

BT-62-0002-02



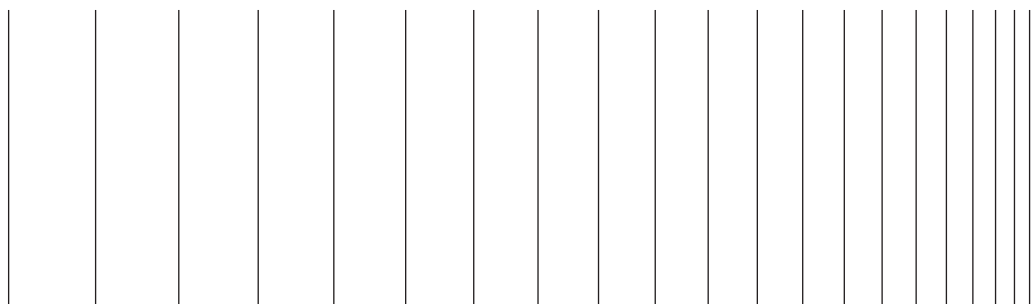
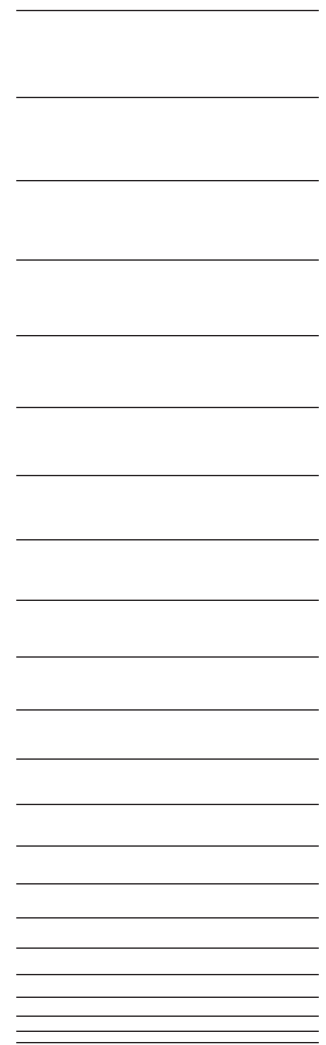
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**HITACHI**

HITACHI INDUSTRIAL COMPUTER

# HF-BT1000

INSTRUCTION MANUAL

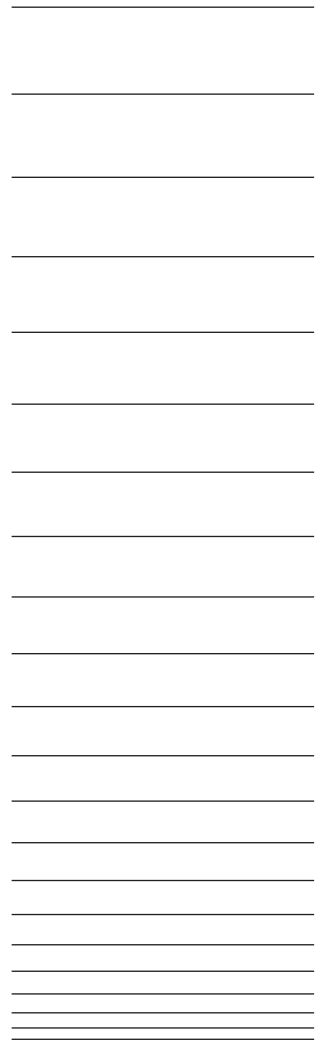


**USER'S  
MANUAL**

HITACHI INDUSTRIAL COMPUTER

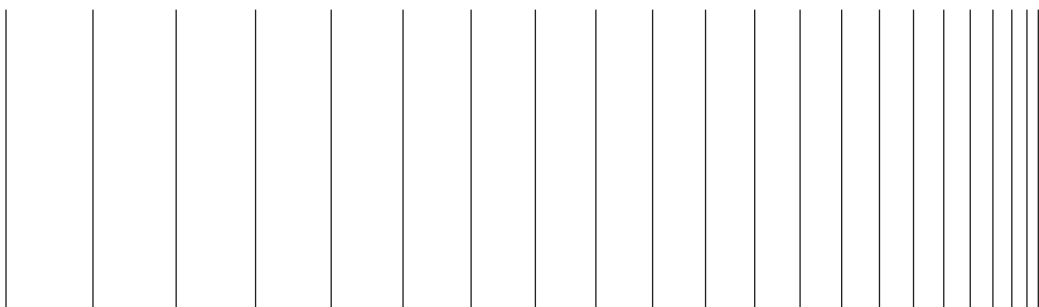
# HF-BT1000

INSTRUCTION MANUAL



**Read and keep this manual.**

- Read safety instructions carefully and understand them before starting your operation.
- Keep this manual at hand for reference.



**USER'S  
MANUAL**

First Edition, April 2014, BT-62-0002-01 (out of print)  
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## SAFETY INSTRUCTIONS

Carefully read and fully understand the safety precautions below before operating the equipment.

- Operate the equipment by following the instructions and procedures described in this manual.
- Pay attention especially to safety precautions displayed on the equipment or in this manual. Make sure you follow them. Otherwise, personal injury and property damage including damage to the equipment may result.
- A safety precaution is indicated by a heading as shown below. A heading is either a safety alert symbol; a word such as “DANGER”, “WARNING”, “CAUTION”, or “NOTICE”; or a combination of both.



This is a safety alert symbol. This symbol is used to signify potential hazards that may result in personal injury or death. Make sure you follow the safety message that follows this symbol in order to avoid possible injury or death.



**DANGER:** This symbol is used to indicate imminent hazards that will highly likely result in serious personal injury or death.



**WARNING:** This symbol is used to indicate potential hazards that may result in serious personal injury or death.



**CAUTION:** This symbol is used to indicate potential hazards that may result in minor or moderate personal injury.

**NOTICE:** This symbol is used to indicate hazards that may result in equipment or property damage but not personal injury.

The heading “NOTE” is used to indicate a cautionary note about handling and operation of the equipment.

- Do not attempt to perform any operation that is not described in this manual. If there is any problem with the equipment, call your maintenance personnel.
- Read this manual carefully and fully understand the directions and precautions written in this manual before operating the equipment.
- Keep this manual nearby so that you can reference the manual anytime you need it.
- Every effort has been made to specify precautions on the equipment and in the manual. Nevertheless, unexpected incidents may occur. When you use the equipment, you are asked not only to follow the instructions but also to use your own judgment on safety.



## SAFETY INSTRUCTIONS (Continued)

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### 1. COMMON SAFETY PRECAUTIONS

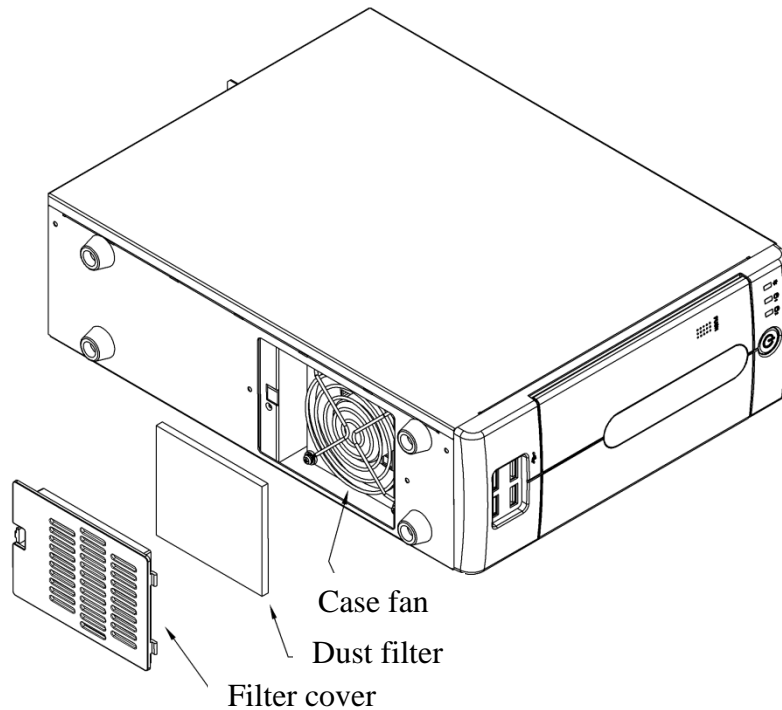
Carefully read and fully understand the following safety precautions.

#### 1.1 WARNING

- This equipment is not designed and manufactured to be used for a life-critical system that requires extreme safety. If there is a possibility that the equipment may be used for this purpose, contact relevant sales representatives.
- In case of smoke, a burning smell, or the like, turn off the power to the equipment, disconnect the power cord from the outlet, and contact your supplier or maintenance personnel. Using the faulty equipment without repair may cause of a fire or an electric shock.
- This equipment has built-in HDDs.  
Do not give blow, shock, vibration to the equipment because that may cause the equipment failure. Should you drop the equipment or damage its chassis, disconnect the power cord from the outlet and contact your maintenance personnel. Using the faulty equipment without repair may cause of a fire or an electric shock. Do not give a shock to the equipment when unpacking or carrying the equipment.
- Do not modify this equipment because that may cause of a fire or an electric shock. The Manufacturer's responsibility is exempted from any results arising out of the user's modification of the Equipment.
- Do not operate this equipment without the dust filter and the filter cover because that may cause of a fire. In addition, make sure you use the Hitachi brand dust filter.



## SAFETY INSTRUCTIONS (Continued)



### 1.2 CAUTION

- If the equipment drops or is tipped over, personal injury may result. Pay full attention when transporting the equipment.
- Make sure you do not catch or hit your fingers to cause personal injury when unpacking or carrying the equipment.
- Before you clean or replace the dust filter or the case fan of this equipment, make sure you shut down the OS, disconnect the plug of the power cord from the outlet, and wait for at least one minute. If you do not, that may cause the injury of hands and fingers.
- Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.



## SAFETY INSTRUCTIONS (Continued)

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### 1.3 NOTICE

- This equipment alone cannot guarantee the system safety. In order to ensure sufficient safety of your system even when this equipment should fail, malfunction, or have program bugs, you must add systemic protections such as building external protective/safety circuits to facilitate safety measures to prevent personal injury and serious accidents.
- When you work on installation or replacement of hardware, wear an antistatic wrist strap to prevent the buildup of static electricity.
- When you tighten or remove a screw, use a screwdriver that fits the size and type of the head of the screw to avoid stripping the head.  
When you tighten a screw, drive a screw along the axis of a tapped hole without adding too much torque in order to avoid damaging the thread.
- This equipment is evaluated with the hardware specified in this manual. Accordingly, use only the specified hardware when installing or replacing components.  
If any other hardware is used for such installation or replacement, correct operation of the equipment will not be guaranteed.
- Do not use the equipment in the environment with full of dust or corrosive gas because that may cause the equipment to fail.
- Do not give a shock to the equipment when unpacking or carrying the equipment. If you do, that may cause the equipment to fail.
- Make sure sufficient clearance is provided for air intake and exhaust in front of and behind the equipment. Otherwise, the temperature inside the equipment may rise and that may cause a failure or short life span of the equipment. In addition, you need to ensure sufficient clearance for maintenance work.
- This equipment uses a lithium battery. Only maintenance personnel are allowed to remove the lithium battery. Otherwise, the BIOS of this equipment may cause breaks and the equipment will not be able to operate.



## SAFETY INSTRUCTIONS (Continued)

### 2. SAFETY WARNINGS IN THIS MANUAL

#### 2.1 Safety Warning Indicated as “ WARNING”

- The power cord that comes with the equipment is rated at the input voltage of 125 VAC. When using this equipment at over 125 VAC, prepare the power cord fitting input voltage and inspect the safeness of this equipment enough.
- When you connect the plug of the power cord to an outlet, make sure you use an outlet with a ground terminal (ground pole) that is properly grounded. In addition, you must install and use an earth leakage circuit breaker. If you do not take these measures, that may result in a fire or an electric shock.
- Do not use a two-pole plug without a ground pole because that may result in an electric shock or failure of the equipment.

(See page 1-3.)

#### Warning about the power supply unit (hazardous voltage)

- Do not remove the power supply. If you do, serious personal injury or death may result due to an electric shock.
- Do not remove the cover of the power supply unit. If you do, serious personal injury or death may result due to an electric shock.

(See page 2-1.)

- If any of the air intake and exhaust holes of the equipment is blocked, the temperature inside the equipment may rise and that may cause a fire or failure of the equipment. Make sure sufficient clearance is provided around the equipment when you install. (See “1.2.2 Installation”.)

(See page 3-1.)

- In case of smoke, a burning smell, or the like, unplug the power cord from the outlet, and contact your supplier or maintenance personnel. Using faulty equipment without repair may result in a fire or electric shock.

(See page 3-4.) (See page 6-1.)

- Make sure to install a dust filter to equipment. If you do not, dusts enter into the equipment and the short circuit fire may occur as a result.

(See page 5-1.) (See page 5-22.)





## SAFETY INSTRUCTIONS (Continued)

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- Before you install or remove a riser board, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. If you install or remove a riser board without shutting down the power, an electric shock or a fire may result.

(See page 5-7.)

- Before you install or remove an extension board, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. If you install or remove an extension board without shutting down the power, an electric shock or a fire may result.

(See page 5-9.)

- Before you install or remove main memory, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. If you install or remove main memory without shutting down the power, an electric shock or a fire may result.

(See page 5-13.)



## SAFETY INSTRUCTIONS (Continued)

### 2.2 Safety Warning Indicated as “ CAUTION”

- Before attaching or detaching the vertical installation stand or dust-proof stand for vertical installation, shut down the OS and disconnect the power cord from the outlet.
- If you install the equipment vertically on your desk, it may topple or fall, resulting in personal injury. Be sure to install it on the vertical installation stand that comes with the equipment on a level surface.  
(See page 1-5.) (See page 5-5.)

#### Caution about fans (rotating objects)

- Only maintenance personnel are allowed to remove a fan. If you remove a fan yourself, your hand or objects may be caught by the rotating part of the operating fan and personal injury may result.  
(See page 2-1.)
- Before you clean or replace the dust filter or the case fan of this equipment, make sure you shut down the OS, disconnect the plug of the power cord from the outlet, and wait for at least one minute. Otherwise, the injury of hands and fingers may result.  
(See page 5-1.) (See page 5-22.)
- When you install the cover of the equipment, do not put your fingers inside the cover. If you do, your fingers may get caught and injured.  
(See page 5-6.)
- Do not hold the riser board or touch the parts with your bare hands when installing or removing it. Those parts are hot and if you touch them, you may get burned. In addition, if you touch them, they may get damaged and that may result in failure of the equipment.  
(See page 5-7.)
- Do not directly touch the parts inside the equipment with your hand when you install or remove an extension board. Those parts are hot and if you touch them, you may get burned. In addition, if you touch them, they may get damaged and that may result in failure of the equipment.  
(See page 5-9.) (See page 5-13.)
- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. Otherwise, an electric shock or failure of the equipment may result.
- When you install or remove an HDD, make sure you do not cut your fingers on the protrusions.  
(See page 5-16.)



## SAFETY INSTRUCTIONS (Continued)

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- When you install or remove an HDD, make sure the drive bay number is correct. If you remove an HDD and install it in a different bay, a configuration information mismatch occurs and the equipment may not start or the data stored on the HDD may be lost.

(See page 5-18.)

- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. Otherwise, an electric shock or failure of the equipment may result.
- When you install or remove a CFast, make sure you do not cut your fingers on the protrusions.

(See page 5-19.)



## SAFETY INSTRUCTIONS (Continued)

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### 2.3 Safety Warning Indicated as “NOTICE”

- Before you move this equipment, make sure you shut down the OS and then disconnect the plug of the power cord from the outlet, and wait for at least one minute. If you do not, the HDDs and other devices may fail.
- When you transport or carry the equipment, pack it in the dedicated container (container and packing materials used when the equipment was delivered). If you use other container or packing materials, that may damage the equipment.
- Do not use damaged or broken dedicated container when you transport or carry the equipment. If you do, that may damage the equipment.
- Due to the property of inrush current restraint method with this equipment, inrush currents may increase than usual if the power is turned on before the power supply unit has sufficiently cooled off naturally after the power has been turned off. Before you turn on the power again, wait at least one minute after you have turned off the power. Otherwise, the inrush currents may affect the breaker connected to the equipment and also the life span of the equipment itself.

(See page C-1.)

- Depending on the type of failure, important files may be lost when you use this equipment. Files can be lost by power failure and human mistakes during operation in addition to the failure of the equipment. If such a situation occurs, the files cannot be recovered. In order to prevent data loss, make it a routine to save your files and establish a systematic schedule for backing up files.

(See page C-7.) (See page i.)



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## SAFETY INSTRUCTIONS (Continued)

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- Before you move this equipment, make sure you shut down the OS, disconnect the plug of the power cord from the outlet, and wait for at least one minute. If you do not, the HDDs and other devices may fail.
- When you transport or carry the equipment, pack it in the dedicated container (container and packing materials used when the equipment was delivered). If you use other container or packing materials, that may damage the equipment.
- Do not use damaged or broken dedicated container when you transport or carry the equipment. If you do, that may damage the equipment.
- If you install the equipment in a mounting chassis or rack with casters, the equipment may be subjected to excessive vibration or shock when it is transported or moved and that may cause the equipment to fail. In order to avoid failure, you must select or design a chassis or rack that satisfies the installation environment requirements of the equipment and be cautious about vibration and shock when you move, transport, or carry the installed equipment.

(See page 1-3.) (See page 5-1.)

- Do not route interface cables and the like near the power cord. If you do, failure and malfunction of the equipment may result.
- Do not connect or disconnect an interface cable while the power for this equipment or for the remote device is on. If you do, failure of the equipment may result due to a short circuit between the power supply and the ground. When an interface cable comes off while the power for the equipment is on, shut down the OS and disconnect the power cord from the outlet. Disconnecting the power cord from the outlet without shutting down the OS might destroy the internal files.

(See page 1-7.)

- Never hot-swap HDDs because that may cause failure of the equipment and HDDs. Before you replace an HDD, make sure you shut down the OS, disconnect the plug of the power cord from the outlet, and wait for at least one minute.
- When using a USB port, check the orientation of the USB connector, and then insert the connector slowly. Otherwise, the USB port may be damaged.
- Do not remove or insert a USB device during online operation (system operation) because that may affect currently running applications.
- If you insert or access a CD or DVD, the system load may increase and running applications may be affected. Do not insert or access an optical disc during online operation (system operation).

(See page 2-1.)



## SAFETY INSTRUCTIONS (Continued)

- Performing emergency shutdown (that is, unplugging the power cord from the outlet or shutting off the breaker without proper shutdown of the OS) may cause the OS or applications not to work properly or may cause saved data to be corrupted. Do not perform emergency shutdown unless you must stop the system immediately due to some kind of error.
- If you turn off the power at the source of AC the power, the system may not be able to recover automatically.  
(See page 3-4.)
- If you insert or access a CD or DVD, the system load may increase and running applications may be affected. Do not insert or access a CD or DVD during online operation (system operation).
- When you finish accessing a CD or DVD, eject the disc from the DVD drive. If you leave the disc in the DVD drive, failure may result.
- If you keep the disc tray open, failure may result.  
When you do not intend to use the DVD drive, keep the disc tray inside the DVD drive.
- Do not use an unbalanced CD or DVD due to attached labels and so on; a CD or DVD with cracks, scratches, or vertical deviation; or a CD or DVD with a non-standard shape. If you do, an abnormal sound or vibration may be generated and failure of the equipment may result.  
(See page 3-5.)
- If you wash a dust filter, dry it completely before re-attaching it to the equipment. If you use the equipment while its dust filter is not completely dry, the equipment may fail. When you use a detergent to clean a dust filter, make sure you use a neutral detergent. If you use other types of detergent, the dust filter may lose its function.  
(See page 5-2.)
- Make sure you disconnect all external cables connected to the equipment before you install or remove a raiser board. Otherwise, failure of the equipment may result.  
(See page 5-7.)
- Make sure you disconnect all external cables connected to the equipment before you install or remove an extension board. Otherwise, failure of the equipment may result.  
(See page 5-9.)



## SAFETY INSTRUCTIONS (Continued)

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- Always attach a slot cover to each unused slot. Otherwise, failure of the equipment may result.  
(See page 5-12.)
- Make sure you disconnect all external cables connected to the equipment before you install or remove main memory. Otherwise, failure of the equipment may result.  
(See page 5-13.)
- The orientation of a main memory module on a connector is fixed. When you install a main memory module, make sure the orientation is correct. Otherwise, failure of the equipment may result.
- Do not install main memory modules with different capacities on slot A and slot B. If you do, the modules may not be recognized.  
(See page 5-14.)
- Put the HDD on a shock-absorbing material such as an antistatic cushion even for a temporary task. If you put an HDD directly on a hard surface such as a desktop, a failure or a shorter life span of the unit or loss of data may result due to possible jarring or shock.
- Never remove the screws on an HDD while the power to the unit is on. Never hot-swap HDDs. If you do either of these, failure of the equipment or the drive may result.
- Before you replace an HDD, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Install or remove an HDD only if necessary, for example, when you need to replace an HDD due to failure. If you do it frequently, failure of the equipment may result.
- Fully insert an HDD. Loose contact and missing screws may result in failure.
- Do not give a shock to an installing HDD and the already mounted hard disks during installing. If you give a shock to an HDD, failure of the drive may result.  
(See page 5-16.)



## SAFETY INSTRUCTIONS (Continued)

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- Even temporarily, place the CFast on antistatic cushioning to absorb any impact. If you place it directly on a hard surface (for example, on a desk), it may malfunction, destroy the data, or shorten the life of the CFast due to the impact.
- Do not remove a screw from the CFast cover, or hot swap the CFast. This may cause the CFast to malfunction.
- Before replacing the CFast, shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Install or remove the CFast only if required (for example, to replace the faulty CFast). If you do it frequently, failure of the equipment may result.
- Install the CFast firmly and securely. Loose contact and missing screws may result in failure.
- When installing or removing the CFast, be very careful not to make an impact on the CFast. An impact on the CFast may cause it to malfunction.

(See page 5-19.)





## SAFETY INSTRUCTIONS (Continued)

- Although this equipment featuring RAID1 is more reliable than general systems, it is still prone to the loss of data in the HDDs. Not only a machine failure but also an unexpected power failure or an operation error may cause data to be lost for good. To prevent such loss of data, implement scheduled data backup in daily operation. Also, protect the power source from undesirable interruptions by such means as UPS.
- This equipment is evaluated based on the specific HDD models authorized by the Manufacturer. Replace only with specific HDD models authorized by the Manufacturer. Otherwise, the existing data in the HDD may be lost. Also, always observe the recommended replacement interval for HDDs (See “APPENDIX HANDLING REPLACEABLE COMPONENTS”).
- Since each equipment has its own RAID1 configuration information (e.g., serial number), you cannot swap HDDs even between two units of this equipment. If you replace an HDD, the replaced HDD is recognized as unmatched with RAID1 configuration information and, as a result, RAID1 reconfiguration starts automatically by the RAID1 reconfiguration function. As a result, all the data in the replaced HDD is deleted. If you are using more than one HDD, be careful in handling and storing them so that you do not mistake one from another.
- This equipment manages a serial number unique to each HDD as RAID1 configuration information. Therefore, if you copy an HDD using any function other than the RAID1 reconfiguration function, the HDD is recognized as an invalid medium, so the equipment does not start even if you install the HDD in a drive bay.
- Maintenance of a RAID1 system requires a high level of expertise. Should any mistakes be made during the work, the data stored on the HDDs may be lost.

(See page 8-1.)

- When a RAID1 system is newly built, the RAID1 configuration information is recorded on the HDDs. An HDD with configuration information recorded cannot be used in any other equipment. If you are using more than one HDD, be careful in handling and storing them so that you do not mistake one from another. If HDDs are mixed up, a RAID1 configuration information mismatch occurs. The equipment may not operate properly, and the data on the HDDs may be lost.
- When you build a RAID1 system from scratch, prepare two new HDDs selected from the models specified and tested by HITACHI. Otherwise, the data stored on the HDDs may be lost.

(See page 8-2.)



## SAFETY INSTRUCTIONS (Continued)

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- Never remove the screws on an HDD while the power to the unit is on. Never hot-swap HDDs. If you do either of these, failure of the equipment or the drive may result.
- As a replacement HDD, do not use an HDD previously used. If you do, this equipment may not operate properly or the data on the HDDs may be lost because of configuration information mismatches or other reasons.
- Mount an HDD securely. Loose contacts and missing screws may result in a failure.
- Do not subject an HDD you are mounting and the already mounted HDDs to shock while replacing an HDD. Otherwise, failure of the equipment may result.
- Until the rebuild is complete, avoid shutting off the power for this equipment or attaching and detaching HDDs. Otherwise, the data on the HDDs may be lost or a failure may result.

(See page 8-6.)

- Wear cotton gloves when replacing an HDD in order to prevent failure caused by static electricity. If you do not, the data stored on the HDD may get corrupted.
- Make sure you check the correct procedure before you start the work. If you do not follow the correct procedure, the data stored on the HDD may be lost.  
(See page 8-6.) (See page 8-10.) (See page 8-11.) (See page 8-12.)



## SAFETY INSTRUCTIONS (Continued)

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- As a replacement HDD, do not use an HDD previously used. If you do, this equipment may not operate properly or the data on the HDDs may be lost because of configuration information mismatches, or other reasons.
- Do not replace the two HDDs at the same time. If you do, the data gets corrupted.

(See page 8-12.)

- Do not use a replaceable component for longer than the recommended replacement cycle. If you do, a deteriorating or worn-out component may cause the equipment to fail.

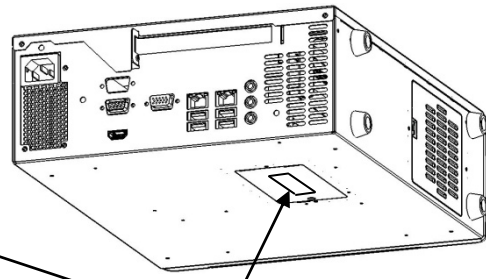
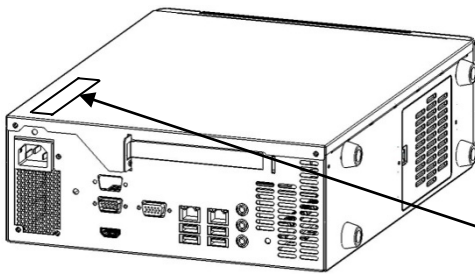
(See page A-1.)






## SAFETY INSTRUCTIONS (Continued)


### 3. WARNING LABELS

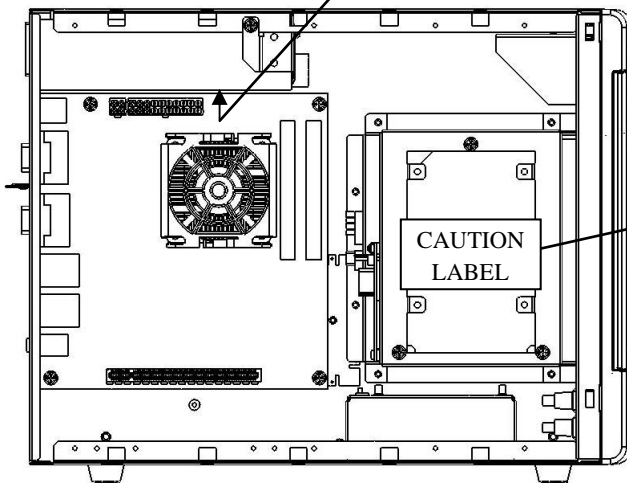
The warning label is attached to the following position on the equipment.



 **CAUTION : HAZARDOUS AREA** (注意: 請勿碰觸危險區域)  
 • DO NOT REMOVE THIS COVER (請勿自行打開機殼)  
 • WITH FAN SENSOR CONTROL (內含風扇溫度控制器) FUSE:T6.3AH/250V

 **警告**  **WARNING**

 **危険电压** 触电会导致死亡或重伤。揭开盖子前, 请从插座拔掉电源线。  
**危険電圧** 感電による死亡または重傷の恐れがあります。カバーを外す前に、電源ケーブルをコンセントから抜いてください。  
 Hazardous voltage. Can cause death or severe injury. Pull out power cord from the outlet before opening the cover.



The CAUTION label is attached to the upper side of the DVD drive. For more details, see “4. PRECAUTIONS WHEN YOU USE THE LASER”

### 4. PRECAUTIONS WHEN YOU USE THE LASER

The DVD drive uses a laser.

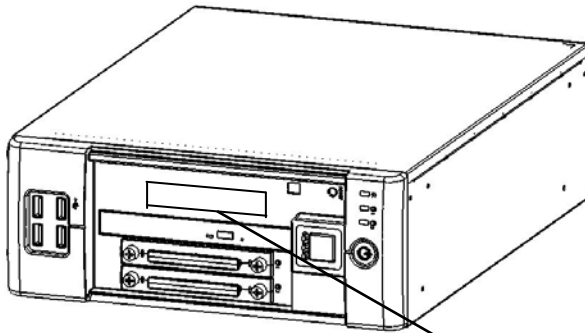
Do not look into the laser beam, whether directly or indirectly. Because that may cause of visual impairment.



## SAFETY INSTRUCTIONS (Continued)

### 5. NOTICE LABEL

The notice label is attached to the following position on the equipment.



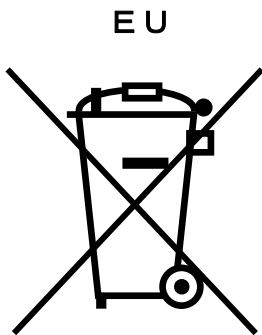
#### 通知 NOTICE

当您更换驱动器设备的启动过程中，系统数据将被销毁。请参阅用户手册。  
装置の電源が入った状態でドライブの挿抜を実施すると、システムデータ破壊にいたりますので、取扱説明書に従いドライブの交換を実施してください。  
Drive replacement during startup of the device, corrupts the system data. See User's Manual.

### 6. DISPOSING THE EQUIPMENT

This Equipment contains materials potentially harmful to environment if improperly abandoned. When you dispose of this Equipment, observe local laws and regulations whatever applicable.

### 7. EU BATTERY DIRECTIVE (2006/66/EC)



This symbol mark is valid in countries inside the European Union. This symbol mark is specified in Article 20 “Information for end-users” and Annex II of the EU directive 2006/66/EC.

This equipment is equipped with a lithium battery.

In the European Union, a separate collection system for used battery and accumulator has been in place. Process batteries and accumulators appropriately at a local collection/recycle center.

## **PRECAUTIONS**

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### **1. PRECAUTIONS ABOUT THE EQUIPMENT**

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#### **NOTICE**

- Before you move this equipment, make sure you shut down the OS and then disconnect the plug of the power cord from the outlet, and wait for at least one minute. If you do not, the HDDs and other devices may fail.
- When you transport or carry the equipment, pack it in the dedicated container (container and packing materials used when the equipment was delivered). If you use other container or packing materials, that may damage the equipment.
- Do not use damaged or broken dedicated container when you transport or carry the equipment. If you do, that may damage the equipment.
- Due to the property of inrush current restraint method with this equipment, inrush currents may increase than usual if the power is turned on before the power supply unit has sufficiently cooled off naturally after the power has been turned off. Before you turn on the power again, wait at least one minute after you have turned off the power. Otherwise, the inrush currents may affect the breaker connected to the equipment and also the life span of the equipment itself.

#### **(1) TRANSPORTING THE EQUIPMENT**

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##### **<Required actions>**

- When you transport or carry the equipment, pack it in a dedicated container (the container or packing materials used when the equipment was delivered). When you transport or carry the equipment in a chassis, protect the equipment so that any vibration and shock the equipment is subjected to is within the specifications provided.
- Keep a dedicated container (the container or packing materials used when the equipment was delivered). You can then use them later when the equipment is transported or carried.

#### **(2) INTERFACE CABLES**

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##### **<Precautions>**

- Do not pull on a cable with excessive force.
- In order to conformity the EMC standards, use shielded cables for the interface cables (display interface cable, keyboard interface cable, and mouse interface cable) connected to the equipment.
- Make sure you use standard certified HDMI cable (Recommendation category 2).

##### **<Required actions>**

- Route the cables in a neat and orderly manner alongside the device so that those cables do not catch on hands or feet. If the power cord is disconnected during operation of the equipment and the power is lost, crucial data stored on the hard disk may be break.

### **(3) CONNECTOR**

---

#### **<Precautions>**

- In order to connect a connector properly, you need to insert it with the proper orientation and at the proper angle. If a connector is not inserted properly, the connection may fail or malfunction.
- Make sure there are no loose I/O cable connectors on the equipment.

### **(4) POWER SUPPLY**

---

#### **1. Power Voltage**

##### **<Required actions>**

- Confirm that the voltage of the power input to the equipment is within the specified range (100V-240V). If the voltage of the power input is close to the upper or lower limit of the specified range, you should treat it as you would a setting error of the input voltage and ask the manager of the power facility to inspect the voltage output by the facility.

#### **2. Power Cord**

##### **<Precautions>**

- The power cord that comes with the equipment is rated at the input voltage of 125 VAC. When using this equipment at over 125 VAC, prepare the power cord fitting input voltage and inspect the safeness of this equipment enough.
- Use a power cord with a 2-prong plug and a grounding pole. (See “1.2.3 Hardware connection”.)
- When you connect the plug of the power cord to an outlet, make sure you use an outlet with a neutral pole that is properly grounded.

#### **3. Turning the Power On and Off**

##### **<Precautions>**

- When you turn off the power, disconnect the plug of the power cord from the outlet. (See “1.2.3 Hardware connection”.)
- Wait for at least one minute before turning the power on again after turning it off. If you wait for less than one minute, the equipment may not operate as specified by the BIOS power settings. (See “4.2 BIOS Setup”.)
- Do not turn off the power to the equipment or press the reset switch during communication or while a CD or DVD or an HDD is being accessed.

**<Required actions>**

- When you connect or disconnect a peripheral, make sure both the equipment and the peripheral have been turned off. Otherwise, a malfunction or failure may result.
- When you turn on the power, turn on the peripherals first and then turn on the equipment. When you turn off the power, turn off the equipment first and then turn off the peripherals.
- When you are not using the equipment, turn off the power. If you do not intend to use the equipment for a long time, unplug the power cord from the outlet.
- Depending on the material, a rug, a lap blanket, or the like may cause static buildup and consequently cause a malfunction of the equipment. Use a conductive rug or lap blanket resistant to static buildup.
- Instantaneous power failure or brownout may occur during operation and the screen may black out when lightning strikes nearby or the AC power supply is not stable. When this situation happens, turn off the power to the equipment and then turn it back on.

**(5) INSTALLATION ENVIRONMENT**

---

**<Precautions>**

- When you install a commercially available device in extension slot, the specifications for the required environment for both the commercially available device and this equipment must be met. (See “1.2.1 Environment”.)
- When you install a device in extension slot, make sure the current consumption does not exceed the maximum current rating. (See “4.1 (11) Maximum current specifications”.)
- In order to use this equipment without failure for a long period of time, you must use it with proper care and in the proper environment. Do not use the equipment in the locations described below. If you do, the life span of the equipment may be reduced and failure of the equipment may result. Be cautious especially when you use the equipment in the environment subject to noise such as electrostatic. Depending on the severity of the noise, failures such as a disruption on the LAN may occur. To avoid those failures, you must thoroughly inspect the installation environment. In case of a disruption on the LAN, consider adding a retry routine in your applications.

- |  |
|--|
| <ul style="list-style-type: none"><li>● In a place subject to exposure to direct sunlight..... Too close to a window</li><li>● In a place subject to rapid temperature or humidity change ..... Too close to an air conditioner</li><li>● In a place close to device that generates electrical noise..... Too close to electric motors and generators</li><li>● In a place close to device that generates a strong magnetic field ..... Too close to magnets or the like</li><li>● In an environment with full of dust</li><li>● In a place subject to vibration</li><li>● In an environment with corrosive gasses present</li><li>● In a place with vibration caused by loud sounds ..... Too close to device that generates a loud buzzer or alarm</li></ul> |
|--|



- The following are precautions for the left, right, top, and bottom sides of the equipment:
  - Do not attach heating devices.
  - For maintenance work, make sure that the Equipment can be moved; if fixed, ensure that the Equipment can be removed.
- It is reported that zinc whiskers can cause a problem with the device. Do not use electro-galvanized material near or at the place where the equipment is installed.  
(A quote from the Technical Report of JEITA (\*) ITR-1001 “Guideline of Facilities and Equipment for Information Systems”)  
Location of whiskers: Whiskers are created by electrogalvanized equipment such as floor panels, stringers, posts, aseismatic flat steel, and the like.  
Phenomenon: Hair-like zinc crystals (conductive whiskers) float into the air from the floor for some reason, go inside the device, and short-circuit a PCB or its pins. The root cause is difficult and time-consuming to find because the symptom differs depending on the location of the short circuit, and often, it is mistaken for a temporary issue.  
(\* ) JEITA: Japan Electronics and Information Technology Industries Association

**<Required action>**

- If you install the equipment in a chassis or in the desk, the temperature increase around the equipment needs to be taken into consideration.
- The system clock and the like inside the equipment always operate by using a backup battery even when the power is off. Therefore, if you store the equipment at a temperature outside the operating temperature range, you may need to reconfigure system BIOS settings including the clock settings, when you start using the equipment again. When you reconfigure system BIOS settings, follow the instructions in “4.2 BIOS Setup”.

**(6) OPERATING CONDITION**

---

**<Precautions>**

- Before you move the equipment, be sure to disconnect the plug of the power cord from the outlet and wait at least one minute.
- In order to prevent moisture condensation, when you move the equipment from outside the building to inside, wait for at least four hours before using the equipment.
- The equipment is made of precision electronic components. Do not subject the equipment to any vibration or shock.
- Do not sit on the equipment or put objects on the equipment.
- During normal operation, do not turn off the display. Set it into the standby mode instead.
- During normal operation, do not touch the keyboard or mouse until the logon screen is displayed when you turn on the equipment.

**<Required action>**

- We recommend that you remove the dust built up in the neighborhood of the device (in particular, below the device), in the vents on the device, and on the front of the device itself.

## **(7) ABNORMAL SOUNDS**

---

### **<Specifications>**

- When the power is turned on, you may hear a low-frequency humming noise. This is caused by transient low-frequency vibrations of the chokes for suppressing high-frequency noise or other components and does not affect the characteristics and life span of the equipment.

## **(8) WARRANTY**

---

### **<Specifications>**

- The Manufacturer cannot guarantee for damage to data or application software caused by hardware damage to the equipment.
- Use an operating system specified by the Manufacturer. The Manufacturer cannot guarantee proper operation of the equipment if you use an operating system not specified by the Manufacturer.
- This equipment is evaluated under the assumption that the hardware specified by the Manufacturer is used. Therefore, when you install or replace hardware, use the hardware specified by the Manufacturer. The manufacturer cannot guarantee proper operation of the equipment if you use other hardware.

## **2. NETWORK**

---

### **<Precautions>**

- Do not send a Magic Packet™ frame at the timing when the power is about to be turned off after OS shutdown. If you do, the equipment may restart without being turned off, or WOL may not be possible at all. (See “3.7.2 Turning on the power using the LAN”.)

### **<Specifications>**

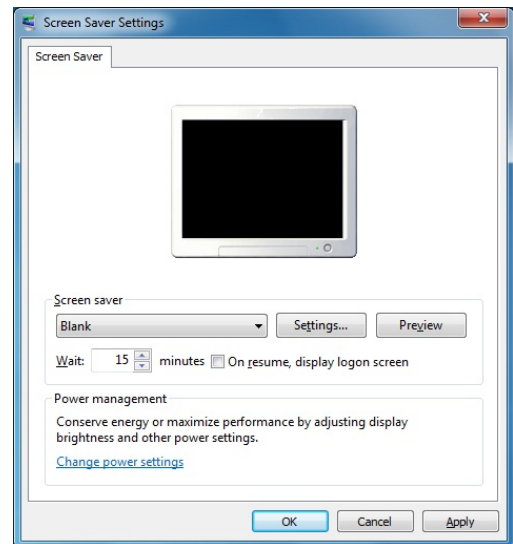
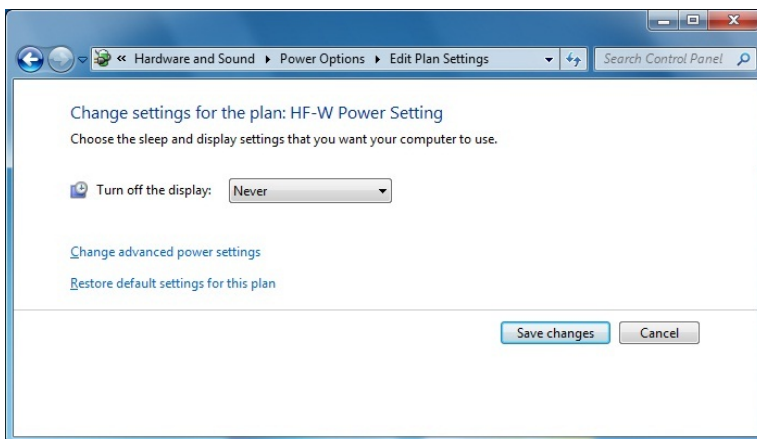
- Depending on the status of the network, Magic Packet™ frames can be lost. In order to avoid this, set up the system so that Magic Packet™ frames can be propagated without loss. (See “3.7.2 Turning on the power using the LAN”.)
- Even though a network drive may be configured to be reconnected at logon, sometimes the reconnection may fail. If this happens, log on again or use the net\_use command to establish the connection.  
For information about the net use command, see the Windows® help.
- If the settings of the hub and the network adapter do not match, the performance of the network adapter may be compromised or the network adapter may not work properly. (See “3.8 Setting Up the LAN Interface”.)
- The electric potential difference between units can generate heat. Therefore, do not use twisted-pair Ethernet cables (such as category 5 or STP cables) for network connections other than the ones specified in “4.4.1 Connector specifications (1) Motherboard (Standard)”.

