log requires an active event log service.
- ✓ If the install pass is different from selected installation folder, messages to the event log will not be output properly.

■Starting the monitoring tool

Execute hwRaid.exe. Optional strings can be specified through the command prompt or the shortcut to hwRaid.exe.

※ For command options, refer to the information under “Command Options”.

Figure 6.1 Starting the monitoring tool

■Exit the monitoring tool

Right-click on the system tray icon to exit the utility.

Select “Exit” of the menu.

Figure 6.2 Exit the monitoring tool

■Status

When “View Status” is selected, the following dialog appears.
(This is the same as the screen displayed through command option /status/dialog.)

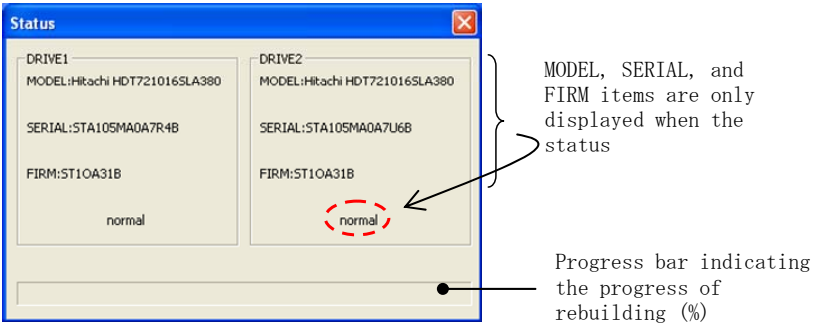


Figure 6.3 Status

■Version

You can check the version information and start-up options of the monitoring tool.

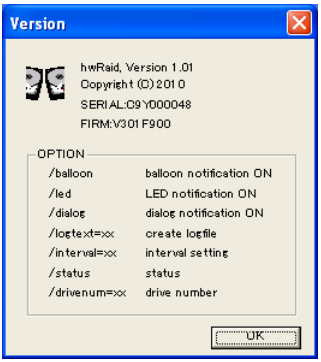


Figure 6.4 Version

■Automatic start

When Windows 2000, Windows XP Pro and Windows XP Embedded is used, create a shortcut to hwRaid.exe in the following folder.

[Start memu]→[All programs]→[Startup]

■Command option

You can modify operation through the following command options.

Table 6.2 Command option

Option	Content of operation
/status	Displays only a dialog for status checks without staying resident in the system tray. This dialog is identical to the one which can be displayed through the system tray icon. If the utility does not stay resident in the system tray, events are not output.
/logtext={file pass}	Changes the log output destination to the specified file. When this option is specified, there is no output to the event log. Specify this if you are going to execute an event log service in a situation where one cannot be started.
/interval={Figure [sec]}	Changes the monitoring interval of the RAID status to the number of seconds specified. (default setting: ten minutes intervals) (Input range) 1 to 65535 seconds
/drivenum={Figure}	Specifies the drive number (0 or higher) of the RAID board. Unless specified, the board functions as drive number 0. You can check the drive number through Windows "Disk Management".
/balloon	This enables the display of a balloon pop-up from system tray icon when failure is detected.
/led	This enables LED output when failure is detected.
/dialog	This enables an automatic dialog popup when failure is detected.

Execution example : (□:Space)

hwRaid.exe□/interval=10□/balloon□/led□/logtext=C:¥Windows¥Temp¥raid.log

Notes on /status option.

If the "View Status" dialog appears with this option specified, the following restrictions are imposed.

- ✓ Task tray icon : Not displayed (A program does not stay resident.)
- ✓ State notification functional : Invalidity
- ✓ Log functional : Invalidity
- ✓ Watch cycle : Fixation for 10sec

■LED display

When you used command option “/led” for enable LED output, the state can be confirmed by front LEDs. The LED of state display are user LED1 and LED2. Refer to Chapter 5 “Each component function” - “Component name”.

●At the fault detection

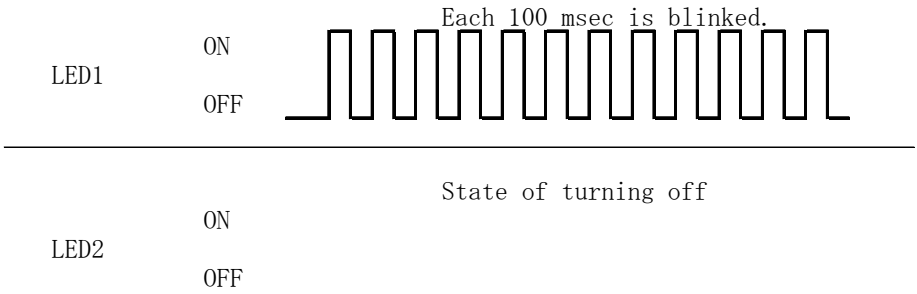


Figure 6.5 Fault detection at the drive 1

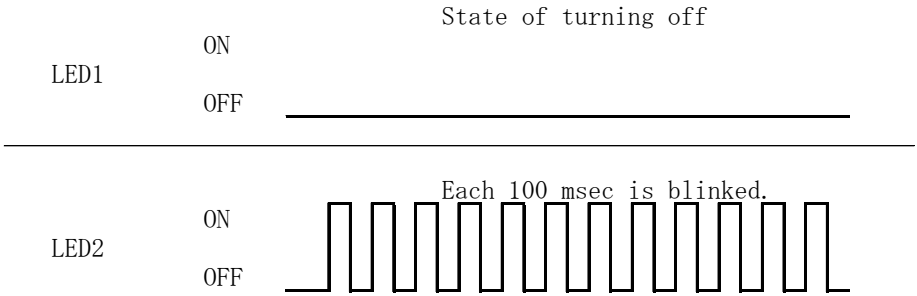


Figure 6.6 Fault detection at the drive 2

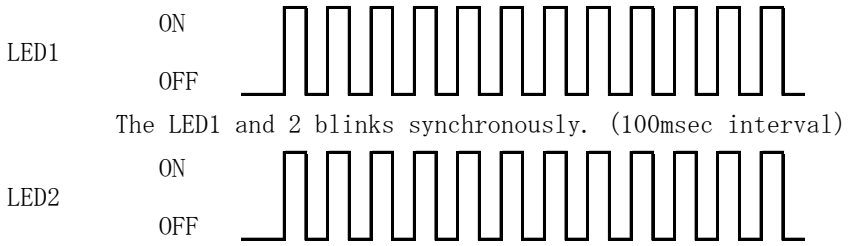


Figure 6.7 Fault detection at the drive 1 and 2 (Error at the same sector)

●At the rebuild

When no adjustment is detected in the data under mirroring, it automatically changes to the state of restructuring(rebuild).

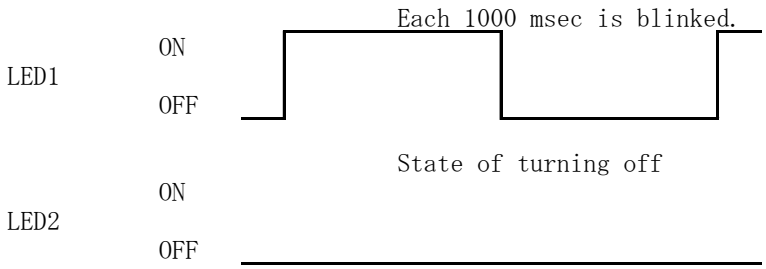


Figure 6.8 Rebuilding the drive 1 (Copying data from the drive 2 to the drive 1)

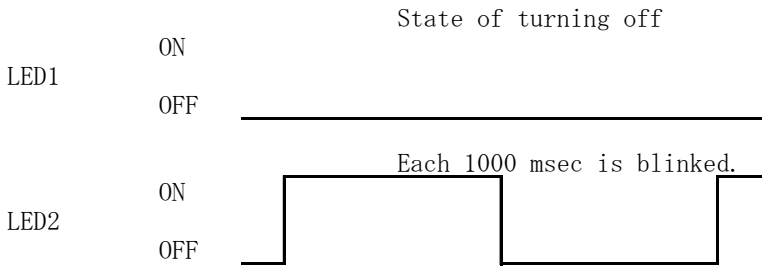


Figure 6.9 Rebuilding the drive 1 (Copying data from the drive 1 to the drive 2)

●Rebuild failure (Read error)

Refer to Chapter 8 “Hardware RAID setup” - “Troubleshooting”, restor it.

