TOSHIBA
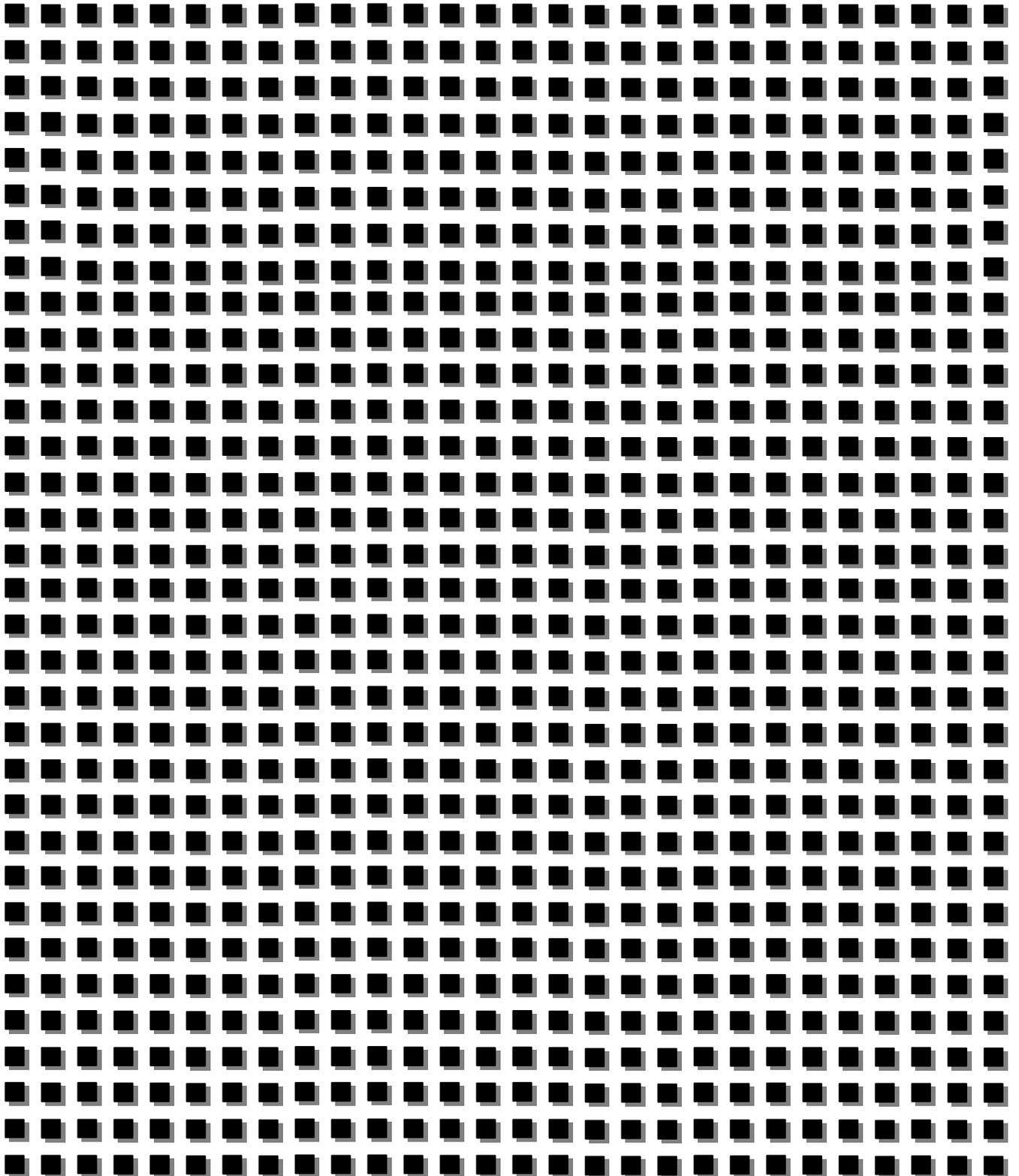
Integrated Controller V series

model 2000
Computer module C2PU37 User's Manual

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Safety Precautions

This manual contains important information for the operator to operate this product safely and correctly and avoid bodily injury and property damage.
Grasp the meanings of the following marks and their descriptions before reading this manual.

●Hazard Classifications

◇ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury, or property damage. It can also be used to alert against unsafe practices.

(Note) 1. Serious injury means loss of sight, injury, burns (high temperature, low temperature), electrical shock, fracture, or intoxication which leaves aftereffects or requires hospitalization or need to go the hospital for a long time.
     2. Injury means hurt, burn, or electric shock which does not require hospitalization or going to the hospital for a long time.
     3. Property damage means extended breakdown of assets and materials.