### 3. DISPLAY SCREEN

#### <Specifications>

- Before you set up the screen, terminate all running application softwares.
- When you change connections to switch between single- and multi- display configurations, turn off the power to the equipment, change the connection of display cables, turn the power back on, and then set up the screen configuration.
- When you change the connection configuration for the monitors, reconfigure the screen settings accordingly.
- Depending on application softwares, the screen may flicker and video playback may not be smooth.
- If the **Turn off the display** setting is used, it is possible that stripe noise may appears at the top of the screen when the screen is turned on again. You can remove the noise by causing the screen to be redrawn, for example, by moving a window. Note that the operation of an application software will not be affected by the noise.

If you want the screen to be blacked out when there is no user input for a certain amount of time, specify **Never** for the **Turn off the display** setting and **Blank** for the **Screen saver** setting.



## **4. HARD DISKS DRIVES (HDDs)**

---

### **NOTICE**

Depending on the type of failure, important files may be lost when you use this equipment. Files can be lost by power failure and human mistakes during operation in addition to the failure of the equipment. If such a situation occurs, the files cannot be recovered. In order to prevent data loss, make it a routine to save your files and establish a systematic schedule for backing up files.

### **(1) Handling the HDDs**

---

#### **<Precautions>**

- The access performance of the HDDs differs depending on each equipment. Also note that the performance of an HDD is lower at high or low temperatures. When you use HDDs, confirm that the access performance of the HDDs at normal temperatures and their degraded performance at high or low temperatures do not cause any problems to the user application.

#### **<Required actions>**

- Do not subject HDDs to vibration or shock.
- Take preventive action against static electricity due to human contact, and due to other activities in the work place.
- Hold the bracket or sides of an HDD. Do not touch the printed circuit board.
- When you store an HDD for a long time, put the HDD into an anti-static bag and then store it in a dedicated HDD box.

#### **<Specifications>**

- The capacity and performance of an HDD may be changed when you replace an HDD as a component.

### **(2) Backing Up Files**

---

#### **<Required actions>**

- Make sure the contents of all HDDs are backed up periodically.
- When you delete a partition, all files in the partition will be deleted. Before you delete a partition, back up important files you need.

### (3) **Media Error**

---

This item applies to D model only. If you are not using the D model, skip reading this item.

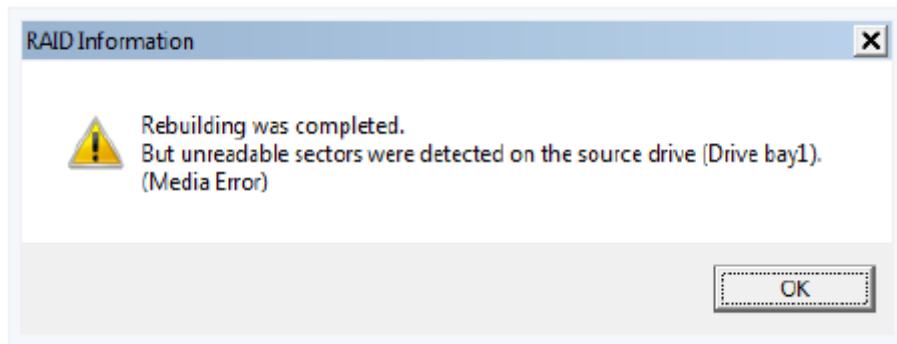
The media error is a status where there is a problem in data healthiness while the RAID status (see “CHAPTER 8 RAID1”) is normal. If a read error occurs on the copy source drive during a rebuild process, the rebuild process will finish, but the sector data where a read error occurred is already lost, indicating a data healthiness problem. For details about the media error, refer to the *RAS FEATURES MANUAL*.

#### <Media error notification>

When a media error occurs, we recommend that you back up the data first, and then replace the copy source HDD with a new HDD. Because you lose only a part of data due to a media error, it is also possible to continue to use the equipment as is. But even if the equipment works normally, a failure may occur later on. If you decide to continue to use the equipment as is, take extra cautions.

Note that this equipment allows you to select, depending on the system operation, whether a media error is handled as a failure. By default, a media error is not recognized as a failure. For information about changing how to notify media error, refer to the *RAS FEATURES MANUAL*. When a media error is handled as a failure, a media error is notified as the “fail” status of the RAID in the following methods:

- Event notification
- Outputs on the Digital LEDs for Status indication
- Remote notification
- Message box



Example of a Message Box When a Media Error Occurs

## **5. DVDs**

---

### **(1) Handling the DVD Drive**

---

#### **<Precautions>**

- The DVD drive is subject to damage by dust. Install the equipment in a place with minimum dust and clean up around the equipment regularly.  
When you use insecticide sprays, or the like, cover the equipment with a protective sheet or covering beforehand.
- Do not subject the equipment to a strong shock while the DVD drive is in use.
- Do not open the tray except when you insert or eject a CD or DVD. Do not put foreign objects into the tray. If you do, the DVD drive may be damaged or fail.
- When you put a CD or DVD on the disc tray, make sure that the CD or DVD is properly set on the disc tray. If not, the CD or DVD may be forced out of the tray while the tray is loaded.

#### **<Specifications>**

- Depending on the type of CD or DVD used, you may not be able to read or write to the CD or DVD. In this case, use another CD or DVD.
- Depending on the condition of a CD or DVD (whether it has scratches, dust, is deformed, has copy protection enabled, and so on) , you may not be able to read or write to the CD or DVD properly.

### **(2) Handling CD or DVD**

---

#### **<Precautions>**

- Do not apply benzene, thinners, water, record cleaner, anti-static liquids, or use a silicone cloth on a CD or DVD.
- Do not use a dryer when you remove dust or moisture from a CD or DVD.
- Do not store a CD or DVD in a location with high temperature and humidity.
- Do not store a CD or DVD in a location not subject to direct sunlight, strong artificial light, and the like.
- Do not fold or bend a CD or DVD.
- Do not write on the recording surface of a CD or DVD.
- Do not scratches on the recording or label surface of a CD or DVD.
- Do not insert a stick into a center hole of a CD or DVD and spin the CD or DVD.
- Do not put stickers, labels, or decals on a CD or DVD.

#### **<Required actions>**

- If a CD or DVD is dirty, wipe it with a soft dry cloth in the direction from the center to the rim.

## **6. USB DEVICE**

---

### **<Precautions>**

- When you start using a USB device, test the device before using it. Never use a USB device for mission critical use.
- Do not connect a USB device during the OS startup because the OS may not start normally.
- If you switch screens during OS startup when you use a USB KVM switch, the OS may not start normally depending on the type of the USB KVM switch. When you use a USB KVM switch, make sure you test its operation thoroughly.
- For USB2.0, the length of the cable used must be less than or equal to the length specified in the specifications. Otherwise, the transfer speed may be compromised. In addition, use a cable that supports USB2.0. Otherwise, a communication error may result. For information about the cable specifications, ask the manufacturer of the cable. (For information about the cable length, see “4.4.2 External interface cable length specifications”.)

### **<Required actions>**

- When using a USB port, check the orientation of the USB connector, and then insert the connector slowly in order not to damage the USB port.
- When a USB device is inserted, removed, or accessed, the system load may be increased. If you need to use a USB device during online operation (system operation), you must confirm that using the device does not affect the currently running application softwares before using the device.
- After you clean a USB keyboard, check the connection between the equipment and the connector of the keyboard. A loose connection may cause the keyboard to be recognized incorrectly or prevent the system from starting normally.

### **<Specifications>**

- It is not guaranteed that all USB devices can be operated.
- Some USB devices do not conform to the USB specifications. If you turn off the main power while a non-compliant USB device is connected, the equipment may not start properly and the clock setting may be corrupted. When you select a USB device, make sure you test its operation thoroughly.

## **7. EXTENSION BOARDS**

---

### **<Required actions>**

- When you use an optional PCI riser board, you cannot use a PCI board that requires -12V power supply because the PCI riser board does not provide the -12V bus power. When you use a PCI board, check what power supply voltages are required by the board.
- If an extension board (PCI Express/PCI board) is supplied by a user, the user must take responsibility for confirming that each component on the board meets the operating temperature specification when those parts heat up.
- After you install an extension board, make sure you save the dummy bracket, and store it in a safe place.
- The equipment may not operate normally when some type of extension board with a PCI-PCI Express bridge is installed in the equipment. When you use an extension board with a PCI-PCI Express bridge, make sure you test the operation of the equipment thoroughly.

## **8. LITHIUM BATTERIES**

---

---

### **<Required actions>**

- This equipment uses a lithium battery. When you dispose of the battery, observe local laws and regulations whatever applicable.

## **9. THE OPTICAL MOUSE**

---

---

### **<Required actions>**

- Due to the nature of the optical sensor, an optical mouse may not work on transparent materials or light-reflecting materials (glass, mirrors, and the like). Avoid using an optical mouse on those materials or purchase an optical mouse pad available on the market.
- If the optical sensor is smeared with condensation or oil mist, the optical mouse may not work properly. If you use an optical mouse in an environment subject to those kinds of smears, take appropriate measures to protect the equipment.

## **10. BIOS SETTINGS**

---

---

### **<Specifications>**

- The purpose of the clock displayed on the BIOS setup menu screen is not to show the correct time and date but to configure the time and date. The date displayed on the screen does not change when the actual date changes. If the actual date changes during setup, you must correct the date setting. (See "4.2 BIOS Setup".)
- When the setup menu is used, the clock display may sometimes show a delay. After you finish the setup menu, make sure you confirm the clock is correct. (See "4.2 BIOS Setup".)
- When you set up a password on the BIOS setup menu, you can no longer use HDDs if you set up a wrong password for the HDDs during repair or maintenance or if you forget the password.



## **11. MAINTENANCE SERVICES**

---

### **<Specifications>**

- Microsoft® Windows®, device drivers, and commercially available application softwares may not be able to be modified directly as a counter measure for a particular failure. Instead, the Manufacturer may offer a work-around as a counter measure.
- If you add new commercially available hardware to the equipment without notice to the Manufacturer, the equipment as a whole will lose eligibility for warranty.
- Some components used in the equipment (such as LSIs from Intel corporation) can not be disassembled for failure analysis because the Manufacturer does not have the right to do so.
- The price of this equipment does not cover maintenance and support. When you order the equipment, you must clarify the desired maintenance support level in the maintenance contract and make the required payment for the maintenance fee defined by the maintenance support level.
- The failure analysis support service for this equipment is supported only "memory dump analysis" with fee.

## **12. Windows® SETTINGS**

---

### **(1) Applying a Hotfix and Other Updates**

---

#### **<Specification>**

- If you need to apply a hotfix, Windows Update, or the latest service pack, do it on your own responsibility. You must thoroughly check the system operation and evaluate how the system is affected by applying the hotfix, Windows Update, or service pack.

### **(2) Configuring the Power Options**

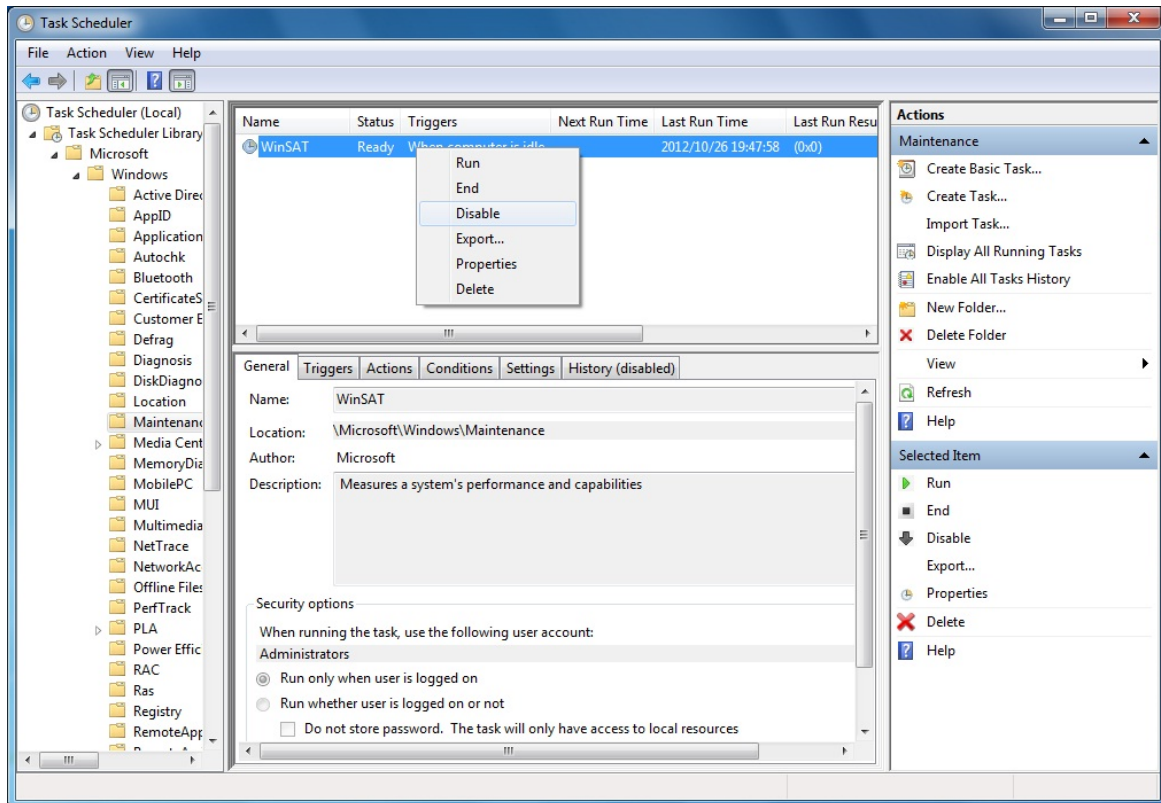
---

#### **<Specification>**

- Even if you configured the power to the display not to be turned off in the Power Options (Never is specified for "Turn off the display"), the power plan can be temporarily switched to **High performance** when the Windows Experience Index is automatically executed, and the power to the display can be turned off.

In order to prevent the power to the display from being turned off, go through the following steps 1 to 6 to disable automatic execution of the Windows Experience Index.

- Procedure to change the settings of the Windows Experience Index
  1. Click **Start > Control Panel**.
  2. Click **System and Security**.
  3. Click **Administrative Tools**.
  4. Double-click **Task Scheduler**.
  5. From the tree in the left pane of the Task Scheduler window, select **Task Scheduler Library > Microsoft > Windows > Maintenance**.
  6. Right-click **WinSAT** displayed in the center of the window and select **Disable**.



- If you follow the procedure above to disable automatic execution of the Windows Experience Index, the Windows Experience Index may not be triggered at all or may not be triggered even after a device driver is updated or a hardware configuration is changed. If the Windows Experience Index is not triggered, Windows® may not operate in the optimum manner and the performance can be compromised. Because of this, you may need to trigger the Windows Experience Index manually.

Follow the procedure below to trigger the Windows Experience Index manually:

- Procedure required to trigger the Windows Experience Index manually
  1. Click **Start > Control Panel**.
  2. Click **System and Security**.
  3. Under **System**, click **Check the Windows Experience Index**.
  4. Click **Rate this computer**. (For the second time and later, click **Re-run the assessment**.) When you see the **User Account Control** window, click **Yes**.

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## PREFACE

This manual is intended for operators of the HITACHI INDUSTRIAL COMPUTER HF-BT1000 (hereafter called as this equipment) and contains information about the operation and maintenance of various devices necessary for their routine work.

This manual consists of the following:

CHAPTER 1	GETTING STARTED
CHAPTER 2	PHYSICAL CONFIGURATION
CHAPTER 3	OPERATION
CHAPTER 4	SPECIFICATIONS
CHAPTER 5	CHECKUP AND MAINTENANCE
CHAPTER 6	TROUBLESHOOTING
CHAPTER 7	MAINTENANCE OPERATION
CHAPTER 8	RAID1
APPENDIX	HANDLING REPLACEABLE COMPONENTS

### **NOTICE**

Depending on the type of failure, important files may be lost when you use this equipment. Files can be lost by power failure and human mistakes during operation in addition to the failure of the equipment. If such a situation occurs, the files cannot be recovered. In order to prevent data loss, make it a routine to save your files and establish a systematic schedule for backing up files.

<Note for storage capacity calculations>

- Memory capacities and requirements, file sizes and storage requirements, etc. must be calculated according to the formula  $2^n$ . The following examples show the results of such calculations by  $2^n$  (to the right of the equals signs).

1 KB (kilobyte) = 1,024 bytes

1 MB (megabyte) = 1,048,576 bytes

1 GB (gigabyte) = 1,073,741,824 bytes

1 TB (terabyte) = 1,099,511,627,776 bytes

- As for disk capacities, they must be calculated using the formula  $10^n$ . Listed below are the results of calculating the above example capacities using  $10^n$  in place of  $2^n$ .

1 KB (kilobyte) = 1,000 bytes

1 MB (megabyte) =  $1,000^2$  bytes

1 GB (gigabyte) =  $1,000^3$  bytes


1 TB (terabyte) =  $1,000^4$  bytes

- 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 a 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 in which case the user will be required to correct the interference at his own expense.
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This equipment conforms to the electromagnetic wave for Industrial use (Class A).Vender or user should take notice and use the purpose except for household use.

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## **CHAPTER 1 GETTING STARTED**

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### **1.1 Scope**

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This manual is intended for operators of the HITACHI INDUSTRIAL COMPUTER HF-BT1000 and contains information about the operation and maintenance of various devices necessary for their routine use.

After you unpack, go through the delivered items list to confirm all the items have been delivered and no items are missing or damaged. If there are missing or damaged items, contact our sales representative.

For information about software, refer to the following manuals.

- *HF-BT1000 SETUP GUIDE* (manual number BT-63-0003)
- *HF-BT1000 RAS FEATURES MANUAL* (manual number BT-63-0004)

## 1. GETTING STARTED

### 1.2 Installation Environment

---

#### 1.2.1 Environment

---

When this equipment is used, it must be used in the following environment.

Item	Requirement
Ambient temperature	Operation: 5 to 40°C (5 to 35°C: when a dust-proof stand for vertical installation is used) Storage: -10 to 60°C
Temperature gradient	±10 K/h or less
Humidity	20 to 80%RH (non-condensing)
Humidity gradient	± 10% RH/h or less
Dust (*1)	No heavy dust (0.3 mg/m <sup>3</sup> or less (JEITA IT-1004A class B))
Corrosive gas	None JEITA IT-1004A class A (Temperature 25, Humidity 50% RH)
Vibration resistance	4.9 m/s <sup>2</sup> (10 Hz, 5 s, except the DVD drive)
Shock resistance	Operation: 19.6 m/s <sup>2</sup> (while not powered on: 98 m/s <sup>2</sup> )
Power voltage	100 to 240 VAC (*2)
Power frequency	50/60 Hz ± 3 Hz
Power supply noise	2.0 kV (fast transient / burst)
Electrostatic noise contact discharge	4 kV (Air: 8 kV) (*3)
Insulation resistance	500 VDC, 5 MΩ
Dielectric strength	1.5 kVAC, one minute
Transient power fault	10 ms or less
Altitude	1000 m or less.

(\*1) This equipment cannot be used in the environment where conductive dust or the like is floating.

(\*2) If a square wave uninterruptible power supply (UPS) is connected to the equipment, the equipment may fail. Do not use this type of UPS.

(\*3) Be cautious when you use the equipment in the environment subject to noise such as electrostatic noise. Depending on the severity of the noise, failures such as a disruption on the LAN may occur. When a user builds a system, make sure that the system can recover (retry) automatically.

#### < NOTE >

- For information about the precautions for the environment, see “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT (5) INSTALLATION ENVIRONMENT”.

## 1.2.2 Installation

---



### **WARNING**

- The power code that comes with the equipment is rated at the input voltage of 125 VAC. When using this equipment at over 125 VAC, prepare the power cord fitting input voltage and inspect the safeness of this equipment enough.
- When you connect the plug of the power cord to an outlet, make sure you use an outlet with a ground terminal (ground pole) that is properly grounded. In addition, you must install and use an earth leakage circuit breaker. If you do not take these measures, that may result in a fire or an electric shock.
- Do not use a two-pole plug without a ground pole because that may result in an electric shock or failure of the device.

### **NOTICE**

- Before you move this equipment, make sure you shut down the OS, disconnect the plug of the power cord from the outlet, and wait for at least one minute. If you do not, the HDDs and other devices may fail.
- When you transport or carry the equipment, pack it in the dedicated container (container and packing materials used when the equipment was delivered). If you use other container or packing materials, that may damage the equipment.
- Do not use damaged or broken dedicated container when you transport or carry the equipment. If you do, that may damage the equipment.
- If you install the equipment in a mounting chassis or rack with casters, the equipment may be subjected to excessive vibration or shock when it is transported or moved and that may cause the equipment to fail. In order to avoid failure, you must select or design a chassis or rack that satisfies the installation environment requirements of the equipment and be cautious about vibration and shock when you move, transport, or carry the installed equipment.

#### < NOTE >

- For information about the precautions for concerning installation requirements, see “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT (5) INSTALLATION ENVIRONMENT”.

1. GETTING STARTED

Table 1-1 Dimension, Service Clearance, and Installation Clearance

Dimension (mm)			Operation and service clearance (mm)				Installation clearance (mm)			
Height	Width	Depth	Front	Rear	Left	Right	Front	Rear	Left	Right
262	100	348	500	600	200	200	120	100	50	50

- When you operate the equipment or do maintenance work, provide sufficient clearance as shown in Figure 1-1.
- The equipment is air-cooled by fans. See “2.1 Display and User Input Sections” and make sure the air flow is not blocked.

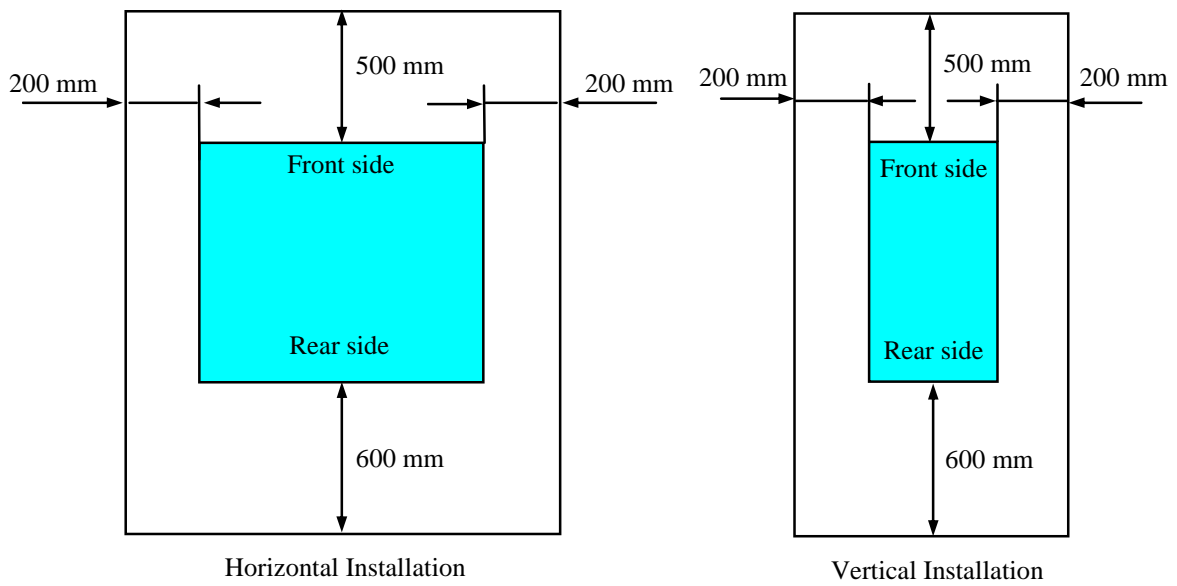


Figure 1-1 Operation and Service Clearance (Top View)

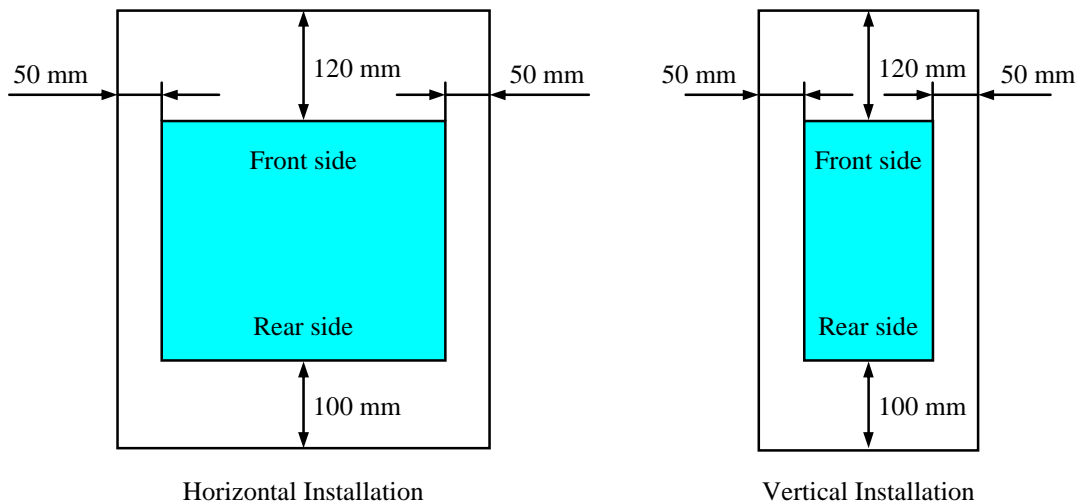


Figure 1-2 Installation Clearance (Top View)

**(a) Vertical installation****WARNING**

- Before attaching or detaching the vertical installation stand or dust-proof stand for vertical installation, shut down the OS and disconnect the power cord from the outlet.
- If you install the equipment vertically on your desk, it may topple or fall, resulting in personal injury. Be sure to install it on the vertical installation stand that comes with the equipment on a level surface.

- In vertical installation, make sure that you install the equipment with the rubber feet attached at the bottom to secure space for an air intake.
- When installing the equipment in a dusty place (e.g., on the floor), use the dust-proof stand (\*) for vertical installation in addition to the vertical installation stand as shown below.

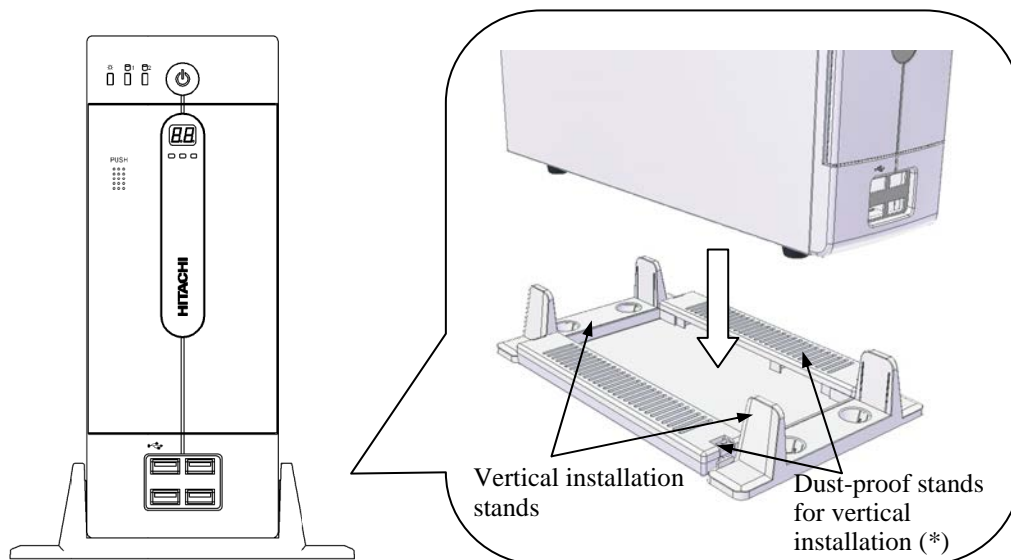


Figure 1-3 Installation Requirements (Vertical Installation)

(\*) The dust-proof stand for vertical installation is provided optionally.



## 1. GETTING STARTED

### (b) Horizontal installation

- In horizontal installation, install the equipment with the rubber feet attached as shown below (for how to attach the rubber feet, see “5.3.8 Attaching and removing rubber feet”).

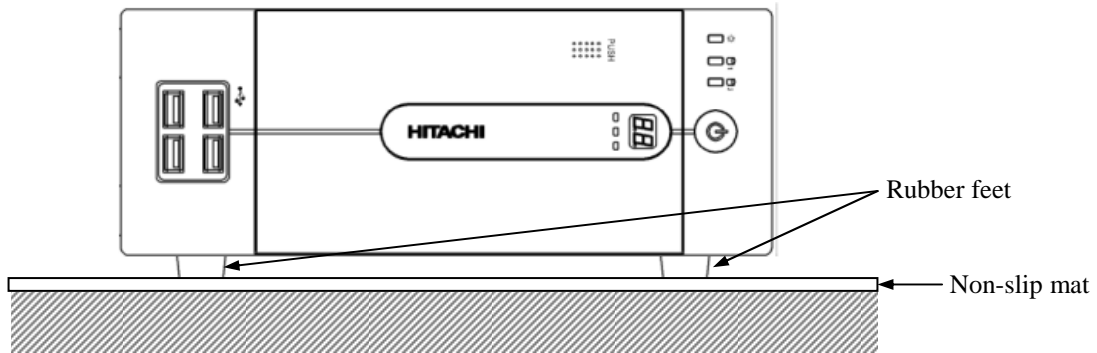


Figure 1-4 Installation Requirements (Horizontal installation)

### 1.2.3 Hardware connection

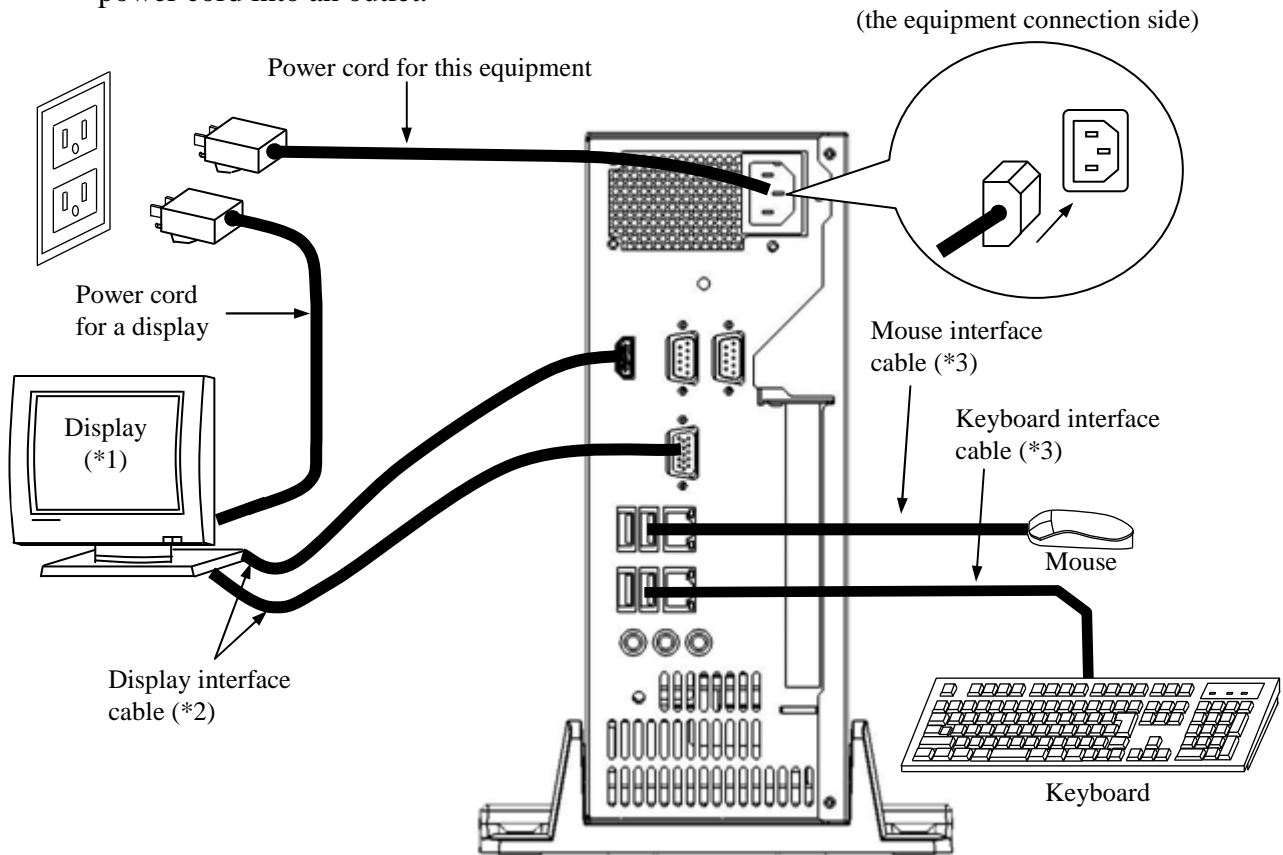
---

#### ***NOTICE***

- Do not route interface cables and the like near the power cord. If you do, failure and malfunction of the equipment may result.
- Do not connect or disconnect an interface cable while the power for this equipment or for the remote device is on. If you do, failure of the equipment may result due to a short circuit between the power supply and the ground. When an interface cable comes off while the power for the equipment is on, shut down the OS and disconnect the power cord from the outlet. Disconnecting the power cord from the outlet without shutting down the OS might destroy the internal files.

## 1. GETTING STARTED

Connect hardware based on the connection example shown in the figure below.  
Connect the display, keyboard, and mouse to this equipment and then insert the plug of the power cord into an outlet.

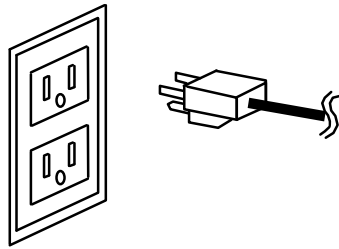


- (\*1) For information about the naming of the user input module and how to operate and adjust the equipment, refer to the user's manual that comes with the device.
- (\*2) For information about the length of each connection cable, see "4.4.2 External interface cable length specifications".
- (\*3) When you connect a connector, pay attention to the orientation of the connector. For a USB mouse and USB keyboard, you can use both front USB ports and rear USB ports.

Figure 1-5 Hardware Connection

- Connecting to an outlet

Fully and securely insert the plug of the power cord of this equipment into an outlet with a grounding pole that is properly grounded. (\*)



Make sure you use a power cable with a 2-pole plug with a grounding pole.

(\*) If you have no other choice than to use an outlet without a grounding pole that is properly grounded, use 3-pole to 2-pole conversion adapter and connect the green ground line from the adapter to the ground of the outlet. A user must verify the proper functionality of the 3-pole to 2-pole conversion adapter before using it.

< NOTE >

- The power cord that comes with the equipment is rated at the input voltage of 125 VAC. When using this equipment at over 125 VAC, prepare the power cord fitting input voltage.

### **1.3 Installing an Extension Board**

---

You can install an extension board supplied by the user in this equipment.

For information about the installation procedure and the limitations of an extension board, see “5.3.4 Installing and removing an extension board”.

### **1.4 Role of an Operator**

---

In order to use this equipment in good working order for a long period of time, an operator must take care of the following items.

**(1) Setting up consumable items**

- (a) When you set up a consumable item (storage medium such as a CD or DVD), follow the device operating procedure shown in the respective chapters.

**(2) Consideration for the characteristics of the equipment**

- (a) See “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT” and take necessary actions considering the characteristics of the equipment.
- (b) The instructions described in this manual are the basics of the procedures you need to follow when you use the equipment. Make sure you follow these instructions.
- (c) For information about how to use the equipment, how to clean the equipment, and so on, see the respective chapters.

**(3) Keep this equipment in good condition**

When you use this equipment, an operator must take care of the following items.

- (a) Backing up files

See “PRECAUTIONS 4. HARD DISKS DRIVES (HDDs) (2) Backing Up Files”.

- (b) Power cord and shutting down the power

See “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT (4) POWER SUPPLY”.

**(4) Maintenance of this equipment**

- (a) For information about maintenance, see “5.1 Daily Checkup” and “5.2 Periodic Checkup”.

**CHAPTER 2 PHYSICAL CONFIGURATION**

---

**WARNING**

Warning about the power supply unit (hazardous voltage)

- Do not remove the power supply except when you remove and install main memory or lithium batteries. If you do, serious personal injury or death may result due to an electric shock.
- Do not remove the cover of the power supply unit. If you do, serious personal injury or death may result due to an electric shock.

**CAUTION**

Caution about fans (rotating objects)

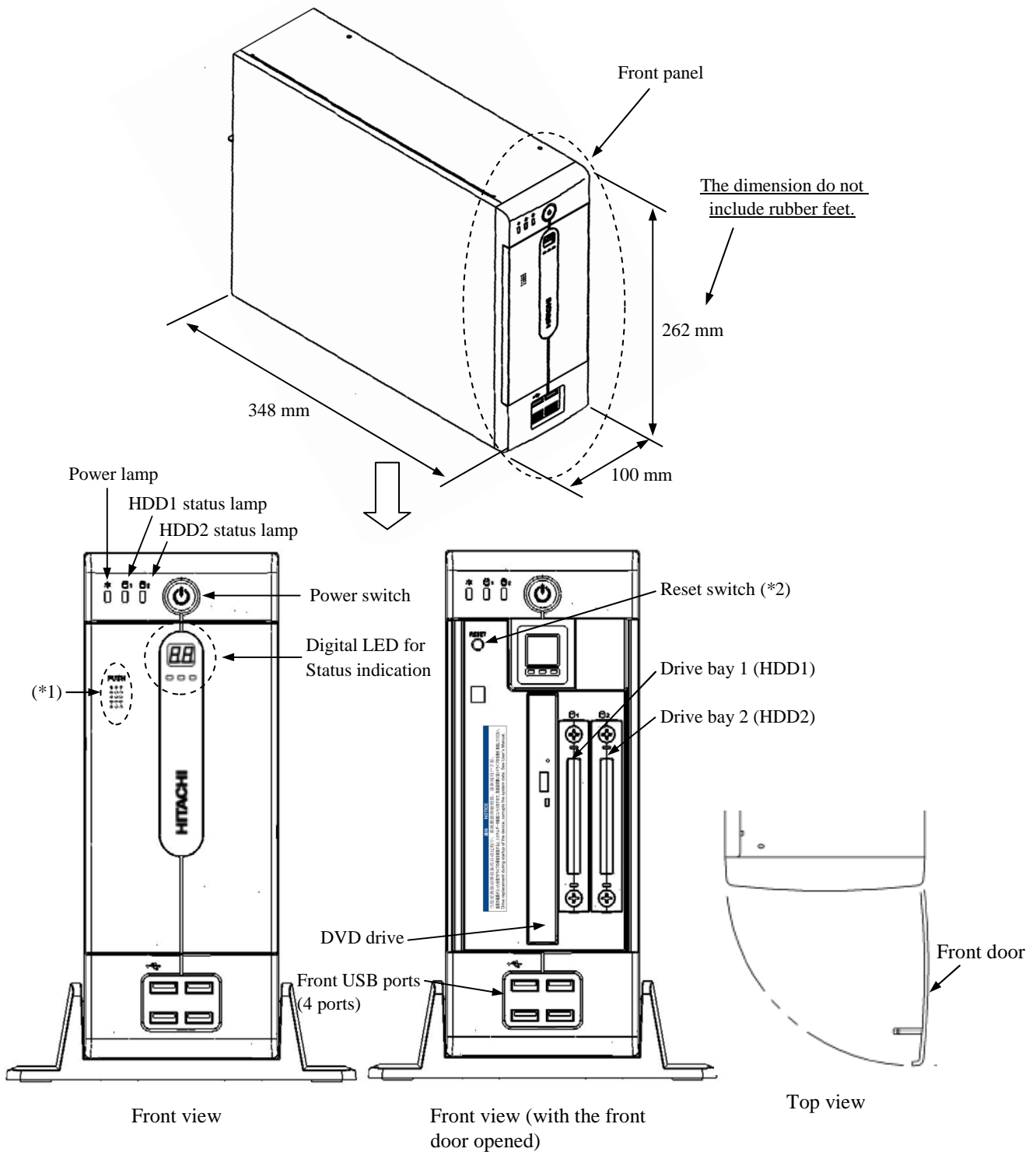
- Only maintenance personnel are allowed to remove a fan. If you remove a fan yourself, your hand or objects may be caught by the rotating part of the operating fan and personal injury may result.

**NOTICE**

- Never hot-swap HDDs because that may cause failure of the equipment and HDDs. Before you replace an HDD, make sure you shut down the OS, disconnect the plug of the power cord from the outlet, and wait for at least one minute.
- When using a USB port, check the orientation of the USB connector, and then insert the connector slowly. Otherwise, the USB port may be damaged.
- Do not remove or insert a USB device during online operation (system operation) because that may affect currently running applications.
- If you insert or access a CD or DVD, the system load may increase and running applications may be affected. Do not insert or access an optical disc during online operation (system operation).