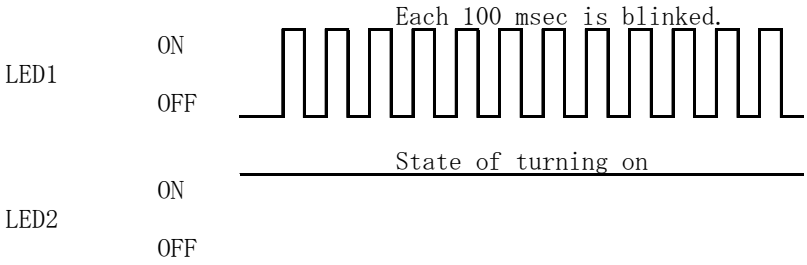


Figure 6.10 Drive1 read error

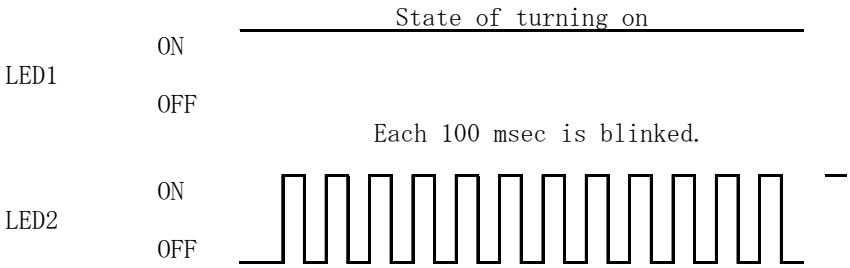


Figure 6.11 Drive 2 read error

●At restoration of read error

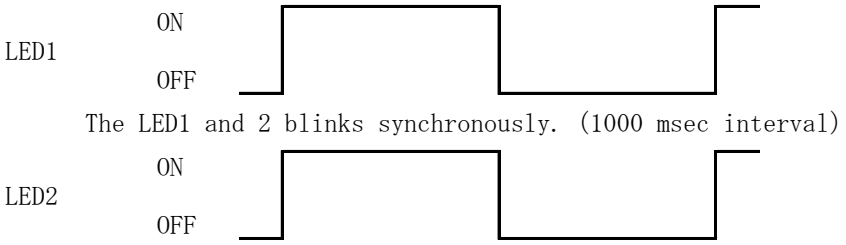


Figure 6.12 Restoring

●Undefined error

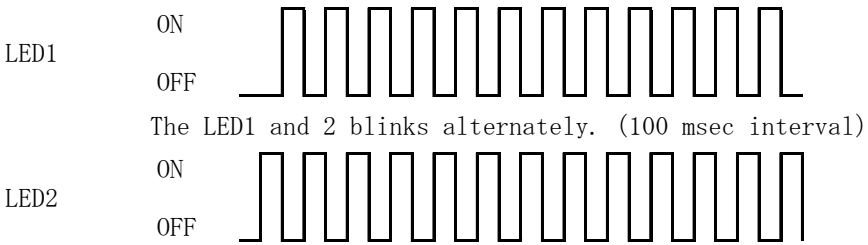


Figure 6.13 Detection at the undefined error

■Log functional

[Event log]

The log is output to the event viewer application.

Table 6.3 Event log Status

Item	State
Warning	✓ Reading error the drive 1 ✓ Reading error the drive 2
Error	✓ The drive 1 in fault ✓ The drive 2 in fault ✓ The drive 1 and 2 in fault ✓ Unknown error
Information	✓ Return ✓ Rebuilding the drive 1 ✓ Rebuilding the drive 2 ✓ Restoring ✓ Starting at the tool

[Text log]

The text log function is only valid when a valid output file is specified through the /logtext option. It appends the data to the specified file. It does not provide functionality for changing the destination file or setting a ceiling on log entry count.

The delimiter is “comma” (fixed). It outputs the log to the specified file in the following format.

Time stamp, Division, Content of log

✓ Time stamp yyyy/mm/dd (Year/Month/Day) □HH:MM:SS (Hour:Minutes:Seconds)

※ A half-width space “□” is included between year, month, day, hours, minutes, and seconds.

✓ Division INFO, WARN, or ERR

※ The text log function is output in English regardless of the OS language environment.

(Output example)

2009/01/29 01:23:45, INFO, Start RAID Monitoring.

[Notes]

At output of the Event log and text log, Error dialog might be displayed.

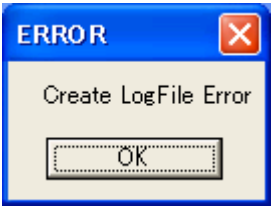


Figure 6.14 Error dialog

When error dialog is displayed, checks along the log output.

・Event log output

Checks the log setting by the property of event log application.

・Text log output

Checks the log output destination.

■API library Specification

GetRaidStatus and GetRaidProgress functions allow you to get the status of hardware RAIDs.

Library files are installed in the same directory as the tool.

●GetRaidStatus

Table 6.4 RAID status

WORD GetRaidStatus(int Port, int *iError);	
Functional	A function to get the operating status of hardware RAIDs.
Argument	The first argument Port Specify the disk number (0 or higher) comprising the RAID. This number can be checked through “Disk Management (diskmgmt.msc) in Windows. The second argument *iError Specify a pointer to the int variable storing run-time errors. If you do not have to get the execution result of the function, specify a NULL pointer. One of the following fixed values is stored. ✓ **RAIDLIB_ERROR_SUCESS** The function was executed successfully. ✓ **RAIDLIB_ERROR_OPEN** The device cannot be opened. ✓ **RAIDLIB_ERROR_READ** Data cannot be read. ✓ **RAIDLIB_ERROR_CLOSE** The device cannot be closed.

Return value	Returns one of the following fixed values. ✓ **RAIDSTS_INACCESSIBLE** Unable to access the RAID status. refer to iError. ✓ **RAIDSTS_NORMAL** RAID status is normal. ✓ **RAIDSTS_DRIVE1_BROKEN** A problem has occured with Drive 1. ✓ **RAIDSTS_DRIVE2_BROKEN** A problem has occured with Drive 2. ✓ **RAIDSTS_DRIVE1_REBUILD** Drive 1 is being rebuilt. ✓ **RAIDSTS_DRIVE2_REBUILD** Drive 2 is being rebuilt. ✓ **RAIDSTS_DRIVE1_ERROR** It failed in the rebuild of Drive 1. ✓ **RAIDSTS_DRIVE2_ERROR** It failed in the rebuild of Drive 2. ✓ **RAIDSTS_VERIFY_CHECK** Restoring.
Explanation	RAIDSTS_DRIVE(x)_ERROR Indicates that data from a source drive coulding not be read in the rebuild. (Read error) At detection, restore it. RAIDSTS_BROKEN Indicates the restore coulding not be restored.
Remarks	Necessary header file : RaidLib.h Static link library : RaidLib.lib Dynamic link library : RaidLib.dll、smart.dll

Table 6.5 RAID progress

int GetRaidProgress (int Port, int *iError)	
Functional	A function to get the progress of rebuilding.
Argument	The first argument Port Specify the disk number (0 or higher) comprising the RAID. This number can be checked through “Disk Management (diskmgmt.msc) in Windows. The second argument *iError Specify a pointer to the int variable storing run-time errors. If you do not have to get the execution result of the function, specify a NULL pointer. One of the following fixed values is stored. ✓ **RAIDLIB_ERROR_SUCESS** The function was executed successfully. ✓ **RAIDLIB_ERROR_OPEN** The device cannot be opened. ✓ **RAIDLIB_ERROR_READ** Data cannot be read. ✓ **RAIDLIB_ERROR_CLOSE** Data cannot be close.
Return value	-1: Error: Could not get progress. refer to iError. 0 or higher: Indicates rebuilding progress % (percent).
Explanation	When you get RAIDSTS_DRIVE(x)_REBUILD or RAIDSTS_DRIVE(x)_VERIFY_CHECK by the RaidGetStatus function, you can get the rebuilding progress by executing this function.
Remarks	Necessary header file : RaidLib.h Static link library : RaidLib.lib Dynamic link library : RaidLib.dll、smart.dll

◆Watch-Dog Timer (WDT) Setting

You can set a watchdog timer by using tRasWdtmr function. Execute this function periodically and program it so that the watchdog timer will not be reset.

Prototype of function

```
int  tRasWdtmr ( DWORD  second )
```

Argument
Reset time (in seconds) of the watchdog timer can be set.
Input range is 0～255.
When 0 is specified, the watchdog timer is deactivated.

Return value
Returns 0 when execution of the function succeeds and a value other than 0 when it fails.

Explanation
Although the time can be set in seconds by using this function, there is an error margin of three seconds in the reset time of the watchdog timer.
For example, if the reset time of a watchdog timer is set to 30 seconds later, you have to reconfigure a watchdog timer within 27 seconds.

When the watchdog timer is reset, data being written to storage is not guaranteed. As Windows cannot handle shutdowns, if Windows is writing system data, Windows system files may be corrupted.