**2.1 Display and User Input Sections**

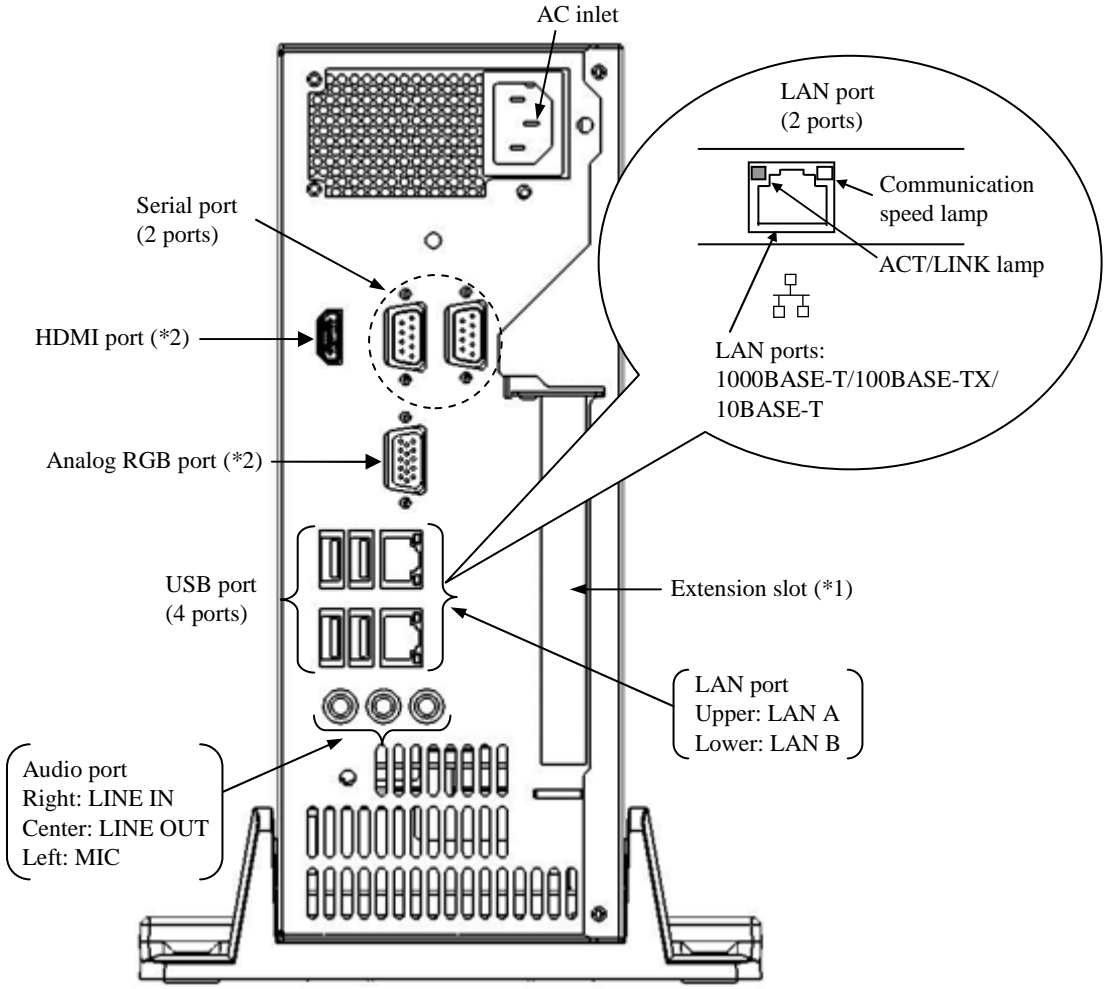
**(1) Front view**



- (\*1) To open and close the front door, press the area marked as “PUSH” on the front panel.
- (\*2) Press the reset switch by inserting an eject pin. If an eject pin is not available, use a pin that fits the hole of the reset switch instead.

Figure 2-1 Name of Each Part (Front View)

(2) Rear view



(\*1) You can install a PCI board or PCI Express x16 board in the extension slot. When you mount a board, a riser board (optional) is required. You need a different riser board for a different type of the board.  
(\*2) If a video board is installed in the extension slot, you cannot use those ports.

Figure 2-2 Name of Each Part (Rear View)



## 2. PHYSICAL CONFIGURATION

### (3) Physical configuration inside the equipment

A model:

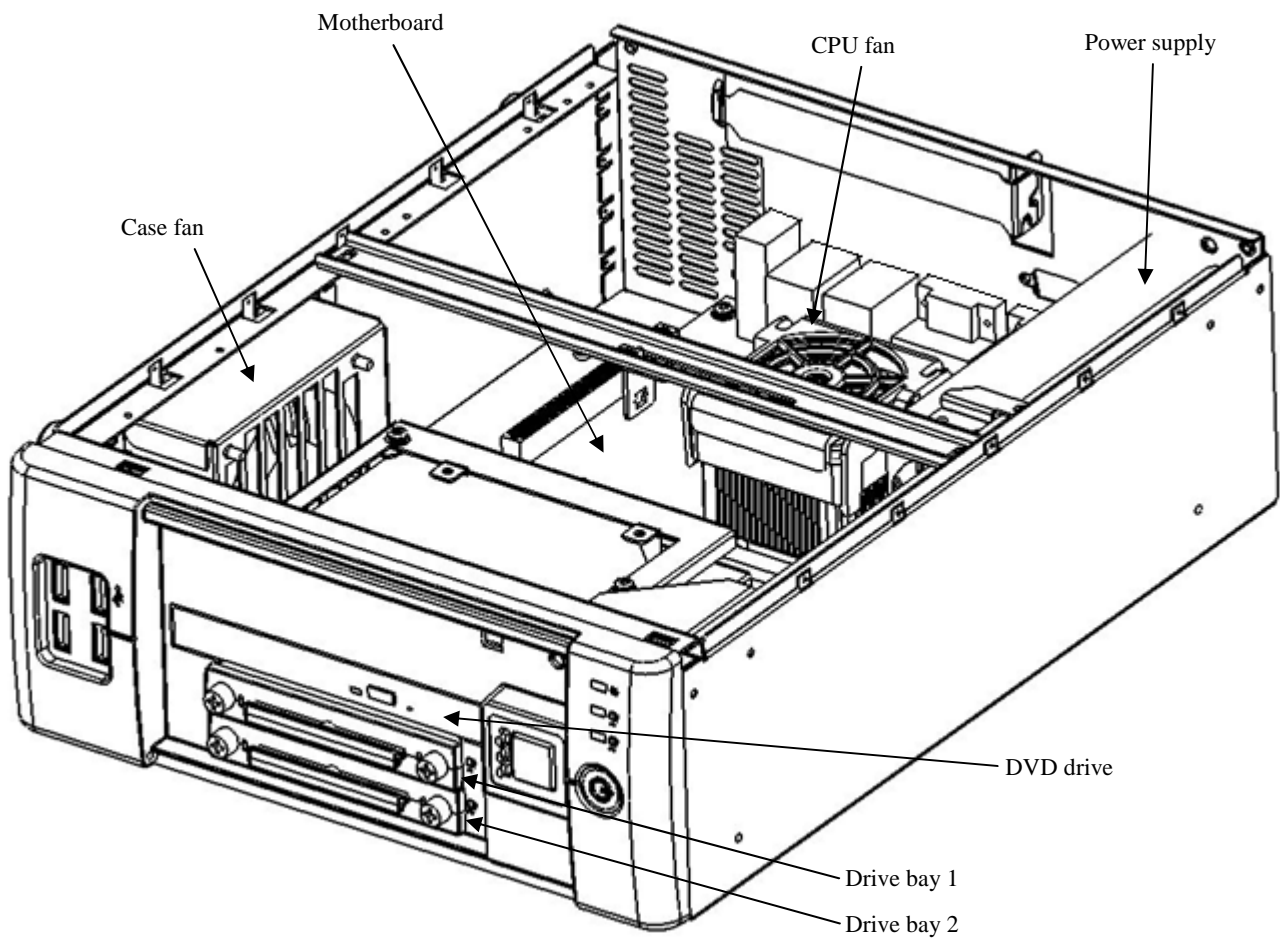


Figure 2-3 Physical Configuration Inside Equipment (A model)

D model:

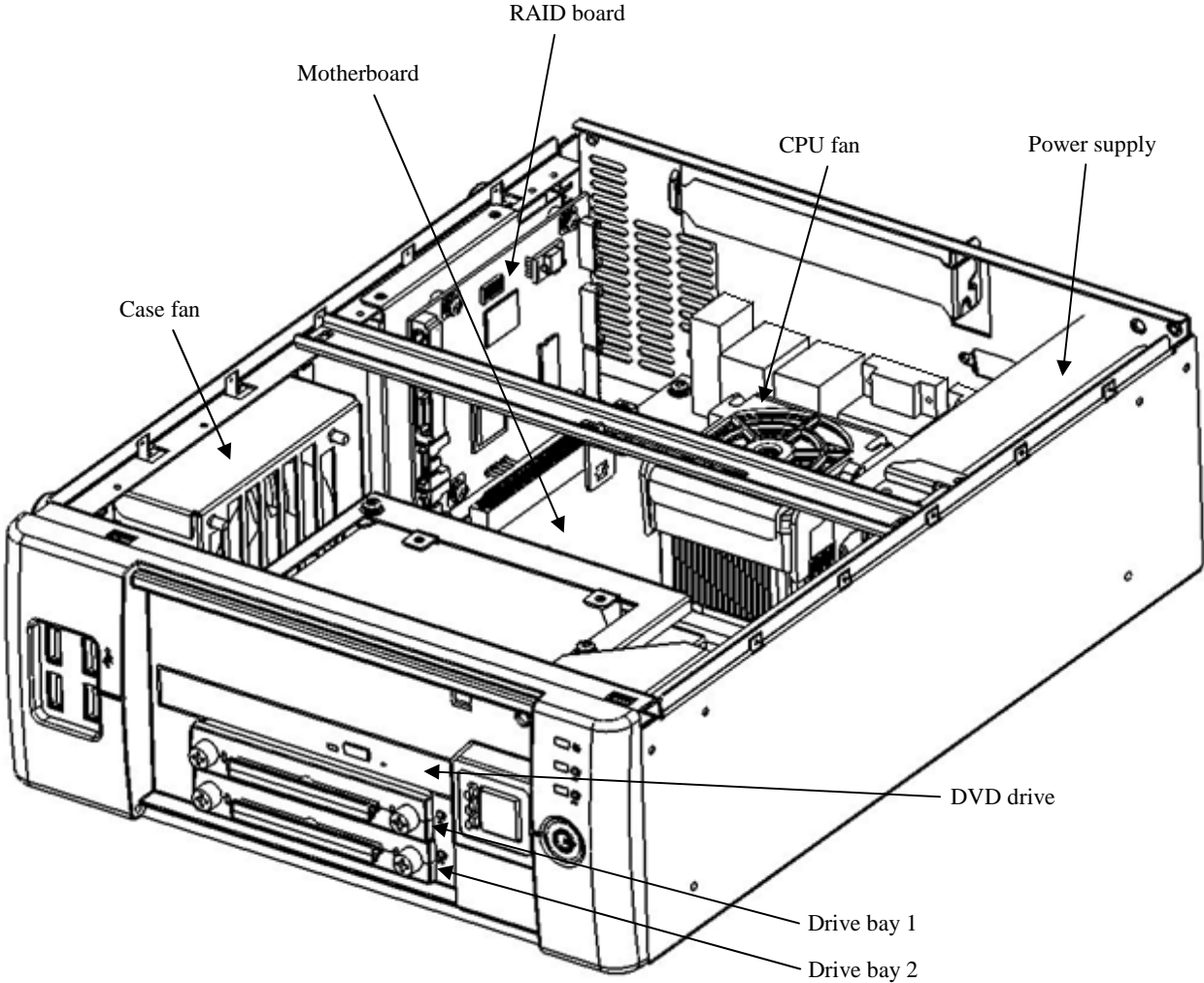


Figure 2-4 Physical Configuration Inside Equipment (D model)

2. PHYSICAL CONFIGURATION

Common to all models (Bottom face of the equipment)

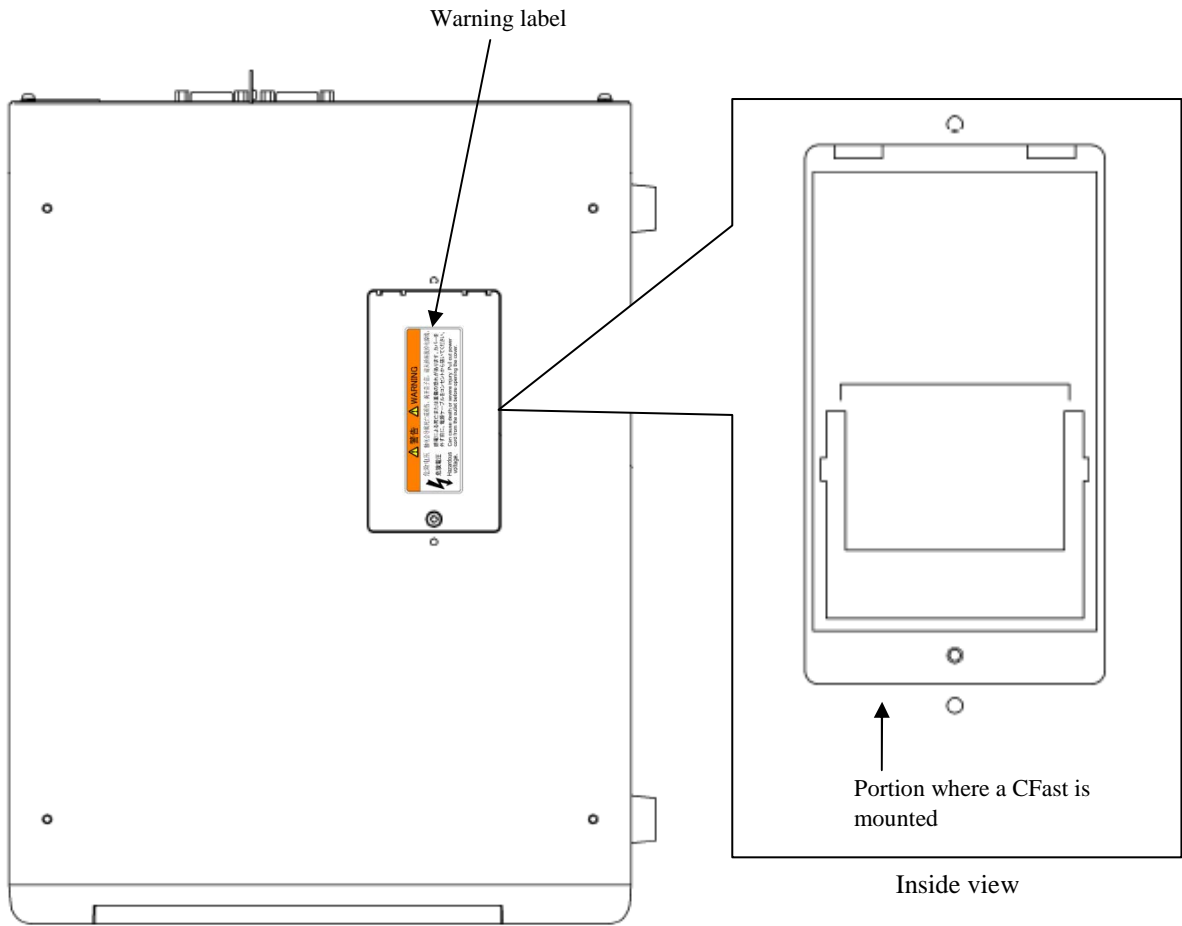


Figure 2-5 Physical Configuration Inside Equipment (Common to All Models)

Table 2-1 Function of Each Part (1/2)

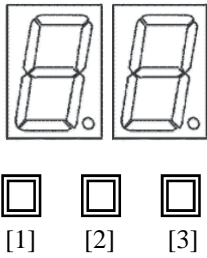
Name	Function
Power switch	When you press this switch, the power is turned on. When you press the switch for four seconds or more, the power is turned off and the system goes into standby mode (for emergencies only).
Reset switch	Use this switch to perform a hardware reset (restarting the equipment).
Power lamp	Lights green when the equipment is operating.
HDD1 status lamp/ HDD2 status lamp	The HDD status lamp lights green when it is being accessed. The HDD2 status lamp does not light even if you mount an HDD in drive bay 2 in the A model. For the lighting pattern of the lamps in the D model, see Chapter 8.
AC inlet	Used for connecting a power cord.
Power supply	A power supply module with a wide-range input voltage (100 to 240 VAC).
Audio port (LINE IN)	An audio line input.
Audio port (LINE OUT)	An audio line output.
Audio port (MIC)	Microphone input
Serial port (9 pins: RS-232C-A)	You can use this connector to connect a device such as a modem that uses a serial interface. (See “4.4.1 Connector specifications”.)
Analog RGB port	Connects the cable from the analog RGB interface of a display. (See “4.4.1 Connector specifications”.)
HDMI port	Connects the cable from the HDMI interface of a display. (See “4.4.1 Connector specifications”.)
Extension slot	Slot used to mount a PCI board or PCI Express x16 board. To mount these boards, you need a riser board dedicated to a PCI board or a PCI Express x16 board.
USB port	Used to connect a device that uses a USB interface. (See “4.4.1 Connector specifications”.)
<p>Digital LED for Status indication</p>  <p>[1] [2] [3] Status indication LEDs</p>	<p>Various states of this equipment are indicated as a two-digit code in hexadecimal and the states of the status indication LEDs.</p> <p>Status indication LEDs                      [1] RAS status (Red)                      [2] Application status (Green)                      [3] Not used by this equipment</p> <p>(For information about how to display arbitrary status data on the Digital LED for Status indication from a user application, refer to the “<i>HF-BT1000 RAS FEATURES MANUAL</i>”.)</p>

Table 2-1 Function of Each Part (2/2)

Name	Function																				
<p>LAN port (1000BASE-T/100BASE-TX/ 10BASE-T)</p>	<p>You can connect a LAN cable to a LAN port. (See “4.4.1 Connector specification”.)</p> <p>● LAN A/LAN B</p> <div data-bbox="678 477 1278 723" style="text-align: center;"> <p>The diagram shows a rectangular LAN port with two small square lamps on the top edge and a larger rectangular lamp in the center. Arrows point from the text labels to these lamps.</p> </div> <table border="1" data-bbox="555 772 1417 1357" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACT/LINK lamp</th> </tr> <tr> <th style="text-align: center;">Lamp</th> <th style="text-align: center;">Status</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Lit in yellow</td> <td>A link is established. Both the equipment and the remote device are powered up and the connection over the twisted-pair Ethernet cable is stable.</td> </tr> <tr> <td style="text-align: center;">Off</td> <td>No link is established.                             <ul style="list-style-type: none"> <li>• The equipment is not physically connected to the network.</li> <li>• The switching hub is not powered up.</li> <li>• The connection over the twisted-pair Ethernet cable is not stable.</li> <li>• The driver settings have some errors.</li> </ul> </td> </tr> <tr> <td style="text-align: center;">Blinking in yellow</td> <td>Network data is being transmitted or received. The blink interval changes depending on the traffic on the network.</td> </tr> </tbody> </table> <table border="1" data-bbox="555 1395 1417 1668" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="text-align: center;">Communication speed lamp</th> </tr> <tr> <th style="text-align: center;">Lamp</th> <th style="text-align: center;">Status</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Lit in green</td> <td>The link is established at 1000 Mbps.</td> </tr> <tr> <td style="text-align: center;">Lit in orange</td> <td>The link is established at 100 Mbps.</td> </tr> <tr> <td style="text-align: center;">Off</td> <td>The link is established at 10 Mbps. Or no link is established.</td> </tr> </tbody> </table>	ACT/LINK lamp		Lamp	Status	Lit in yellow	A link is established. Both the equipment and the remote device are powered up and the connection over the twisted-pair Ethernet cable is stable.	Off	No link is established. <ul style="list-style-type: none"> <li>• The equipment is not physically connected to the network.</li> <li>• The switching hub is not powered up.</li> <li>• The connection over the twisted-pair Ethernet cable is not stable.</li> <li>• The driver settings have some errors.</li> </ul>	Blinking in yellow	Network data is being transmitted or received. The blink interval changes depending on the traffic on the network.	Communication speed lamp		Lamp	Status	Lit in green	The link is established at 1000 Mbps.	Lit in orange	The link is established at 100 Mbps.	Off	The link is established at 10 Mbps. Or no link is established.
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Lamp	Status																				
Lit in green	The link is established at 1000 Mbps.																				
Lit in orange	The link is established at 100 Mbps.																				
Off	The link is established at 10 Mbps. Or no link is established.																				

< NOTE >

- For information about the precautions for USB devices, see “PRECAUTIONS 6. USB DEVICE”.

## CHAPTER 3 OPERATION

---

### 3.1 Before Turning On the Power

---

---



#### WARNING

If any of the air intake and exhaust holes of the equipment is blocked, the temperature inside the equipment may rise and that may cause a fire or failure of the equipment. Make sure sufficient clearance is provided around the equipment when you install. (See “1.2.2 Installation”.)

#### < NOTE >

When you turn on the power, see the following:

- “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT  
(2) INTERFACE CABLES
- “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT  
(4) POWER SUPPLY”
- “PRECAUTIONS 1. PRECAUTIONS ABOUT THE EQUIPMENT  
(5) INSTALLATION ENVIRONMENT”

## **3.2 Starting the Equipment**

---

For information about how to start the equipment for the first time after you purchase it or you recover the equipment from failure, refer to the “GETTING STARTED” or the “SETUP GUIDE”.

For other cases, follow the procedure below to start the equipment:

1. Confirm that the plug of the power cord is connected to the outlet.
2. Turn on the power to the display.
3. Press the power switch. (See “2.1 Display and User Input Sections”.)
4. When the power is turned on, the power lamp will light. (green)

After the above steps are complete, the equipment automatically goes through the startup process until the logon screen appears.

For information about how to control the power using the LAN, see “3.7 Controlling the Power Using the LAN”.

### **3.3 Shutting Down the Equipment**

---

When you shut down the equipment, first confirm that no other users are using the equipment and no background programs are running. Then follow the procedure below:

- Stop application programs.
- Shut down the OS.

The specific procedure for stopping an application program differs depending on each application. For more information, see the manual of each application.

To shut down the OS, click the Start button at the left bottom corner of the screen and click Shut down. After the OS is shut down, the power is automatically turned off and only the auxiliary power supply is on (standby mode).

If the normal shutdown process cannot be executed (for example, a shutdown request cannot be accepted due to system deadlock), press the power switch for at least four seconds. The power is turned off and the equipment goes into the standby mode. If you turn off the power by pressing the power switch for at least four seconds, you cannot turn on the power by way of the LAN next time. Do not turn off the power this way except for emergencies. (See “3.7 Controlling the Power Using the LAN”.) For information about how to collect a memory dump, see “7.2 Collecting a Memory Dump”.



### 3. OPERATION

#### 3.4 Power Shutdown

---

1. Confirm that the equipment is shut down. (See “3.3 Shutting Down the Equipment”.)
2. Unplug the power cord from the outlet.

#### 3.5 Emergency Shutdown

---



#### **WARNING**

In case of smoke, a burning smell, or the like, unplug the power cord from the outlet, and contact your dealer or maintenance personnel. Using faulty equipment without repair may result in a fire or an electric shock.

#### **NOTICE**

- Performing emergency shutdown (that is, unplugging the power cord from the outlet or shutting off the breaker without proper shutdown of the OS) may cause the OS or applications not to work properly or may cause saved data to be corrupted. Do not perform emergency shutdown unless you must stop the system immediately due to some kind of error.
- If you turn off the power at the source of AC the power, the system may not be able to recover automatically.

In the following cases, turn off the power at the source of the AC power.

- When the equipment shows an error condition and you have to shut down the power immediately (for example, when a burning smell is detected).
- When you cannot shut down the equipment due to some error.
- When the power is turned off repeatedly or only the auxiliary power supply is on due to excess current or overheating.

In the following cases, unplug the power cord from the outlet or shut down the power supply from the power source.

- If the fan is stopped and the temperature gets too high or too low and consequently the power is automatically turned off to protect the equipment and only the auxiliary power supply is on. (For information about actions recommended after the power shutdown, see “6.2.2 (1)”.)

After the OS starts, when a stopped fan is detected, the OS is automatically shut down and then the power is turned off.

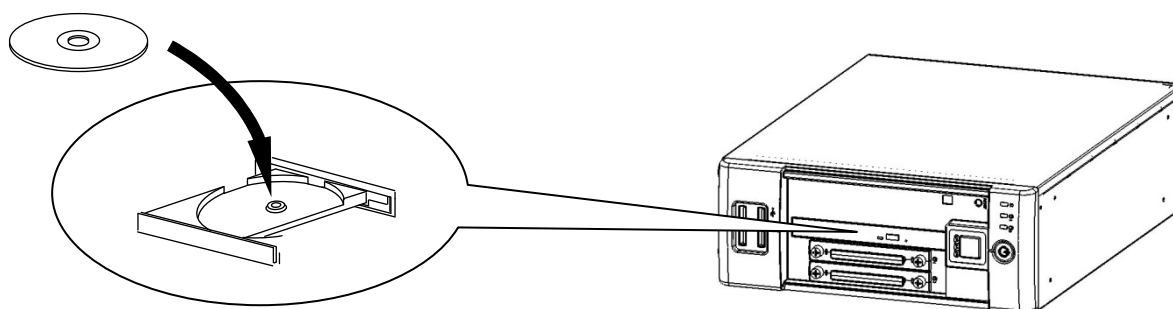
### 3.6 DVD drive

#### **NOTICE**

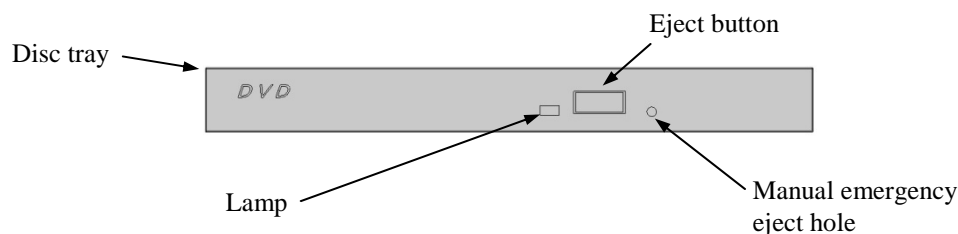
- If you insert or access a CD or DVD, the system load may increase and running applications may be affected. Do not insert or access a CD or DVD during online operation (system operation).
- When you finish accessing a CD or DVD, eject the disc from the DVD drive. If you leave the disc in the DVD drive, failure may result.
- If you keep the disc tray open, failure may result. When you do not intend to use the DVD drive, keep the disc tray inside the DVD drive.
- Do not use an unbalanced CD or DVD due to attached labels and so on; a CD or DVD with cracks, scratches, or vertical deviation; or a CD or DVD with a non-standard shape. If you do, an abnormal sound or vibration may be generated and failure of the equipment may result.

#### 3.6.1 Inserting a CD or DVD

1. Press the eject button gently to open the disc tray.
2. Set the CD or DVD on the disc tray with the label side facing up.
3. Push the disc tray to load the disc into the DVD drive.



Front View When the Disc Tray Is Open



Front View of the DVD Drive

Figure 3-1 DVD Drive (Front View)

### 3. OPERATION

< NOTE >

- For information about the precautions for the DVD drive, see “PRECAUTIONS 5. DVDs”.

#### **3.6.2 Ejecting a CD or DVD**

---

1. Confirm that the lamp is neither on nor flashing (the drive is operating).
2. Press the eject button gently to open the disc tray.
3. Pick up the CD or DVD.

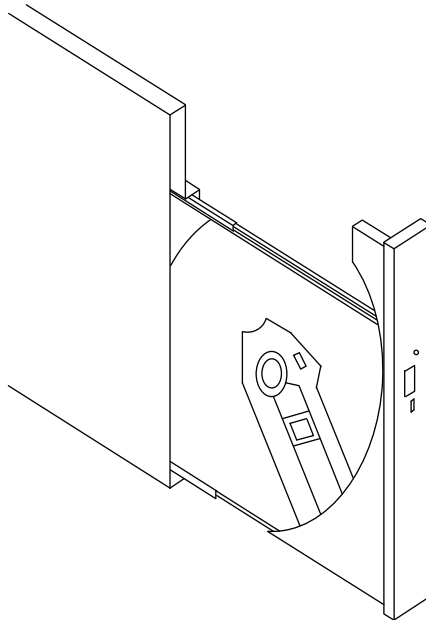
< NOTE >

- When you are writing to a CD or DVD, use the OS to eject the disc. If you press the eject button, writing to the disc may fail.

#### **3.6.3 Using the DVD drive when the equipment is installed vertically**

---

1. Press the eject button to eject the disc tray from the DVD drive.
2. While holding the disc tray with your right hand, set a CD or DVD on the disc tray with your left hand.
3. Remove your right hand from the disc tray.
4. Push the disc tray to load the CD or DVD into the DVD drive.
5. When you remove the CD or DVD, pull out the CD or DVD without applying excessive force to the CD or DVD.



DVD Drive When the Equipment Is Installed Vertically

### 3.7 Controlling the Power Using the LAN

Only LAN B port can turn on the power by remote control using LAN.

The power for this equipment can be turned on from a remote device by way of the LAN.

This section explains WOL (Wake on LAN™), which is used for turning on the power for the equipment through the LAN. WOL can be initiated by sending a Magic Packet™ frame to the LAN interface of the equipment which has been shut down normally.

In the initial factory settings, this function is disabled. If you want to use this function, follow steps 1 through 3 described in “3.7.1 Enabling the WOL (Wake on LAN™) function” to enable the WOL function and then follow the steps below.

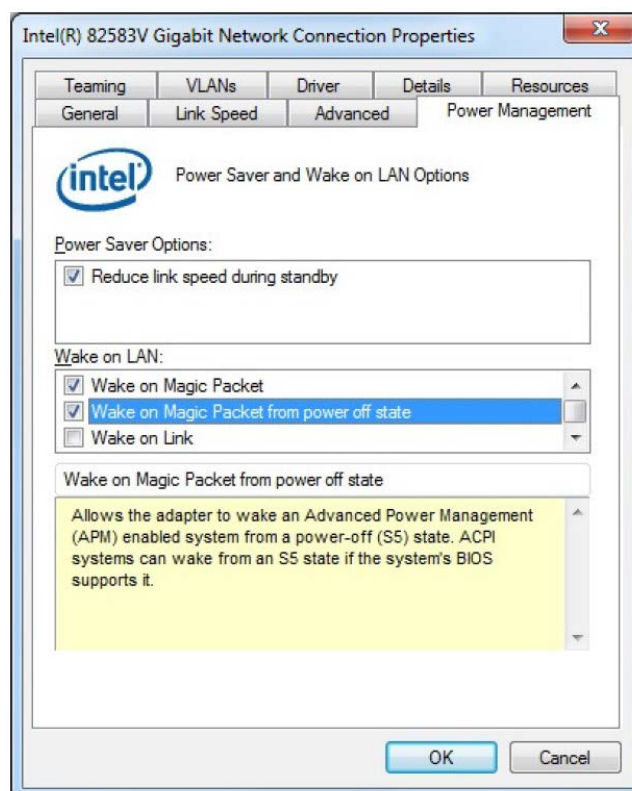
#### < NOTE >

- WOL function can be used by only LAN B port. WOL function in LAN A port is a non-support.
- For information about the precautions for the network, see “PRECAUTIONS 2. NETWORK”.

#### 3.7.1 Enabling the WOL (Wake on LAN™) function

By following the procedure below, you can set up whether to start WOL when a Magic Packet™ frame is received. In the initial factory settings, the WOL function is disabled.

1. Execute steps 1 though 7 in “● Setting up the network transfer speed” in “3.8 Setting Up the LAN Interface”.
2. Click the Power Management tab. If you want to enable WOL, select the Wake on Magic Packet from power off state check box under Wake on LAN:.
3. Click OK and restart the system.



### 3. OPERATION

#### 3.7.2 Turning on the power using the LAN

---

1. Insert the plug of the power cord into an outlet.
2. Send a Magic Packet™ frame to the built-in LAN adapter in the equipment. When the built-in LAN adapter receives a Magic Packet™ frame, the power for the equipment is turned on.

To turn on the power to the equipment through LAN (to use the WOL function), the equipment must have been powered off in the shutdown process.

The built-in LAN adapter in the equipment is compliant with WfM 2.0 (\*1) to support the Magic Packet™ technology. Because of this, the power for the equipment can be turned on when a special data packet called a “Magic Packet™ frame” (\*2) is received at the built-in LAN adapter.

A program for transmitting a Magic Packet™ frame does not come with the equipment. Use a commercially available program for to transmit the Magic Packet™ frame.

(\*1) Wired for Management (WfM) is a guideline regarding the hardware specifications proposed by Intel Corporation for managing PCs on a network.

(\*2) The Magic Packet™ technology has been proposed by AMD Japan, Ltd. and can be starting a PC on a network from a remote device.

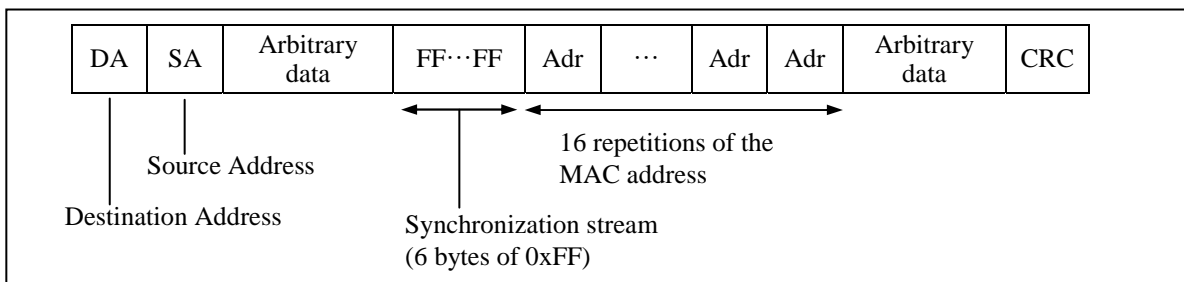
#### < NOTE >

- If you turn off the power by pressing the power switch for at least four seconds, you cannot use WOL the next time. When you turn off the power by pressing the power switch for at least four seconds, turn on the equipment by pressing the power switch and go through the shutdown process to turn off the power.

#### <About the Magic Packet™ frame>

In a Magic Packet™ frame, the SOURCE ADDRESS, DESTINATION ADDRESS (the MAC address of the receiver or the MULTICAST ADDRESS including the BROADCAST ADDRESS), CRC, and the like must meet the basic requirements of the LAN in use. The data in a Magic Packet™ frame consists of a sequence of 16 repetitions of the MAC address of the node. This sequence can be anywhere in the packet but it must follow a synchronization stream. The synchronization stream is defined as 6 bytes of 0xFF. As long as the MAC address that repeats itself 16 times targets the address of the equipment to be started, the device can receive a BROADCAST frame.

A Magic Packet™ frame is shown in the following figure.



### 3.8 Setting Up the LAN Interface

This equipment has two built-in 1000BASE-T/100BASE-TX/10BASE-T LAN port. For information about the location of the LAN port connector (1000BASE-T/100BASE-TX/10BASE-T), see “2.1 Display and User Input Sections”.

#### < NOTE >

- For information about the precautions for the network, see “PRECAUTIONS 2. NETWORK”.

- Automatic recognition of the network transfer speed or transfer mode

The LAN port has an auto-negotiation function to automatically recognize the network transfer speed or transfer mode. For normal use, enable the auto-negotiation function. (Especially when you use the WOL function. If the speed is fixed to 1000 Mbps (auto-negotiation), the WOL function cannot be used.)

If there is a compatibility issue with the connected hub, the auto-negotiation function may not work properly and that may affect the communication with other terminals.

If the auto-negotiation function does not work properly, configure the LAN interface as follows.

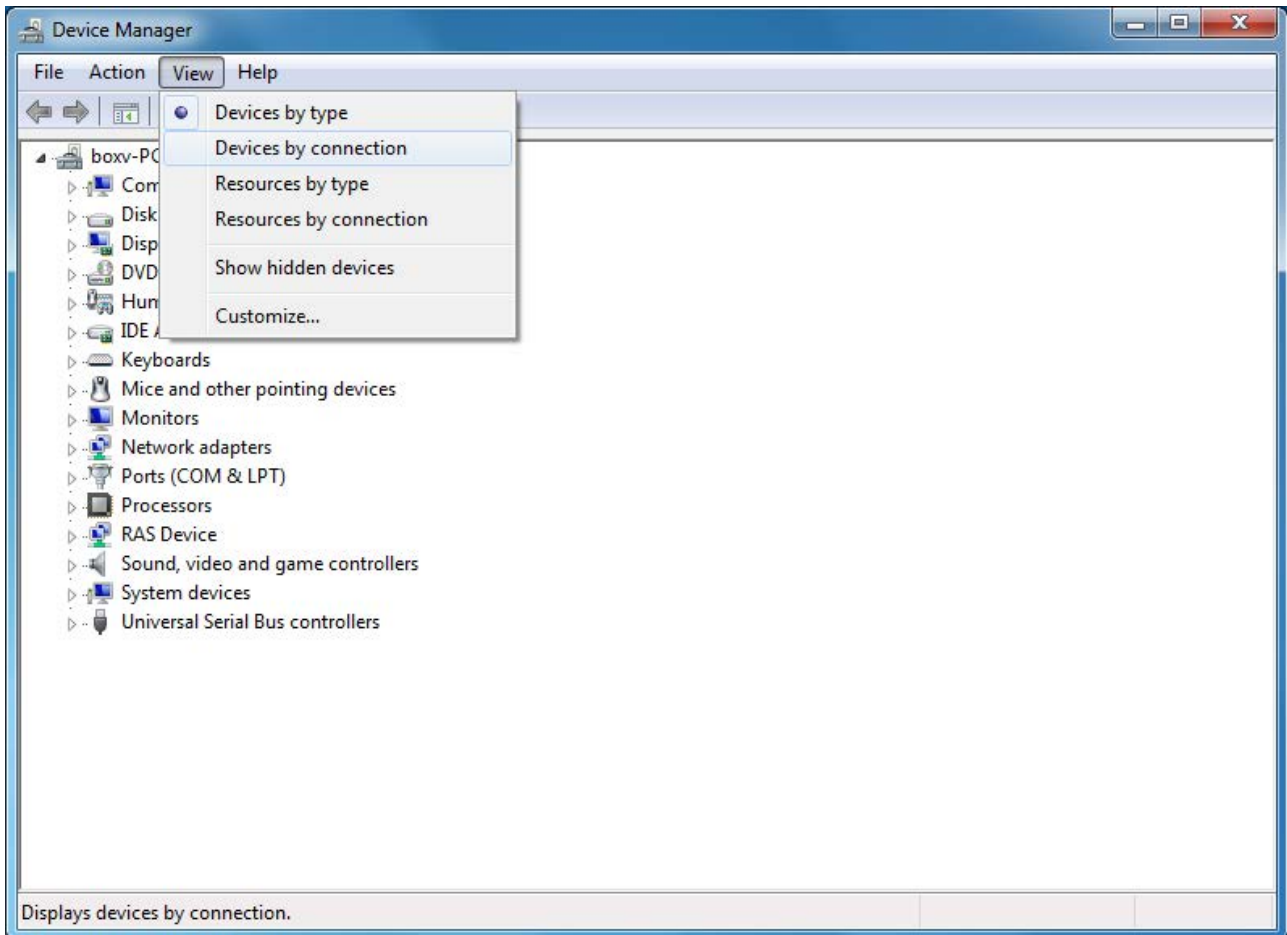
Specification of the hub	Specification of the LAN setting (*)	
	Speed	Speed
10 Mbps / Half-duplex	10 Mbps	Half Duplex
10 Mbps / Full-duplex	10 Mbps	Full Duplex
100 Mbps / Half-duplex	100 Mbps	Half Duplex
100 Mbps / Full-duplex	100 Mbps	Full Duplex
1000 Mbps	1000 Mbps (1.0 Gbps)	Auto Negotiation or Full Duplex

(\*) How the setting is displayed is different depending on the OS and the LAN port in use.

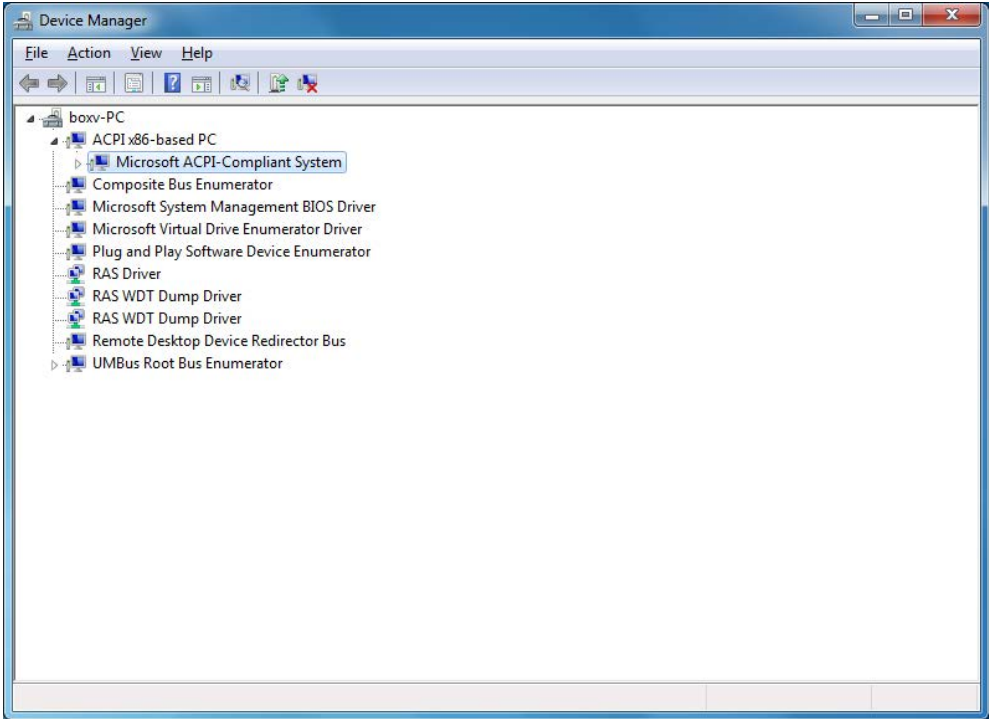
### 3. OPERATION

- Setting the network transfer speed

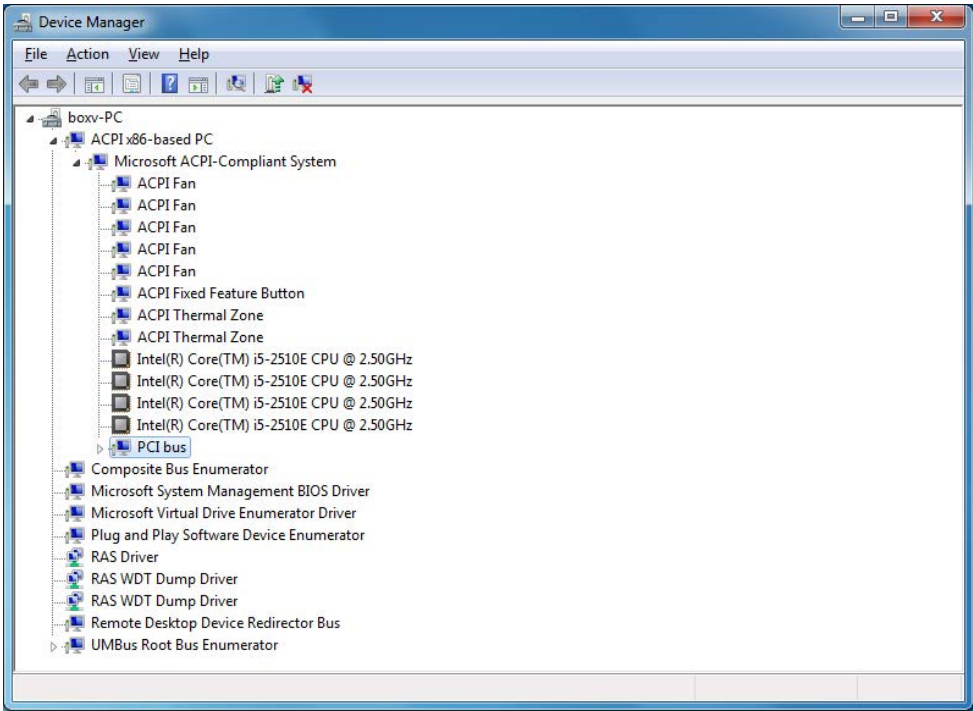
1. Log on to the computer using an administrator's account.
2. Click **Start > Control Panel > System and Security**.
3. Click the **System** icon. Then click **Device Manager**.
4. The Device Manager window appears. Click the **View** menu and select **Devices by connection**.



5. Click **ACPI x86-based PC**. Then click **Microsoft ACPI-Compliant System**.



6. Click **PCI bus**.

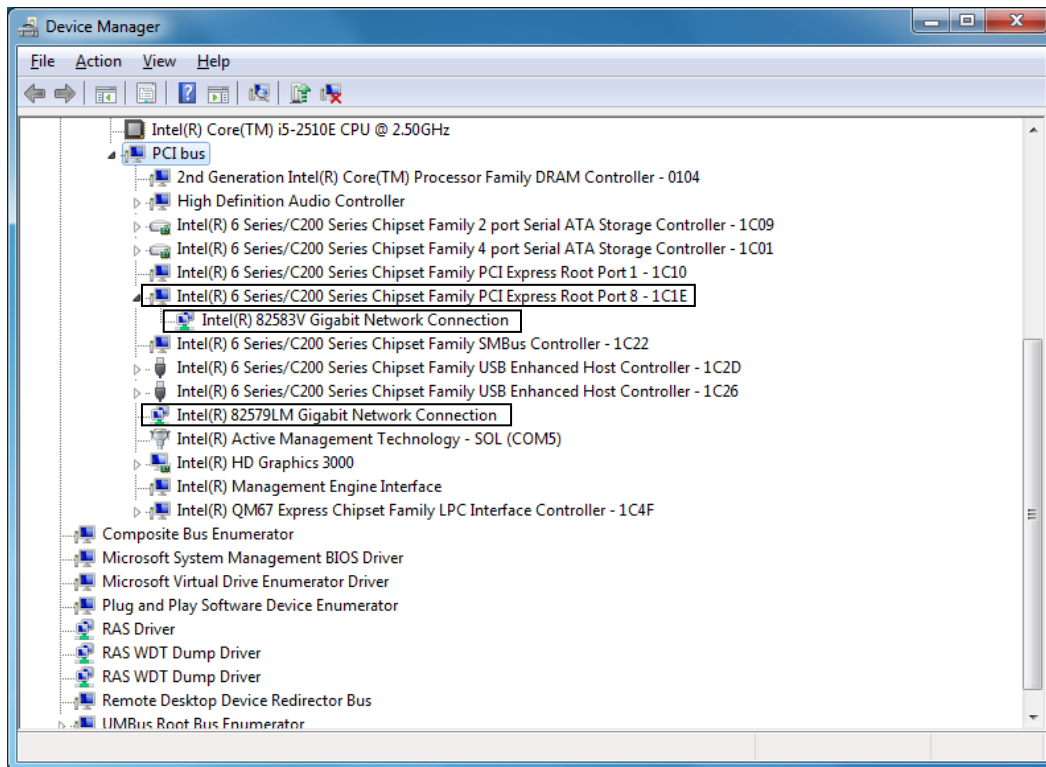




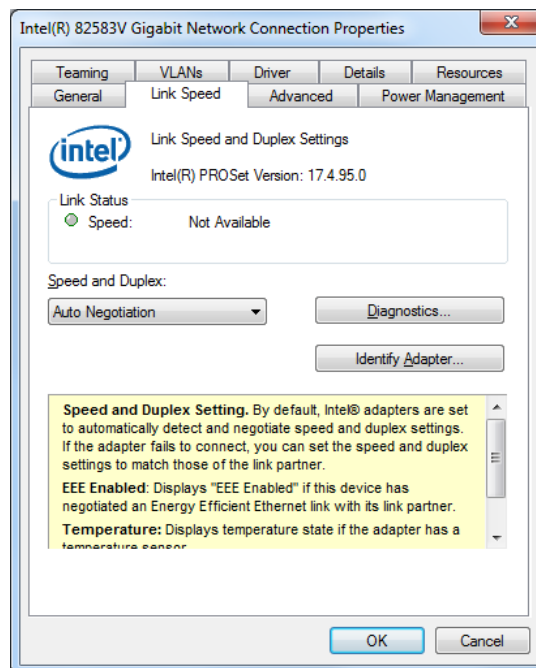
### 3. OPERATION

7. See the following and double-click the network adapter you want to configure.
  - When you configure the built-in LAN (LAN A):  
Double-click the network adapter (in the example in the figure below, **Intel(R) 82579LM Gigabit Network Connection**).
  - When you configure the built-in LAN (LAN B):  
Click **Intel(R) 6 Series/C200 Series Chipset Family PCI Express Root Port 8 – 1C1E**. Then double-click the network adapter under it (in the example in the figure below, **Intel(R) 82583V Gigabit Network Connection**).

Perform the same procedure as above to change the settings of the LAN adapter installed in the extended slot.



8. Click the **Link Speed** tab.

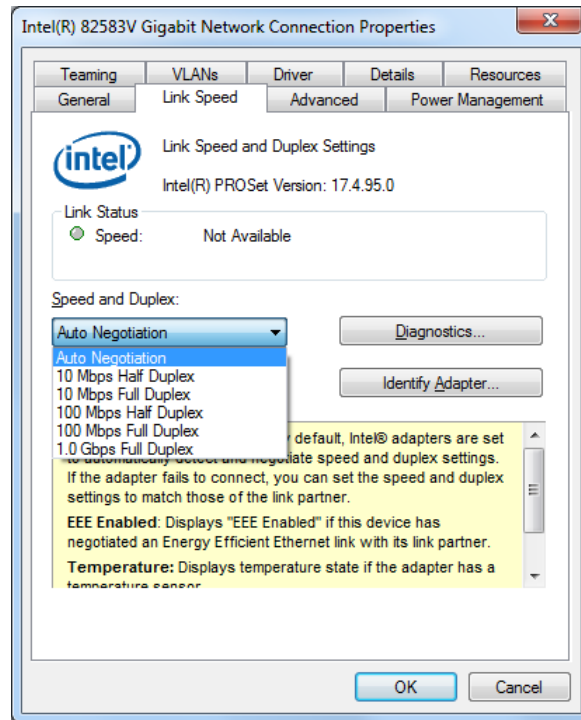


9. Select the transfer speed and the transfer mode you want to choose from the **Speed and Duplex** list.

- Auto Negotiation: auto-negotiation setting
- 10 Mbps Half Duplex: 10 Mbps/Half-duplex setting
- 10 Mbps Full Duplex: 10 Mbps/Full-duplex setting
- 100 Mbps Half Duplex: 100 Mbps/Half-duplex setting
- 100 Mbps Full Duplex: 100 Mbps/Full-duplex setting
- 1.0 Gbps Full Duplex: 1.0 Gbps/Full-duplex setting

If you do not have to configure the transfer speed and the transfer mode, select **Auto Negotiation** at the top of the list to choose the auto-negotiation setting.

### 3. OPERATION

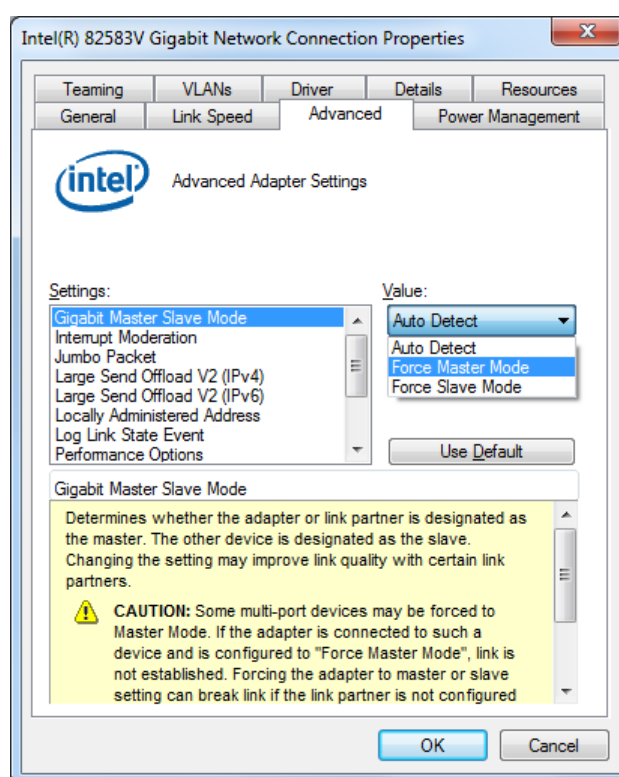


10. Click **OK**.
11. Close the **Device Manager** window.
12. Click **OK** in the **System Properties** window.
13. Close the **Control Panel** window.

#### < NOTE >

- For information about the precautions for the network, see "PRECAUTIONS 2. NETWORK".

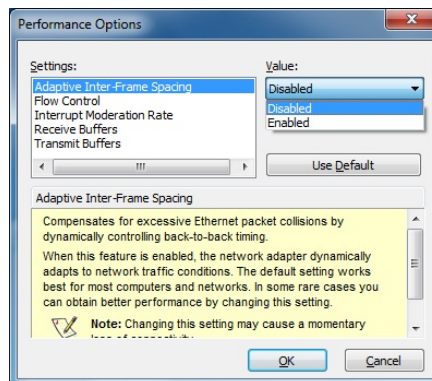
- Action to take if the link is unstable at 1000 Mbps  
Depending on the type of the connected hub, the link may not be stable at 1000 Mbps. If you want to use the network at 1000 Mbps, verify the connection with the hub in advance. If the link is unstable at 1000 Mbps, it is made stable by taking the following action.
    - Use a cable which is 20 to 100 meters long (UTP Category 5e or better).
    - Fix the master/slave mode setting to Master (valid only in the 1000 Mbps setting).
 Follow the procedure below to fix the mater/slave mode to Master. The link may not function depending on the type of the hub. In this case, re-set the setting to **Auto Detect**.
1. Execute steps 1 though 4 in “● Setting the network transfer speed” in “3.8 Setting Up the LAN Interface”.
  2. Click the **Advanced** tab. Select **Gigabit Master/Slave Mode** from the **Settings** list.
  3. From the **Value** pull-down menu, select **Master Mode**.
  4. Click **OK** and restart the equipment.



### 3. OPERATION

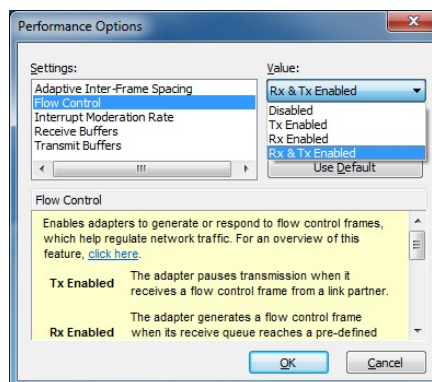
- Adaptive Inter-Frame Spacing

This compensates for excessive Ethernet packet collisions by dynamically controlling back-to-back timing.



- Flow Control

This enables adapters to generate or respond to flow control frames, which help regulate network traffic. The default setting of the flow control is different depending on the OS and the type of LAN adapter in use. You must configure the flow control setting according to the network you are using.

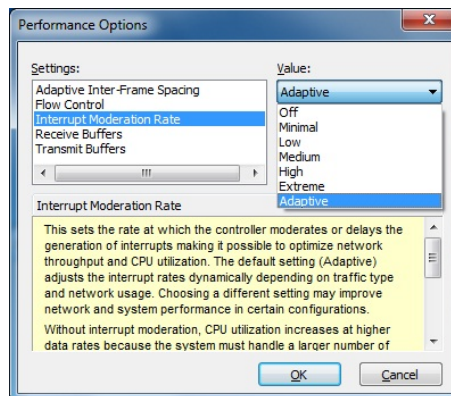


< NOTE >

- If the LAN driver stops due to a system failure such as an OS deadlock, broadcast frames from other devices may not be able to be processed and the receive queue may get full.  
If **Rx Enabled** or **Rx & Tx Enabled** is specified for **Flow Control**, flow control frames are continuously sent from this equipment under such a condition. If this happens, that may affect the whole network connected to the equipment. Specify **Disabled** for **Flow Control** at this equipment or at the connected hub as required.
- If **Disabled** is specified for **Flow Control** and if the device receives frames quicker than it can process, the device gets overloaded, and the frames receive will be discarded until the device recovers from the overload condition. You have to design the network appropriately to avoid such an overload condition.
- In LAN A (82579LM), flow control frames may be sent continuously in the event of a blue screen even if you set **Flow Control** to **OFF**. To prevent this operation, configure the equipment so it is restarted automatically after a memory dump of a blue screen, or set **Flow Control** to **OFF** if the connected hub allows this setting change.

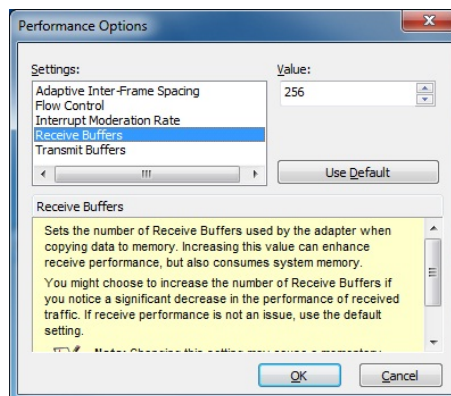
- **Interrupt Moderation Rate**

This sets the rate at which the controller moderates or delays the generation of interrupts.



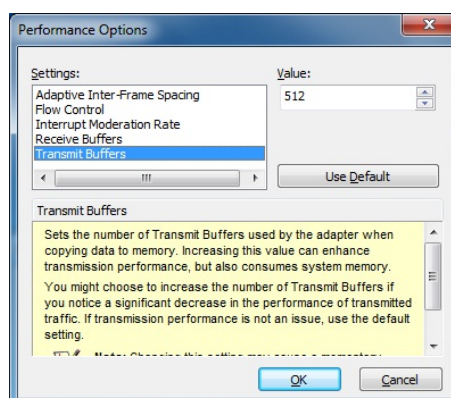
- **Receive Buffers**

This sets the number of Receive Buffers used by the driver when copying data to protocol memory.



- **Transmit Buffers**

This sets the number of Transmit Buffers, data segments used by the adapter when recording transmission packets in system memory.



### 3. OPERATION

- Notes about the case when link down is recorded in the log during OS startup.  
While Windows® is starting, the following warnings may be displayed in the event log.  
These warnings are recorded by the initialization process of the LAN driver at the startup of Windows® and will not cause any problems in the system operation.

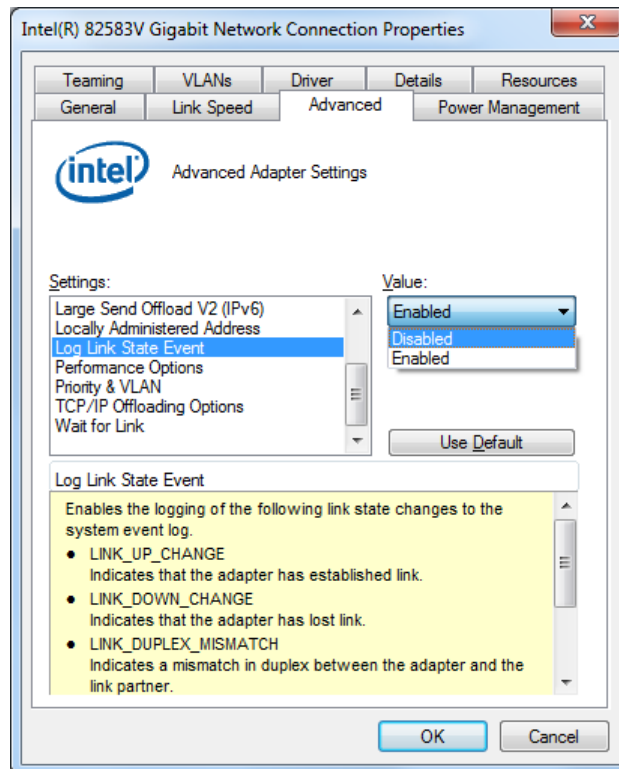
Event ID	Source	Type	Category	Description
27	e1qexpress	Warning	None	Intel(R) 82579LM Gigabit Network Connection (*) A network link has been lost.
27	e1rexpress	Warning	None	Intel(R) 82583V Gigabit Network Connection (*) A network link has been lost.

(\*) How the name is displayed differs depending on the LAN adapter.

You can keep these warnings from being displayed in the event log by changing the LAN adapter settings as follows.

Note that if you change the settings shown below, log entries such as LAN connection and disconnection during system operation are also not recorded and that may make failure analysis difficult when a problem occurs.

1. Execute steps 1 though 7 in “● Setting the network transfer speed” in “3.8 Setting Up the LAN Interface”.
2. Click the **Advanced** tab. Select **Log Link State Event**. Select **Disabled** from the **Value** list.



### 3.9 Setting Up the Screen

---

- For screen settings, you can configure the color depth (the number of colors that can be displayed on the screen simultaneously), resolution (the number of dots that constitutes the screen), refresh rate (the number of screen refreshes per second), and the single- display and multiple-display settings.

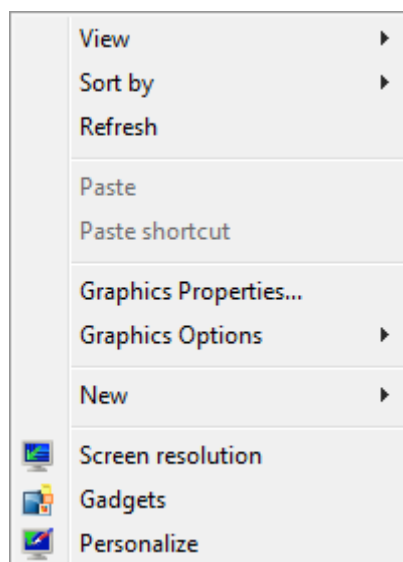
< NOTE >

- For information about the precautions for the screen, see “PRECAUTIONS 3. DISPLAY SCREEN”.

#### (1) Configuring screen settings for a single display

When one display is connected, follow the procedure below to configure the screen settings.

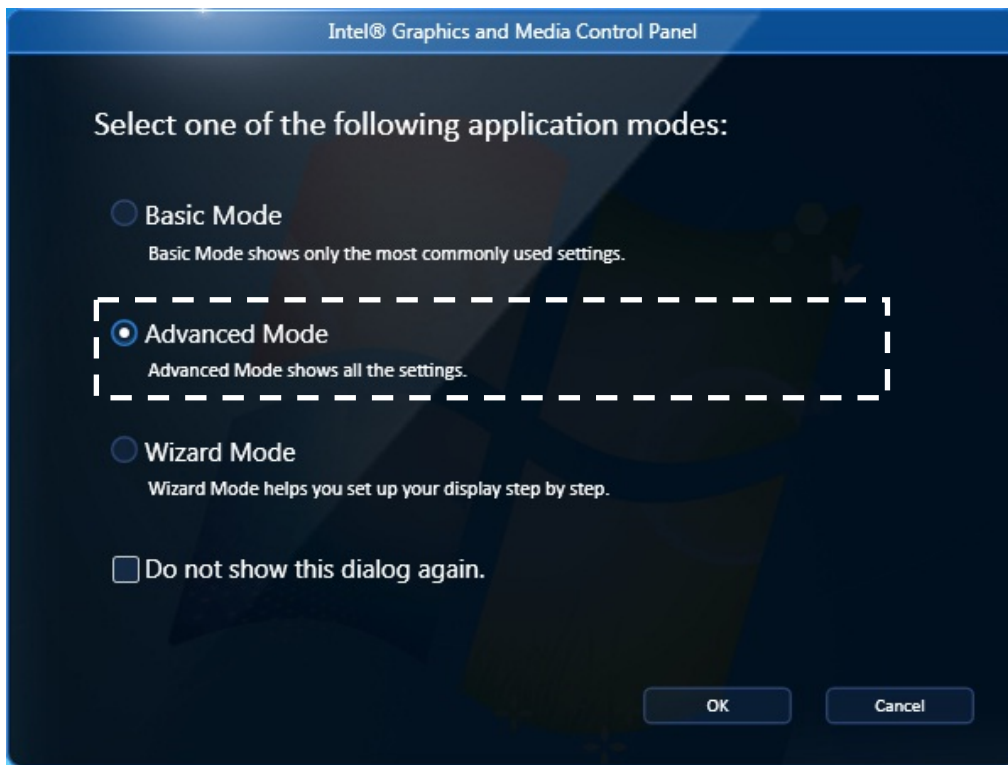
1. Right-click on the desktop to display a menu. From the menu, click **Graphics Properties** to start **Graphics and Media Control Panel**.





### 3. OPERATION

2. In the **Graphics and Media Control Panel** window, select **Advanced Mode** and click **OK**.



3. In the **Graphics and Media Control Panel** window, select **Display > General Settings**.
4. Configure the screen setting items displayed on the right side of the window.



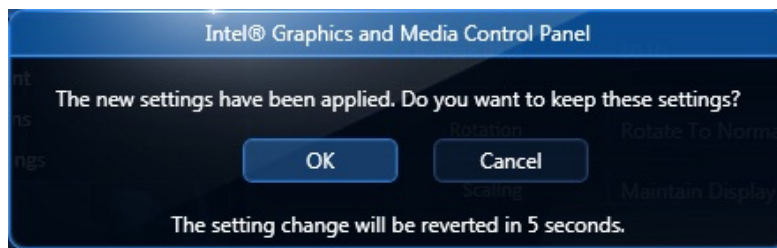
Setting Item	Description
Resolution	This allows you to select the resolution.
Color Depth	This allows you to select the number of colors.
Refresh Rate	This allows you to select the refresh rate.

< NOTE >

- Do not change the Rotation and Scaling settings.
- When you configure the resolution, color depth, and refresh rate, you must choose from the options described in “4.1 Equipment Specification (7) Supported resolutions”.

### 3. OPERATION

5. When you finish configuring the setting items, click **OK**. If you change the resolution or refresh rate, the following confirmation screen for the configuration change will be displayed. Click **OK**.



#### < NOTE >

The resolution options may include resolutions larger than the resolutions supported by the connected display.

If you select a resolution larger than the maximum resolution supported by the display, the display will black out.

When the driver is installed, the resolution is automatically set to the maximum resolution supported by the connected display. When you change the resolution, select a resolution smaller than that.

#### (2) Configuring screen settings for two (multiple) displays

This equipment supports multiple display output. If you connect two displays, the two displays can be used simultaneously. Use the Intel® Graphics and Media Control Panel to select either Clone Displays or Extended Desktop.

The following shows how to set up the Clone Displays and Extended Desktop.

**(a) Clone Displays**

If you select this mode, both displays show the same screen and have the same resolution, color depth, and refresh rate. Before connecting displays, check the capabilities of the displays (maximum resolution, highest refresh rate, and so on).

1. Right-click on the desktop to display a menu. From the menu, click **Graphics Properties** to launch the Intel® Graphics and Media Control Panel.
2. Select **Advanced Mode** and click **OK**.
3. Select **Display > Multiple Displays**.
4. Select **Clone Displays** for **Operating Mode**.



5. When you finish configuring the settings, click **OK**. If you change the resolution or refresh rate, the following confirmation screen for the setting change will be displayed. Click **OK**.



### 3. OPERATION

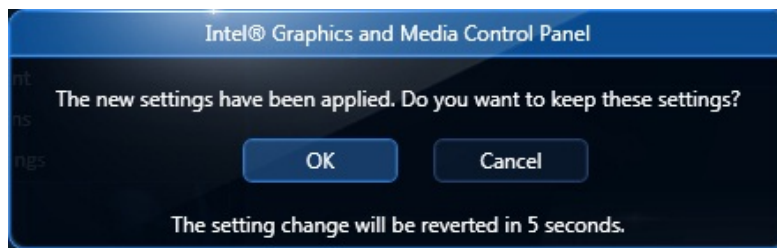
#### (b) Extended Desktop

If you select this mode, one screen is divided into two and displayed on two displays. The resolution, color depth, and refresh rate can be configured independently. The task bar is not displayed in display 2. Which resolution, color depth, and refresh rate can be selected depends on the capabilities of the display connected.

1. Right-click on the desktop to display a menu. From the menu, click **Graphics Properties** to launch the Intel® Graphics and Media Control Panel.
2. Select **Display > Multiple Displays**.
3. Select **Extended Desktop** for **Operating Mode**.



4. When you finish configuring the setting items, click **OK**. If you change the resolution or refresh rate, the following confirmation screen for the configuration change will be displayed. Click **OK**.



<Example of the Screen Using the Extended Desktop>



Display 1

Display 2

< NOTE >

- When you use Extended Desktop and try to display a gadget with an animation on display 2, the window over the gadget cannot be drawn properly. Such a gadget must be located on display 1.

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## CHAPTER 4 SPECIFICATIONS

### 4.1 Equipment Specifications

#### (1) Common specifications

Item		Specifications
Model		See “(2) Individual specifications”.
Processor		See “(2) Individual specifications”.
Main memory		4 GB/8 GB (*1)
Display resolution and color depth		See “(7) Supported resolutions”.
Built-in file device	DVD	DVD-MULTI drive
	HDD	See “(2) Individual specifications”.
	CFast	1 slot (prepared by users)
Extended slot	PCI	See “(2) Individual specifications”.
	PCI Express	See “(2) Individual specifications”.
Interface	Display (*2)	Analog RGB (Mini D-Sub 15 pins)
		HDMI (Type A 19 pins) (*3)
	USB	USB port × 8 (front × 4, rear × 4), compatible with USB2.0/1.1
	Serial	RS-232C (D-sub 9 pins) × 2
	LAN	1000BASE-T/100BASE-TX/10BASE-T × 2 (RJ45, Wake on LAN™ supported by only LAN B port)
Audio	LINE IN × 1, LINE OUT × 1, Microphone input × 1	
External Dimensions (Width × Depth × Height)		100 × 262 × 348 mm (protrusions, rubber feet, and vertical installation stand not included)
RAS features		Hardware status monitoring (fan failure (excluding a power fan), temperature failure, SMART, drive operating time, and others), watchdog monitoring, alarm notification (pop up notification, Digital LEDs for Status indication, remote notification, and others), memory dump collection, maintenance operation support commands, and simulation function
Weight		See “(2) Individual specifications”.
Inrush current (*4)		65 A or less (20 ms or less) (115 VAC) 80 A or less (20 ms or less) (230 VAC)
Leakage current		3.5 mA or less
Consumption current (Max)		100 VAC: 1.6 A, 240 VAC: 0.9 A
Power	Power	100 - 240 VAC (wide range input)
	Frequency	50/60 Hz ± 3 Hz
	Output Capacity	270 W
USB keyboard and mouse		Option

(\*1) Due to the requirements of the OS, the maximum usable memory size is about 3.41 GB in Windows® 7 (32-bit) (when the size of main memory is 4 GB or 8 GB).

(\*2) If you install a video board in the extension slot, you cannot use all the display ports of the motherboard.

(\*3) By using a conversion connector or a conversion cable, you can output DVI-D. The conversion connector or the conversion cable must be provided by the users.

(\*4) When using this equipment, connect a breaker or the like in preparation for an inrush current.



## 4. SPECIFICATIONS

### (2) Individual specification

Item		Specifications	
Model (*5)		HJ-T101	HJ-T105
		HJ-T101xxxMA HJ-T101xxxMD	HJ-T105xxxMA HJ-T105xxxMD
Processor		Intel® Celeron® B810 (1.6 GHz)	Intel® Core™ i5® 2510E (2.5 GHz)
Built-in file device (*6)	HDD1	SATA 500 GB	
	HDD2	SATA 500 GB (*7)	
	RAID (D model only)	RAID1: Not hot-swappable	
Extension slot	PCI	Full-height short size × 1	
	PCI Express	Full-height short-sized PCI Express x16 × 1	
Weight		About 5.5 kg (A model) About 6.0 kg (D model)	

(\*5) The “xxx” denotes the OS type. For details about OS types, see “(3) Pre-installed OS model specifications”.

If “xxx” is “NOS”, an OS is not installed.

An “M” denotes that the OS supports multiple languages: Japanese, English, Chinese (Mandarin), Chinese (Cantonese), Chinese (Taiwanese), Korean, Thai, and Portuguese

The alphabet at the end denotes the model: A: HDD model (A model), D: RAID1 model (D model).

(\*6) For information about the precautions for hard disks, see “PRECAUTIONS 4. HARD DISK DRIVES (HDDs)”.

(\*7) HDD2 is optional item in the A model, but it becomes essential item in the D model.

### (3) Pre-installed OS model

OS type	Pre-installed OS
8EW	Microsoft® Windows® 7 Professional (64bit) (Embedded licensing version)
9EW	Microsoft® Windows® 7 Professional (32bit) (Embedded licensing version)

### (4) Accessories

Item	Note
Power cord	7 A 125 V two-prong plug with a grounding pole
Stand for vertical installation	Used to install the equipment vertically
Manual	“GETTING STARTED” (manual number BT-6A-0002)

**(5) Option specifications**

Item	Specifications
Riser board for a PCI board (*1)	PCI slot × 1 (For details, see “(9) Specifications for the riser board for the PCI board”.)
Riser board for a PCI Express × 16 board (*1)	PCI Express x16 slot × 1 (For details, see “(10) Specifications for the riser board for the PCI Express × 16 board”.)
Service menu	General Q and A service (10 incidents per year)

(\*1) Both of them cannot be used simultaneously. You can install only either of them with the motherboard.

**(6) DVD drive specification**

The DVD drive in this equipment supports the following types of media.

Item	Specifications
Read supported	CD-ROM, DVD-ROM
Read/write supported	DVD-R, CD-R, CD-RW

**(7) Supported resolutions**

- Onboard video (Mini D-Sub 15 pins)

Screen settings		
Resolution	Color depth	Refresh rate (*1)
		For analog output
800 × 600	High Color (16 bit)	60 Hz, 75 Hz, 85 Hz
	True Color (32 bit)	60 Hz, 75 Hz, 85 Hz
1024 × 768	High Color (16 bit)	60 Hz, 75 Hz, 85 Hz
	True Color (32 bit)	60 Hz, 75 Hz, 85 Hz
1280 × 1024	High Color (16 bit)	60 Hz, 75 Hz, 85 Hz
	True Color (32 bit)	60 Hz, 75 Hz, 85 Hz
1600 × 1200	High Color (16 bit)	60 Hz
	True Color (32 bit)	60 Hz
1920 × 1080	High Color (16 bit)	60 Hz
	True Color (32 bit)	60 Hz
1920 × 1200	High Color (16 bit)	60 Hz
	True Color (32 bit)	60 Hz

(\*1) It has been confirmed that all refresh rate settings indicated in the table actually work in the test environment provided by Hitachi. It should be noted that supported resolutions and refresh rates are different depending on the display. Consequently, some settings may not be used for a specific display.

#### 4. SPECIFICATIONS

- Onboard video (HDMI 19 pins) (\*1)

Screen settings		
Resolution	Color depth	Refresh rate (*2)
		For digital output
800 × 600	High Color (16 bit)	60 Hz
	True Color (32 bit)	60 Hz
1024 × 768	High Color (16 bit)	60 Hz
	True Color (32 bit)	60 Hz
1280 × 1024	High Color (16 bit)	60 Hz
	True Color (32 bit)	60 Hz
1600 × 1200	High Color (16 bit)	60 Hz
	True Color (32 bit)	60 Hz
1920 × 1080	High Color (16 bit)	60 Hz
	True Color (32 bit)	60 Hz
1920 × 1200	High Color (16 bit)	60 Hz
	True Color (32 bit)	60 Hz

(\*1) DVI output is available through an HDMI-DVI conversion connector (optional) or an HDMI-DVI conversion cable (prepared by the user).

(\*2) It has been confirmed that all refresh rate settings indicated in the table actually work in the test environment provided by Hitachi. It should be noted that supported resolutions and refresh rates are different depending on the display. Consequently, some settings may not be used for a specific display.

#### (8) Main memory specifications

Only the following combinations can be used for the configuration of the main memory of this equipment.

Slot A	Slot B	Total capacity
4 GB	–	4 GB
4 GB	4 GB	8 GB

#### (9) Specifications for the riser board for the PCI board

Item	Specifications
Interface	PCI slot × 1
Installed slot	PCI Express
Dimensions	110 × 75 mm (board only, protrusions excluded)
Weight	About 150 g

#### (10) Specifications for the riser board for the PCI Express × 16 board

Item	Specifications
Interface	PCI Express x16 slot × 1
Installed slot	PCI Express
Dimensions	110 × 75 mm (board only, protrusions excluded)
Weight	About 150 g

**(11) Maximum current specifications (USB port, Extension slot)**

The following table shows the maximum total current consumption for each of the USB ports, extension slots (PCI Express / PCI). Make sure that the inrush current when a device is connected does not exceed the specified maximum current. If the inrush current exceeds the specified maximum current, the surge protection circuit may be activated and the connected device may not be recognized.

Item	Voltage (*)	Maximum current	
		When using the riser board for PCI	When using the riser board for PCI Express
USB port	5 V	0.5 A/port	
Extension slot	3.3 V	1.0 A/slot	3.0 A/slot
	5 V	1.0 A/slot	–
	12 V	1.0 A/slot	2.1 A/slot

(\*) 5 V can be supplied to the extension slot (1 A) and the USB ports (4 A: 0.5 A × 8 ports) at the same time.

**4.2 BIOS Setup**

---

The BIOS stores the system configuration information in the SPI-ROM. When the system configuration is modified, it may be necessary to change the BIOS settings.

**< NOTE >**

When the equipment is shipped, the BIOS is configured in accordance with the system configuration.  
 If the BIOS settings are changed, the system may not operate stably or may not start properly. Pay sufficient attention when you change the BIOS settings.

**(1) Starting the setup menu**

When you set up the BIOS, start the setup menu.

Turn on the power switch (see “2.1 Display and User Input Sections”). Messages related to system initialization will be displayed. Press the F2 key to launch the setup menu.

**(2) Maneuvering through the setup menu**

Use the following keys to maneuver through the menu.

Key name	Description
Esc	Used for exiting the setup or returning from a lower menu to a higher menu.
← or →	Used for selecting a menu or selecting a menu group displayed at the top of the screen.
↑ or ↓	Used for selecting an item or selecting a sub-item under a menu group.
+ or -	Used for selecting a value for the setting. By pressing those keys, the setting switches among the available options.
Space	Used for selecting a value for the setting. If there are only two available options, the setting toggles when you press the key.
Tab	When you configure the date and time, by pressing this key, the focus moves between setting items, for example, from month to day and from hour to minute.
Enter	Used for moving from a higher menu to a lower menu, exiting the setup (saving data to the SPI-ROM), or other purposes.

**(3) Overview of the setup menu**

The setup menu consists of the following items:

Main: You can confirm the basic configuration of the system. You can also set the date and time.

Advanced: You can make detailed settings that are available with the system.

Chipset: You can make detailed settings that are available with the system.

Boot: You can specify boot settings for the system.

Security: You can set a password for system security.

Save & Exit: You can load or save the setup settings, or end the setup menu.

**(4) Details of the setup menu**

The following tables show the details of the items you can set up in each menu.

(1/4)

Top menu	Setting item		Default value	Note	
Main	System Date			When you set the system up for the first time, be sure to configure these two items.	
	System Time				
Advanced	PCI Subsystem Settings	PCI ROM Priority	Legacy ROM	Do not change this setting.	
		ACPI Settings	ACPI Sleep State		Suspend Disabled
			Resume On RTC Alarm		Disabled
	Trusted Computing	TPM SUPPORT	Disabled		
	CPU Configuration	Hyper-threading		Enabled	You can specify hyper-threading (multi-threading). This item is displayed only when the CPU is Core i5.
		Active Processor Cores		All	You can set the number of CPU cores (The number of cores you can set depends on the CPU installed.)
		Limit CPUID Maximum		Disabled	Do not change this setting.
		Execute Disable Bit		Enabled	
		Hardware Prefetcher		Enabled	
		Adjacent Cache Line Prefetch		Enabled	
		Intel Virtualization Technology		Enabled	
	Power Technology		Energy Efficient		
	SATA Configuration	SATA Controller(s)		Enabled	
		SATA Mode Selection		IDE	
	Intel TXT(LT) Configuration	Intel TXT(LT) Support		Disabled	
	PCH-FW Configuration	Firmware Update Configuration	Me FW Image Re-Flash	Disabled	
	AMT Configuration	Intel AMT		Disabled	
		Intel AMT Setup Prompt		Disabled	
		BIOS Hotkey Pressed		Disabled	
		MEBx Selection Screen		Disabled	
Verbose Mebx Output		Disabled			
Hide Un-configure ME Confirmation		Disabled			
MEBx Debug Message Output		Disabled			
Un-Configure ME		Disabled			
Intel AMT Password Write Enabled		Disabled			
AMT Wait Timer		0			
	ASF		Disabled		

4. SPECIFICATIONS

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Top menu	Setting item		Default value	Note		
Advanced	AMT Configuration	Activate Remote Assistance Process		Disabled	Do not change this setting.	
		USB Configure		Disabled		
		PET Progress		Disabled		
		Intel AMT SPI Protected		Disabled		
		AMT CIRA Timeout		0		
		OS Timer		0		
		BIOS Timer		0		
	USB Configuration	Legacy USB Support		Enabled	You can specify the functions that support USB ports.	
		EHCI Hand-off		Disabled	Do not change this setting.	
	Super IO Configuration	Serial Port * Configuration (*: 1, 3 to 5)	Serial Port	Enabled		
			Change Settings	Auto		
		Smart Fan Function		Enabled		
		Smart Fan Mode Configuration	System Fan Mode	Manual Mode		
			SYSFAN PWM/DC Voltage Output Value	96		
			CPU Fan Mode	Manual Mode		
			CPU FAN PWM/DC Voltage Output Value	64		
		Power-Loss		Last State		You can specify the startup state that the equipment is in when the PC is turned on.
		Case Open Warning		Disabled		Do not change this setting.
		Resume on PS2 KB		Disabled		
		Resume on PS2 MS		Disabled		
		Resume on Ring		Disabled		
		Watch dog Timer		Disabled		
		Digital I/O Configuration	Digital I/O Pin 0, 1, 5			
	Digital I/O Pin 2 to 4, 6		Input			
	Digital I/O Pin 7		Output Low			
	H/W Monitor	CPU Warning Temperature		Disabled		
		ACPI Shutdown Temperature		Disabled		
Serial Port Console Redirection	COM1, COM6	Console Redirection	Disabled			
	Serial Port for Out-of-Band Management/ Windows Emergency Management Services (EMS)	Console Redirection	Disabled			
		Out-of-Band Mgmt Port	COM1			
		Terminal Type	VT-UTF8			

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Top menu	Setting item		Default value	Note		
Advanced	Sandybridge DTS Configuration	CPUDTS	Disabled	Do not change this setting.		
		Sandybridge PPM Configuration	EIST		Enabled	
	Sandybridge PPM Configuration	Turbo Mode		Disabled	You can specify the setting to use the CPU at the fast rate.	
		CPU C3 Report		Disabled	Do not change this setting.	
		CPU C7 report		Disabled		
		Long duration power limit		0	This item is displayed when Turbo Mode is enabled. Do not change the settings.	
		Long duration maintained		28		
		Short duration power limit		0		
TCC active offset		0				
Chipset	System Agent(SA) Configuration	VT-d		Enabled	Do not change this setting.	
		Primary Display		Auto		
		Intel IGFX Configuration	Graphics Turbo IMON Current			31
			Internal Graphics			Auto
			GTT Size			2MB
			DVMT Pre-Allocated			64M
			DVMT Total Gfx Mem			MAX
			LCD Control	Primary IGFX Boot Display		VBIOS Default
		NB PCIe Configuration	PEG0 - Gen X			Auto
			Always Enable PEG			Disabled
		Memory Configuration	DIMM profile			Default DIMM profile
			Memory Frequency			Auto
			Max TOLUD			Dynamic
			NMode Support			Auto
			Memory Scrambler			Disabled
			RMT Crosser Support			Disabled
			MRC Fast Boot			Enabled
		DIMM Exit Mode		Auto		
	PCH-IO Configuration	LAN1 Controller		Enabled		
		LAN1 Option-ROM		Disabled		
		Wake on LAN1 from S5		Enabled		
		LAN2 Controller		Enabled		
		LAN2 Option-ROM		Disabled		
Wake on LAN2 from S5		Enabled				
Azalia		Auto				
After G3 Status		Power On				
High Precision Timer		Enabled				
USB Configuration		EHCI 1		Enabled		
	EHCI 2		Enabled			



## 4. SPECIFICATIONS

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Top menu	Setting item	Default value	Note	
Boot	Setup Prompt Timeout	1	Do not change this setting.	
	Bootup NumLock State	On		
	Quiet Boot	Disabled		
	GateA20 Active	Upon Request		
	Interrupt 19 Capture	Disabled		
	1st Boot	USB Floppy	Configures the priority order of the devices from which an OS is booted. Do not change this setting.	
	2nd Boot	CD/DVD		
	3rd Boot	USB CD/DVD		
	4th Boot	Hard Disk		
	5th Boot	UEFI: Built-in EFI Shell		
	CD/DVD ROM Drive BBS Priorities	Built-in DVD drive	Not displayed when the device is not connected.	
	Hard Disk Drive BBS Priorities	HDD1, HDD2	Do not change this setting.	
UEFI Boot Drive BBS Priorities	Built-in EFI Shell	Do not change this setting.		
Security	Administrator Password	-	If you set a password using this menu, you cannot use the HDD if somebody sets a different password during repair or maintenance or you forget the password. Consider carefully whether you need to set a password as well as how to manage a password.	
	User Password			
Save & Exit	Save Changes and Exit	-	You can exit after saving the settings.	
	Discard Changes and Exit		You can exit without saving the settings.	
	Save Changes and Reset		You can restart the system after saving the settings.	
	Discard Changes and Reset		You can restart the system without saving the settings.	
	Save Options		Save Changes	You can save the settings.
			Discard Changes	The settings are not saved.
	Restore Defaults		You can restore the defaults.	
	Save as User Defaults		You can save the changes as user defaults.	
	Restore User Defaults		You can restore the user defaults.	
	Boot Override		Built-in EFI Shell	A device that can be booted is displayed.
			Connected device name	

**(5) Restoring the default settings**

When you want to restore all items in the setup menu back to the default settings, follow the procedure below:

1. Start the setup menu. (See “(1) Starting the setup menu”.)
  2. Open **Save & Exit** in the top menu. Move the cursor to **Restore Defaults** and press **Enter**.
  3. The message, “Load optimized Defaults?” is displayed. Move the cursor to **Yes**. Press **Enter**.
  4. Open **Save & Exit** in the top menu again. Move the cursor to **Save Changes and Exit**. Press **Enter**.
  5. The message “Save configuration and exit?” is displayed. Press **Enter**.
- This completes the procedure.