Header file	TinyRAS.h
Inport library	TinyRAS.lib
DLL file	TinyRAS.dll

Example programming

```
#include    “TinyRAS.h”
int  main ( void ){
    tRasWdtmr(10);      // The watch-dog timer after ten seconds resets it.
    return 0;
}
```

◆Hardware monitor

You can monitor hardware information such as voltage information, temperature information, and the number of fan revolutions, by using the tRasHwMon function.

Prototype of function

```
int  tRasHwMon ( HMVAL *val );
```

Argument	Specifies the first pointer to the HMVAL structure. ※ The HMVAL structure is defined in the TinyRAS.h file.
Return value	Returns 0 when execution of the function succeeds and a value other than 0 when it fails.

Header file	TinyRAS.h
Inport library	TinyRAS.lib
DLL file	TinyRAS.dll

⚠CAUTION

- CPU temperature values given by the hardware monitoring function installed in the VPC-1500 series will vary according to the stepping of the installed CPU.

  Since the bundled software corrects the value according to the CPU, there is no problem. However, if you use the hardware monitoring function through direct hardware access or the standard Windows API, give consideration to the value variations for each CPU.

- If a fan is replaced with service parts, fan speed may be different.

```
/*++++++++++++++++++++++++++++++++++++++++++++

          Values obtained through the hardware monitoring function

++++++++++++++++++++++++++++++++++++++++++++*/
typedef struct  {
        DWORD        f_cpu;                          //        CPU Fan
           DWORD     f_sys;                          //        chassis Fan
           DWORD     f_misc1;                        //        Other Fan1
           DWORD     f_misc2;                        //        Other Fan2

           float     t_cpu;                          //        CPU Temperature
           float     t_sys;                          //        System Temperture
           float     t_misc;                         //        Other Temperture

           float     v_cpu;                          //        CPU Core Voltage
           float     v_mem;                          //        Memory Voltage
           float     v_vcc3;                         //        VCC 3.3V
           float     v_vcc5;                         //        VCC 5V
           float     v_p12v;                         //        +12V
           float     v_p5v;                          //        +5V
           float     v_m12v;                         //        -12V
           float     v_m5v;                          //        -5V
           float     v_5vsb;                         //        5V Stanby
           float     v_3vsb;                         //        3V Stanby
           float     v_batt;                         //        Battery
}HMVAL, *pHMVAL;
```

Example programming

```
#include  <stdio.h>
#include  <string.h>
#include   "TinyRAS.h"
int  main ( void ){
    HMVAL  val;
    (void)memset(&val, 0, sizeof(val));
    (void)tRasHwMon(&val);
    printf("CPUtemperature %.1f℃¥n", val.t_cpu) ;
    printf("CPUvoltage %.1f[V]¥n", val.v_cpu) ;
    printf("CPUFan %d[rpm]¥n", val.f_cpu) ;
    return 0 ;
}
```

CAUTION

Set the threshold value optionally. (例: Sound an alarm for excessive temperatures, etc…)

◆General purpose input

tRasIoRead functions allow you to get the status of General PurposeI/OPort.

Prototype of function

General Purpose Input　　BYTE　tRasIoRead (BOOL isRead);

Argument　If TRUE is specified, gets the status of the general-purpose input port.
If FALSE is specified, gets the status of the general-purpose output port.

Return value　Returns byte data from a port specified by an argument.

For the general purpose input(isRead=TRUE)

bit	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	IO3	IO2	IO1	IO0

For general purpose output(isRead=FALSE)

bit	7	6	5	4	3	2	1	0
Meaning	-	-	-	-	DO3	DO2	DO1	DO0

※ DO2(User LED1) and DO3(User LED2) are allocated to the two front LEDs.

Header file　TinyRAS.h
Inport library　TinyRAS.lib
DLL file　TinyRAS.dll

Example programming

```
#include  <stdio.h>
#include   “TinyRAS.h”
int  main ( void ){
    BYTE  dat=0;
    dat = tRasIoRead(TRUE);              // Acquiring the state of input port.
    printf( “the state of input port %02X¥n”, dat);
    return 0;
 }
```

◆General purpose output

The tRasIoWrite function allows you to control the general-purpose output port.

Prototype of function

General Purpose Output　　int tRasIoWrite (BYTE data);

Argument　Specifies data output to the general-purpose output port.

Output data corresponds to the following bits.

bit	7	6	5	4	3	2	1	0
意味	-	-	-	-	DO3	DO2	DO1	DO0

※DO2(User LED1) and DO3(User LED2) are allocated to the two front LEDs.

Return value　Returns 0 when execution of the function succeeds and a value other than 0 when it fails.

Header file　TinyRAS.h
Inport Library　TinyRAS.lib
DLL file　TinyRAS.dll

Example programming

```
#include “TinyRAS.h”
int  main ( void ){
    BYTE  dat=0;
    dat = tRasIoRead(FALSE);
    (dat & 0x01) ? dat &= ~0x01 : dat |= 0x01;  // LED:ON→OFF, OFF→ON
    (void)tRasIoWrite(dat);
    return 0;
}
```

Chapter 7 Software RAID setup

This chapter describes software mirroring (RAID1) setup. We only support mirroring. We do not support operation for other RAIDs (RAID0, RAID5, and RAID10). Be aware that functions not supported are outside the scope of the warranty.

Software RAIDs are not hot-swappable.

⚠CAUTION

If RAID settings are changed, all data on the hard disks will be erased.

Back up necessary data in advance.

◆Starting the setup screen

Before starting the RAID utility, set the IDE device to RAID in the BIOS setup described in Chapter 4. Press the <CTRL> and <I> keys on the following screen to start the RAID utility. After a few seconds, the RAID utility can be started.

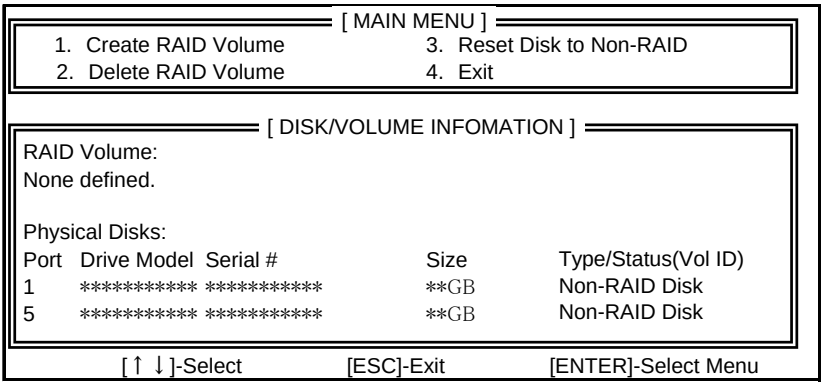
```
AHCI Option ROM BIOS Revision: 01.05.20 Date: 07-01-2007
Copyright © 2006-2008 Phoenix Technologies, LTD

Port 00:**************** SATA-1, CD-ROM/DVD-ROM
Port 01:**************** SATA-1, Hard Drisk        **GB [RAID HDD]
Port 05:**************** SATA-2, Hard Drisk        **GB [RAID HDD]

AHCI BIOS installed!!
Intel® Matrix Storage Manager option Rom v7.5.0.1017 ICH9R wRAID5
Copyright© 2003-07 Intel Corporation. All Rights Reserved.

RAID Volumes:
None defined.

Physical Disks:
  Port  Drive Model       Serial #          Size        Type/Status(Vol ID)
  1     ****************  ****************  **GB        Non-RAID Disk
  5     ****************  ****************  **GB        Non-RAID Disk

Press <CTRL-I> to enter Configuration Utility....
```

⚠CAUTION

If the IDE device is not set to RAID in the BIOS setup, the above screen will not appear.

◆Main window

When you start the RAID utility, the main window appears.

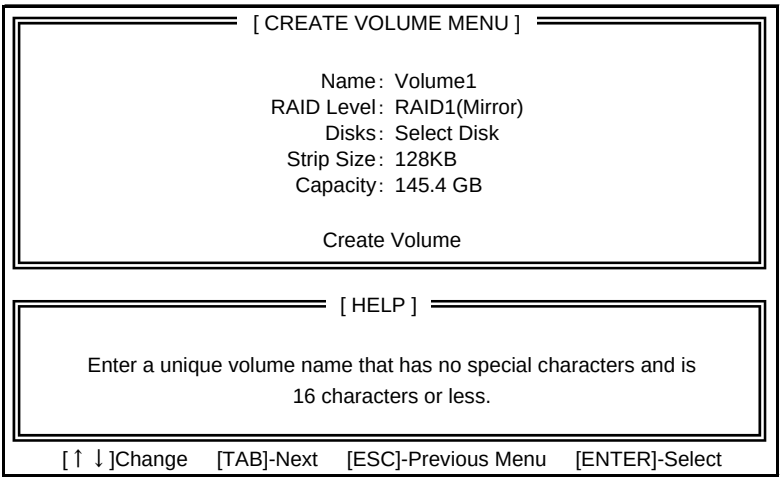


1. The cursor keys <↑>, <↓>, <→>, <←> allow you to navigate through menu items and the <Enter> key allows you to choose among them.
   (You can also select items by entering menu numbers 1 to 4 with the keyboard.)
2. You are prompted to confirm that you are saving the current settings. Press the <Y> key to save them and press the <N> or <ESC> key to exit the RAID utility without saving them.

- RAID Volume : Displays the type, volume, and status of the created RAID drive.
- Physical Disks : Displays hard disks which will be the target of the RAID drive.

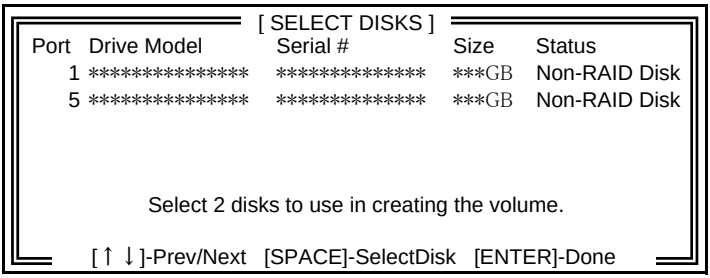
- Create RAID Volume : A RAID drive can be created. The type and capacity of the created RAID drive can be set when it is created.
- Delete RAID Volume : An existing RAID drive can be deleted. If deleted, data will be lost.
- Reset Disk to Non-RAID : The RAID configuration of the selected hard disk can be cleared.
  If the RAID configuration uses system drive, then after clearing it, the OS will be unable to boot.
  ※The VPC-1500 series does not use this.
- Exit : Exit RAID utility.

◆Create RAID drive (Mirroring)



1. Select “Create RAID Volume” by pressing the <Enter> key or the <1> key in the Main window.
2. The <TAB> key and the <Enter> key allow you to navigate through items.
3. Select “RAID1(Mirror)” by pressing the <↑> and <↓> keys for the “RAID Level” setting and press the <TAB> key or the <Enter> key to confirm the setting.

The number of HDDs necessary for setting “RAID1(Mirror)” for the “RAID Level” setting is two. If only two HDDs are connected, the “Disks” setting cannot be selected, so go to step 7. If more than two HDDs are connected, it will be necessary to set up the HDDs comprising a mirroring RAID drive on the following screen, so proceed to step 4.



4. Select the “Select Disk“ setting by pressing the <Enter> key, and select the HDDs comprising the RAID drive by pressing the <SPACE> key.

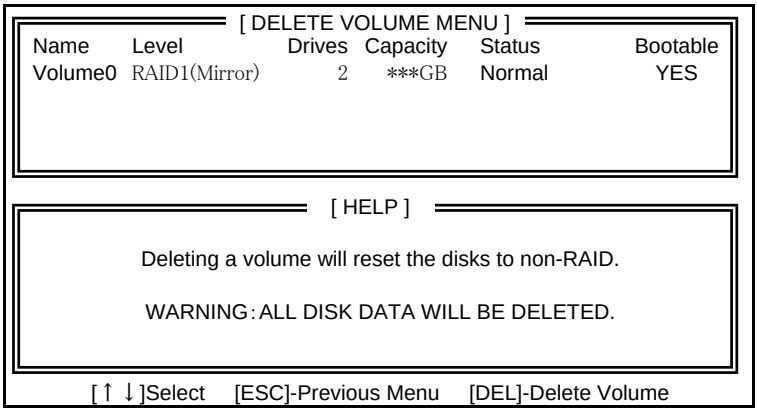
5. Press the <Enter> key to close the “SELECT DISKS” window.
6. You can optionally configure other settings. “Name” and “Capacity” can be set by keyboard entry.
7. Once setting up the RAID drive is complete, press the <Enter> key with “Create Volume” selected.
8. When you are prompted to confirm that you are creating a RAID drive, press the <Y> key.
9. A RAID drive will be created under “RAID Volume” in the Main window. The “Type/Status(Vol ID)” of the HDDs will read “Member Disk”.
10. Press the <↑> and <↓> keys to select “Exit” in the Main window, and confirm your choice by pressing the <Enter> key or the <4> key.
11. When you are prompted to confirm that you are saving the current settings, press the <Y> key to exit the RAID utility.

⚠CAUTION

Mirroring requires the creation of a RAID drive before installing the OS. If a RAID drive is created after installing the OS, data will be lost and the OS will be unable to boot.

Our support is limited to mirroring. Creating a RAID drive other than a mirroring RAID is up to the customer. We assume no responsibility for damage caused by doing so.

◆Delete RAID drive (Mirroring)



1. Select “Delete RAID Volume” by pressing the <Enter> key or the <2> key in the Main window.
2. When all mirroring-configured RAID drives are displayed, press the <↑> and <↓> keys to move to the RAID drive to be deleted and press the <DEL> key.
3. When you are prompted to confirm that you are deleting the selected RAID drive, press the <Y> key.
4. The RAID drive will be deleted from “RAID Volume” in the Main window. Its “Type/Status” will indicate “Non-RAID Disk”.
5. Press the <↑> and <↓> keys to select “Exit” in the Main window, and confirm your choice by pressing the <Enter> key or the <4> key.
6. When you are prompted to confirm that you are saving the current settings, press the <Y> key to exit the RAID utility.

⚠CAUTION

When an existing RAID drive is deleted, data may be lost. Back up the data on a RAID drive before deleting it if the data is important.

◆Software RAID monitoring tool(Matrix storage console)

Matrix Storage Console allows you to monitor the information and status of an existing RAID drive or HDDs comprising a RAID drive. Furthermore, as necessary, it allows creating, deleting and reconfiguring of RAID drives.
In Windows 7 Professional, Rapid Storage Technology is used, and the display is different. Matrix storage console used with Windows XP Professional is chiefly described here.

◆Matrix storage console Install

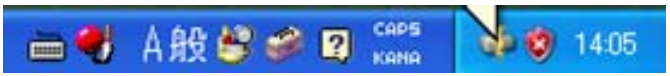
When the system is recovered using the bundled recovery CD-ROM, Matrix Storage Console will be installed by default.

Uninstalling it is up to the customer.

◆Starting the matrix storage console

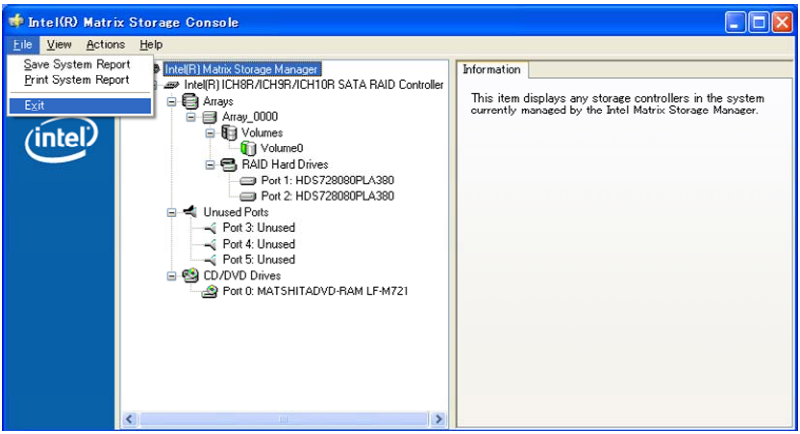
After installing Matrix Storage Console, you can launch it from “Start Menu” - “Programs”.

When the contents of Matrix Storage Console are updated or activities are in progress internally, an icon is display in the Task Manager. You can also launch it by clicking the icon. Be aware that the icon is not always displayed in the Task Bar.