## 4. SPECIFICATIONS

### 4.3 Hardware System Clock

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This equipment has a hardware system clock that uses an RTC (real-time clock) IC. The clock has a built-in calendar and continues to work using a backup battery even when the system power is off.

Table 4-1 Hardware System Clock Specification

Item	Specifications
Time function	Hour/Minute/Second (24-hour clock)
Date function	Year/Month/Date
Precision	$\pm 3$ minutes per month (*)
Battery backup	Lithium button cell battery

(\*) Rough estimates when the ambient temperature is 25°C.

For your information, the system program normally updates the internal clock by using a periodic timer. The internal clock is adjusted by reading the time and date from the hardware clock when, for example, the system starts.

**4.4 Interface Specifications**

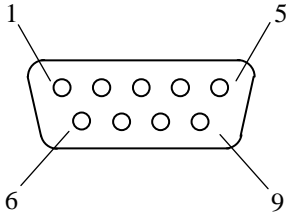
**4.4.1 Connector specifications**

The following shows the specifications of the interfaces from this equipment to external devices.

For information about the location of the ports, see “2.1 Display and User Input Sections”.

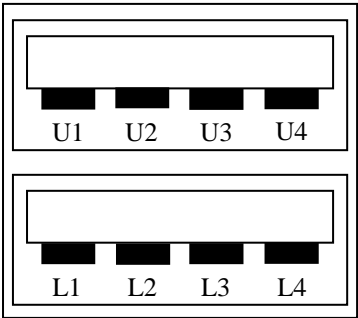
**(1) Motherboard (Standard)**

- Serial port (male connector, inch screws) (COM A, COM B)



Pin No.	Signal name	Pin No.	Signal name
1	CD	6	DSR
2	RD	7	RTS
3	TD	8	CTS
4	DTR	9	RI
5	GND		

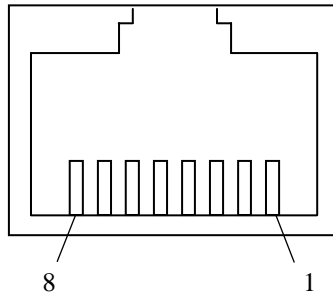
- USB port (front and rear)



Pin No.	Signal name
U1	+5V
U2	USBD0-
U3	USBD0+
U4	GND
L1	+5V
L2	USBD1-
L3	USBD1+
L4	GND

#### 4. SPECIFICATIONS

- Built-in LAN port (RJ-45 modular port 8 pins) (LAN A, LAN B)

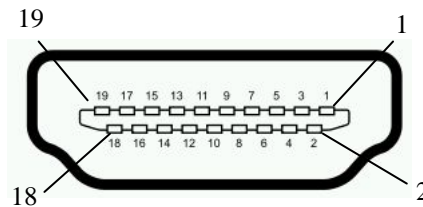


Pin No.	Signal name
1	TRD0+
2	TRD0-
3	TRD1+
4	TRD2+
5	TRD2-
6	TRD1-
7	TRD3+
8	TRD3-

For network connection, use a cable specified as follows.

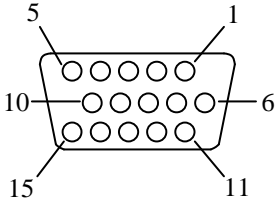
Cable specification: UTP cable (twisted-pair cable without shield) category 5e or 6

- Video port (HDMI)



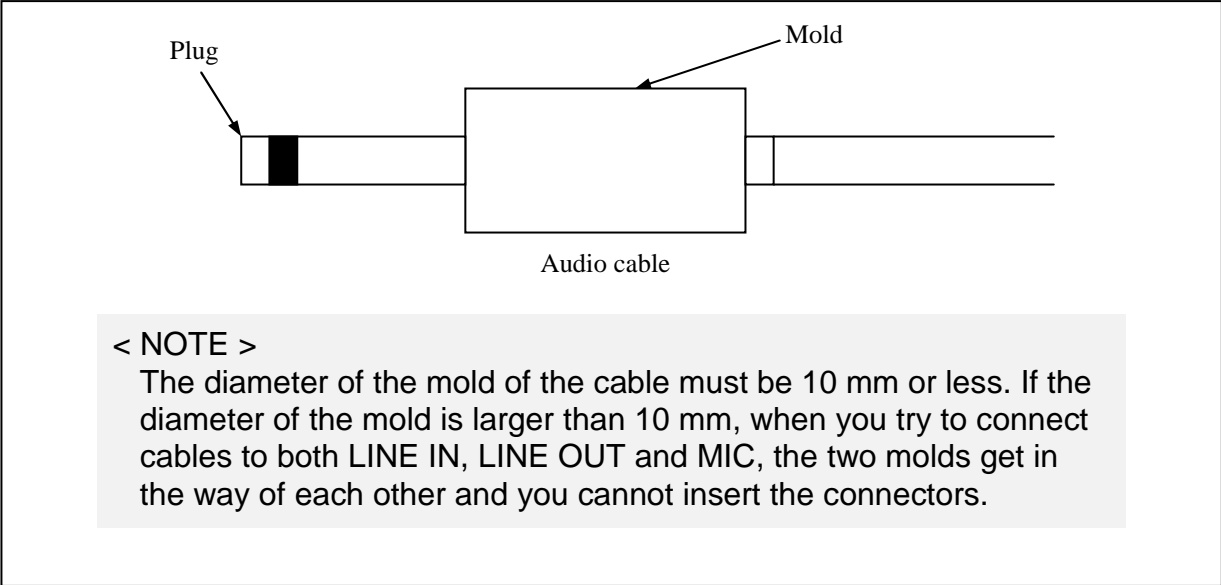
Pin No.	Signal name	Pin No.	Signal name
1	TMDS Data2+	10	TMDS Clock+
2	TMDS Data2Shield	11	TMDS ClockShield
3	TMDS Data2-	12	TMDS Clock-
4	TMDS Data1+	13	NC
5	TMDS Data1Shield	14	NC
6	TMDS Data1-	15	SCL
7	TMDS Data0+	16	SDA
8	TMDS Data0Shield	17	GND
9	TMDS Data0-	18	+5V
		19	HotPlug

● Video port (Analog RGB, D-Sub 15 pins)



Pin No.	Signal name	Pin No.	Signal name
1	R	9	5V
2	G	10	GND
3	B	11	NC
4	NC	12	DDCDATA
5	GND	13	HSYNC
6	R-GND	14	VSYNC
7	G-GND	15	DDCCLK
8	B-GND		

● Audio port: LIN, LOUT and MIC (3.5φ stereo audio port)



## 4. SPECIFICATIONS

### 4.4.2 External interface cable length specifications

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#### (1) External interface cable length specifications

The recommended maximum cable length for each interface of this equipment is as follows.

No.	Connector name	Cable length (m)	Remarks
1	Analog RGB port	3	
2	HDMI port	3	
3	LAN port (LAN A)	100	UTP Category 5e or better
4	LAN port (LAN B)		
5	Serial port (COM A)	15	Use a shielded cable.
6	Serial port (COM B)		
8	Front USB ports (4 ports)	1	Use a USB 2.0 compliant shielded cable. If you use an extension cable, connected USB devices may not work properly.
9	Rear USB ports (4 ports)	3	
10	Audio (LINE IN/LINE OUT/MIC)	2	

A connected device may not work properly depending on the device. Check proper operation of the device before you use it.

## CHAPTER 5 CHECKUP AND MAINTENANCE

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### 5.1 Daily Checkup

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#### **WARNING**

Make sure to install a dust filter to equipment. If you do not, dusts enter into the equipment and the short circuit fire may occur as a result.



#### **CAUTION**

Before you clean or replace the dust filter or the case fan of this equipment, make sure you shut down the OS, disconnect the plug of the power cord from the outlet, and wait for at least one minute. Otherwise, the injury of hands and fingers may result.

#### **NOTICE**

- Before you move this equipment, make sure you shut down the OS, disconnect the plug of the power cord from the outlet, and wait for at least one minute. If you do not, the HDDs and other devices may fail.
- When you transport or carry the equipment, pack it in the dedicated container (container and packing materials used when the equipment was delivered). If you use other container or packing materials, that may damage the equipment.
- Do not use damaged or broken dedicated container when you transport or carry the equipment. If you do, that may damage the equipment.
- If you install the equipment in a mounting chassis or rack with casters, the equipment may be subjected to excessive vibration or shock when it is transported or moved and that may cause the equipment to fail. In order to avoid failure, you must select or design a chassis or rack that satisfies the installation environment requirements of the equipment and be cautious about vibration and shock when you move, transport, or carry the installed equipment.



**(1) Cleaning a dust filter**

**NOTICE**

If you wash a dust filter, dry it completely before re-attaching it to the equipment. If you use the equipment while its dust filter is not completely dry, the equipment may fail. When you use a detergent to clean a dust filter, make sure you use a neutral detergent. If you use other types of detergent, the dust filter may lose its function.

● Frequency

Clean a dust filter between once per month and once per three months depending on the amount of dust in the environment.

● Procedure

1. Shut down the OS.

2. Unplug the power cord from the outlet. Wait for at least one minute before you start cleaning.

3. Take out the dust filter located on the front panel. Then dust or wash the filter. If you wash the filter, wait until the filter is completely dry. Then re-attach it to the equipment.

For how to install and remove a dust filter, see “5.3.9 Installing and removing a dust filter”.

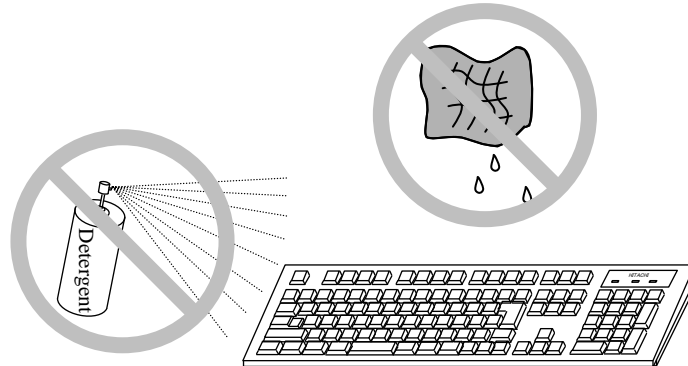
< NOTE >

- Do not forget to attach a dust filter to the equipment after you clean it.

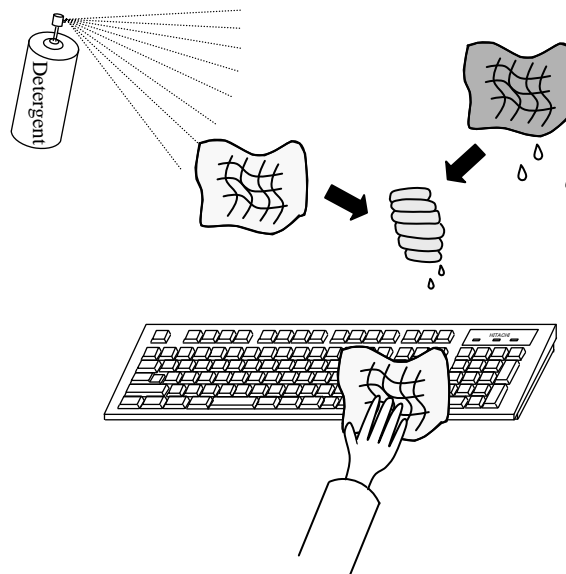
**(2) Cleaning a keyboard (optional)**

When you clean a keyboard, make sure you follow the instructions below:

- Do not spray detergent directly on to the keyboard or spill liquid detergent on it.
- Do not wipe the keyboard with a wet cloth. If you do, the equipment may fail.



- When you use detergent, spray a minimum amount of detergent on a cloth.
- Before wiping the keyboard with a wet cloth, wring out the cloth well.
- Use a soft cloth such as gauze.
- Before using detergent, carefully read the instructions on use of the detergent.
- Cover the whole keyboard with gauze, spray detergent all over it, leave it for a couple of minutes, and wipe off the keyboard.

**< NOTE >**

- For information about the precautions for USB devices, see “PRECAUTIONS 6. USB DEVICE”.

5. CHECKUP AND MAINTENANCE

**5.2 Periodic Checkup**

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The table below shows how to check up the Equipment periodically. A qualified maintenance personnel must conduct this periodical checkout. Include the checkout time in the system operation schedule.

Checkup item	Frequency	Note
Collection of logging information	Once per year	
Inspection and cleaning for the components <ul style="list-style-type: none"> <li>• Inspection and cleaning for inside and outside of the equipment</li> <li>• Inspection of fan rotation, dust removal</li> <li>• Removal of foreign objects that have entered the equipment</li> <li>• Other general inspection items</li> </ul>	Once per year	
Replacing dust filters	Once per year	
Measuring the power voltage	Once per year	
Operation check <ul style="list-style-type: none"> <li>• Operation check of switches and indicators</li> <li>• Operation check by using test programs</li> </ul>	Once per year	
Periodic replacement of replacement components (*)	As required	
Routine checkup <ul style="list-style-type: none"> <li>• Cleaning the keyboard</li> <li>• Cleaning dust filters</li> </ul>	Between once per month and once per three months	For details, see section “5.1 Daily Checkup”.

(\*) For details about how to handle replaceable components, see “APPENDIX HANDLING REPLACEABLE COMPONENTS”.

**5.3 Replacing a Component**

**! CAUTION**

- Before attaching or detaching the vertical installation stand or dust-proof stand for vertical installation, shut down the OS and disconnect the power code from the outlet.
- If you install the equipment vertically on your desk, it may topple or fall, resulting in personal injury. Be sure to install it on the vertical installation stand that comes with the equipment on a level surface.

**5.3.1 Types and locations of installed components**

The figure below shows the types and locations of the components installed in this equipment.

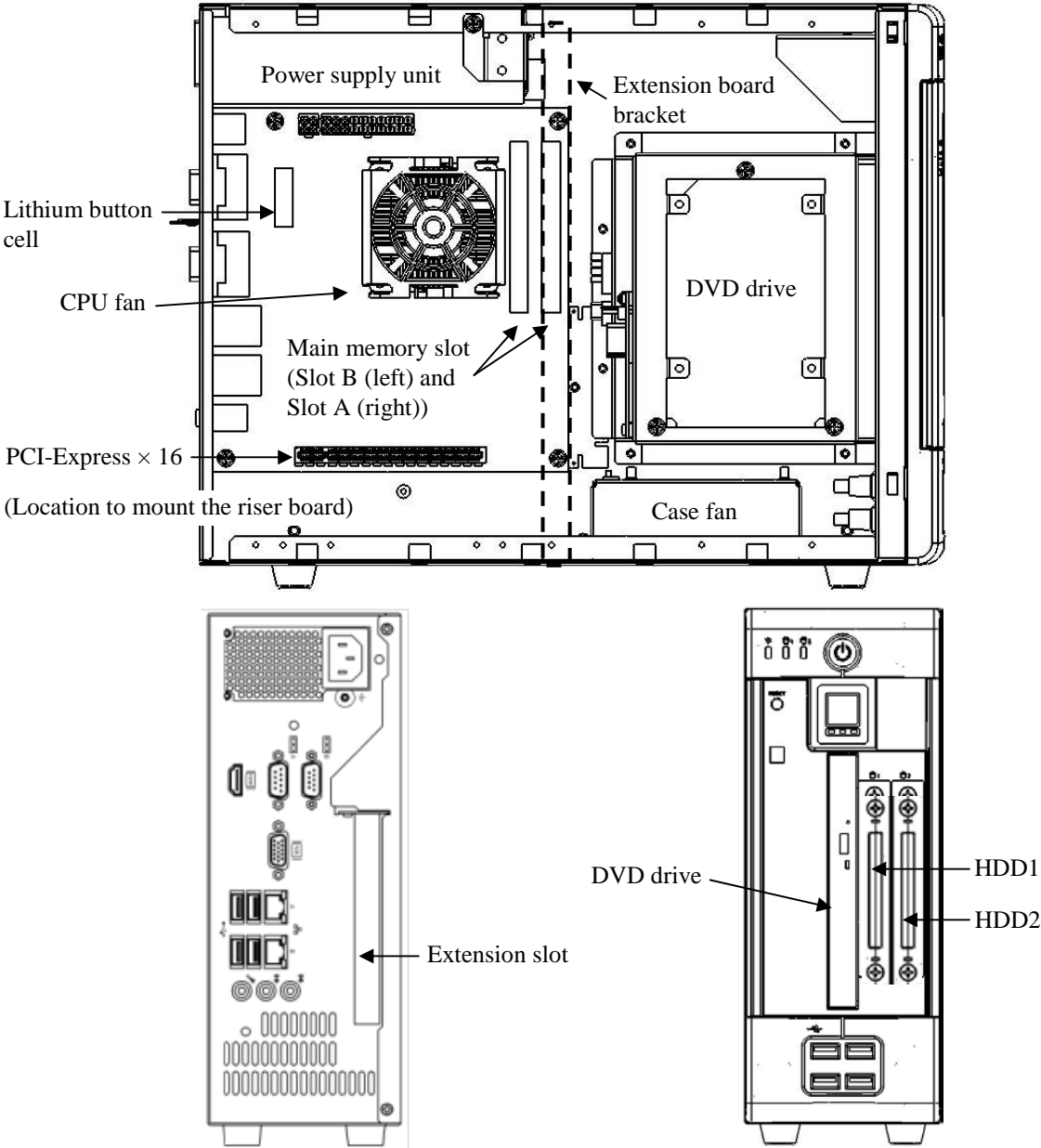


Figure 5-1 Types and Locations of Installed Components

### 5.3.2 Installing and removing the cover of the equipment



#### CAUTION

When you install the cover of the equipment, do not put your fingers inside the cover. If you do, your fingers may get caught and injured.

#### (1) Removing the cover of the equipment

[1] Remove the two screws on the rear of the equipment.

[2] Slide the cover to the rear of the equipment.

[3] Slightly pull the sides of the cover apart from the body of the equipment and then lift the cover up and away.

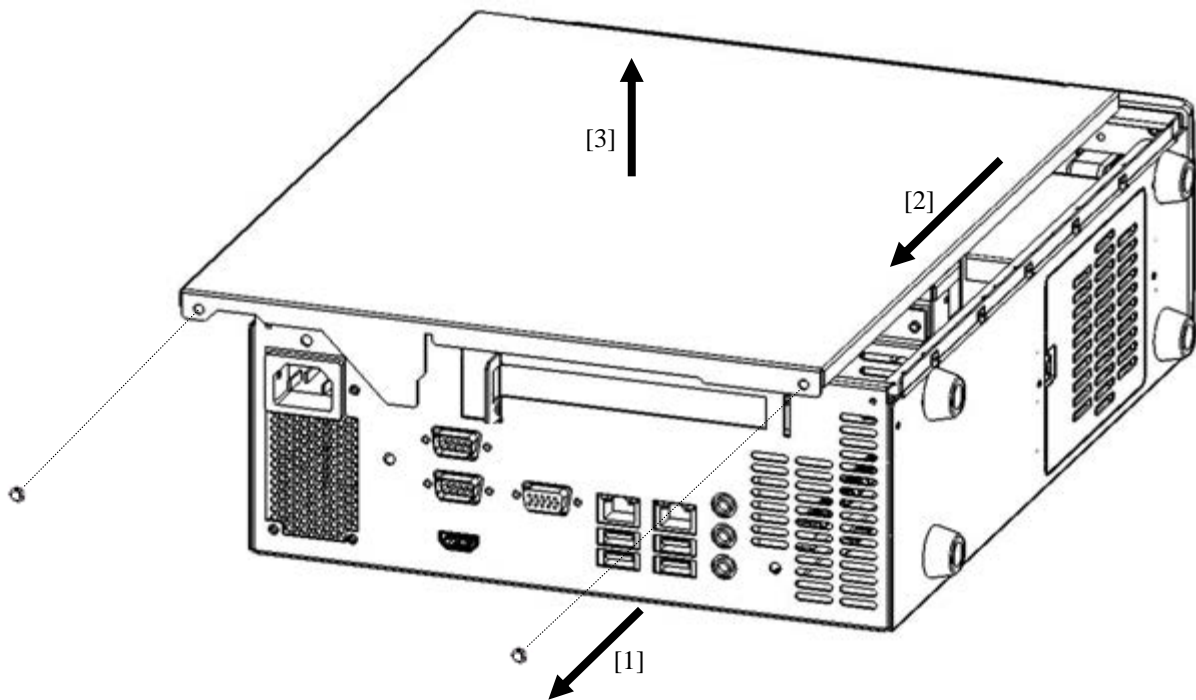


Figure 5-2 Removing the Cover of the Equipment

#### (2) Installing the cover of the equipment

When installing the cover of the equipment, reverse the procedure described in “(1) Removing the cover of the equipment.”

### 5.3.3 Installing and removing a riser board

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#### **WARNING**

Before you install or remove a riser board, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. If you install or remove a riser board without shutting down the power, an electric shock or a fire may result.



#### **CAUTION**

Do not hold the riser board or touch the parts with your bare hands when installing or removing it. Those parts are hot and if you touch them, you may get burned. In addition, if you touch them, they may get damaged and that may result in failure of the equipment.

#### **NOTICE**

Make sure you disconnect all external cables connected to the equipment before you install or remove a raiser board. Otherwise, failure of the equipment may result.

#### **(1) Before installing or removing the riser board**

- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Allocate sufficient clearance for maintenance work. Carry out the work on a flat surface. (See “1.2.2 Installation”.)
- Wear cotton gloves when you install or remove an riser board.
- When you tighten or remove a screw, use a Phillips screwdriver (JIS #2) to avoid stripping the head.
- When you tighten a screw, drive the screw along the axis of the tapped hole without adding too much torque in order to avoid damaging the thread.
- For information about the location of the riser board, check “Figure 5-1 Types and Locations of Installed Components.”
- Before installing or after removing the riser board, place the tip of the vacuum cleaner nozzle on the top of a connector where the riser board is (was) installed and clean the connector three times along the connection part.

**(2) Installing the riser board**

(a) Removing the cover of the equipment

Follow the instructions in “5.3.2 Installing and removing the cover of the (1) Removing the cover of the equipment” to remove the cover of the equipment.

(b) Installing the riser board

Insert the riser board into the PCI Express-standard connector of the motherboard, holding down the both ends of the riser board.

After inserting the riser board completely by holding down the part right above the board connector, tighten the screws to secure the riser board to the equipment.

After this, install the cover of the equipment, following the installation procedure in the reverse order.

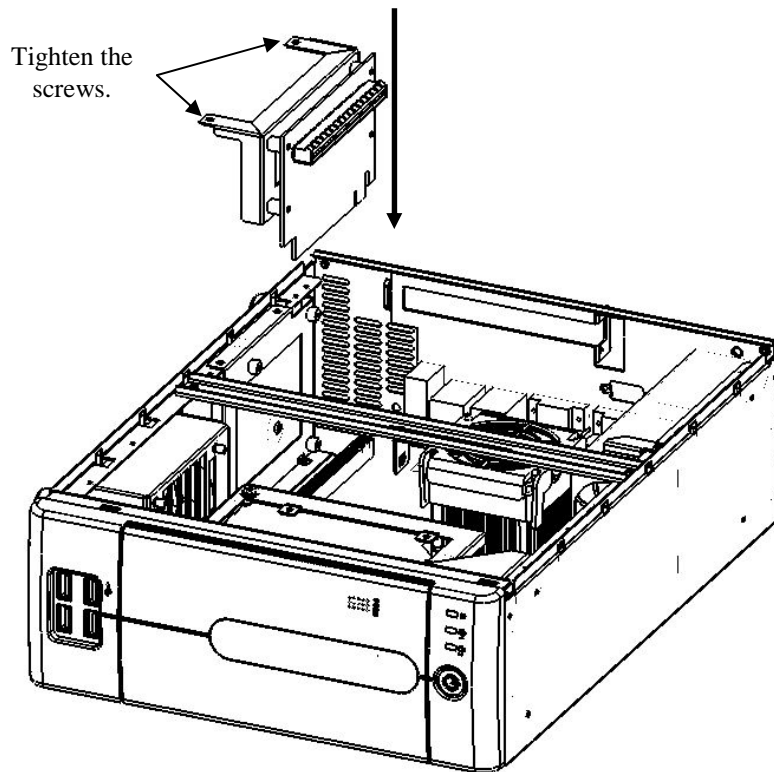


Figure 5-3 Installing the Riser Board

**(3) Removing the riser board**

Follow the procedure described in “(2) Installing the riser board” in reverse to remove the extension board.

**5.3.4 Installing and removing an extension board****WARNING**

Before you install or remove an extension board, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. If you install or remove an extension board without shutting down the power, an electric shock or a fire may result.

**CAUTION**

Do not directly touch the parts inside the equipment with your hand when you install or remove an extension board. Those parts are hot and if you touch them, you may get burned. In addition, if you touch them, they may get damaged and that may result in failure of the equipment.

**NOTICE**

Make sure you disconnect all external cables connected to the equipment before you install or remove an extension board. Otherwise, failure of the equipment may result.

**(1) Before installing or removing an extension board**

- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Allocate sufficient clearance for maintenance work. Carry out the work on a flat surface. (See “1.2.2 Installation”.)
- Wear cotton gloves when you install or remove an extension board.
- When you tighten or remove a screw, use a Phillips screwdriver (JIS #2) to avoid stripping the head.
- When you tighten a screw, drive the screw along the axis of the tapped hole without adding too much torque in order to avoid damaging the thread.
- For information about the location of the extension boards, see “Figure 5-1 Types and Locations of Installed Components”.
- Before installing or after removing the riser board, place the tip of the vacuum cleaner nozzle on the top of the connector where the riser board is (was) installed and clean the connector three times along the connection part.

**< NOTE >**

- For information about the precautions for extension boards, see “PRECAUTIONS 7. EXTENSION BOARDS”.



## (2) Information about extension boards

### 1. Types of extension boards

The extension boards can be used only when you install the optional riser board. A PCI Express extension slot or a PCI extension slot is available depending on the type of the riser board.

### 2. Size of extension boards

The dimensions (length × height) of the extension board that can be mounted on the riser board for PCI Express or the riser board for PCI are as follows (the height includes the connector):

- Extension board that can be mounted on the riser board for PCI Express
  - PCI Express board: 167.65 × 111.15 (mm)
- Extension board that can be mounted on the riser board for PCI
  - PCI board: 174.63 × 106.68 (mm) (\*1)

(\*1) Because the riser board for PCI does not have -12V bus power, no PCI board that requires -12V power can be used. Before using a PCI board, check the power supply requirements.

**(3) Installing an extension board****(a) Removing the cover of the equipment**

Follow the instructions in “5.3.2 Installing and removing the cover of the equipment (1) Removing the cover of the equipment” to remove the cover of the equipment.

**(b) Removing a slot cover**

Remove the screw on the slot cover of the extension slot. Then remove the slot cover.

**(c) Installing an extension board**

[1] Insert the extension board into the connector of the riser board, holding down the both ends of the extension board from right above the extension slot. At this time, make sure to insert the metal fitting into the stopper of the equipment (see the figure below).

[2] Press down on the board at the position right above the connector of the board to insert the board completely.

[3] Use a screw to secure the board to the equipment.

[4] Adjust the position of the stopper for the extension board to secure the extension board.

[5] Follow the procedure for removing the cover of the equipment in reverse to re-install the cover.

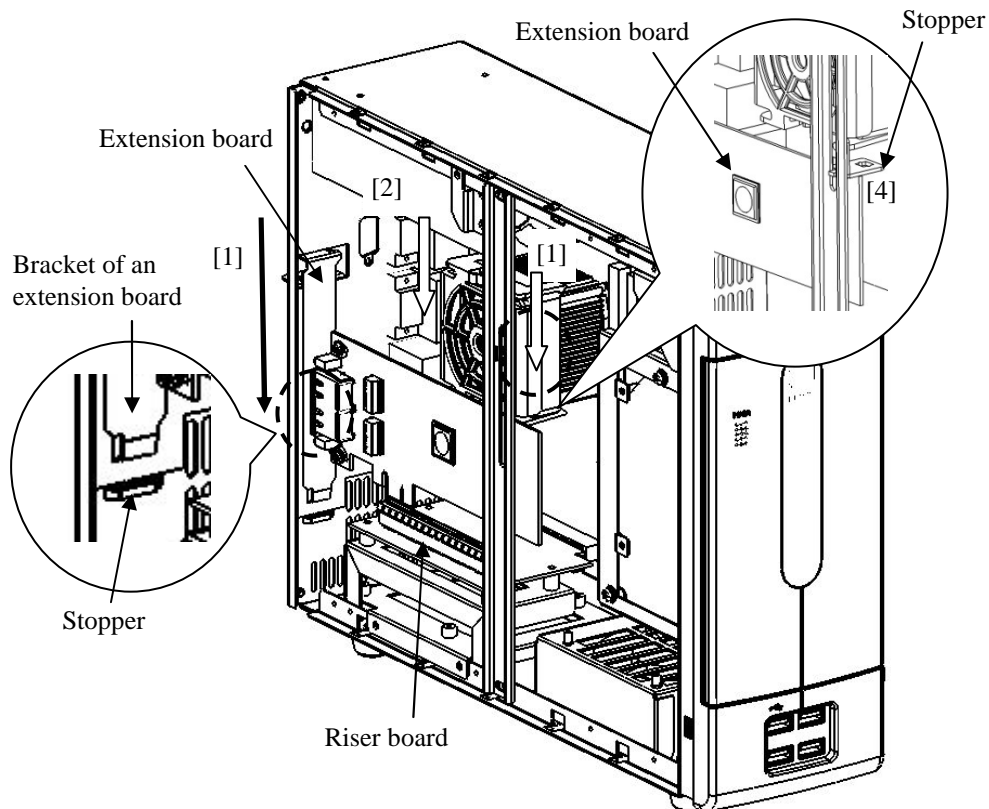


Figure 5-4 Installing an Extension Board

## 5. CHECKUP AND MAINTENANCE

### **(4) Removing an extension board**

- [1] Adjust the position of the stopper for the extension board not to hit the extension board.
- [2] Remove the screws that secure the extension board to the equipment.
- [3] Remove carefully the extension board from the connector of the riser board, holding the both ends of the extension board from above the riser board. At this time, make sure to remove the metal fitting from the stopper of the equipment.

<b><i>NOTICE</i></b>
Always attach a slot cover to each unused slot. Otherwise, failure of the equipment may result.

### 5.3.5 Installing and removing main memory

#### WARNING

Before you install or remove main memory, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. If you install or remove main memory without shutting down the power, an electric shock or a fire may result.

#### CAUTION

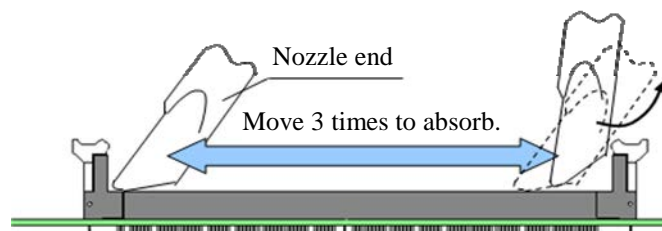
Do not directly touch the parts inside the equipment with your hand when you install or remove an extension board. Those parts are hot and if you touch them, you may get burned. In addition, if you touch them, they may get damaged and that may result in failure of the equipment.

#### NOTICE

Make sure you disconnect all external cables connected to the equipment before you install or remove main memory. Otherwise, failure of the equipment may result.

#### (1) Before installing or removing main memory

- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Allocate sufficient clearance for maintenance work. Carry out the work on a flat surface. (See “1.2.2 Installation”.)
- Wear cotton gloves when you install or remove main memory.
- When you tighten or remove a screw, use a Phillips screwdriver (JIS #2) to avoid stripping the head.
- When you tighten a screw, drive the screw along the axis of the tapped hole without adding too much torque in order to avoid damaging the thread.
- For information about the location of the main memory slots, see “Figure 5-1 Types and Locations of Installed Components”.
- Before installing or after removing the main memory module, place the tip of the vacuum cleaner nozzle on the top of the connector where the main memory module is (was) installed and clean the connector three times along the connection part.



**(2) Installing main memory**

**NOTICE**

- The orientation of a main memory module on a connector is fixed. When you install a main memory module, make sure the orientation is correct. Otherwise, failure of the equipment may result.
- Do not install main memory modules with different capacities on slot A and slot B. If you do, the modules may not be recognized.

**(a) Removing the cover of the equipment**

Follow the instructions in “5.3.2 Installing and removing the cover of the equipment (1) Removing the cover of the equipment” to remove the cover of the equipment.

**(b) Installing main memory**

Insert the main memory module into the connector from right above the connector. When the module is fully inserted, you will hear a click.

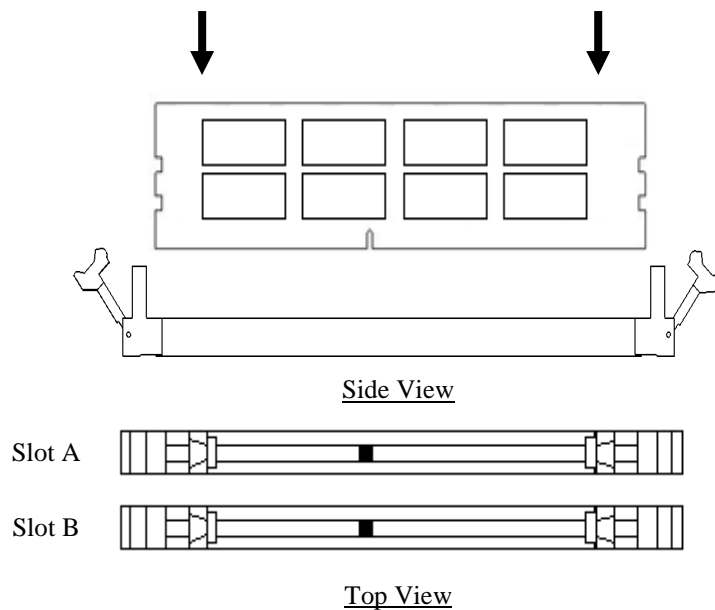


Figure 5-5 Installing Main Memory

**(c) Installing the cover of the equipment**

Follow the instructions in “5.3.2 Installing and removing the cover of the equipment (2) Installing the cover of the equipment” to install the cover of the equipment.

**(3) Removing main memory**

Follow the procedure described in “(2) Installing main memory” in reverse to remove main memory.

**(4) After installing or removing main memory**

Reconfiguring the memory dump file settings

When you change the capacity of main memory, you must reconfigure the memory dump collection settings.

When you reconfigure the memory dump collection setting, see “7.3 When the Saving Memory Dump Confirmation Message is Displayed” for details.

### 5.3.6 Installing and removing an HDD

---



#### **CAUTION**

- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. Otherwise, an electric shock or failure of the equipment may result.
- When you install or remove a HDD, make sure you do not cut your fingers on the protrusions.

#### **NOTICE**

- Put the HDD on a shock-absorbing material such as an antistatic cushion even for a temporary task. If you put an HDD directly on a hard surface such as a desktop, a failure or a shorter life span of the unit or loss of data may result due to possible jarring or shock.
- Never remove the screws on an HDD while the power to the unit is on. Never hot-swap HDDs. If you do either of these, failure of the equipment or the drive may result.
- Before you replace an HDD, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Install or remove an HDD only if necessary, for example, when you need to replace an HDD due to failure. If you do it frequently, failure of the equipment may result.
- Fully insert an HDD. Loose contact and missing screws may result in failure.
- Do not give a shock to an installing HDD and the already mounted hard disks during installing. If you give a shock to an HDD, failure of the drive may result.

#### **(1) Before installing or removing an HDD**

- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Allocate sufficient clearance for maintenance work. Carry out the work on a flat surface. (See “1.2.2 Installation”.)
- Wear cotton gloves when you install or remove an HDD.
- When you tighten or remove a screw, use a Phillips screwdriver (JIS #2) to avoid stripping the head.
- When you tighten a screw, drive the screw along the axis of the tapped hole without adding too much torque in order to avoid damaging the thread.

#### **< NOTE >**

- For information about the precautions for hard disk drives, see “PRECAUTIONS 4. HARD DISK DRIVES (HDD)s”.

**(2) Removing an HDD**

- [1] Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- [2] Push the upper center part of the upper front panel to open the cover.
- [3] Release the set screws for the HDD case.
- [4] Hold the grips on the front of the HDD case and pull out the case.

**< NOTE >**

- When you pull out an HDD, make sure you do not apply too much force to the connector. Slowly pull out the hard disk in order not to subject the hard disk.
- When you connect an HDD to a connector, do not subject the HDD to shock or jarring.
- Make sure you mount a system disk in drive bay 1. Even if you mount a system disk in drive bay 2 by mistake, the OS may start, but other problems may arise, so you have to exercise extra caution for the mounting location of the HDD.

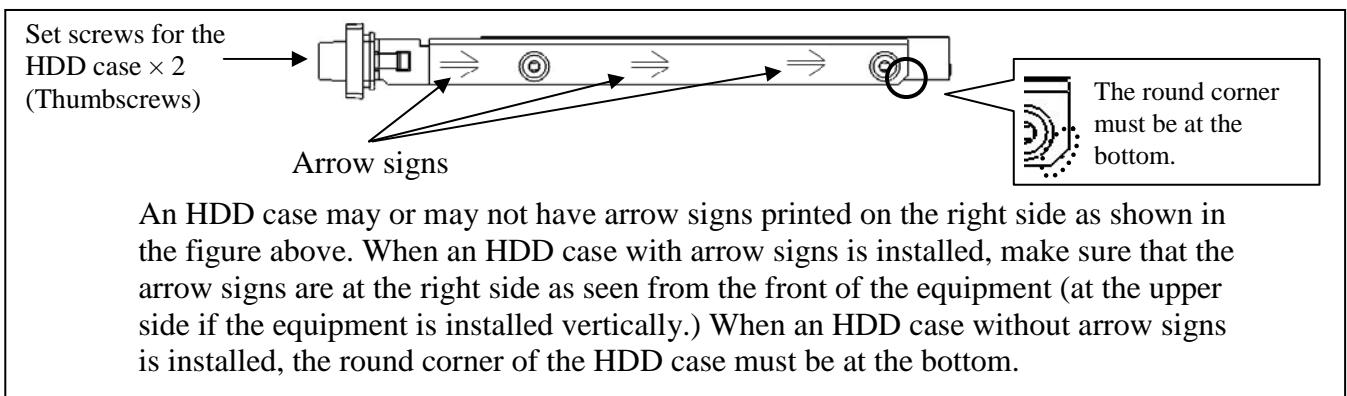
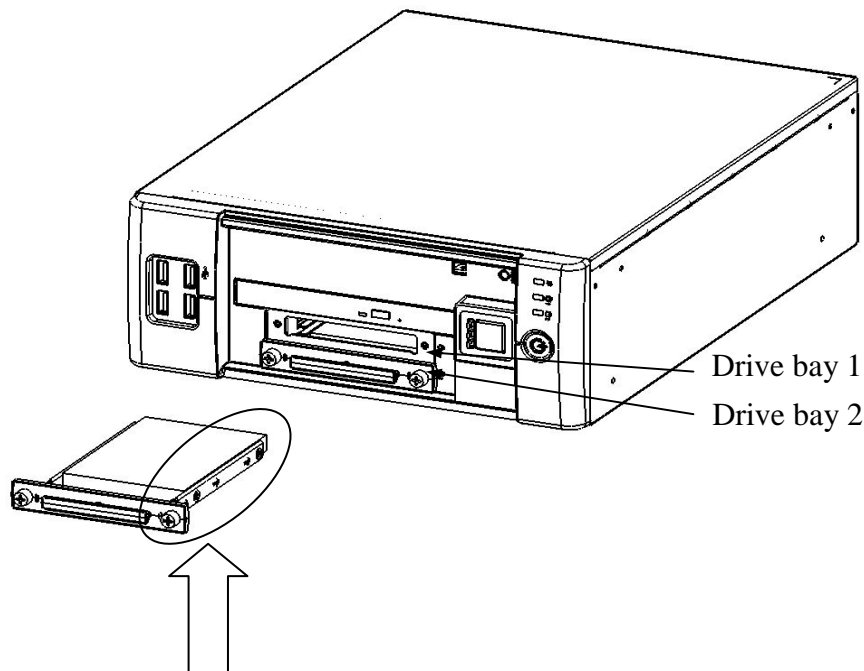


Figure 5-6 Installing and Removing an HDD





## CAUTION

When you install or remove an HDD, make sure the drive bay number is correct. If you remove an HDD and install it in a different bay, a configuration information mismatch occurs and the equipment may not start or the data stored on the HDD may be lost.

### (3) Installing an HDD

Follow the procedure described in “(2) Removing an HDD” in reverse to remove main memory.

### (4) After installing or replacing an HDD

If an additional HDD is installed or an HDD is replaced, the priority of starting the media will be changed. Check the **Hard Disk Drive BBS Priorities** in the BIOS setup menu to make sure that the HDD is given higher priority than other media.

For the BIOS setup menu, see “4.2 BIOS Setup.”

### 5.3.7 Installing and Removing a CFast

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#### **CAUTION**

- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute. Otherwise, an electric shock or failure of the equipment may result.
- When you install or remove a CFast, make sure you do not cut your fingers on the protrusions.