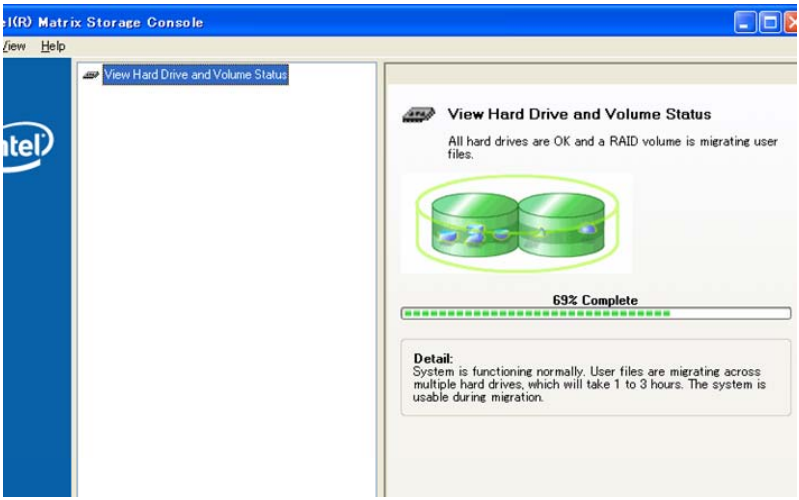
◆Exiting the matrix storage console

You can exit Matrix Storage Console by selecting <Exit> from the File menu or clicking "×" on the upper right corner of the window.



◆Making of mirroring synchronize

Data on mirrored drives is compared, and if a difference is found, data on the drives will be copied between HDDs and data on the mirrored drives will be automatically unified.



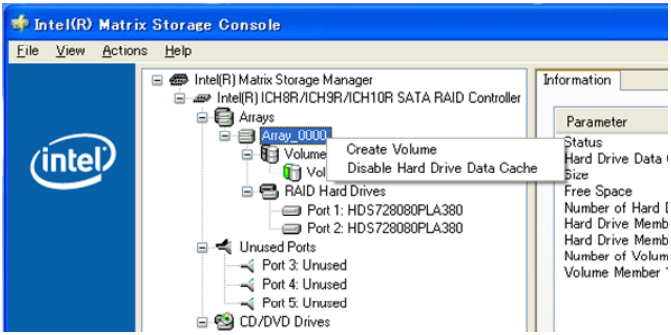
CAUTION

Synchronization by Matrix Storage Console cannot be suspended while it is in progress. In addition, you should not turn off the power to the PC while synchronization is in progress. Doing so will cause data loss and data error.

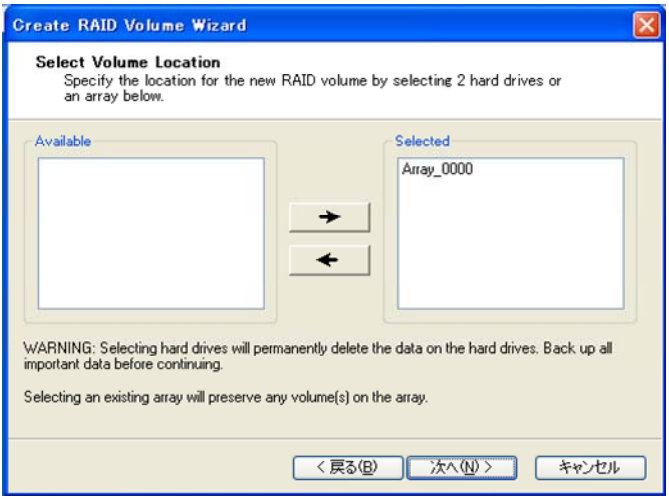
If a HDD to be mirroring-configured is not a “Member disk”, you have to set it to be a mirrored drive using the RAID utility or Matrix Storage Console.

◆Create RAID drive (Mirroring)

You can create a mirroring RAID drive from Matrix Storage Console.



1. Select “Create Volume” on the Array drive.
2. A setup wizard will appear.

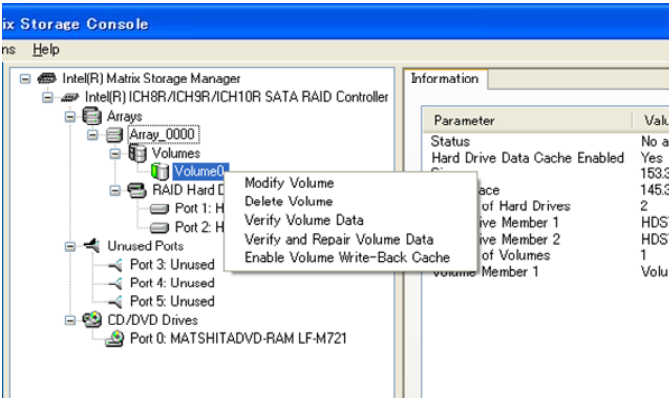


3. In the setup wizard shown above, move the Array of the RAID drive to be created to the “Selected” box by pressing the <→> and <←> keys.
4. When the wizard is finished, a new RAID drive will be created.

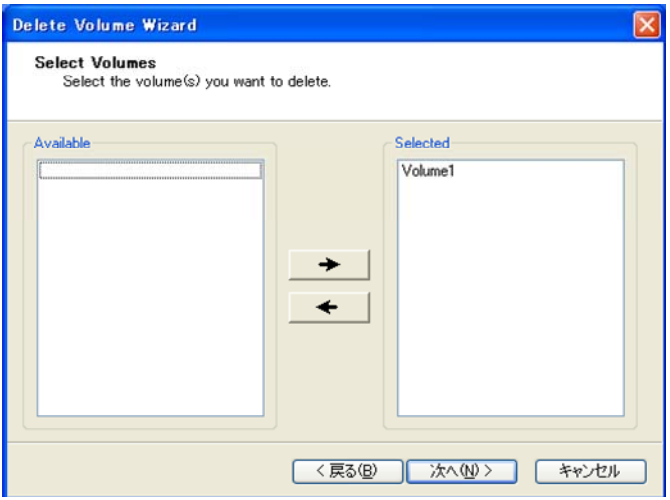
⚠CAUTION

The number of mirroring RAID drives which can created in one Array is two.

◆Delete RAID drive (Mirroring)



1. Select “Delete Volume” on the RAID drive you desire to delete.
2. A setup wizard will appear.



3. In the setup wizard shown above, move the RAID drive to be deleted to the “Selected” box by pressing the <→> and <←> keys.
4. When the setup wizard is finished, the RAID drive will be deleted.

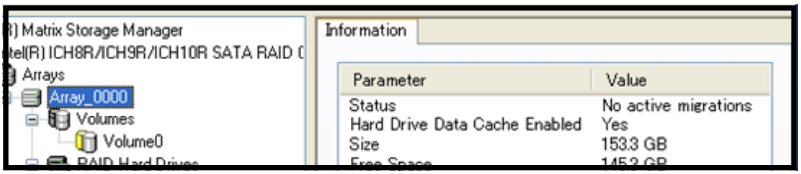
⚠CAUTION

If an existing RAID drive is a system drive, it cannot be deleted.

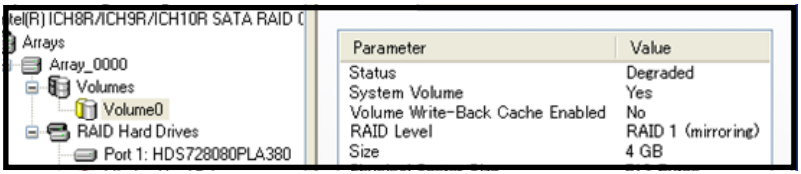
◆For the error

If an error occurs in a RAID drive or a HDD, you can check the status of the Array, the mirroring-configured RAID drive, and the HDD using Matrix Storage Console. Each status can be checked through the “Status” option in the “Advanced Mode” of Matrix Storage Console.

- Array

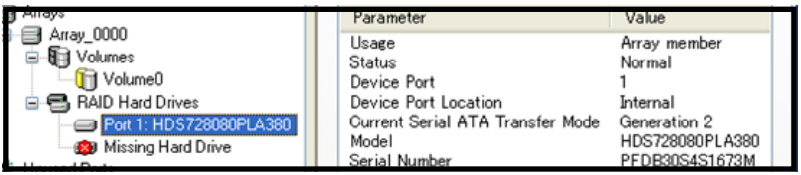


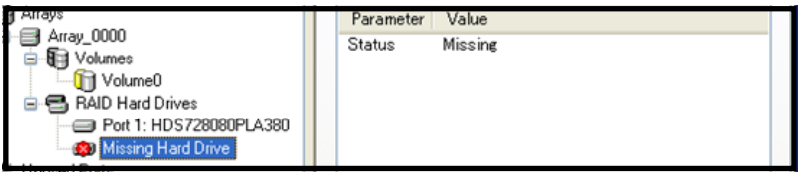
- RAID drive



※When the RAID drive status is normal, “Normal” is indicated.