#### **NOTICE**

- Even temporarily, place the CFast on antistatic cushioning to absorb any impact. If you place it directly on a hard surface (for example, on a desk), it may malfunction, destroy the data, or shorten the life of the CFast due to the impact.
- Do not remove a screw from the CFast cover, or hot swap the CFast. This may cause the CFast to malfunction.
- Before replacing the CFast, shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Install or remove the CFast only if required (for example, to replace the faulty CFast). If you do it frequently, failure of the equipment may result.
- Install the CFast firmly and securely. Loose contact and missing screws may result in failure.
- When installing or removing the CFast, be very careful not to make an impact on the CFast. An impact on the CFast may cause it to malfunction.

#### **(1) Before installing or removing a CFast**

- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Allocate sufficient clearance for maintenance work. Carry out the work on a flat surface. (See “1.2.2 Installation”.)
- Wear cotton gloves when you install or remove a CFast.
- When you tighten or remove a screw, use a Phillips screwdriver (JIS #2) to avoid stripping the head. (When you use tamper-resistant screws, use a dedicated screwdriver for tightening and removing the screws.)
- When you tighten a screw, drive the screw along the axis of the tapped hole without adding too much torque in order to avoid damaging the thread.

**(2) Installing a CFast**

- [1] Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- [2] Remove the screw from the CFast cover and detach the CFast cover.
- [3] Install the CFast in the equipment.
- [4] Return the CFast cover and secure it with a screw.

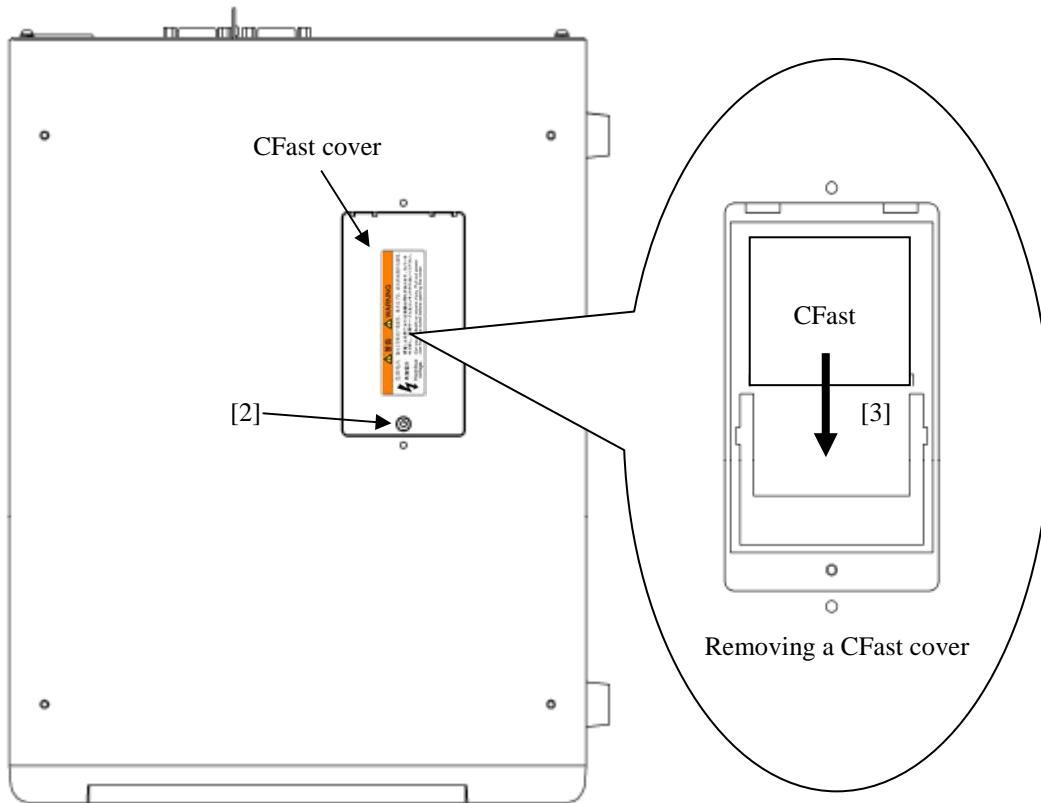


Figure 5-7 Installing and Removing a CFast

**(3) Removing main memory**

- [1] Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- [2] Remove the screw from the CFast cover and detach the CFast cover.
- [3] Remove the CFast in the equipment.
- [4] Return the CFast cover and secure it with a screw.

### 5.3.8 Attaching and removing rubber feet

#### < NOTE >

- When changing the installation method of the equipment (such as changing the orientation of the equipment from vertical installation to horizontal installation), perform the following procedure.

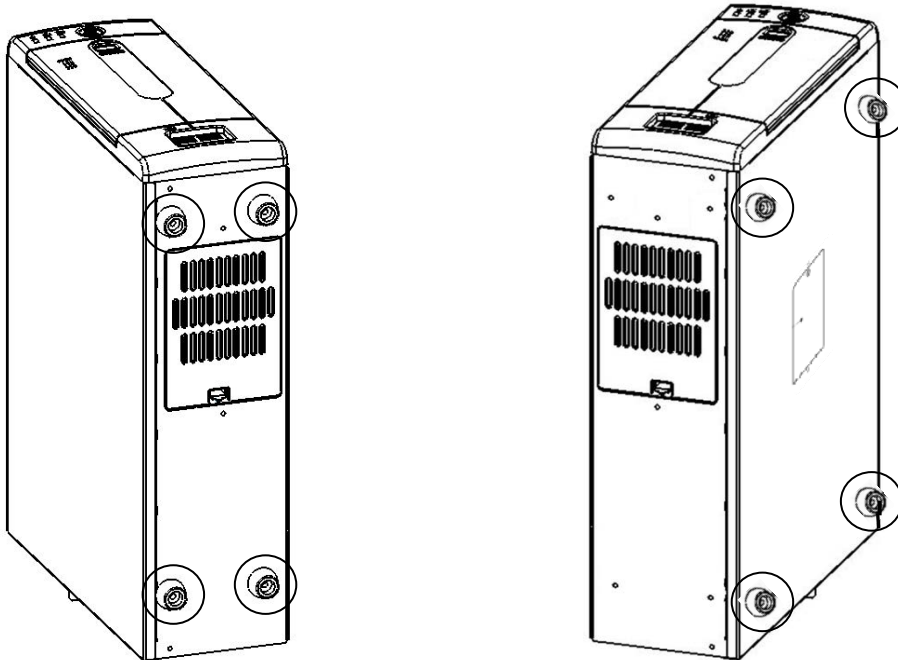
#### (1) Before attaching and removing rubber feet

When you attach or remove rubber feet, follow the instructions below:

- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Allocate sufficient clearance for maintenance work. Carry out the work on a flat surface. (See “1.2.2 Installation”.)
- Do not subject the equipment to unnecessary jostling or shock.
- When you tighten or remove a screw, use a Phillips screwdriver (JIS #2) to avoid stripping the head.
- When you tighten a screw, drive the screw along the axis of the tapped hole without adding too much torque in order to avoid damaging the thread.

#### (2) Installing and removing rubber feet

Loosen the screw on the center of each rubber foot (four in total) and remove each rubber foot. To install the rubber feet, reverse the procedures.



Vertical installation

Horizontal installation

Figure 5-8 Removing a Rubber Foot

### 5.3.9 Installing and removing a dust filter

**! WARNING**

Make sure to install a dust filter to equipment. If you do not, dusts enter into the equipment and the short circuit fire may occur as a result.

**! CAUTION**

Before you clean or replace the dust filter or the case fan of this equipment, make sure you shut down the OS, disconnect the plug of the power cord from the outlet, and wait for at least one minute. Otherwise, the injury of hands and fingers may result.

**(1) Before installing and removing a dust filter**

When you install or remove a dust filter, follow the instructions below:

- Before you start the work, make sure you shut down the OS, unplug the power cord from the outlet, and wait for at least one minute.
- Allocate sufficient clearance for maintenance work. Carry out the work on a flat surface. (See “1.2.2 Installation”.)

**(2) Removing a dust filter**

- [1] Remove the filter cover as shown below.
- [2] Remove the dust filter from the equipment.

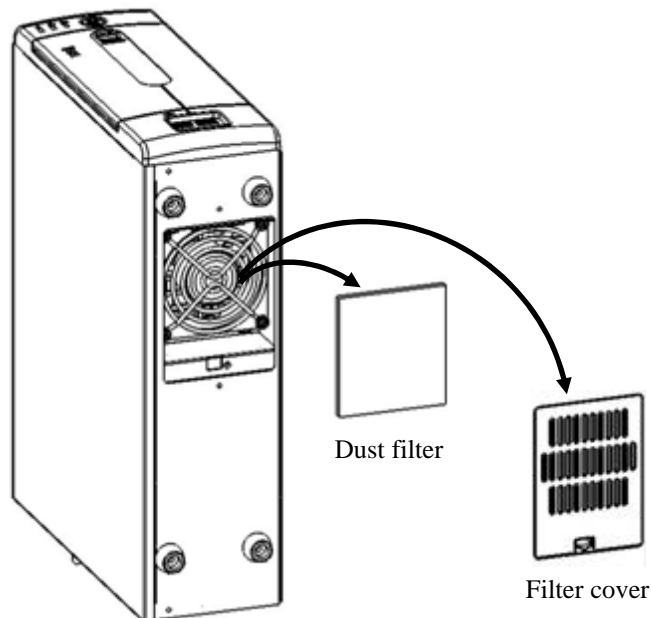


Figure 5-9 Replace a Dust Filter

**(3) Installing a dust filter**

Follow the procedure described in “(1) Removing a dust filter” in reverse to install a dust filter.

## CHAPTER 6 TROUBLESHOOTING

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This chapter explains the possible causes of common problems and the actions to be taken to address those problems. Select an applicable symptom from the list in “6.1 List of Problems”. Follow the link (“6.2 Countermeasures” through “6.6 Digital LEDs for Status Indication”) and take actions according to the instruction. If following the instruction in “6.2 Countermeasures” does not resolve the symptom, contact the system administrator or maintenance personnel. Refer to “Chapter 8 RAID1” for the trouble about the RAID.



### WARNING

In case of smoke, a burning smell, or the like, unplug the power cord from the outlet, and contact your dealer or maintenance personnel. Using faulty equipment without repair may result in a fire or an electric shock.

## 6.1 List of Problems

---

The following is a list of problems that can occur in the equipment. Search for an applicable item in the list below, perform root cause analysis, and take an appropriate action.

### 6.1.1 Problems that occur before the OS startup

---

The following is a list of problems that occur before the desktop is displayed (before the OS startup). For information about the names of the lamps on the front panel, see “2.1 Display and User Input Sections”.

(1) The equipment does not start.

Check the operation of the equipment after the power switch is turned on in the order of the following steps 1 through 4. If there is an applicable item, follow the link. (If there are multiple applicable items, the first one has precedence.)

1. When the power switch is turned on, fans do not rotate or the power lamp is not turned on. (See page 6-3.)
  2. When the power switch is turned on, fans rotate and the power lamp is lit, but the status indication LEDs and the Digital LEDs for Status indication do not display anything (See page 6-3.)
  3. The screen is blank. (See page 6-3.)
  4. The system stops when the Windows® logo is displayed. (See page 6-4.)
- (2) Beep sounds are generated. (See page 6-4.)
- (3) The BIOS setup menu cannot be opened. (See page 6-4.)
- (4) WOL cannot be used. (See page 6-5.)

### **6.1.2 Problems that occur after the OS startup**

---

The following is a list of problems that occur after the desktop is displayed (after the OS startup).

- (1) The Digital LEDs for Status indication show alphanumeric characters. (See page 6-6.)
- (2) The processing speed of the equipment is slow. (See page 6-8.)
- (3) The equipment does not respond. (See page 6-8.)
- (4) The equipment automatically goes into the standby mode, or restarts. (See page 6-9.)
- (5) The screen blacks out. (See page 6-10.)
- (6) A blue screen is/was displayed. (See page 6-10.)
- (7) The equipment cannot connect to the network. (See page 6-11.)
- (8) The network connection is unstable, or the connection speed is slow. (See page 6-11.)
- (9) A CD or DVD cannot be recognized or cannot be read or written to. (See page 6-12.)
- (10) Writing to a CD or DVD fails. (See page 6-12.)
- (11) A CD or DVD cannot be ejected. (See page 6-13.)
- (12) Keyboard input is not accepted. (See page 6-13.)
- (13) Mouse input is not accepted. (See page 6-14.)
- (14) A USB device (other than a keyboard and a mouse) cannot be recognized or does not work. (See page 6-14.)
- (15) No sound is generated, or the sound is extremely faint. (See page 6-15.)
- (16) A serial port or a parallel port does not work properly. (See page 6-15.)
- (17) The equipment cannot be shut down. (See page 6-16.)

## 6.2 Countermeasures

---

### 6.2.1 Problems that occur before the OS startup

---

#### (1) The equipment does not start.

- 1. When the power switch is turned on, fans do not rotate or the power lamp is not turned on.**

**<Possible cause>**

Power is not supplied to the equipment.

**<Action>**

1. Make sure that the plug of the power cord is connected to the outlet.
  2. Make sure that the circuit breaker on the power distribution panel is on.
  3. Perform steps 1 and 2 and press the power switch.
- ⇒When the equipment starts, fans rotate and the power lamp is turned on.

- 2. When the power switch is turned on, fans rotate and the power lamp is lit, but the status indication LEDs and the Digital LEDs for Status indication do not display anything.**

**<Possible cause>**

The equipment has failed.

**<Action>**

1. Contact your system administrator or maintenance personnel.

#### **3. The screen is blank.**

**<Possible cause>**

The display has a problem.

**<Action>**

1. Make sure that the power switch of the display is on.
2. Make sure that the plug of the power cord for the display is connected to the outlet.
3. Make sure that the equipment and the display are connected through a display interface cable.
4. Re-examine the display settings. For information about the display settings, refer to the manual of the display.



**4. The system stops when the Windows® logo is displayed.**

**<Possible cause>**

There is an error in hardware, or the OS is corrupted.

**<Action>**

1. Unplug the power cable from the back of the equipment, and remove all USB devices except a keyboard and mouse as well as all extension boards. After this, plug the power cable into the outlet and restart the equipment. (For how to remove the extension board, see “5.3.4”.)
2. If the symptom persists after step 1, the OS may be corrupted. If you have a recovery DVD, restore the system drive back to the factory default using the recovery DVD.

**< NOTE >**

- Do not connect a USB device during the OS startup because the OS may not start normally.
- When you change screens during the OS startup, the OS does not start normally in some CPU/USB switching devices. If you use a CPU/USB switching device, perform sufficient operation verification.

**(2) Beep sounds are generated.**

**a) One beep is generated.**

**<Possible cause>**

This is just a beep for power-on. This is not an error.

**b) Two or more beeps are generated.**

**<Possible cause>**

No main memory is installed or the contact might be poor.

**<Action>**

1. Check if main memory is installed.
2. If main memory is installed, remove the main memory module and re-install it, referring to “5.3.5 Installing and removing main memory”.

**(3) The BIOS setup menu cannot be opened.**

**<Possible cause>**

Keyboard input is not accepted.

**<Action>**

1. Disconnect the keyboard cable and securely reconnect it to ensure stable connection.
2. Connect the keyboard cable to another port.

**(4) WOL cannot be used.****<Possible cause>**

The WOL function is not enabled.

**<Action>**

1. Enable the WOL function according to “3.7.1 Enabling the WOL (Wake ON LAN™) function”.
2. Check the BIOS setup to see if **Wake on LAN1 from S5** and **Wake on LAN2 from S5** are enabled. For details, see “4.2 BIOS Setup”.

## 6.2.2 Problems that occur after the OS startup

---

### (1) The Digital LEDs for Status indication show alphanumeric characters.

#### <Possible cause>

This is a hardware error notification from the RAS software or is displayed by a user application.

#### <Action>

1. If one of the status indication LEDs is lit in red, this is a hardware error notification from the RAS software. Check the characters displayed on the Digital LEDs for Status indication.
  - When 11 or 12 is displayed on the Digital LEDs for Status indication.
    - ⇒Rotation of a fan is abnormal. (11 indicates a power supply fan failure, 12 indicates a front fan failure.)  
Check the following items.
      - i) Make sure that no foreign objects are attached to the fan.
        - ⇒If any foreign objects are attached, the efficiency of cooling inside the equipment becomes is reduced. Remove the foreign objects.
      - ii) Make sure that the power cord for the fan is connected to a power connector.
        - ⇒A loose connection may have caused the symptom. Remove the power cord for the fan from the power connector and then reconnect them.
  - When 21 is displayed on the Digital LEDs for Status indication.
    - ⇒The temperature is abnormal. Check the following items.
      - i) Make sure that the dust filter of the case fan and the exhaust outlet at the rear are not clogged.
        - ⇒If they are clogged, clean the dust filter and the air intake and exhaust holes. If necessary, replace the dust filter.
      - ii) Make sure that sufficient clearance is provided around the equipment. (See “1.2.2 Installation”.)
        - ⇒If not, provide sufficient clearance around the equipment.
      - iii) Make sure that the temperature of the installation environment (ambient temperature) is less than 40°C.
        - ⇒Remove obstacles to air flow or use air-conditioning to keep the ambient temperature less than 40°C.
  - When 31 or 32 is displayed on the Digital LEDs for Status indication.
    - ⇒Failure is predicted for the drive in drive bay.(31 indicates the drive bay 1 and 32 indicates the drive bay 2) We recommend you back up the data and replace the drive.

**<Action>**

The following is displayed when the equipment is the D model.

- When 41 or 42 is displayed on the Digital LEDs for Status indication.  
⇒HDD is abnormal. (41 indicates the drive bay 1, 42 indicates the drive bay 2.)  
Read the description of “8.4.2 Recovery from a failure in one HDD” and replace an HDD.
- When 4B is displayed on the Digital LEDs for Status indication.  
⇒RAID array is failure. (HDD failure in both sides.) Contact your system administrator or maintenance personnel.
- When 4C is displayed on the Digital LEDs for Status indication.  
⇒RAID status is unknown. (RAS software cannot get RAID status.) Contact your system administrator or maintenance personnel.
- When 4D is displayed on the Digital LEDs for Status indication (\*).  
⇒Media error is occurred on RAID.  
Read the description of *HF-BT1000 RAS FEATURES MANUAL* “2.6.2” and take action accordingly.

(\*) This code is not displayed in default setting. Read the description of *HF-BT1000 RAS FEATURES MANUAL* “2.6.2” when you want to display this code.

**< NOTE >**

If one of the status indication LEDs is lit in green, a user application is using the LEDs to display characters. Contact your system administrator or maintenance personnel.

**(2) The processing speed of the equipment is slow.**

**<Possible cause>**

The capacity of the memory or the HDDs is not sufficient.

**<Action>**

1. Terminate unnecessary applications to increase available memory.  
⇒When you want to check the usage of the CPU and memory, follow the instructions in “6.5 Checking the System Load by Using Performance Monitor”.
2. Delete unnecessary files to increase free clearance on the HDDs.

**(3) The equipment does not respond.**

**<Possible cause>**

There is an error in hardware or software.

**<Action>**

1. The screen can seem to be frozen when an application freezes. If the equipment responds by pressing **Alt + Tab** or **Ctrl + Alt + Delete**, try the following procedure.
  - i) Switch applications by pressing **Alt + Tab** and identify which application has frozen.
  - ii) After you identify the frozen application, use Task Manager to terminate the application. To start Task Manager, press **Ctrl + Alt + Delete**. The **Windows Security** window will open. Click **Task Manager**.
  - iii) Restart the equipment.
2. If you cannot restart the equipment at step 1, turn off the power of the equipment according to <Forcibly terminating the equipment> below.  
Remove all USB devices except a keyboard and mouse as well as all extension boards when the power is off and then start the equipment.

**<Forcibly terminating the equipment>**

If the shutdown fails, press the power switch for at least four seconds. The power is turned off and the equipment goes into the standby mode.

After the equipment goes into the standby mode, disconnect the plug of the power cord from the outlet.

**(4) The equipment automatically goes into the standby mode, or restarts.****a) The Digital LEDs for Status indication show alphanumeric characters****<Possible cause>**

This is a hardware error notification from the RAS software or is displayed by a user application.

**<Action>**

1. Check the characters displayed on the Digital LEDs for Status indication.
  - If one of the status indication LEDs is lit in red, this is a hardware error notification from the RAS software. See “6.6.2 Displaying a hardware status code” and take appropriate action.
  - If one of the status indication LEDs is lit in green, a user application is using the LEDs to display characters. Contact your system administrator or maintenance personnel.

**b) A warning or error message is recorded in the event log.****<Possible cause>**

There is an error in hardware or software.

**<Action>**

1. Check the description of the messages in the “System” or “Application” category in the event log and take actions accordingly. (See Section 6.4, “Event Log.”)
2. If the source of the message is a component purchased by the user, contact the supplier.

**c) Neither a) nor b)****<Possible cause>**

There is a problem with a cable connection, or the AC power supply is unstable.

**<Action>**

1. Make sure that the plug of the power cord is securely connected to the outlet.
2. If the symptom persists after step 1, the AC power supply may be unstable. Confirm that the AC power voltage is appropriate.

**(5) The screen blacks out.**

**<Possible cause>**

There is an error in the display or in the video board.

**<Action>**

1. Make sure that the plug of the power cord for the display is connected to the outlet.
2. Make sure that the equipment and the display are connected through a display interface cable.
3. Re-examine the display settings. For information about how to adjust the display, refer to the manual of the display.
4. When you use a video card, check the following items.
  - i) Make sure that the settings of the video card are correct.  
(For information about how to set up the video card, refer to the manual of the video card.)
  - ii) Shut down the OS and unplug the power cable from the outlet. Replace the video card with another one and check whether it works.

**(6) A blue screen is/was displayed.**

**<Possible cause>**

There is an error in the OS or in the equipment.

**<Action>**

1. If the blue screen is still displayed, record the STOP error code.
2. If you cannot record the STOP error code, search the “System” category in the event log for the STOP error code.
3. Check Microsoft’s support technical information and determine the cause of the memory dump collection.
4. When you request an analysis of the memory dump (a service provided for a fee), save the log after you restart the equipment (see “7.4 Maintenance Operation Commands”) and contact our sales representatives.

**(7) The equipment cannot connect to the network.****<Possible cause>**

There is an error in the settings of the LAN or the network device (hub and so on), or there is a problem with the cable connection.

**<Action>**

1. Re-examine the network settings according to the instructions in “3.8 Setting Up the LAN Interface”.
2. Disconnect the LAN cable and securely reconnect it to ensure a stable connection.
3. Make sure that the LAN cable is connected to the correct port.
4. Replace the LAN cable with another LAN cable.
5. When you use network device, check the following items.
  - i) Make sure that the power of the network device is on.
  - ii) Turn on the power of the network device first and then turn on the power of this equipment.
  - iii) Replace the network device with other one to check whether the latter works.

**(8) The network connection is unstable, or the connection speed is slow.****<Possible cause>**

There is an error in the settings of the LAN or the network device, or there is a problem with the cable connection.

**<Action>**

1. Re-examine the network settings according to the instructions in “3.8 Setting Up the LAN Interface”.
2. Disconnect the LAN cable and securely reconnect it to ensure a stable connection.
3. Make sure that the LAN cable is connected to the correct port.
4. Replace the LAN cable with another LAN cable.
5. When you use network equipment, check the following items.
  - i) Turn on the power of the network device first and then turn on the power of this equipment.
  - ii) Replace the network device with other one to check whether the latter works.



**(9) A CD or DVD cannot be recognized or cannot be read or written to.**

**<Possible cause>**

An unsupported or bad CD or DVD is used.

**<Action>**

1. See “4.1 Equipment Specification (6) DVD drive specification” and make sure that the CD or DVD you want to use is supported.
2. Check that there are no scratches or dirt on the CD or DVD. If the disc is dirty, clean the disc.
3. Select **Start > Computer** and check if the DVD drive is recognized.  
⇒If the DVD drive is not recognized, restart the equipment.
4. Use another CD or DVD.

**< NOTE >**

If you use a USB DVD drive, depending on the DVD drive, it may take around 10 minutes to read a disc (CD or DVD) at the startup of the equipment.

If this situation occurs, you may be able to resolve this problem by selecting **disable** for **Legacy USB Support** on the **Advance** tab in the BIOS settings.

**(10) Writing to a CD or DVD fails.**

**<Possible cause>**

The capacity of the HDDs is not sufficient, or a bad CD or DVD is used.

**<Action>**

1. Check that the CD or DVD is writable.
2. If enough free space is not available for the work area on an HDD, clean up files and increase free space on the HDD.
3. Check that there are no scratches or dirt on the CD or DVD. If the disc is dirty, clean the disc.
4. Use another CD or DVD.

**(11) A CD or DVD cannot be ejected.****<Possible cause>**

Writing to a disc is ongoing, or there is an error in the DVD drive.

**<Action>**

1. Check if writing to a disc is ongoing (the drive access lamp is on or flashing). You cannot eject a disc during the write to the disc.
2. Press the eject button a couple of times (at least five times).
3. Insert an eject pin into the manual emergency eject hole. When the disc tray opens slightly, hold and pull it out by hand.

**< NOTE >**

- Turn off the main power of the equipment before you eject a disc by using the manual emergency eject hole. Do not insert an eject pin at an angle or apply too much force.
- An eject pin does not come with the equipment. If an eject pin is not available, use instead a pin that fits the hole of the eject hole.

**(12) Keyboard input is not accepted.****<Possible cause>**

An application has frozen, there is a problem with the cable connection, or the keyboard has failed.

**<Action>**

1. Keyboard input may not be accepted temporarily due to a frozen application. If the equipment responds to **Alt + Tab** or **Ctrl + Alt + Delete**, try the following procedure:
  - i) Switch applications by pressing **Alt + Tab** and identify which application has frozen.
  - ii) After you identify the frozen application, use Task Manager to terminate the application. To start Task Manager, press **Alt + Ctrl + Delete**. The **Windows Security** window will open. Click **Task Manager**.
  - iii) Restart the equipment.
2. Disconnect the keyboard interface cable and securely reconnect it to ensure a stable connection.
3. Connect the keyboard interface cable to another port.
4. Replace the keyboard with another keyboard to check whether the latter works.
5. Reboot the equipment.

## 6. TROUBLESHOOTING

### **(13) Mouse input is not accepted.**

#### **<Possible cause>**

The mouse does not work properly due to dust or dirt on the mouse, there is a problem with the cable connection, or the mouse has failed.

#### **<Action>**

1. When you use an optical mouse, check the following items.
  - i) Check if dust or dirt is clinging to the optical sensor. If dust or dirt is present, clean it off.
  - ii) Do not use an optical mouse on a glass, mirror, or shiny material. (We recommend using a mouse pad designed for use with an optical mouse.)
2. If you use a mouse that is not an optional component provided by the Manufacturer, refer to the manual of the mouse for information about how to use it.
3. Disconnect the mouse interface cable and securely reconnect it to ensure a stable connection.
4. Replace the mouse with another mouse to check whether the latter works.

### **(14) A USB device (other than a keyboard and a mouse) cannot be recognized or does not work.**

#### **<Possible cause>**

There is a problem with the cable connection, or the device driver for the USB device has not been installed.

#### **<Action>**

1. Disconnect the cable for the USB device and securely reconnect it to ensure a stable connection.
2. Replace the cable for the USB device with another cable.
3. If the USB device requires installing a device driver, install the device driver according to the manual of the USB device and restart the equipment.
4. If the USB device requires an external power supply, make sure that the plug of the power cord of the USB device is connected to the outlet.
5. If the USB device uses USB bus power, make sure that the current consumption of the USB device does not exceed the specified maximum current for the USB port of the equipment. (See “4.1(11) Maximum current specifications”.) If the USB device can accept an external power supply, connect the device to an external power supply.
6. If the above steps 1 through 5 do not resolve the symptom, a failure of the USB device may be the cause. Take action according to the manual of the USB device.

**(15) No sound is generated, or the sound is extremely faint.****<Possible cause>**

There is an error in the settings of the equipment and the speakers, there is a problem with the cable connection, or the speakers have failed.

**<Action>**

1. Adjust the volume of the equipment to an appropriate level. (See <Setting a volume>.)
2. When you use speakers, check the following items.
  - i) Make sure that the speakers have built-in amplifiers.  
(If the speakers do not have amplifiers, you cannot hear sound.)
  - ii) Make sure that the plug of the power cord of the speakers is connected to the outlet.
  - iii) Turn on the power of the speakers.
  - iv) Make sure that the volume level of the speakers is adequately adjusted.
  - v) Make sure that the cable from the speakers is connected to LINE OUT.
  - vi) When you record an audio signal from an audio device, connect LINE OUT of the audio device to LINE IN of the equipment by using a cable. (LINE IN cannot be used as a MIC input.)
  - vii) Disconnect the cable from the speakers and securely reconnect it to ensure a stable connection.
  - viii) Use another pair of speakers.

**<Setting a volume>**

1. Click **Start > Control Panel**.
2. Click **Hardware and Sound** and then click **Adjust system volume** to adjust the volume.

**(16) A Serial port does not work properly.****<Possible cause>**

There is a problem with the cable connection, or the target device has failed.

**<Action>**

1. Disconnect the cable and securely reconnect it to ensure a stable connection.
2. Check to see if the target device has failed.

**(17) The equipment cannot be shut down.**

**a) The drive access lamp is on or flashing.**

**<Possible cause>**

The shutdown process is simply taking a long time.

**<Action>**

1. Wait until the shutdown process finishes.

**b) other than a)**

**<Possible cause>**

The OS has frozen.

**<Action>**

1. Press the **Scroll Lock** key twice while holding down the **Ctrl** key to collect a memory dump. The equipment restarts automatically after a memory dump is collected. When you request an analysis of the memory dump (a service provided for a fee), save the log after you restart the equipment (see “7.4 Maintenance Operation Commands”) and contact our sales representatives.
2. If you cannot restart the equipment at step 1, turn off the power of the equipment according to the instructions in <Forcibly terminating the equipment> below.
3. If executing step 1 does not resolve the problem, remove all USB devices except a keyboard and mouse as well as all extension boards when the power is off and then start the equipment.

**<Forcibly terminating the equipment>**

If the shutdown fails, press the power switch for at least four seconds. The power is turned off and the product goes into the standby mode.

After the equipment goes into the standby mode, disconnect the plug of the power cord from the outlet.

### 6.3 STOP Error Codes

---

A STOP error code provides a summary of an error cause.

STOP error codes are displayed on a blue screen as well as embedded in a memory dump file.

Table 6-1 shows the error cause corresponding to a STOP error code and a message displayed along with the STOP error code.

Table 6-1 STOP Error Codes

No.	STOP Error code	Contents of the STOP message screen	Error Cause	Action
1	0x00009222	—	Watchdog timer timed out (*)	Ask the system administrator or maintenance personnel.
2	Other than the above (a code that indicates the error cause in more detail)	(A short message that explains the STOP error)	Windows® STOP error	For information about a Windows® STOP error, refer to the Microsoft Knowledge Base.

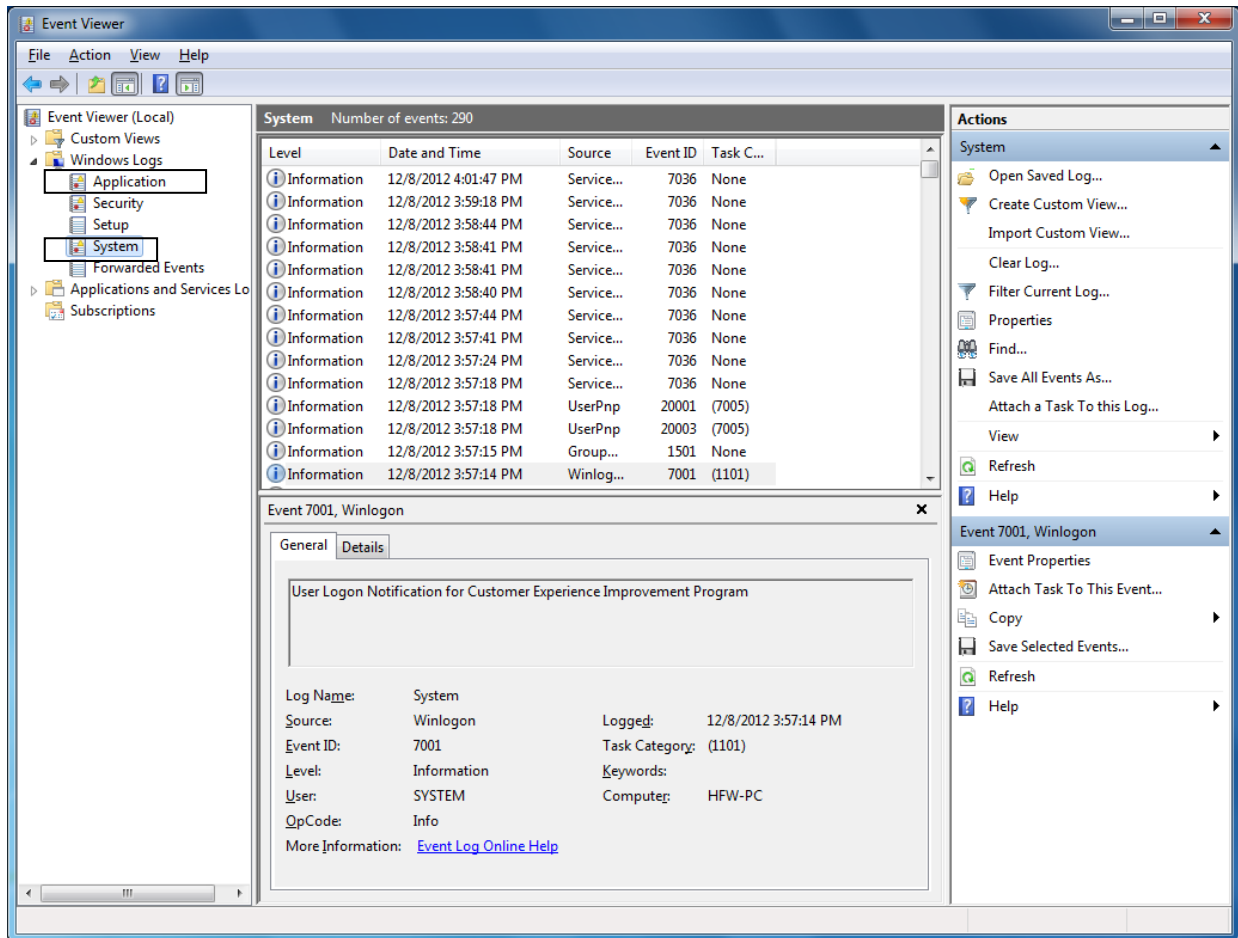
(\*) Only if “Memory dump” is selected for Action at timeout under Watchdog timer setting in the RAS Setup window.

## 6.4 Event Log

When a critical event occurs, for example, when the environment information is changed, this equipment collects logs by using the Windows® event log service.

The following procedure shows how to check the event log.

1. Click **Start > Control Panel > System and Security > View event logs**.
2. The **Event Viewer** window opens. Select **Windows Logs** and then select **System** or **Application** to check the system log or application log. (The display image assumes Windows® 7)



### < NOTE >

- The system log may contain an error log entry of the event "ID7034". The entry may show a message "The audio service terminated unexpectedly.", but as long as you can play back audio, there is no problem with the function of the audio ports (LINE IN/LINE OUT).
- The system log may contain an error log entry of the event "ID51". The entry may show a message "An error was detected on the CD-ROM during the paging operation.", but as long as you can access the DVD drive, there is no problem.

Table 6-2 lists event log entries unique to the equipment. No.1 through 11 and No.13 through 20 are collected in the system log, and Nos.12 is collected in the application log.

Table 6-2 Event Log Entries Unique to the Equipment (1/2)

No.	Event ID	Source	Type	Category	Description	Action
1	259	HFBRAS_SYS	Warning	HFBRAS	The temperature exceeded prescribed value.	Read the description of abnormal temperature in “6.2.2 (1)” and take action accordingly.
2	263	HFBRAS_SYS	Information	HFBRAS	Temperature returned to prescribed value.	No handling
3	265	HFBRAS_SYS	Warning	HFBRAS	Immediately back up your data and replace drive. A failure may be imminent on the drive of the drive bay%1 (%2).	We recommend you back up the data and replace the drive.
4	266	HFBRAS_SYS	Error	HFBRAS	Revolutions of cpu fan deteriorated remarkably.	Read the description of fan failure in “6.2.2 (1)” and take action accordingly.
5	267	HFBRAS_SYS	Information	HFBRAS	Revolutions of cpu fan returned to normal value.	No handling.
6	268	HFBRAS_SYS	Error	HFBRAS	The computer was shut down because temperature became dangerous.	Read the description of abnormal temperature in “6.2.2 (1)” and take action accordingly.
7	270	HFBRAS_SYS	Information	HFBRAS	Used hours on the drive of the drive bay%1 exceeded prescribed value.	We recommend you back up the data and replace the drive.
8	274	HFBRAS_SYS	Error	HFBRAS	Revolutions of case fan deteriorated remarkably.	Read the description of fan failure in “6.2.2 (1)” and take action accordingly.
9	275	HFBRAS_SYS	Information	HFBRAS	Revolutions of case fan returned to normal value.	No handling.
10	524	HFBRAS_SYS	Information	HFBRAS	In the current settings, memory dump file won't be saved.	Change the setting according to “7.3.2”.
11	539	HFBRAS_SYS	Error	HFBRAS	The “%1” was finished.	Hardware monitoring of the RAS software has been terminated. If restarting the equipment does not resolve the error, contact the system administrator or maintenance personnel.
12	769	HFBRAS_APP	Error	HFBRAS	An error occurred in %1. errorcode = %2.	Hardware monitoring of the RAS software has been terminated. If restarting the equipment does not resolve the error, contact the system administrator or maintenance personnel.



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Table 6-2 Event Log Entries Unique to the Equipment (2/2)

No.	Event ID	Source	Type	Category	Description	Action
13	2001	HFBRAS_SYS	Error	HFBRAS	The drive on the drive bay%1 is OFFLINE because of failure.	Read the description of abnormal temperature in “8.4.2” and take action accordingly.
14	2002	HFBRAS_SYS	Information	HFBRAS	RAID status is OPTIMAL.	No handling.
15	2003	HFBRAS_SYS	Error	HFBRAS	RAID status is UNKNOWN.	Contact the system administrator or maintenance personnel.
16	2004	HFBRAS_SYS	Information	HFBRAS	RAID status was revealed.	No handling.
17	2011	HFBRAS_SYS	Information	HFBRAS	Rebuilding was completed. But unreadable sectors were detected on the source drive (Drive bay%1). (Media error)	Read the description of abnormal temperature in “8.4.2” and take action accordingly.
18	2012	HFBRAS_SYS	Error	HFBRAS	Rebuilding failed due to error on the destination drive (Drive bay%1).	Read the description of abnormal temperature in “8.2.2” and build a RAID.
19	2019	HFBRAS_SYS	Information	HFBRAS	Media error is occurred on RAID.	Read the description of <i>HF-BT1000 RAS FEATURES MANUAL</i> and take action accordingly.
20	2020	HFBRAS_SYS	Error	HFBRAS	RAID status is FAIL.	Contact the system administrator or maintenance personnel.

No.3: %1 denotes the drive bay number. %2 denotes the manufacturer and the model name of the storage.

No.7, 13, 17, 18: %1 denotes the drive bay number.

No.11: %1 records one of the following:


FAN, TEMP, RMTSTDN, TMPLOG, WDT, RAID1, RAID\_SMART, SMART, USETIME, RASLOG, INTERNAL - LOGD

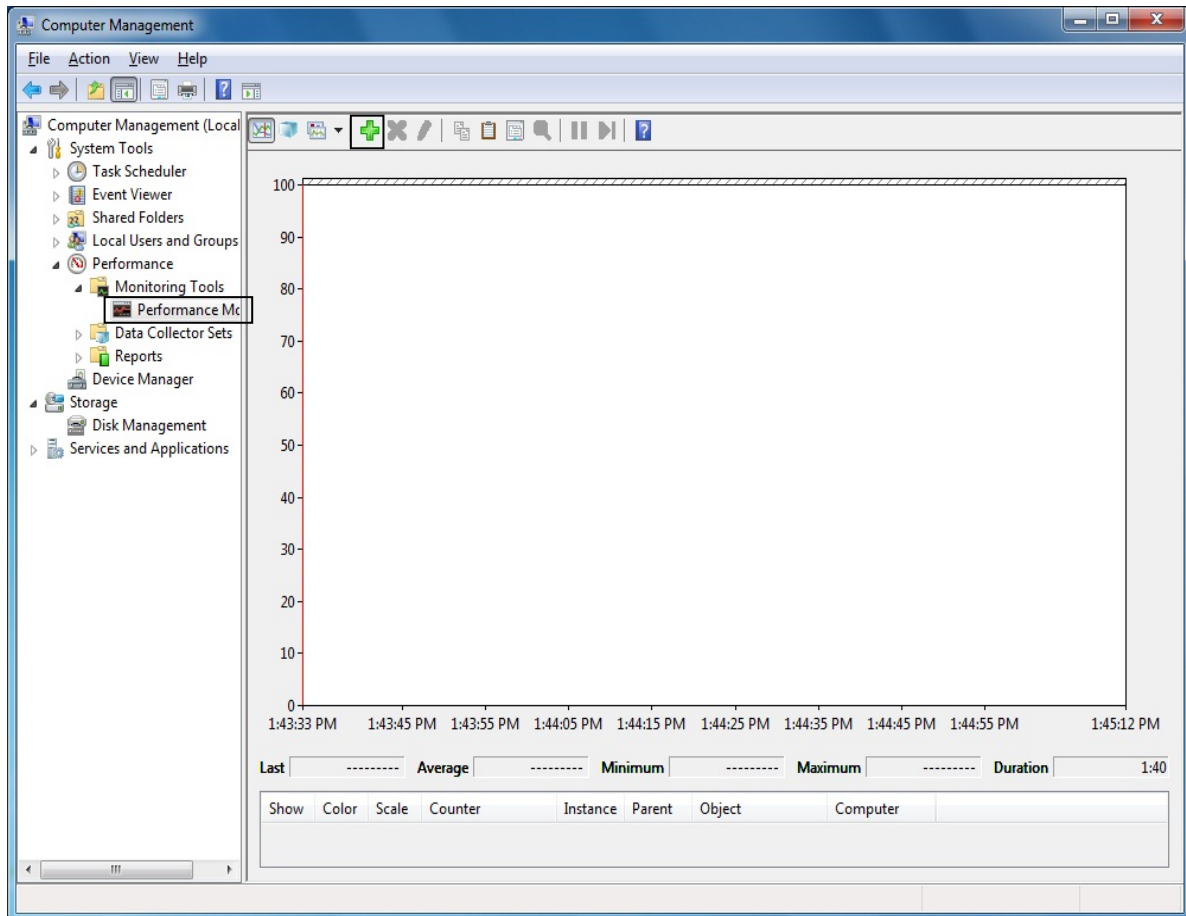
No.12: %1 denotes the function terminated with an error. %2 denotes the error code.

## 6.5 Checking the System Load by Using Performance Monitor

Performance Monitor that comes with Windows® is used for monitoring the usage of the CPU and memory. Use this tool, for example, when you analyze the system load.

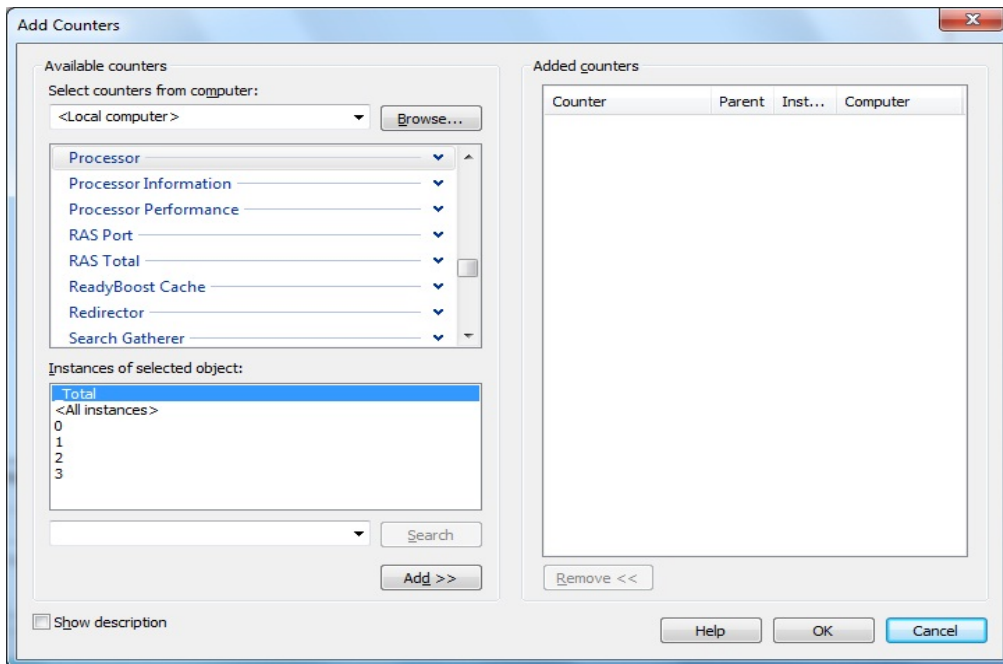
The following shows how to start the performance monitor:

1. Click **Start > Control Panel > System and Security > Administrative Tools**.
2. Double-click **Performance Monitor**.
3. The **Performance Monitor** window opens. Click **Performance Monitor** and then click .

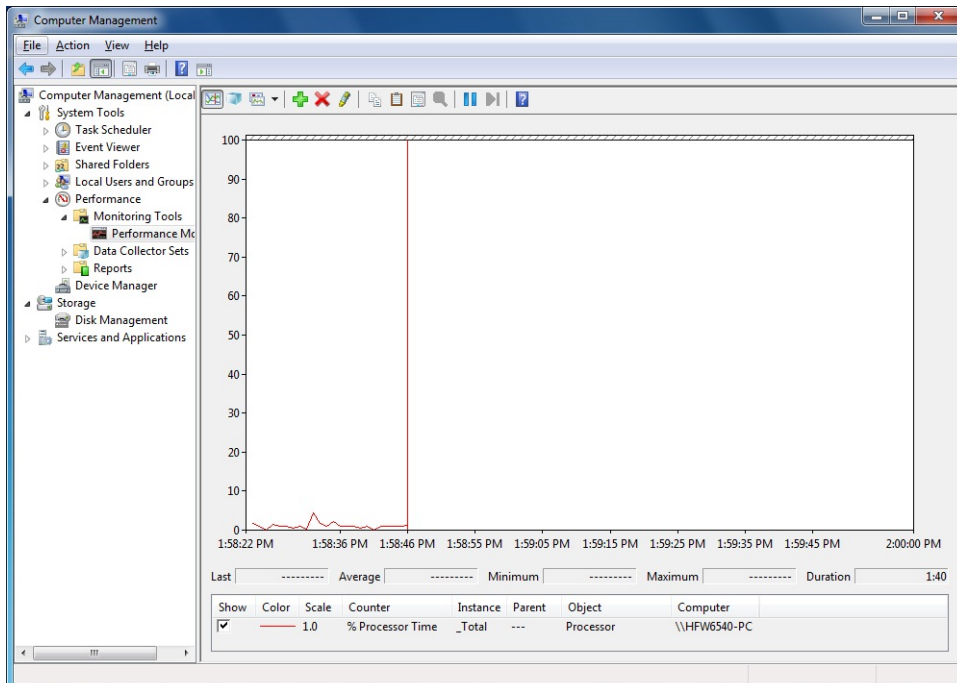


## 6. TROUBLESHOOTING

4. The **Add Counters** window opens. If you select items such as Processor, Memory, Physical Disc, or Network Interface and click **Add>>**, the performance of those items will be monitored. Click **OK**.



5. In the **Performance Monitor** window, you can check the performance of the items you selected.



The following table shows a list of performance counters most closely related to the performance of the equipment.

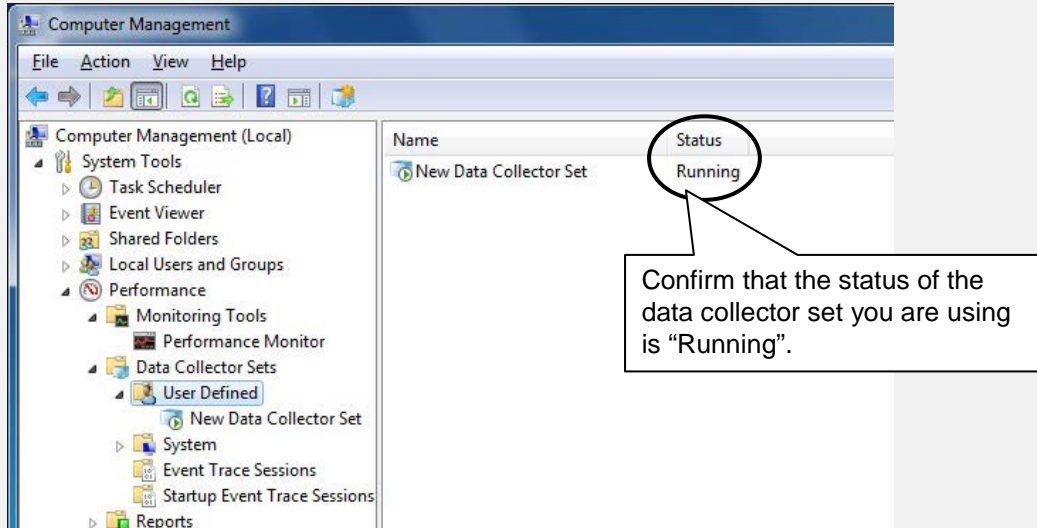
Table 6-3 Performance Counters Related to the Performance of the Equipment

No.	Performance object	Counter	Description
1	Processor	%Processor Time	Shows the CPU usage. If this value is continuously high, the CPU processing power is likely to be a bottleneck.
2	Memory	Pages/sec	Indicates the number of pages per second that are read from or write to the disk in order to resolve page faults. If this value is high, it is likely that the amount of memory is not sufficient. The closer this value is to 0, the better.
3		Available Bytes	Indicates the size of physical memory available for processes. If this value indicates a decreasing trend, it is likely that there is a memory leak.
4		Pool Nonpaged Bytes	Indicates the size of the memory area that will never be paged out to the disk and stays in the physical memory as long as it is allocated. If this value indicates an increasing trend, it is likely that there is a memory leak.
5	PhysicalDisk	%Disk Time	Indicates the percentage of time that the disk is busy reading and writing. If this value is continuously high, the disk performance is likely to be a bottleneck.
6	Network Interface	Bytes Total/sec	Indicates the number of bytes per second that are sent and received by the network adapter. If this value is continuously high compared to the value of No.7, the network is likely to be a bottleneck.
7		Current Bandwidth	Shows the network bandwidth.

## 6. TROUBLESHOOTING

### < NOTE >

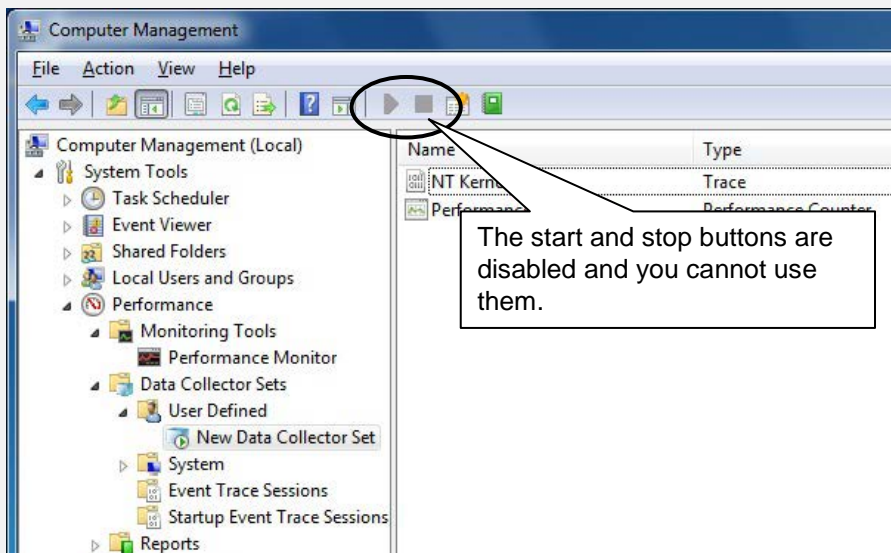
You may not be able to start collecting performance counter data when the system load is high. After you start collecting performance counter data, confirm that the status of the data collector set you are using is “Running”.



Confirm that the Performance Counter data collection has started properly.

In addition, if the system load is high or if you repeatedly start and stop collecting performance counter data, sometimes you cannot start or stop collecting performance counter data.

If this situation happens, terminate Performance Monitor, wait for a while, restart Performance Monitor, and then start collecting the data.



Performance Counter data cannot be collected.

If you cannot start collecting performance counter data even after you have restarted Performance Monitor, restart the system.

## 6.6 Digital LEDs for Status Indication

---

The Digital LEDs for Status indication are used for displaying a POST code at system startup. It also displays an error code that occurred during system operation.

It should be noted that the Digital LEDs for Status indication may display a code even when there is no error.

(Example: when the BIOS setup menu is displayed: Ab, POST code for power on until OS startup)

As shown below, the numerical value lamp shows the digits from 0 to F hexadecimally.



### 6.6.1 POST messages

---

Power On Self Test (POST) is a function whereby the system BIOS makes routine checks for hardware failure when the power of the computer system is turned on. If any failure is found, the POST code corresponding to the location of the failure is displayed on the Digital LEDs for Status indication situated on the front of the equipment.

In this equipment, a POST code is displayed in the following cases:

- (1) Main memory is not installed.  
POST code “53” is displayed with a beep.
- (2) The BIOS setup menu is being displayed.  
POST code “Ab” is displayed.
- (3) The OS starts.  
POST code “A0” is displayed.  
If RAS software is installed, the Digital LEDs for Status indication go out after indicating “A0”.  
If RAS software is not installed, the digital LEDs for status indication remain to indicate “A0”.

(Note) If the user’s tool and a device driver write in “80h” of I/O space, a display code may change.

### 6.6.2 Displaying a hardware status code

---

A hardware status code is displayed when an error occurs in the hardware during system operation.

When the hardware status code is displayed, the RAS status lamp (red) in the status indication LEDs is lit.

Table 6-4 Hardware Status Code and Cause/Action

Status code	Cause	Action
11	Rotation of the case fan is abnormal.	Read the description in subsection 6.2.2 (1) and take action accordingly.
12	Rotation of the CPU fan is abnormal.	
21	The temperature is abnormal.	Read the description in subsection 6.2.2 (1) and take action accordingly.
31	Failure is predicted for the drive in drive bay 1.	We recommend you back up the data and replace the drive.
32	Failure is predicted for the drive in drive bay 2.	
41	The drive bay1 is abnormal.	Read the description of “8.4.2” and replace an HDD.
42	The drive bay2 is abnormal.	
4B	RAID array is failure (HDD failure in both sides.)	Contact your system administrator or maintenance personnel.
4C	RAID status is unknown (RAS software could not get the RAID status.)	Contact your system administrator or maintenance personnel.
4D (*)	Media error is occurred on RAID.	Read the description in subsection 8.4.2 and take action accordingly.

(\*) This code is not displayed in default setting. Read the description of *HF-BT1000 RAS FEATURES MANUAL* “5.3 RAID Configuration Control Command (raidctrl) (D Model Only)” when you want to display this code.

#### < NOTE >

- If a code other than one of the above is displayed, contact the system administrator or maintenance personnel.

### 6.6.3 Displaying a timeout code

---

A timeout code is displayed if a watchdog timer has timed out during system operation. The status indication LEDs do not light for a timeout code. If another code was displayed before a timeout code, the status indication LEDs remain lit.

Table 6-5 Timeout Code and Cause/Action

Timeout code	Cause	Action
88	A watchdog timer has timed out.	Read the description in subsection 6.2.2 (3) and take action accordingly.

< NOTE >

- A timeout code is displayed only if the operation for a timeout is set to “Not reset” in the watchdog timer setting in the RAS Setup window.
- A timeout code flashes regardless of the display mode setting for the digital LEDs for status indication.
- For how to set the RAS features setting window, watchdog timer and digital LEDs for status indication display mode, refer to “3.1 RAS Setup Window” in the *HF-BT1000 RAS FEATURES MANUAL*.



**6.6.4 Displaying a STOP error code**

---

A STOP error code is displayed when a Windows® STOP error (blue screen) occurred for some reason.

A STOP error code is displayed with all digital LEDs for status indication lit.

Table 6-6 Stop Error Code and Cause/Action

STOP error code	Cause	Action
80	A STOP error has occurred.	Read the description in subsection 6.2.2 (6) and take action accordingly.

< NOTE >

- A STOP error code is displayed in preference to other codes regardless of the display mode setting for the digital LEDs for status indication.
- For the display mode setting for the digital LEDs for status indication, see “3.1 RAS Setup Window” in the *HF-BT1000 RAS FEATURES MANUAL*.

## CHAPTER 7 MAINTENANCE OPERATION

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This chapter describes maintenance operations that use the Reliability, Availability, and Serviceability (RAS) features of this equipment.

### 7.1 Overview

---

RAS features are designed to achieve highly reliable features of the equipment. The following table shows an overview of the RAS features of this equipment.

Category		Item
Monitoring		Hardware status monitoring
		Watchdog timer monitoring
GUI features setting		RAS setup window
Status check	GUI display	Hardware status window
		Notification
		Event notification
		Popup notification
		Status display digital LEDs
		Remote notification
Control	Shutdown/system reset	Automatic shutdown
		System reset
		Shutdown using library functions
		Controlling the status display digital LEDs
Library functions		RAS library
Maintenance /Failure analysis	Memory dump related	Memory dump collection
		Log information collection window
		Maintenance operation support commands
		Logging the trend of the temperature inside the chassis
Simulation		Hardware status simulation

#### <Monitoring>

##### (1) Hardware status monitoring

Monitors the hardware status of this equipment including the status of the fans and drives as well as the temperature inside the chassis.

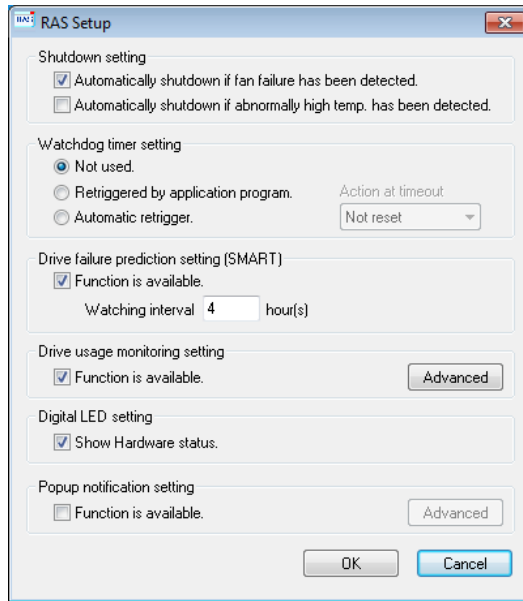
##### (2) Watchdog timer monitoring

This function monitors the operation of the OS or user programs using a watchdog timer installed in this equipment. It also provides library functions to use the watchdog timer.

<GUI feature setting>

(3) RAS Setup window

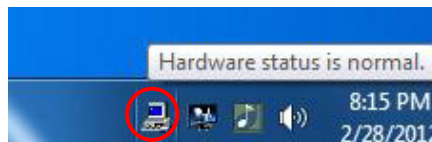
This window provides a graphical user interface for configuring RAS feature settings including the condition of automatic shutdown and the watchdog timer settings.



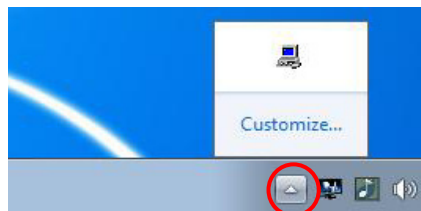
<Status check>

(4) Hardware status window

This window displays the hardware status of this equipment by using a graphical interface. There is always an icon in the notification area of the taskbar to display the hardware status.



However, the window is not displayed in the default factory settings. If you click the arrow at the side of the notification area, the icon will appear. If you want this icon to reside in the notification area of the taskbar, click Customize to have it displayed in the notification area of the taskbar.



(5) Event notification

Enables a user application to check the hardware status of this equipment by monitoring the status of event objects.

**(6) Popup notification**

Notifies a user that an error occurred in the hardware of this equipment by displaying popup messages.

**(7) Status display digital LEDs**

The status display digital LEDs are on the front of this equipment and notify a user that an error occurred in the hardware of this equipment. These LEDs can be used by a user application in order to, for example, notify the failure of the application.

**(8) Remote notification**

Enables a remote device to check the hardware status of the equipment. This function also notifies to a remote device whenever the hardware status changes.

**(9) Status acquisition using library functions**

This function enables a user application to get the hardware status of this equipment by using the RAS library.

**<Control>****(10) Automatic shutdown**

Automatically shuts down the equipment when fan failure or abnormal temperature inside the chassis. Use “(3) RAS Setup window” to enable or disable the automatic shutdown feature.

**(11) System reset**

The system resets when a watchdog timer timeout in the equipment is detected. Use “(3) RAS Setup window” to enable or disable the system reset feature.

**(12) Shutdown using library functions**

A user application can shut down the equipment using the RAS library.

**(13) Controlling the status display digital LEDs**

Enables a user to control the status display digital LEDs with the RAS library.

**<Library functions>****(14) RAS library interface**

Offers library functions for recording log information in addition to the library functions offered by (2), (9), (12), and (13).

**<Maintenance / Failure analysis>****(15) Memory dump collection**

When a failure occurs, for example, this equipment stops unexpectedly, you can save the contents of the system memory to a file (memory dump file) by pressing **Scroll Lock** twice while holding the right **Ctrl** key. By analyzing the data in this memory dump, you can investigate the cause of the failure.

**(16) Log information collection window**

Allows you to collect log data and memory dump files for this equipment using a graphical user interface.

## 7. MAINTENANCE OPERATION

### **(17) Maintenance operation support commands**

These commands include a command used for saving failure information such as memory dump files and event log files to an external medium.

### **(18) Trend logging of the temperature inside the chassis**

This feature periodically measures the temperature inside the chassis of this equipment and records the data in a file.

### **<Simulation>**

#### **(19) Hardware status simulation**

Simulates the hardware status of this equipment. By using this function, you can test a user application and check the notification interface of the RAS software without actual hardware failure.

This manual explains a part of function (7) as well as functions (15) and (17). For details about other features, refer to *HF-BT1000 RAS FEATURES MANUAL*.

## 7.2 Collecting a Memory Dump

When one of the errors in Table 7-1 occurs, this equipment records the contents of the system memory in a file (memory dump file). Then a blue screen appears and a STOP error code is displayed. By analyzing the data in this memory dump file, you can investigate the cause of the failure.

Table 7-1 Error That Trigger a Memory Dump

Cause	Description
Keyboard operation	Pressing the Scroll Lock twice while holding down the <b>Ctrl</b> key allows you to collect a memory dump (*1).
Watchdog timer timed out	When a watchdog timer timed out, a memory dump is collected (*2).
Microsoft® Windows® STOP error	When a fatal error occurs in the Microsoft® Windows® kernel, a memory dump is collected.

(\*1) It may be impossible to collect a memory dump depending on conditions, such as Windows® is suspending responses at a high interrupt request level (IRQL).

(\*2) In the RAS Setup window, you can configure whether to collect a memory dump.

### < NOTE >

- The Windows® function that allows you to collect a memory dump by pressing the **Scroll Lock** twice while holding down the **Ctrl** key is enabled in this equipment. Do not perform this key operation for any purpose other than to collect a memory dump.

For details about the displayed STOP error code, see “6.3 STOP Error Codes”.

To select the memory dump file type, open System in Control Panel. You can select from the following three types defined below. Because the memory dump file type determines how far you can analyze the failure by using the dump file, we recommend selecting “Complete memory dump” whenever you can. The factory default is “Complete memory dump”.

- Complete memory dump The entire contents of system memory is recorded. The boot volume (\*3) must have enough free space to hold a paging file equal to the size of the physical memory plus 1 MB.
- Kernel memory dump The kernel memory is recorded. The boot volume (\*3) must have enough free space to hold a paging file about one third the size of the physical memory.
- Minimum memory dump The minimum information necessary for identifying what caused the equipment to stop is recorded. The boot volume (\*3) must have enough free space to hold a paging file of more than 2 MB.

(\*3) The boot volume is a volume that contains Windows® files and Windows® support files.

< NOTE >

- The factory default is “Complete memory dump”, but if you change the setting, you cannot restore the setting back to “Complete memory dump” by using System in Control Panel. For information about how to select “Complete memory dump”, see “7.3.5 Configuring settings related to a memory dump (2) Specifying a memory dump file”.

If you use System in Control Panel, you can make settings for not only the memory dump file but also virtual memory and automatic restart after a memory dump is collected. For information about how to make those settings, see “7.3.5 Configuring settings related to a memory dump”.

<Examples of blue screens>

The following is an example of screen display when collecting a memory dump.

```
*** STOP: 0x0000001e (0x0000009a, 0x80123f36, 0x02000000, 0x00000246)
Unhandled Kernel exception c000009a from 80123f 36
Address 80123f 36 has base at 80100000-ntoskml.exe

(A list of drivers and a list of stacks follow.)
Beginning dump of physical memory
Physical memory dump complete. (when the dump is finished)
Contact your system administrator or technical support group.
```

< NOTE >

- The time required for collecting a memory dump depends on the type of dump file collected, the configuration of the mounted drives, and the memory capacity. It should be noted that if you keep the factory setting, “Complete memory dump”, for the memory dump file type, the time required may be extremely long.
- After “Beginning dump of physical memory” is displayed on the blue screen, the count on the screen that shows the progress of the memory dump sometimes stops being updated. This is because collection of the memory dump failed due to an error of the file system or a hard disk.

If this happens, record the first five lines of the STOP message screen. Then press the reset switch or turn the power off and then back on to restart the equipment.

<Record example>

```
*** STOP: 0x0000001e (0x0000009a, 0x80123f36, 0x02000000, 0x00000246)
Unhandled Kernel exception c000009a from 80123f 36
```

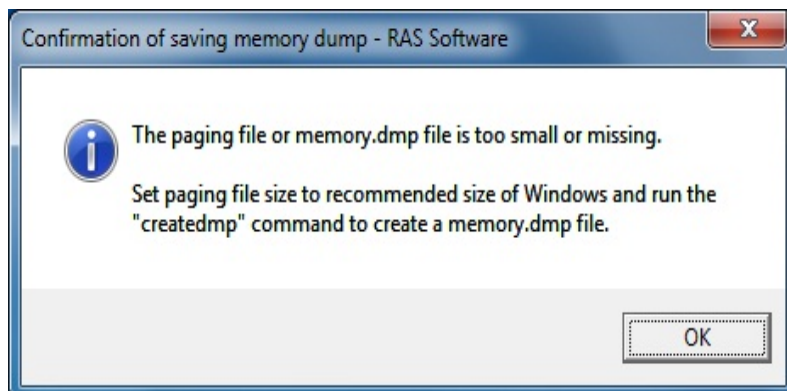
### **7.3 When the Saving Memory Dump Confirmation Messages is Displayed**

In order to allow more reliable failure analysis, this equipment is configured to collect a memory dump when a system error (Blue Screen of Death) occurs. This equipment checks the memory dump file settings during Windows® startup, and if the equipment detects that a memory dump cannot be collected, the user is notified of this fact by the display of a message box and the recording of an event in the event log.

#### **7.3.1 When the capacity of the memory dump file is insufficient or when the virtual memory setting is changed**

- When the capacity of a memory dump file is insufficient

In order to collect a memory dump file, you need a memory dump file of a size proportional to the capacity of the physical memory. In addition, the virtual memory (page file) setting must be the one recommended for this equipment. If the capacity of the physical memory exceeds the capacity of the memory dump file or the virtual memory due to, for example, newly added physical memory, or if a memory dump cannot be collected because the virtual memory setting has changed, the following message will be displayed.



If this situation happens, follow the procedure in “7.3.3 Countermeasures when the capacity of the memory dump file is insufficient” and configure the virtual memory setting and the memory dump file capacity so that memory dump files can be collected.

#### **< NOTE >**

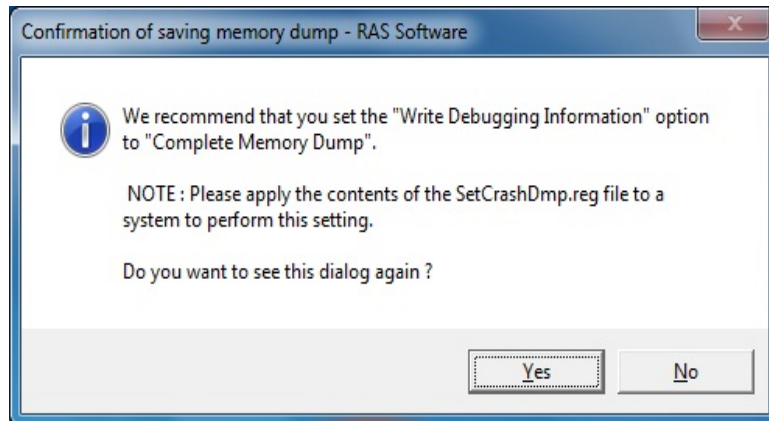
- When the message box above is displayed, sometimes an information log entry with Event ID 26 is recorded in the event log.



### 7.3.2 Changing the memory dump collection setting

---

We recommend collecting a complete memory dump for this equipment. In order to collect a complete memory dump, you must properly configure the settings related to a memory dump. If you changed the settings related to a memory dump, and as a result, a complete memory dump cannot be collected, the following message will be displayed. (The image shown is from Windows® 7.)



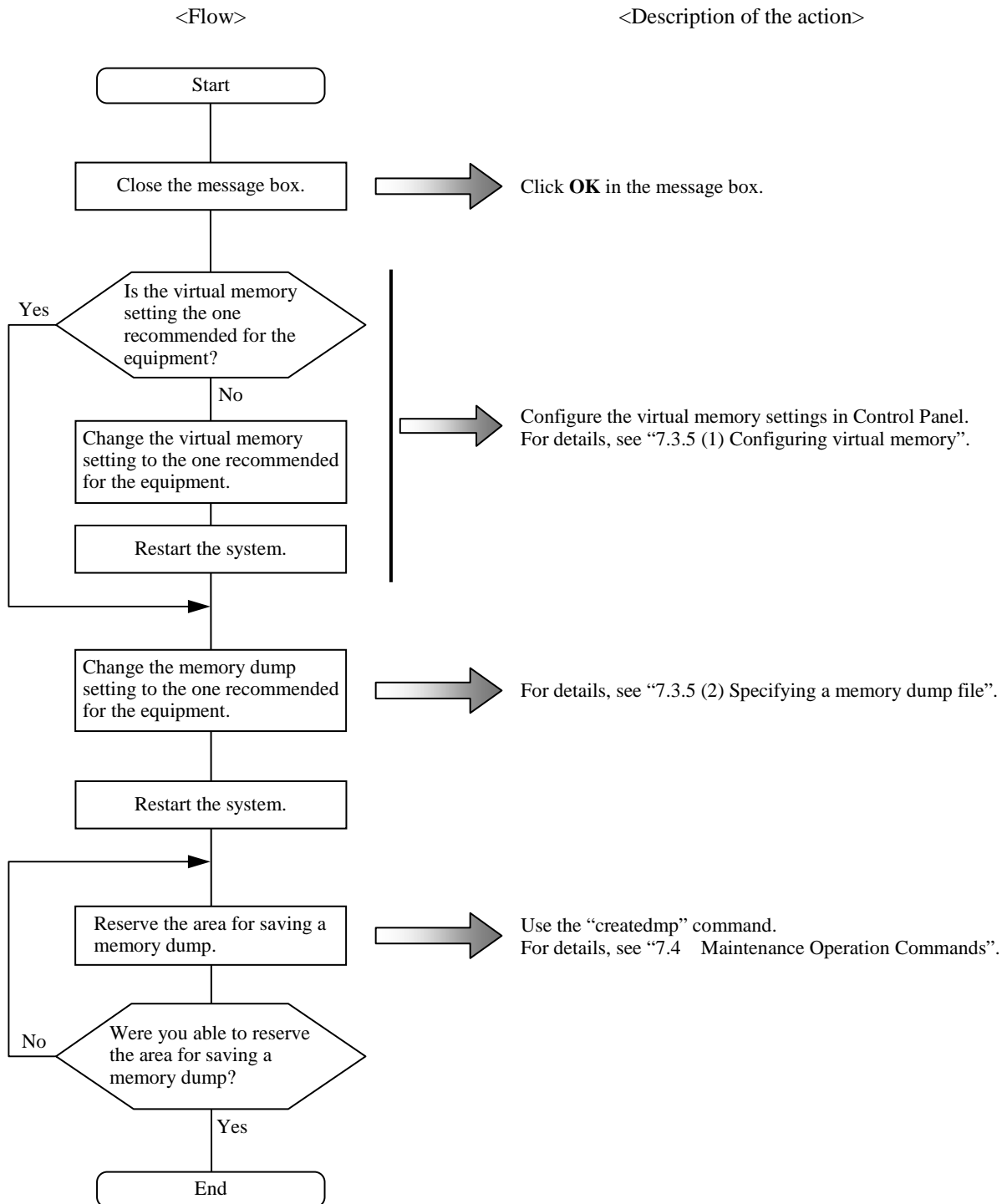
If this situation happens, follow the procedure in “7.3.4 Countermeasures when changing the memory dump collection setting” and configure the memory dump setting to make collecting a complete memory dump possible.

< NOTE >

- If you click **No** in the message box, this message box will not be displayed after that. If you decide not to collect a “Complete memory dump” when you use the equipment, click **No**.
- When the message box above is displayed, sometimes an information log entry with Event ID 26 is recorded in the event log.

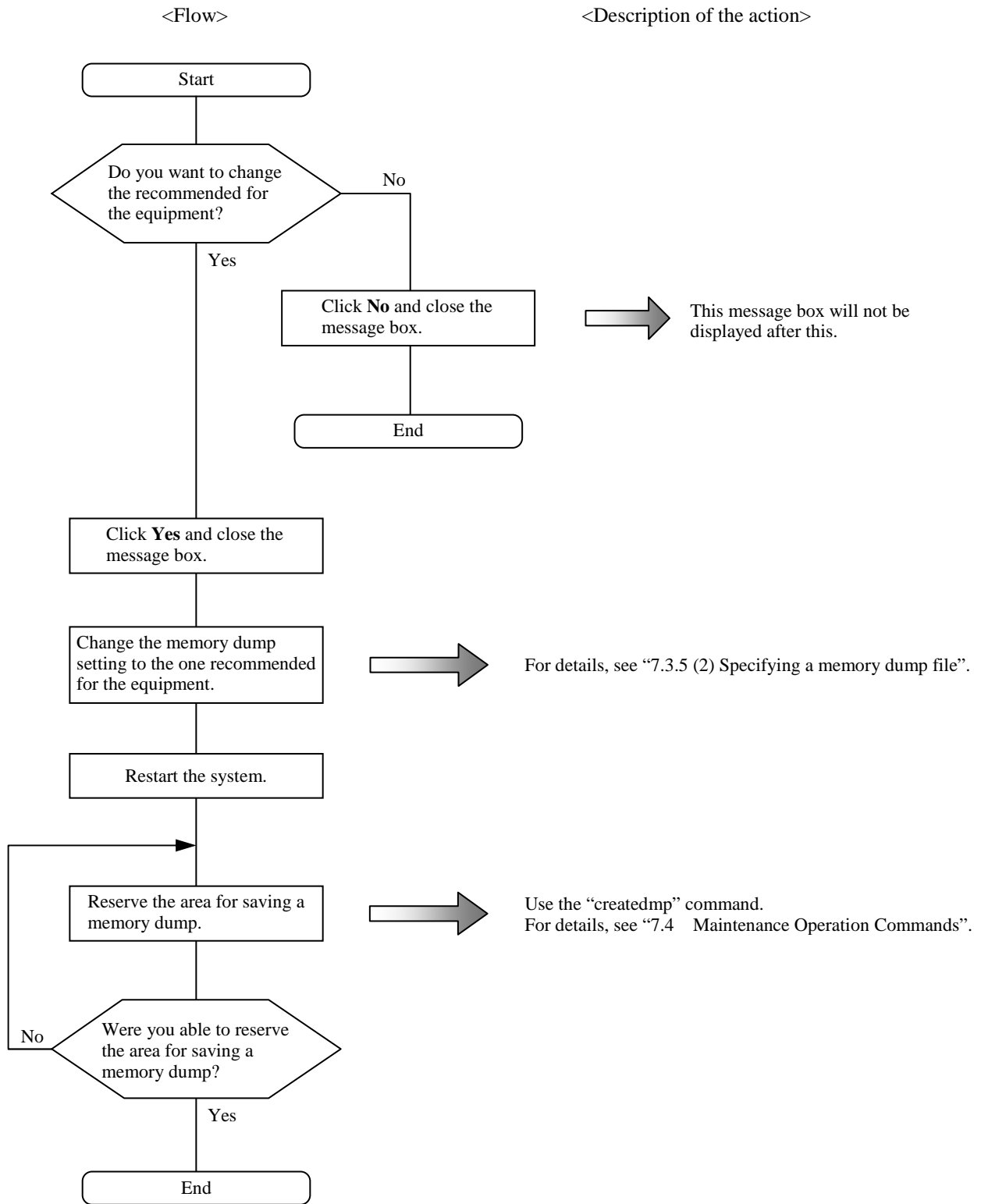
### 7.3.3 Countermeasures when the capacity of the memory dump file is insufficient

Follow the flow chart below to take appropriate actions.



**7.3.4 Countermeasures when changing the memory dump collection setting**

Follow the flow chart below to take appropriate actions.



### 7.3.5 Configuring the settings related to a memory dump

---

< NOTE >

Before starting a procedure in this subsection, you must log on to the local computer by using an administrator account registered on the computer (as a member of the Administrators group).

**(1) Configuring virtual memory**

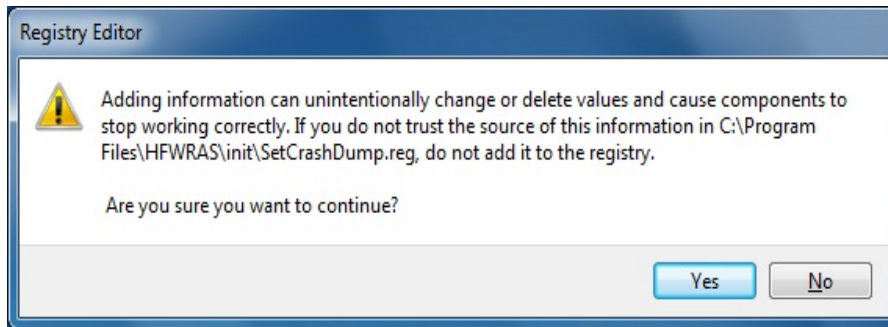
1. Click **Start > Control Panel > System and Security**. Then click **System**.
2. Under **Task** on the left side of the window, click **Advanced system settings**.
3. If you see **User Account Control window**, click **Yes**.
4. On the **Advanced** tab page, click **Settings** under **Performance**.
5. In the **Performance Options** window, click the **Advanced** tab. Under **Virtual memory**, click **Change**.
6. Clear the **Automatically manage paging file size for all drives** check box.
7. In the **Drive** list, select the drive that stores the paging file you want to change. For the sake of explanation, assume C: (system drive) is clicked here.
8. Select **Custom size**. In the **Initial size (MB)** or **Maximum size (MB)** box, type the new size of the paging file in megabytes. Then click **Set**.  
Note that the initial size must be at least the **Recommended** size shown under **Total paging file size for all drives**. The **Recommended** size equals 1.5 times the total size of the main memory of the equipment.
9. Click **OK**.

**(2) Specifying a memory dump file**

1. Click **Start > Control Panel > System and Security**. Then click **System**.
2. Under **Task** on the left side of the window, click **Advanced system settings**.
3. If you see the **User Account Control** window, click **Yes**.
4. In the **Advanced** tab page, click **Settings** under **Setup and Recovery**.
5. In the **Dump file** box, type a memory dump file name.  
By default, “%SystemRoot%\MEMORY.DMP” is specified for this box.  
Unless it is necessary, you do not have to enter a name.
6. Select the **Overwrite any existing file** check box.
7. Click **OK**.

In order to enable a Complete memory dump as recommended for this equipment, follow the procedure below.

1. In the search box that is displayed by clicking the Start button in the lower left corner, enter the following and press Enter.  
C:\Program Files\HFWRAS\init\SetCrashDump.reg  
(Alternately, double-click the SetCrashDump.reg file under C:\Program Files\HFWRAS\init.)
2. If you see the **User Account Control** window, click **Yes**.
3. The following message box will open. Click **Yes**.



4. A message box will appear indicating that information has been added successfully. Click **OK**.

**(3) Enabling automatic restart after a memory dump**

1. Click **Start > Control Panel > System and Security**. Then click **System**.
2. Under **Task** on the left side of the window, click **Advanced system settings**.
3. If you see the **User Account Control** window, click **Yes**.
4. On the **Advanced** tab page, click **Settings** under **Setup and Recovery**.
5. If you want to restart the equipment after a memory dump, select the **Automatically restart** check box. If you want to stop the equipment after a memory dump, clear the **Automatically restart** check box.
6. Click **OK**.

## 7.4 Maintenance Operation Commands

---

This section explains how to use maintenance operation commands. These commands are used when problems occur in the equipment and during preventive maintenance. All these commands are started at the command prompt when they are used.

Table 7-2 shows a list of maintenance operation commands.

Table 7-2 Maintenance Operation Commands

Command name	Feature
logsave	Used for collecting data for preventive maintenance or data for post-failure analysis during preventive maintenance or when problems occur.
mdump	Used for copying a memory dump file to a portable medium when a memory dump is collected due to a STOP error.
createdmp	Used for reserving a disc area for a memory dump file when a message is displayed indicating the capacity of the memory dump file is insufficient.
getrasinfo	Used for checking the status of the equipment such as the status of the fan and the temperature inside the chassis.

The Manufacturer provides charged services to analyze the data collected by these maintenance operation commands, such as memory dump files and data for failure analysis. To start the command prompt, follow the procedure below.

### (1) Starting the command prompt

1. Log on to the computer by using an administrator account.
2. Click **Start**.
3. Click **All Programs**.
4. Click **Accessories**.
5. Right-click **Command Prompt** and click **Run as administrator**.  
(If the administrator account you used for logon is a built-in administrator account, simply click **Command Prompt**.)  
If you see the **User Account Control** window, click **Yes**.

**7.4.1 Log information collection command (logsave)**

---

<Name>

logsave - Collecting log information

<Syntax>

logsave [-e file name][Directory]

<Feature>

The logsave command saves the data used for preventive maintenance and post-failure analysis of problems. The data is compressed and recorded as one file (File name: logsave.dat).

The following options are available for this command. If no options are specified, the logsave directory, is created under the system drive (usually C:\) and the data is saved under that directory.

**-e file name:** The data previously saved by the logsave command will be decompressed. For the file name, specify the absolute path of the file you want to decompress. If this option is not used, the logsave command will save the data.

**Directory:** When the -e option is not used, specify the directory where you want to store the saved data. If this option is not used, a directory, the logsave directory, is created under the system drive (usually C:\) and the data is saved under that directory.

When the -e option is used, specify the directory where you want to store the decompressed data. If this option is not used, the data is decompressed under the current directory.

Table 7-3 shows the information collected by the logsave command.

Table 7-3 Information Saved by logsave

Item	Description
Windows® event log file	Backup of the event log file
RAS software log data	RAS software operation log
RAS software user configuration information	User configuration definition file of the pop-up notification
Windows® version information	Version information of the Windows® system files and driver files
Minimum memory dump	Files under the directory used for storing a minimum memory dump
System information	System information including hardware resources and software environment.
Output of the RAS information display command	Status of the equipment such as the status of the fan and the temperature inside the chassis and configuration information of the RAS software
Output of the ipconfig command	Network that sets information
RAID log data	RAID operational log (D Model only)

## &lt;Diagnosis&gt;

When this command is terminated with an error, the following error message is displayed. If a directory for saving data does not exist, an error message from the Windows® xcopy command is displayed.