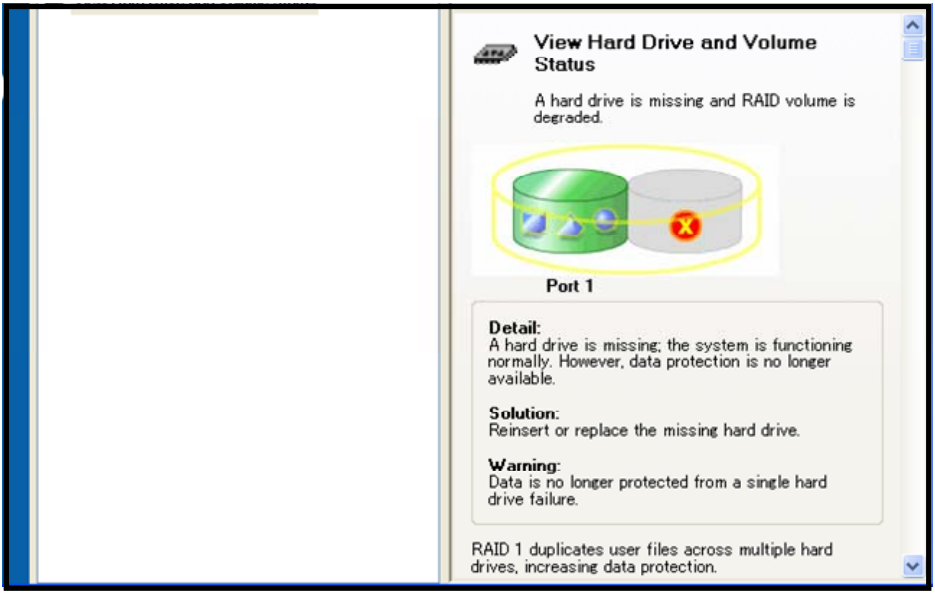
- HDD





※One mirroring-configured HDD is not connected.

In “Basic Mode”, a screen appears as illustrated below.



※One mirroring-configured HDD is not connected.

Details on errors HDD and RAID drive errors are shown. Repair the RAID drive or replace the HDD optionally in accordance with the type of error.

⚠CAUTION

RAID errors cannot be detected by the application.

Therefore, check for errors using the icon displayed in the status bar.

◆Confirming the error log

When an error occurs in a RAID drive, it is logged into the Windows-standard “Event Viewer”.

You can check errors using the Windows-standard “Event Viewer”.

⚠CAUTION

Matrix Storage Console does not provide a logging function.

◆RAID setup when replacing the HDD

The VPC-1500 series is installed with a RAID-1 Array created. However, if a HDD is replaced, you must reconfigure the mirroring RAID drive in the Array.
Set up the RAID in accordance with the following procedure.

⚠CAUTION

RAIDs in the VPC-1500 series are not hot-swappable. Always turn off the power before replacing a HDD.

1. Replace the HDD and boot the PC.

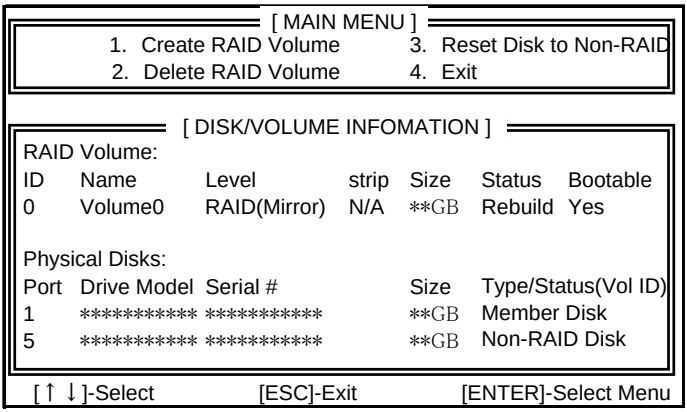
```
AHCI Option ROM BIOS Revision: 01.05.20 Date: 07-01-2007
Copyright © 2006-2008 Phoenix Technologies, LTD

Port 00:**************   SATA-1, CD-ROM/DVD-ROM
Port 01:**************   SATA-1, Hard Drisk          **GB [RAID HDD]
Port 02:**************   SATA-2, Hard Drisk          **GB [RAID HDD]

AHCI BIOS installed!!
Intel® Matrix Storage Manager option Rom v7.5.0.1017 ICH9R wRAID5
Copyright© 2003-07 Intel Corporation. All Rights Reserved.

  RAID Volumes:
  ID   Name        Level          Strip  Size     Status     Bootable
  0    Volume0     RAID1(Mirror)  N/A    * * GB   Degraded   Yes

  Physical Disks:
  Port  Drive Model      Serial #              Size     Type/Status(Vol ID)
  1     **************   **************        * * GB   Member Disk(0)
  5     **************   **************        * * GB   Non-RAID Disk

Press <CTRL-I> to enter Configuration Utility....
```

2. Press the <Ctrl> and <I> keys in the above screen to start the RAID utility.

   When the RAID utility launches, the following screen will appear with the replaced HDD indicated.

```
[ DEGRADED VOLUME DETECTED ]
"Degraded" volume and disk available for rebuilding detected. Selecting
a disk initiates a rebuild. Rebuild completes in the operating system.

    Select the port of the destination disk for rebuilding (ESC to exit):
        Port   Drive Model          Serial #            Size
        5      ***************      ***************     ***GB


[↑ ↓]-Previous/Next  [SPACE]-Selects  [ENTER]-Selection Complete
```

3. Move to a mirroring-configured (replaced) HDD by pressing the <↑> and <↓> keys and confirm your choice by pressing the <Enter> key. In the Main window of the RAID utility, the “Status” item under “RAID Volume” item changes to “Rebuild” and the “Type/Status(Vol ID)” item under “Physical Disks” item changes to “Non-RAID Disk”.



4. Press the <ESC> or <4> key and the <Y> key in turn to save settings and exit the RAID utility.
5. Boot the OS.
6. When the OS boots, the RAID drive will be automatically synchronized by Matrix Storage Console.
7. When synchronization is finished, reconfiguration of mirroring is complete.

In addition to the above procedure, mirroring can be also reconfigured from Matrix Storage Console, but we recommend replacement through the above procedure.

For the recovery procedure using Matrix Storage Console, refer to the help information for Matrix Storage Console.

Chapter 8 Hardware RAID setup

This chapter describes hardware mirroring (RAID1) setup. We only support mirroring. We do not support operation for other RAIDs (RAID0, RAID5, and RAID10). Be aware that functions not supported are outside the scope of the warranty.

Hardware RAIDs are also hot-swappable.

Functional specification

For more on the specifications of RAID boards (hereinafter described as "mirror card") used for hardware RAIDs, refer to Chapter 2 "General" - "Specification".

◆Locations and settings of switches and connectors

Once you have removed the case cover, the bracket for the riser card, and the mirror card bracket, you will be able to see the connectors and jumpers as illustrated below.

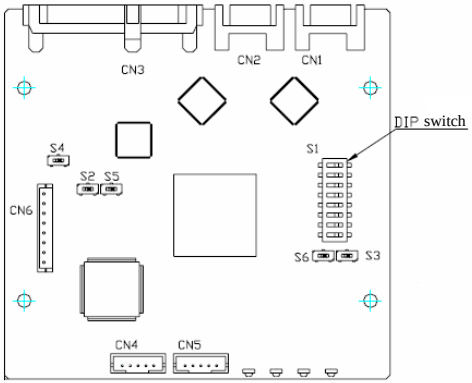


Table 8.1 Switch list

Name	Function	Factory default setting	Reference page	Remarks
S1	DIP switch setting	1~8 all OFF	P124	State usually
S2/S3/S4/S5/S6	S2/S3/S4/S5/S6 switch setting	Right	P124	※1

※1 Use the factory default settings.

Table 8.2 Connector list

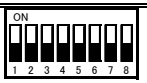
Name	Function	Reference page	Name	Function	Reference page
CN1	Serial ATA connector (HDD1)	-	CN3	Serial ATA connector	-
CN2	Serial ATA connector (HDD2)	-	CN4/CN5/CN6	※2	-

※2 Do not use these.

◆Switch setting

■DIP switch : S1

Table 8.3 DIP switch setting

S1	Function
	State usually (Factory default setting)
	Setting 1
	Setting 2

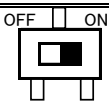
⚠CAUTION

The DIP switch must be set only when the power is off.

In addition, do not set any settings other than those described above.

■S2/S3/S4/S5/S6 switch setting : S2,S3,S4,S5,S6

Table 8.4 S2 switch setting

S2	Function
	State usually (Factory default setting)

⚠CAUTION

Use the factory default settings.

◆Internal LED status

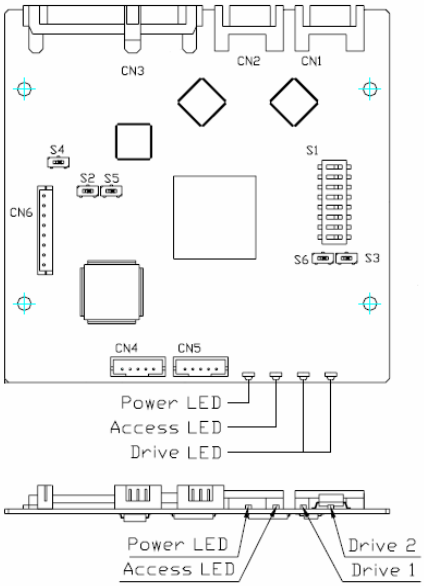


Table 8.5 LED status

Operation		Power LED※1	Access LED	Drive LED
Boot up		Green lighting	Green lighting	Green lighting
Normal performance			Green lighting※2	Green lighting※2
Faulty				Orange lighting
Rebuilding				Copy destination : Orange blinking Copy original : Green lighting
Copy error				Copy original : Orange blinking Green lighting※2
System hung	Both drives sre hung		Orenge blinking	Turning off
	HDD configuration information is incompatible.		Orange blinking	Green lighting

※1 At the power off, it turns off.
※2 At the access it lights.

CAUTION

You can see these LEDs from the outside of the chassis.
You can check the status conditions that correspond to these LEDs using a utility.

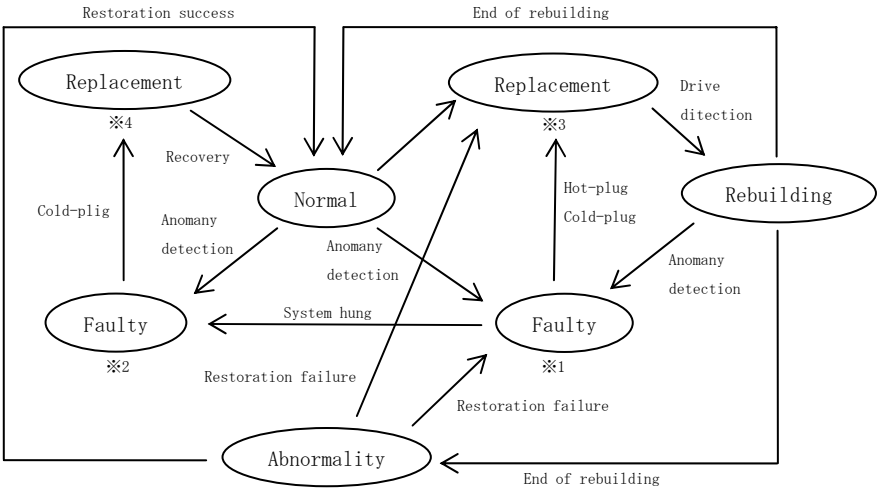
Hardware RAID setup

Information and the state of HDDs that it is existing in the mirroring composition can be observed by the utiliry. Regarding this utility, refer to Chapter 6 “Software utility” - “Hardware RAID monitoring tool”.

The state of HDDs that it is existing in the mirroring composition can be observed by the mirror card LED. Regarding the Mirror card LED, refer to This Chapter “Internal LED status”.

◆Operation flow

During hardware RAID operation, the following conditions are possible, with either condition available.



※1 Of two drives, only one is faulty

※2 Both drives are faulty

※3 Of two drives, only one is replacement

※4 Both drives are replacement

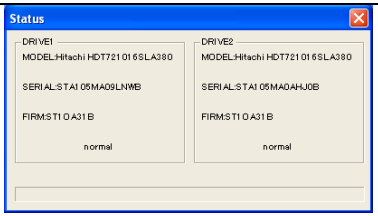
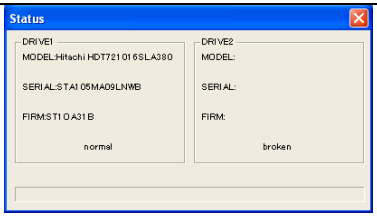
Table 8.6 Mirror card status

Status	Explanation
Normal	Both drives are normal and the system is operating normally. Read from either drive and write the same data to both drives.
Faulty	One drive is faulty and the system remains capable of operation. Two drives are faulty and the system has been deactivated.
Replacement	Replace a faulty drive with a good drive.
Rebuilding	The system is capable of operation while a drive is being rebuilt. When restarting during a rebuild, rebuilding resumes from the last completed block. Replacement of drives is possible in the following two modes. **Hot-plug** Replace a drive during operation of the RAID board (with the power on). Even if the replaced drive is identical to the one prior to replacement, start rebuilding. **Cold-plug** Replace a drive while the RAID board is deactivated (with the power off). If a new drive is not inserted, do not rebuild.
Abnormality	A read error occurs from the source during rebuilding. Write data where a read error occurs from the source.

◆For the error

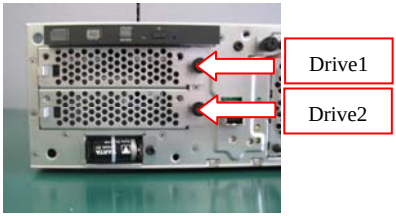
If an error occurs in a mirroring-configured HDD, you can check the status of the HDD using a utility or the mirror card LED. Replace the HDD optionally in accordance with the type of error.

Table 8.7 HDD error

	Normal	Abnormal
Utirity		

※One mirroring-configured HDD (Drive2) not connected

Drive1 and Drive2 in the software utility and on the mirror card correspond to the drive bays illustrated below.



⚠CAUTION

During installation of a HDD and cabling of the mirror card, ensure that they are not turned upside down.

◆RAID setup when replacing the HDD

This section describes the setup for replacing a mirroring-configured HDD. Set it up along the number of exchanged HDD.

⚠CAUTION

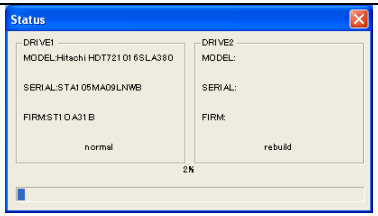
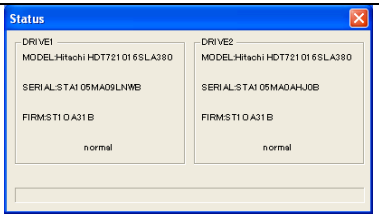
Prepare a HDD for replacement with the same type and capacity.

●When replaced HDD is one

Prepare a good HDD and replace a faulty HDD with it. Regarding replacement of HDDs, refer to Chapter 3 "Setup of Hardware" - "Installation of Hard Disks".

After replacement of a HDD, rebuilding will be automatically started. The table below shows when a HDD connected to Drive2 is replaced. If a HDD connected to Drive1 is replaced, the indication given by the utility and the statuses of Drive1 and Drive2 will be reversed.

Table 8.8 To have mirroring reconfiguration

	Rebuilding	After rebuilding
Utirity		

※Replacing a HDD connected to Drive2

⚠CAUTION

After checking a HDD for replacement, replace it. Replacing a normal HDD with a faulty HDD may halt and damage the system.

If rebuilding is not automatically started, refer to This Chapter "Troubleshooting".

If rebuilding doesn't end normally, refer to This Chapter "Troubleshooting".

■When replaced HDD is two

Prepare two good HDDs, and after replacing two existing HDDs with them, recover it. However, regarding replacement of HDDs, refer to Chapter 3 “Setup of Hardware” - “Installation of Hard Disks”. Regarding the recovery, refer to This Chapter “OS recovery setting”.

⚠CAUTION

After setup, HDDs will be set to factory default settings, and all data on a good HDD you have prepared will be erased.

◆Hot-swap

This mirror card is hot-swapping, and while the OS is up and running, it is possible to replace a HDD. Regarding replacement of HDDs, refer to Chapter 3 “Setup of Hardware” - “Installation of Hard Disks”.

Although this function remains available if one HDD fails, it cannot be used when both HDDs are broken.

⚠CAUTION

In order to replace a HDD using the hot-swap function, always check in advance the HDD to be replaced. Removing a normal HDD with the power on and either HDD faulty may damage the system.

Two HDD is normal, and one HDD is not recommended to be detached.

OS recovery setting

This section consists of notes on OS recovery with the mirror card connected.

Usually, you should perform recovery using recovery media after connecting two HDDs to the mirror card.

If both HDDs connected to the mirror card recognize the card as normal, you can perform recovery using recovery media and bypassing the above step.

However, if two HDDs, for example, used for other RAID system are to be mirroring-configured, the mirror card may not be recognized as normal due to information on mirroring configuration.

In this case, you need to manipulate the DIP switch for the mirror card. Conduct recovery in accordance with the procedure described below.