Table 7-4 Error Messages of the logsave Command

Error message	Meaning
Error: You do not have the privilege to run this command. Please run this command again on “Administrator: Command Prompt”.	You do not have administrator privileges. Log on to the computer by using an administrator account and run the command again. If User Account Control (UAC) is enabled, start the command prompt with administrator privileges and run the command.

## &lt; NOTE &gt;

- When you run the logsave command, log on to the computer by using an administrator account registered on computer (as a member of the Administrators group). You cannot run multiple instances of the logsave command simultaneously.
- If User Account Control (UAC) is enabled, start the command prompt with administrator privileges according to “7.4 (1) Starting a command prompt” and run the command.
- The log information can also be collected by using a program in the start menu. For details, refer to “HF-BT1000 RAS FEATURES MANUAL”.
- The size of the file after compression depends on how the equipment is used and how Windows® is set up, but roughly speaking, the size is about 10 MB.



### 7.4.2 Memory dump file copy command (mdump)

---

<Name>

mdump - Copying a memory dump file

<Syntax>

mdump [-n | -e file name] <Copy (Decompress) destination path name>

<Feature>

The mdump command compresses a memory dump file collected by Microsoft® Windows® when the equipment stops unexpectedly. Then the command copies the compressed memory dump file to a portable medium. The dump file, which is specified in the **Setup and Recovery** window displayed by selecting **Control Panel > System and Security > System > Advanced system settings** and clicking **Settings** under **Startup and Recovery**, and all the files under the minimum dump directory will be saved. The memory dump file is compressed and stored as a file (File name: memory.mcf).

As an option, if you use the -e option, the compressed file will be decompressed.

The following options are available for this command:

-n: Files will be copied without compression.

-e file name: A file compressed by the mdump command will be decompressed. You must specify the file name.

Copy destination path name: When the -e option is not specified, specify the drive name of the copy destination. If you want to copy files to a directory, specify a full path including the directory name.

When the -e option is used, specify the directory where you want to store the decompressed files.

- A memory dump file is copied to the copy (decompress) destination specified by this command.
- If a file with the same name as the copy (decompress) destination already exists at the same location, the file is overwritten.
- When you run the mdump command by typing “mdump /?” or “mdump -?” at the command prompt or when there is an error in the specified parameters, a help message will be displayed to show how to use the command.

< NOTE >

- When you run the mdump command, log on to the computer by using an administrator account registered on the computer (as a member of the Administrators group). You cannot run multiple instances of the mdump command simultaneously.
- If User Account Control (UAC) is enabled, start the command prompt with administrator privileges according to “7.4 (1) Starting a command prompt” and run the command.

## &lt;Diagnosis&gt;

When the mdump command finishes, exit code 0 is returned after copying (decompressing) a memory dump file is complete. Then some of the following messages may be displayed.

Table 7-5 Messages of the mdump Command

Message	Description
Warning: Memory dump file was not copied.	The memory dump file could not be copied.
Warning: Minidump files were not copied.	Some minimum memory dump files could not be copied.

(Note) If these messages are displayed, to show the cause of these messages, one of the following error messages may be displayed depending on the way the command was executed.

When this command is terminated with an error, one of the following error messages is displayed and exit code 1 is returned.

Table 7-6 Error Messages of the mdump Command

Message	Description
Error: Systemcall failed. (%s, %x) %s: Name of the Windows API function where the error occurred %x: Error code from the Windows API	An internal error has occurred.
Error: You do not have the privilege to run this command. Please run this command again on "Administrator: Command Prompt".	You do not have administrator privileges. Log on to the computer by using an administrator account and run the command again. If User Account Control (UAC) is enabled, start the command prompt with administrator privileges and run the command.

### **7.4.3 Disk area allocation command for saving a memory dump (createdmp)**

---

<Name>

createdmp - Reserving a disk area for a memory dump file

<Syntax>

createdmp

<Feature>

The createdmp command creates a vacant memory dump file beforehand and reserves the disk area for a memory dump in order to prevent the situation where collecting a memory dump fails because the disk capacity is insufficient. By using this command, you can avoid a failure in collecting a memory dump caused by a lack of disk capacity.

The createdmp command reserves a disk area if the following conditions are met. If those conditions are not met, the command terminates with an error. Make sure that the memory dump settings are appropriate and then retry this command. For information about how to set up the memory dump settings, see “7.3.5 Configuring settings related to a memory dump”.

- A “Complete memory dump” is specified to be collected.
- The file name of the memory dump must be correctly input.
- The memory dump file must be able to be overwritten.
- After the area for the memory dump file is allocated, the partition used for allocation still has free space of at least 10 % of the disk capacity:

The size of the disk area to be allocated is as follows.

- The size of the physical memory size plus 10 MB.

**< NOTE >**

- When you run the createdmp command, log on to the computer by using an administrator account registered on the computer (as a member of the Administrators group). You cannot run multiple instances of the createdmp command simultaneously.
- If User Account Control (UAC) is enabled, start the command prompt with administrator privileges according to “7.4 (1) Starting a command prompt” and run the command.

## &lt;Diagnosis&gt;

When this command finishes normally, the command exits without output in the command prompt window. When this command is terminated with an error, the following error message is displayed.

Table 7-7 Error Messages of the createdmp Command

Error message	Meaning
Error: In the current settings, memory dump file won't be saved.	A memory dump cannot be collected with the current setting. In the memory dump settings, select a "Complete memory dump" option.
Error: Free disk space is too low.	The free space on the disk is too low. Increase the free space on the disk and retry.
Error: Systemcall failed. (%s, %x) %s: Name of the Windows API function where the error occurred %x: Error code from the Windows API	An internal error has occurred.
Error: You do not have the privilege to run this command. Please run this command again on "Administrator: Command Prompt".	You do not have administrator privileges. Log on to the computer by using an administrator account and run the command again. If User Account Control (UAC) is enabled, start the command prompt with administrator privileges and run the command.

**7.4.4 RAS information display command (getrasinfo)**

---

<Name>

getrasinfo - Displays the status of the equipment such as the status of the fan and the temperature inside the chassis as well as the configuration information of the RAS software

<Syntax>

getrasinfo [/status | /setting] [/e file name]

<Feature>

The getrasinfo command displays the status of the equipment such as the status of the fan and the temperature inside the chassis as well as the configuration information of the RAS software at the command prompt. This command can also store the output in the specified file in the text format.

The following options are available for this command. If neither the /status nor the /setting option is used, the command displays both the information about the equipment and the settings of the RAS software.

/status: Displays the status of the current equipment including the status of the fan and the temperature inside the chassis.

/setting: The command displays the configuration information of the RAS software.

/e File name: The output is not displayed at the command prompt but instead stored in the file specified by the file name in the text format.

Table 7-8 shows the information displayed by the getrasinfo command.

Table 7-8 Information Displayed by the getrasinfo Command

Item	Description
Status of the equipment	<ul style="list-style-type: none"> <li>• Fan status</li> <li>• Temperature status</li> <li>• RAID status (D model only)</li> <li>• Drive status</li> </ul>
RAS software settings	<ul style="list-style-type: none"> <li>• Automatic shutdown setting</li> <li>• Watchdog timer setting</li> <li>• Self-Monitoring, Analysis and Reporting Technology (SMART) setting</li> <li>• Drive power-on hours monitoring setting</li> <li>• Digital LEDs for Status indication setting</li> <li>• Pop-up display setting</li> </ul>

## &lt;Display output&gt;

The following is an example of display output when the getrasinfo command is executed without options.

```

<<getrasinfo result>>
Date:          2013/10/03 20:59:30
Computer Name: HF-BX/BT1000 Series D Model

[Hardware Status]
[Fan condition]
Case fan status:          Normal
CPU fan status:          Normal

[Temperature condition]
Internal temperature status: Normal
Internal temperature value: 28 deg C

[RAID condition] (*2)
Array1
Status:                  Optimal
RAID level:              1

[Drive condition]
Drive bay1
Status:                  Normal
Used hours:              2000 hours
Drive bay2
Status:                  Smart Detected
Used hours:              5 hours

```

Header (\*1)

(Status of the equipment)  
Hardware Status section

Continues on the next page.

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[RAS Setting]		
[Automatic shutdown setting]		
Fan:	ON	
Temperature:	OFF	
[Watchdog timer setting]		
Retrigger type:	Application	
Action at timeout:	Reset	
[Drive failure prediction setting]		
Function is available:	Enable	
Interval:	4 hours	
[Drive used hours monitoring setting]		
Function is available:	Enable	
[Advanced]		
Time limit of drive bay1:	20000 hours	
Time limit of drive bay2:	20000 hours	
[Digital LED setting]		
Show Hardware status:	ON	
[Popup setting]		
Function is available:	Disable	
[Advanced]		
Fan:	Enable	
Temperature:	Disable	
SMART:	Disable	
Used hours:	Enable	
RAID:	Disable (*2)	

} RAS Setting section  
(RAS software settings)

(\*1) The "Computer Name" shown in the header depends on the model of the equipment.

(\*2) These are displayed only in the D model.

## &lt;Explanation of the display output&gt;

## ■ Header:

This section shows the date and time when the getrasinfo command is executed and the computer name.

The following is the format of the header.

```
<<getrasinfo result>>
Date: YYYY/MM/DD hh:mm:ss
Computer Name: XX
```

YYYY: Year, MM: Month, DD: Day, hh: hour (24-hour clock), mm: minute, ss: second, XX: Computer name

## ■ [Hardware Status] section:

This section shows the status of the equipment. The Hardware Status section has the following subsections.

## • [Fan condition] section:

Shows the status of fans. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
<u>xx</u> fan status: <u>yy</u>	xx	Shows the name of the fan. Case: Case fan CPU: CPU fan
	yy	Shows the status. Normal: The fan is operating normally. Error: The fan is not operating normally.

## • [Temperature condition] section:

Shows the various statuses related to temperature. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
<u>xx</u> Temperature status: <u>yy</u>	xx	Shows the type of temperature Internal: Inside the chassis
	yy	Shows the status. Normal: The temperature is normal. Error: The temperature is not normal.
<u>xx</u> Temperature value: <u>zz</u> degC	xx	Shows the type of temperature Internal: Inside the chassis
	zz	Shows the temperature value.



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- [RAID condition] section:

Shows the RAID status. The following table shows the list of items in this subsection and their respective descriptions. This subsection is available in the D model.

Output item	Description	
Arrayxx	xx	Shows the number of the RAID array.
Status: yy( <u>zz</u> , <u>Media Error</u> )	yy	Shows the RAID status Optimal: Normal status Degraded: Abnormal status Unknown: Unknown status Fail: Failing status
	zz	Shows the progress status of a task. "zz" is shown only when the RAID is being reconfigured.
	Media Error	Shown only when a media error is detected during the task.
RAID level: <u>ww</u>	ww	RAID level in the representation below.k. 1: RAID1

- [Drive condition] section:

Shows the status of a drive. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
Drive bayxx	xx	Shows the drive bay number.
Status: <u>yy</u>	yy	Shows the status of the drive. Healthy: Normal Not Connected: No disks are mounted. (A model only) Smart Detected: SMART is detected. Offline: Offline (D model only) Rebuild: Rebuilding (D model only) Overrun: Power-on (=used) hours exceeded the threshold. Unknown: Unknown status Smart Detected, Overrun: SMART is detected and the power-on hours exceeded the threshold.
	Used hours: <u>zz</u>	zz

■ [RAS Setting] section:

This section shows the settings of the RAS software. The RAS Setting section has the following subsections.

• [Automatic shutdown setting] section:

Shows the automatic shutdown setting. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
Fan: <u>xx</u>	xx	Shows whether the system is automatically shut down when a fan failure occurs. ON: Automatically shut down. OFF: Not automatically shut down.
Temperature: <u>yy</u>	yy	Shows whether the system is automatically shut down when the temperature is abnormal. ON: Automatically shut down. OFF: Not automatically shut down.

• [Watchdog timer setting] section:

Shows the watchdog timer setting. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
Retrigger type: <u>xx</u>	xx	Shows the retrigger type. Automatic: Automatically retriggered. Application: Retriggered by an application. Not used: Not used.
Action at timeout: <u>yy</u>	yy	Shows the action to be taken upon a timeout. Reset: Resets the system. Not reset: Does not reset the system. Memory dump : A memory dump is generated.

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- [Drive failure prediction setting] section:

Shows the Self-Monitoring, Analysis and Reporting Technology (SMART) setting. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
Function is available: <u>xx</u>	xx	Shows whether the Self-Monitoring, Analysis and Reporting Technology (SMART) is enabled or disabled. Enable: Enabled Disable: Disabled
Interval: <u>yy</u>	yy	Shows the monitoring interval.

- [Drive used hours monitoring setting] section:

Shows the drive power-on (used) hours monitoring setting. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
Function is available: <u>xx</u>	xx	Shows whether the drive power-on (used) hours monitoring function is enabled or disabled. Enable: Enabled Disable: Disabled
[Advanced]	–	Shows the advanced settings.
Time limit of drive bay <u>yy</u> : <u>zz</u>	yy	Shows the drive bay number.
	zz	Shows the threshold used for the drive power-on (used) hours monitoring function.

- [Digital LED setting] section:

Shows the setting of the Digital LEDs for Status indication. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
Show Hardware status: <u>xx</u>	xx	Shows whether the hardware status display is enabled or disabled. ON: Enabled OFF: Disabled

- [Popup setting] section:

Shows the pop-up notification setting. The following table shows the list of items in this subsection and their respective descriptions.

Output item	Description	
Function is available: <u>xx</u>	xx	Shows whether the pop-up notification function is enabled or disabled. Enable: Enabled Disable: Disabled
[Advanced]	-	Shows the advanced settings.
Fan: <u>yy</u>	yy	Shows whether a pop-up is displayed for a fan failure. Enable: Displayed Disable: Not displayed
Temperature: <u>zz</u>	zz	Shows whether a pop-up is displayed when the temperature is abnormal. Enable: Displayed Disable: Not displayed
SMART: <u>aa</u>	aa	Shows whether a pop-up is displayed when SMART is detected. Enable: Displayed Disable: Not displayed
Used hours: <u>bb</u>	bb	Shows whether a pop-up is displayed when the drive power-on (=used) hours exceeds the threshold. Enable: Displayed Disable: Not displayed
RAID: <u>cc</u> (D model only)	cc	Shows whether a pop-up is displayed when abnormal RAID status is detected. Enable: Displayed Disable: Not displayed

## 7. MAINTENANCE OPERATION

### <Diagnosis>

When this command finishes normally, the getrasinfo command returns exit code 0. When this command is terminated with an error, one of the following error messages is displayed and exit code 1 is returned.

Table 7-9 Error Messages of the getrasinfo Command

Error message	Meaning
Usage: getrasinfo [/status   /setting] [/e File]	There is an error in the specified options. Specify correct options.
An error occurred in %s. errorcode=%x. %s: Name of the Windows API function or internal function where the error occurred %x: Error code from the Windows API or internal function	An internal error has occurred. Re-execute the command.
You do not have the privilege to run this command. Please run this command again on “Administrator: Command Prompt”.	You do not have administrator privileges. Log on to the computer by using an administrator account and run the command again. If User Account Control (UAC) is enabled, start the command prompt with administrator privileges and run the command.

### < NOTE >

- When you run the getrasinfo command, log on to the computer by using an administrator account registered on the computer (as a member of the Administrators group). You cannot run multiple instances of the getrasinfo command simultaneously.
- If User Account Control (UAC) is enabled, start the command prompt with administrator privileges according to “7.4 (1) Starting a command prompt” and run the command.
- When the /e option is used, if a file with the same name as the output file already exists at the same output location, the file is overwritten.
- If the command fails to acquire some of the information required for the output, it is possible that only the section name is displayed in a section or a part of the information is replaced with “---”. If this situation happens, re-execute the command.

## CHAPTER 8 RAID1

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### 8.1 What Is RAID1 ?

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This chapter describes how to manage the RAID1 feature of the D model.

In this chapter, “this equipment” denotes the D model. Note that only HDDs (hard disk drives) are used as a drive for this equipment. A drive is denoted simply as “HDD” in the following explanation.

#### **NOTICE**

- Although this equipment featuring RAID1 is more reliable than general systems, it is still prone to the loss of data in the HDDs. Not only a machine failure but also an unexpected power failure or an operation error may cause data to be lost for good. To prevent such loss of data, implement scheduled data backup in daily operation. Also, protect the power source from undesirable interruptions by such means as UPS.
- This equipment is evaluated based on the specific HDD models authorized by the Manufacturer. Replace only with specific HDD models authorized by the Manufacturer. Otherwise, the existing data in the HDD may be lost. Also, always observe the recommended replacement interval for HDDs (See “APPENDIX HANDLING REPLACEABLE COMPONENTS”).
- Since each equipment has its own RAID1 configuration information (e.g., serial number), you cannot swap HDDs even between two units of this equipment. If you replace an HDD, the replaced HDD is recognized as unmatched with RAID1 configuration information and, as a result, RAID1 reconfiguration starts automatically by the RAID1 reconfiguration function. As a result, all the data in the replaced HDD is deleted. If you are using more than one HDD, be careful in handing and storing them so that you do not mistake one from another.
- This equipment manages a serial number unique to each HDD as RAID1 configuration information. Therefore, if you copy an HDD using any function other than the RAID1 reconfiguration function, the HDD is recognized as an invalid medium, so the equipment does not start even if you install the HDD in a drive bay.
- Maintenance of a RAID1 system requires a high level of expertise. Should any mistakes be made during the work, the data stored on the HDDs may be lost.

RAID1 (Redundant Array of Independent Disks Level 1) is a technology generally referred to as “Disk mirroring”. Two HDDs are combined and managed as one RAID1 system (array). In a RAID1 system, the same data is written to the two HDDs. Data is read from either of the two HDDs. Should one HDD fail, you can read correct data from the other HDD. RAID1 uses two HDDs but the capacity available is only equal to the capacity of one HDD.

This equipment shows the status of HDDs used for RAID1 graphically, using the RAS software. For information about how to use the RAS software, refer to the *HF-BT1000 RAS FEATURE MANUAL*. Note that screenshots used in this chapter are shown only as examples. The model name, capacity, and other information about an HDD shown here may be different than those shown in an actual working system.

## 8.2 Setup

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### 8.2.1 Setup overview

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The RAID controller installed in this equipment lets the equipment recognize the two HDDs as one HDD. The RAID controller performs RAID1 processing. Therefore, the BIOS to control the RAID controller from the equipment or a device controller to control the RAID controller from the OS is not necessary. Since the equipment recognizes the HDDs as normal SATA HDDs, you don't need any special software to set up RAID1.

### 8.2.2 Building a RAID1 system newly

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#### **NOTICE**

- When a RAID1 system is newly built, the RAID1 configuration information is recorded on the HDDs. An HDD with configuration information recorded cannot be used in any other equipment. If you are using more than one HDD, be careful in handling and storing them so that you do not mistake one from another. If HDDs are mixed up, a RAID1 configuration information mismatch occurs. The equipment may not operate properly, and the data on the HDDs may be lost.
- When you build a RAID1 system from scratch, prepare two new HDDs selected from the models specified and tested by HITACHI. Otherwise, the data stored on the HDDs may be lost.

To build a RAID1 system, follow the procedure below.

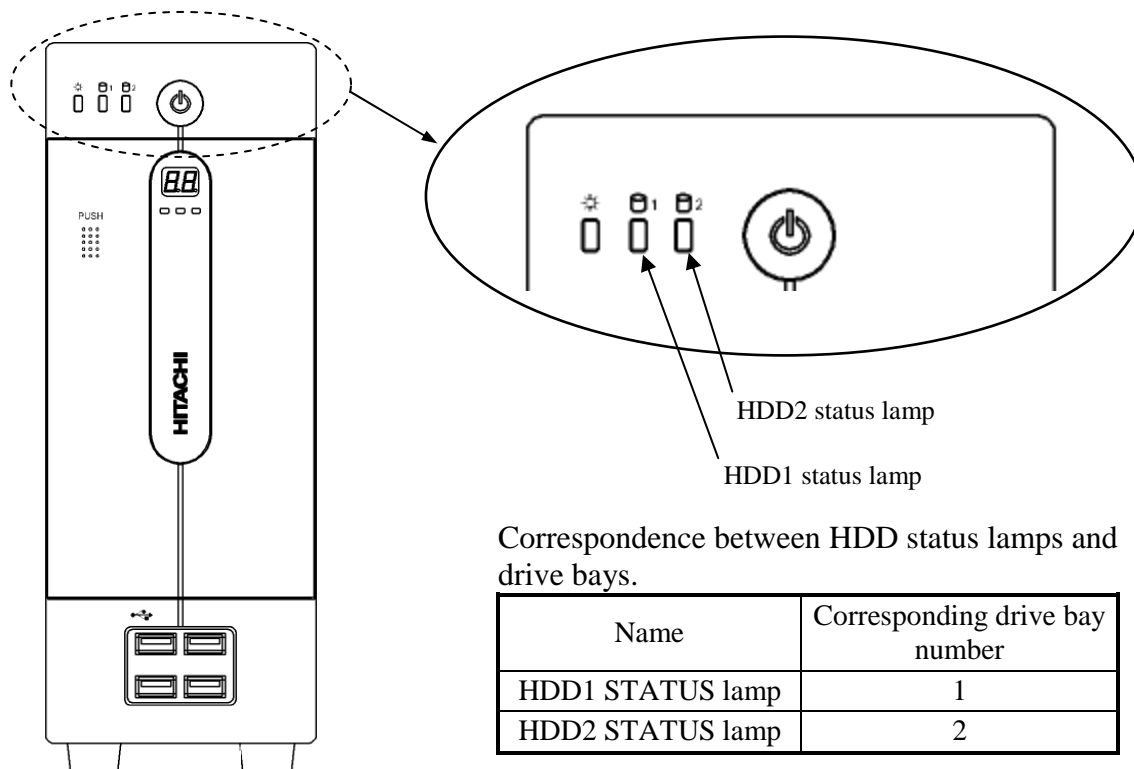
Note that, when the product is shipped, a RAID1 system has been already built, and the following procedure is not necessary.

- [1] Prepare two new HDDs.
- [2] Shut down the OS. Turn off the main power to the equipment, and wait for at least one minute. And then mount the HDDs on drive bays 1 and 2. (See 5.3.6 Installing and removing an HDD.)
- [3] Plug the power cable to the outlet to turn the equipment on. The RAID controller automatically recognizes that HDDs are installed and writes RAID1 configuration information to both HDDs.
- [4] Install the OS using a recovery DVD (refer to the *HF-BT1000 SETUP GUIDE*).

## 8.3 Checking the RAID1 Status

### 8.3.1 Status lamp

This equipment has HDD status lamps (an HDD1 status lamp and an HDD2 status lamp) as shown in the figure below. These lamps show the status of each HDD in the RAID1 system.



#### Meaning of the HDD status lamps

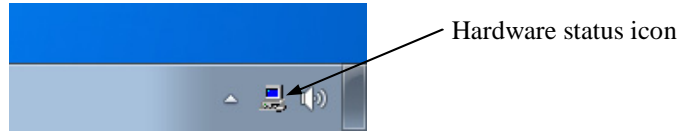
HDD status Lamp status	Status of the HDDs
OFF (Both)	Both HDDs are working properly.
Flashing in green (Both/Either one)	The HDD is being written or read.
Lit in red (Either one)	One HDD has an error. (The power of the HDD with an error is ON.)
Flashing in red (Either one) (*1)	Rebuild (copy) is ongoing. (Only the lamp of the copy destination HDD flashes in red.)
Flashing in red (Both)	Both HDDs have errors. (Including errors in the configuration information)

(\*1) If the HDD is written or read during reconfiguration, the lamp lights red and green alternately, or it flashes orange depending on the timing.

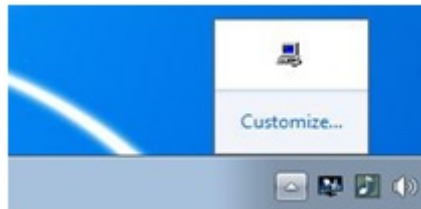


### 8.3.2 Hardware status window

This equipment allows you to check the status of HDDs in the RAID1 system in the **Hardware status** window. To display the **Hardware status** window, double-click the hardware status icon on the notification area of the taskbar.

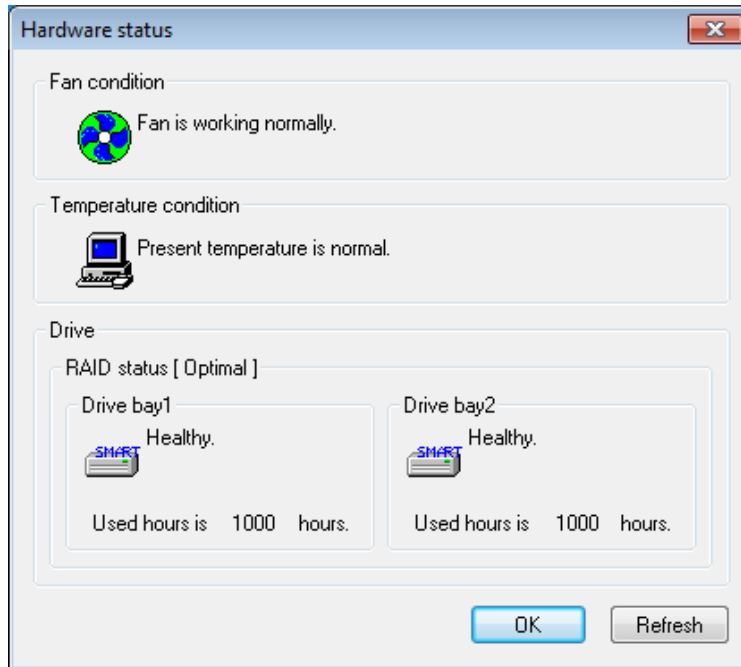


Note: By default, the icon is not shown in the notification area of the taskbar. If you click the arrow at the side of the notification area, the icon will appear. Furthermore, if you click **Customize**, you can set this icon to be displayed in the notification area of the taskbar.



If both HDDs are working properly, the **Hardware status** window is displayed as follows.

Hardware status window



Note: In the RAS software, an auxiliary memory unit in general, such as an HDD, is denoted as a “drive”.

## 8.4 Recovering from Failure

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### 8.4.1 Detection of failure

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When a failure is detected in the RAID1 system, the following actions are executed by this equipment

No.	Action	Cause
1	The HDD status lamp (Red) turns on.	HDD failure (Either one or both HDDs)
2	The Digital LEDs for Status indication indicate an output message. (See “6.6.2 Displaying a hardware status code” and refer to the <i>HF-BT1000 RAS FEATURES MANUAL</i> .)	
3	Data is recorded using the event log. (See Section 6.4, “Event Log”.)	HDD failure (Either drive)
4	The HDD status of the RAID1 system is displayed in the <b>Hardware status</b> window. (Refer to the <i>HF-BT1000 RAS FEATURES MANUAL</i> .)	

The following part of this section describes how to recover from each type of failure and how to handle the situation when a problem occurs during recovery work.

### 8.4.2 Recovery from a failure in one HDD

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#### **NOTICE**

- Never remove the screws on an HDD while the power to the unit is on. Never hot-swap HDDs. If you do either of these, failure of the equipment or the drive may result.
- Wear cotton gloves when replacing an HDD in order to prevent problems caused by static electricity. If you do not, the data stored on the HDD may get corrupted.
- Make sure you check the correct procedure before you start the work. If you do not follow the correct procedure, the data stored on the HDD may be lost.
- As a replacement HDD, do not use an HDD previously used. If you do, this equipment may not operate properly or the data on the HDDs may be lost because of configuration information mismatches or other reasons.
- Mount an HDD securely. Loose contacts and missing screws may result in a failure.
- Do not subject an HDD you are mounting and the already mounted HDDs to shock while replacing an HDD. Otherwise, failure of the equipment may result.
- Until the rebuild is complete, avoid shutting off the power for this equipment or attaching and detaching HDDs. Otherwise, the data on the HDDs may be lost or a failure may result.

To recover from a failure in one HDD, follow the procedure below.

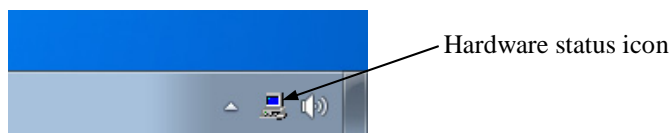
For information about how to recover using a backup HDD, see “8.5.2 Recovery using a backup HDD”.

[1] Back up the data.

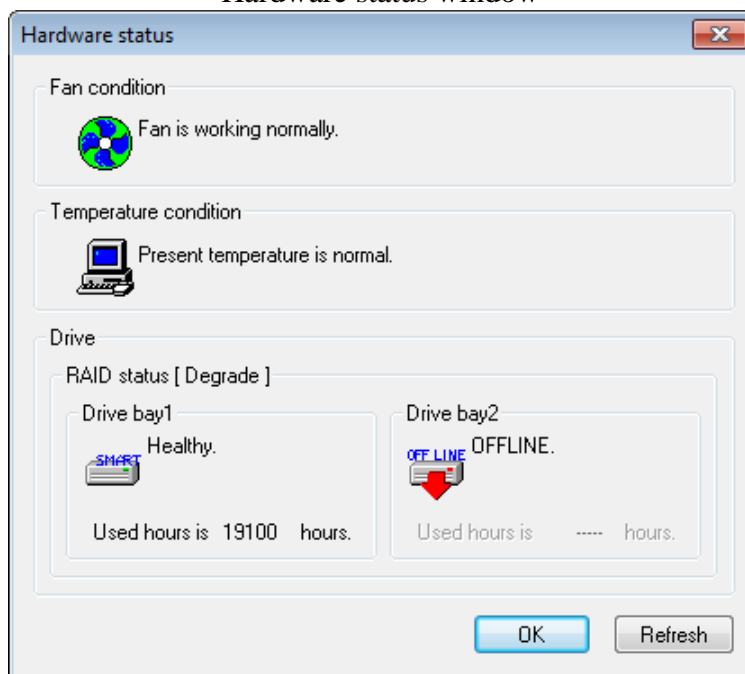
[2] Terminate all running applications.

[3] Double-click the hardware status icon on the notification area of the taskbar.

The **Hardware status** window appears. In the **Hardware status** window, check which HDD has failed.



Hardware status window



Note: The screen above shows the case where the HDD mounted in drive bay 2 has failed.

- [4] Shut down the OS, unplug the power cable from the outlet, and wait for at least one minute. Then replace the faulty HDD with a new one. (See “5.3.6 Installing and removing an HDD”.)
- [5] When you turn on the equipment, the RAID board automatically detects a new HDD and starts reconfiguration. Check that the HDD status lamp on the new HDD is flashing.
- [6] The OS starts while reconfiguring the system. The time required for reconfiguration depends on the applications that run during the reconfiguration. Therefore, do not run a new application until the reconfiguration is finished.  
If you do not want to have the OS start, press the **F2** key while a message saying the system is being initialized is being displayed (during a BIOS memory check) after turning on the equipment to start the BIOS setup menu.
- [7] When the HDD status lamps go out, reconfiguration is completed.  
If the BIOS setup menu is started in step 6, open the upper menu “Exit”, move the cursor to “Save Changes and Exit”, and press **Enter**. A message “Save configuration and exit?” is displayed. Press **Enter** to restart the equipment.
- [8] After reconfiguration is finished, in the Hardware status window, confirm that both HDDs are healthy and the RAID status is “Optimal”.

## 8. RAID1

Note: If the RAID1 status is displayed as “Optimal (Media Error)” after the rebuild process is complete, we recommend that you also replace the copy source HDD with a new HDD after backing up the data.

(For information about how to replace an HDD, see “5.3.6 Installing and removing an HDD”.)

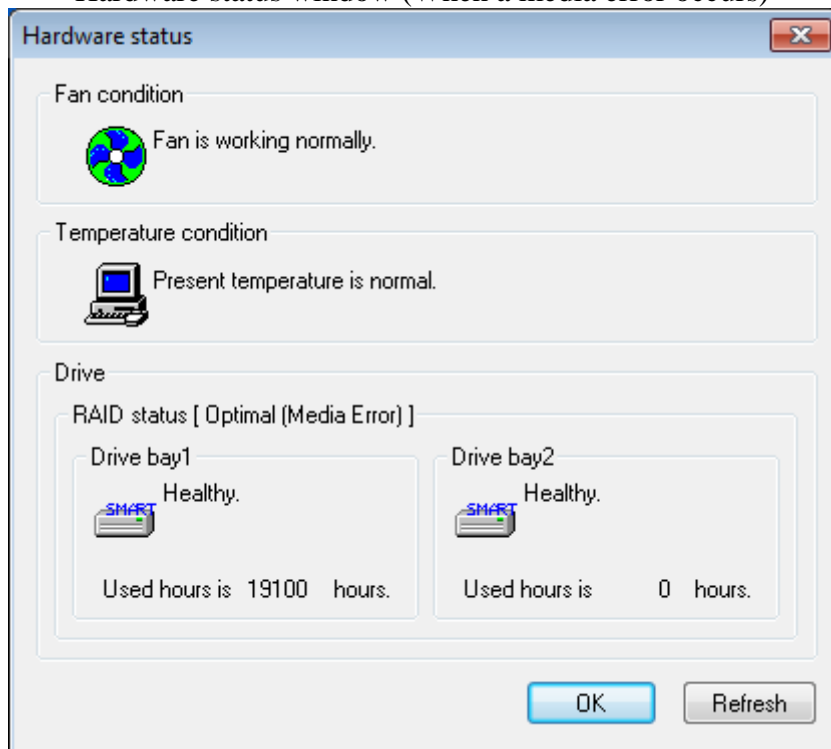
After you replace both HDDs, set up the equipment again and recover the data from the backup files.

(For information about how to set up the equipment again, see “8.2.2 Building a RAID1 system newly”.)

Alternatively, recover the equipment using a backup HDD.

(See “8.5.2 Recovery using a backup HDD”.)

Hardware status window (When a media error occurs)



### **8.4.3 Recovery from failure in both HDDs**

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After you replace both HDDs, set up the equipment again and recover the data from the backup file. (For information about how to set up the equipment again, see “8.2.2 Building a RAID1 system newly”.)

Alternatively, recover the equipment using a backup HDD. (See “8.5.2 Recovery using a backup HDD”.)

## 8.5 Preventive Maintenance

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### 8.5.1 Creating a backup HDD

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#### **NOTICE**

- Wear cotton gloves when replacing an HDD in order to prevent failure caused by static electricity. If you do not, the data stored on the HDD may get corrupted.
- Make sure you check the correct procedure before you start the work. If you do not follow the correct procedure, the data stored on the HDD may be lost.

RAID1 is more reliable compared to a system with a conventional configuration. Nevertheless, the data stored on the HDDs may be lost due to human error or other reasons. If you create a backup HDD, you can recover from such data loss. (Note that you can only restore to the point of backup.) We recommend that you prepare a new HDD as a backup and make a backup copy in the HDD. Create a backup HDD following the procedure below.

Note: The following procedure is the one for the HDD mounted in drive bay 1. To create a backup HDD from the HDD mounted in drive bay 2, read drive bay 1 and the HDD1 status lamp as drive bay 2 and the HDD2 status lamp respectively.

- [1] Shut down the OS. Unplug the power cable from the outlet, and wait for at least one minute. Then replace the HDD mounted in drive bay 1 with a brand-new HDD. (See “5.3.6 Installing and removing an HDD”.)  
Make sure you record the drive bay number of the removed HDD.
- [2] Store the removed HDD in a safety place as a backup HDD.
- [3] Turn on the power to the equipment. Then the RAID board automatically detects that a brand-new HDD is mounted and starts the rebuild process. Confirm that the HDD2 status lamp is flashing.
- [4] The OS starts while the rebuild process is continuing. The time required for the rebuild process depends on what applications are executed during this period. Therefore, minimize the number of running applications during the rebuild process. If you do not want to start the OS, while the messages for system initialization are displayed (during the BIOS memory check), press **F2** to launch the BIOS setup menu.
- [5] When the HDD1 status lamp turns off, the rebuild process is complete. Also in the **Hardware status** window, confirm that both HDDs are healthy.  
If the BIOS setup menu is started at step 4, open the upper menu “Exit”, move the cursor to “Save Changes and Exit”, and press **Enter**. A message “Save configuration and exit?” is displayed. Press **Enter** to restart the equipment.

## 8.5.2 Recovery using a backup HDD

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### **NOTICE**

- Wear cotton gloves when replacing an HDD in order to prevent failure caused by static electricity. If you do not, the data stored on the HDD may get corrupted.
- Make sure you check the correct procedure before you start the work. If you do not follow the correct procedure, the data stored on the HDD may be lost.

Prepare the backup HDD and a new HDD, or HDD to which “Initialize Drives” has been applied (see “8.2.2 Building a RAID1 system newly”). Then recover the array by following the procedure below. When you install and remove an HDD, see “5.3.6 Installing and removing an HDD” for the procedure.

Note: The following procedure is the procedure to mount a backup HDD in drive bay 1. To mount a backup HDD in drive bay 2, read drive bay 1 and the HDD1 status lamp as drive bay 2 and the HDD2 status lamp respectively.

- [1] Shut down the OS, and unplug the power cable from the outlet. If HDDs are installed, remove both HDDs one minute after you unplug the power cable from the outlet.
- [2] Install the backup HDD in drive bay 1 and install a new HDD in drive bay 2.
- [3] Turn on the equipment. The RAID board automatically detects a new HDD and starts reconfiguration. When the reconfiguration starts, the HDD2 status lamp flashes.
- [4] The OS starts while reconfiguring the system. The time required for reconfiguration depends on the applications that run during reconfiguration. Therefore, do not run a new application until reconfiguration is finished.  
If you do not want to have the OS start up, press the **F2** key while a message saying the system is being initialized is being displayed (during BIOS memory check) after turning on the equipment to start the BIOS setup menu.
- [5] When the HDD status lamps go out, reconfiguration is completed. In the Hardware status window, confirm that both HDDs are healthy and the RAID status is “Optimal”.  
If the BIOS setup menu is started in step 4, open the upper menu “Exit”, move the cursor to “Save Changes and Exit”, and press **Enter**. A message “Save configuration and exit?” is displayed. Press **Enter** to restart the equipment.



### 8.5.3 Performing periodical HDD replacement

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#### **NOTICE**

- Wear cotton gloves when replacing an HDD in order to prevent failure caused by static electricity. If you do not, the data stored on the HDD may get corrupted.
- Make sure you check the correct procedure before you start the work. If you do not follow the correct procedure, the data stored on the HDD may be lost.
- As a replacement HDD, do not use an HDD previously used. If you do, this equipment may not operate properly or the data on the HDDs may be lost because of configuration information mismatches, or other reasons.
- Do not replace the two HDDs at the same time. If you do, the data gets corrupted.

An HDD is a replacement component that must be replaced periodically. (For information about the recommended replacement cycle, see “APPENDIX HANDLING REPLACEABLE COMPONENTS”.)

Follow the procedure below for periodic replacement.

Note: The following is the procedure for replacing the HDD mounted in drive bay 1. When you replace the HDD mounted in drive bay 2, interpret drive bay 1 as drive bay 2 and the HDD1 status lamp as the HDD2 status lamp when following the procedure.

- [1] Back up the data.
- [2] Shut down the OS. Unplug the power cable from the outlet, and wait for at least one minute. Then replace the HDD mounted in drive bay 1 with a replacement HDD. (See “5.3.6 Installing and removing an HDD”.)
- [3] Turn on the power to the equipment. Then the RAID board automatically detects that the replacement HDD is mounted and starts the rebuild process.  
Confirm that the HDD1 status lamp is flashing.
- [4] The OS starts while the rebuild process is continuing. The time required for the rebuild process depends on what applications are executed during this period.  
Therefore, minimize the number of running applications during the rebuild process.  
If you do not want to start the OS, while the messages for system initialization are displayed (during the BIOS memory check), press **F2** to launch the BIOS setup menu.
- [5] When the HDD1 status lamp turns off, the rebuild process is complete. Also, in the **Hardware status** window, confirm that both HDDs are healthy.  
If the BIOS setup menu is started at step 4, open the upper menu “Exit”, move the cursor to “Save Changes and Exit”, and press **Enter**. A message “Save configuration and exit?” is displayed. Press **Enter** to restart the equipment.

**APPENDIX HANDLING REPLACEABLE COMPONENTS**

**NOTICE**

Do not use a replaceable component for longer than the recommended replacement cycle. If you do, a deteriorating or worn-out component may cause the equipment to fail.

- As you use a component, it gradually deteriorates and becomes subject to wear and tear. The following components must be replaced at fixed intervals.
- These components are provided at our regular prices. (The DVD drive is replaced at our regular price.)

Consult our sales representatives as required.

- The recommended replacement cycle in the following table assumes that the average ambient temperature of the system unit is 25°C or less.

Note that when the average ambient temperature exceeds 25°C, the replacement cycle may be shortened in some cases.

We provided the recommended replacement cycle based on the use condition that the engineer assumed. The replacement cycle may be shortened depending on the environmental conditions, use conditions (for example, access frequency in a magnetic disk unit), etc. Perform periodic inspections and earlier replacement in accordance with the environmental conditions.

Replaceable component	Recommended replacement cycle	Description
HDD	2 years	If the equipment is running 24 hours/7 days a week, the replacement cycle is two years. If the equipment is not running 24 hours/7 days a week, the HDD should be replaced every four years or when the power-on hours count exceeds 20000 hours, whichever comes first. In order to ensure quick recovery of corrupted files, routinely back up your files.
DVD drive	4 years	Return the drive for a replacement.
Dust filter	1 year	If you do not replace a filter regularly, failure or shorter life span of the equipment may result.
Lithium battery	7 year	When you need to replace the lithium battery, send back the equipment to our manufacture. Alternatively, if you have concluded a paid maintenance contact, request the maintenance company to replace the lithium battery.
Keyboard (optional)	4 years or 10 million uses, whichever comes first	
Mouse (optional)	4 years or the following number of uses, whichever comes first: 1. Switch: 3 million uses 2. Wheel: 1 million uses	

< NOTE >

- When you replace a component in order to, for example, repair equipment, you may need to replace the component with a functionally compatible one.
- If you repair a component in a manner not recommended by the Manufacturer, proper operation of the component is not guaranteed.