1. Set the DIP switch for the mirror card for setting 1 with the power off.

   ※For more on installation/removal of a mirror card when setting the DIP switch, refer to Chapter 3 “Setup of Hardware” - “Option: Installation/Removal of a Mirror Card”.

   The DIP switch setteing refer to This Chapter “Switch setting” - “DIP switch”.

2. After installing the mirror card, turn on the power and check that the Access LED on the mirror card flashes orange.

   ※Check visually the mirror card LED.

   For more on the status of the mirror card LED, refer to This Chapter “Internal LED status”.

3. Turn off the power and set the DIP switch for the mirror card to normal status.

   ※How to set the DIP switch and installation/removal of the mirror card are the same as step 1 of this procedure.

4. After installing the mirror card, turn on the power and perform recovery.

   ※For more on how to perform recovery, refer to the “Windows Setup Procedure Manual” accompanying the recovery media.

FAQ・Troubleshooting

This section consists of FAQ and troubleshooting related to mirror cards. When you run into trouble, refer to the relevant items.

◆FAQ

●I am not sure in which direction the data between HDDs is copied.

・If a faulty HDD is replaced through hot-plugging, data is copied from the existing HDD to the replacement HDD.

・If a faulty HDD is replaced through cold-plugging, data is copied from the existing HDD to the replacement HDD.

●I exchanged HDDs connected to a mirror card.

・If both HDDs are normal, data is not copied.

・If either HDD is faulty, data is not copied between HDDs.

●I want to configure mirroring for an existing HDD from a backup HDD.

The backup HDD exists besides two HDDs that it is existing in the mirroring composition. When the mirroring is composed by the backup HDD, follows the following steps.

<Steps>

1. Turn off the power of PC.
2. Remove both HDDs that it is existing from the mirror card.

   Regarding removal of HDDs, refer to Chapter 3 “Setup of Hardware” - “Attaching the hard disk”.
3. Connect only a backup HDD to the mirror card.

   Regarding removal of HDDs, refer to Chapter 3 “Setup of Hardware” - “Attaching the hard disk”.
4. Turn on the power of PC.
5. Connect the HDD for which you want to configure mirroring to an empty drive attached to the mirror card and rebuild it.
6. After the rebuilding normally completes, two HDDs that is connected are mirroring composition.

◆Troubleshooting

●The OS does not boot.

・Check if switches 1 to 8 of S1 (DIP switches) are all OFF.
If not, after setting them all to OFF, turn on the power again.
・Check that the cables are properly connected.
・Check the LED on the mirror card.
If the status of the LED indicates normal, there may be a problem in the software, such as the OS.
※For more on the position and status of the LED, refer to This Chapter “Internal LED status”.

●After replacement of HDDs, rebuilding does not start.

・Check that the replacement HDD is good.
・Check the capacity of the replacement HDD.
If the capacity of the replacement HDD is smaller than that of the other HDD, it cannot be rebuilt.
In addition, even when the capacity is the same, if the make and model are different, rebuilding the HDD may not be possible due to differing specifications. Therefore, a replacement HDD must be of the same make and model as the previous HDD.
・If the replacement HDD was used in another RAID system, its configuration information may be different due when combined with the mirror card.
In that case, follows the following steps.

<Steps>

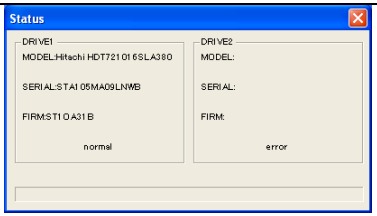
1. Set the DIP switch for the mirror card for setting 1 with the power off.
   ※For more on installation/removal of a mirror card when setting the DIP switch, refer to Chapter 3 “Setup of Hardware” - “Option: Installation/Removal of a Mirror Card”.
   The DIP switch setteing refer to This Chapter “Switch setting” - “DIP switch”.
2. After installing the mirror card, connect only a not replacement HDD to the mirror card and turn on the power.
3. check that the Access LED on the mirror card flashes orange.
   ※Check visually the mirror card LED.
   For more on the status of the mirror card LED, refer to This Chapter “Internal LED status”.
4. Turn off the power and set the DIP switch for the mirror card to normal status.
   ※How to set the DIP switch and installation/removal of the mirror card are the same as step 1 of this procedure.
5. After installing the mirror card, turn on the power.
6. Connect the replaced good HDD to an empty drive attached to the mirror card and the rebuilding is started.

●Both HDDs are broken.

・Prepare two good HDDs and perform recovery.

●Rebuild failure (Read error)

A read error occurs from the source during rebuilding. Conduct restore in accordance with the procedure described below.

	Utiliry
Rebuild failure	

⚠CAUTION

This the restoration operation restores the error sector and not restores the data.

Because there is fear of the system may become unstable according to the data is lost, recovers optionally in accordance.

<Restoration steps>

1. Set the DIP switch for the mirror card for setting 1 with the power off.

   ※For more on installation/removal of a mirror card when setting the DIP switch, refer to Chapter 3 “Setup of Hardware” - “Option: Installation/Removal of a Mirror Card”.

   The DIP switch setteing refer to This Chapter “Switch setting” - “DIP switch”.

2. After installing the mirror card, connect only a not replacement HDD to the mirror card and turn on the power.

3. Check this status.

	Screen	Mirror card
DIP switch setting 1	 ※Message : ” DISK BOOT FAILURE, INSERT SYSTEM DISK AND PRESS ENTER”	 ※Refer to This Chapter “Internal LED status.

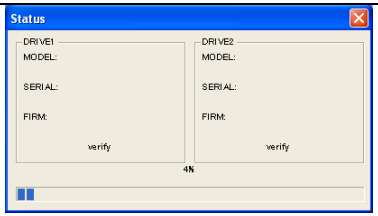
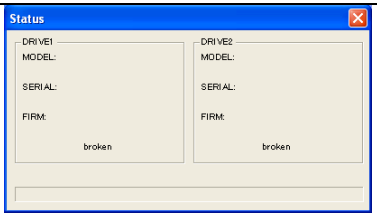
※When the DIP switch is the setting 1, can not start Windows. Not Check by utility.

4. Turn off the power and set the DIP switch for the mirror card for setting 2.

   ※How to set the DIP switch and installation/removal of the mirror card are the same as step 1 of this procedure.

5. After installing the mirror card, turn on the power and start Windows.

6. After start Windows, check this status.

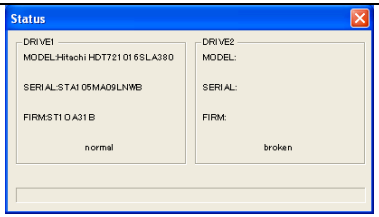
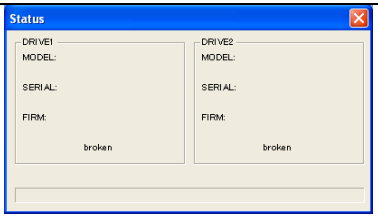
	DIP switch setting 2 running	DIP switch setting 2 completion
Utility		

7. After this step 6 completed, the restoration was completed if there is no error.

   ※When the error is generated, the restoration is a failure. Refer to the next item “Restoration failure”.

●Restoration failure

When the restoration of the before item “Rebuilding failure” failed, follows the following steps according to each state.

	One HDD	Two HDDs
Utility		

※The Failure of restoration doesn’t check from the mirror card LED. Check only the utility.

[One HDD]

One HDD in a mirroring-configured has the error sector that can not be restored. Replace a faulty HDD for a new HDD. After the HDD replaced, recovers it. Regarding replacement of HDDs, refer to This Chapter “RAID setup when replacing the HDD”.

[Two HDDs]

Two HDDs in a mirroring-configured has the error sector to the same sector. Follows the following steps

<Restoration steps>

1. One HDD either of two HDDs in a mirroring-configured is replaced.

   ※Regarding replacement of HDDs, refer to This Chapter “RAID setup when replacing the HDD”.

2. After the HDD replaced, the rebuilding is started.
3. After the rebuilding is completed, a read error occurs from the source. Follows the same as step 6 from 1 of the before item “Rebuilding failure”
4. After this step 3, the restoration was completed if there is no error.

   ※When the error is generated by the not replace HDD, the restoration fails. Replace that HDD for the good HDD.

   If the error doesn’t occur and the rebuilding completes, the restoration complets after that HDD is replaced the good HDD. When the error occurred, refer to before item “Rebuilding failure”.

Chapter 9 List of options

■ Parts for maintenance exchange

Name	Model
3.5 inch SATA Hard disk (Capacity 250GB)	PC-HDD250G-3SATA
3.5 inch SATA Hard disk (Capacity 2TB)	PC-HDD2T-3SATA

VPC-1500 Series

User's Manual

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