●Notation of Markings

🚫	Indicates a "may not" mark. The concrete forbiddance is indicated with a pictograph or wording.
❗	Indicate a mandatory action that you should never fail to do. The concrete content is indicated inside or near the circle with a pictograph or wording.
△	Indicates a caution. The concrete content is indicated inside or near the triangle.

(Note)   The descriptions of forbiddance, mandatory, and caution marks are subject to change, depending on the labels on the main unit.

1.Markings used on the model 2000 and in this Manual

Make sure warning markings are attached on the model 2000.
If any of them are missing or the wording is illegible, contact Toshiba's Service Department

[Warning Mark on the model 2000]

This is the warning mark for dangerous location. It is attached to the equipment at positions where there is a risk of electric shock and at positions where there is a risk of damage to the equipment through incorrect wiring.
Take the following precautions where this mark is found.

(1)   Keep hands away from terminals, especially the input terminal of the power supply while power is on, to avoid the risk of electric shock.

(2)   Turn off power before installing or removing modules, terminal blocks, or wires.

(3)   Applying excess power voltage to the model 2000 can cause failure or malfunction. Apply power of the specified ratings described in this manual.

(4)   Turn off the power of the tool (a personal computer, etc.) before connecting the connector to the tool port. Afterwards, turn on power.
Avoid short-circuiting between   the tool connector pins with the cover, etc.

[Safety Label]
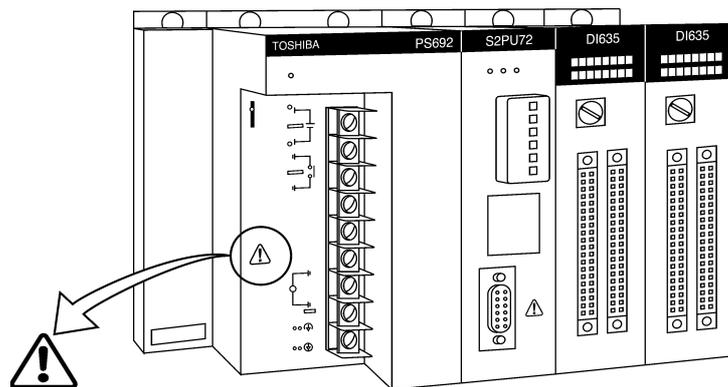
The safety label as shown on the left both in Japanese and English is attached to the power supply terminal of the model 2000. (exept the 24Vdc input power supply module)

Remove the mount paper before wiring

Peel off either of the Japanese and English labels from the mount paper and stick it to the model 2000 or near the power terminal where it can be readily seen.
In the event the seal is damaged, contact the dealer.

Notes

Marks printed at pages in this manual should always be read carefully.
Be sure to read them in handling your model 2000.

2. Precautions on Installation

⚠ WARNING

🚫 **Mandatory**

Be sure to ground the model 2000. The protective ground terminal of the model 2000 must be connected to an external protective earth.
Operation without grounding may cause accidental fire or shock.

⚠ CAUTION

🚫 **Mandatory**

Avoid the following locations when installing or storaging the model 2000.
- Locations where there is dust, salinity or ion particles
- Locations where there are corrosive gases (SO_2, H_2S) or flammable gases
- Locations where vibration or shock occurs beyond the allowance
- Locations where there is condensation due to sharp temperature variations
- Locations where the ambient temperature exceeds the allowance range
- Locations where the relative humidity exceeds the allowance range
- Locations where the model 2000 is exposed to direct sunlight
- Locations where strong electric radiation or magnetic field is generated

🚫 **Mandatory**

Improper the installation or wiring of the system can cause not only insufficient performance but also malfunction and failure of the model 2000.
Installation in an unspecified direction or improper installation can cause fall-off, fire, interference, or malfunction of the model 2000.

🚫 **Mandatory**

Install the model 2000 at a place where maintenance and inspection are easy to do. Otherwise, recovery from failure may take much more time, leading to a serious accidents.

🚫 **Forbidden**

Do not cover the hole of the model 2000, and the ventilator/air inlet of the system.
Otherwise, overheating, etc. can cause fire or malfunction.

🚫 **Mandatory**

Avoid entering wire scraps or other foreign debris into the model 2000, and related equipment. Otherwise, it can cause fire, failure or malfunction.

3. Precautions on Wiring

⬦ WARNING

🔴
Mandatory

Be sure to turn off power before wiring.
Otherwise, it can cause electric shock or
malfunction of the model 2000.

🔴
Mandatory

Be sure to use crimp-style terminal with
insulating sheath or insulating tape to cover
the conductive parts when wiring modules so
that no conductive parts are exposed.
Handle the terminal cover with care so as not
to fall off or get damaged.
Be sure to fix the cover on the terminal block
after wiring.
An exposed conductive part can cause
electrical shock.

⚠ CAUTION

🔴
Mandatory

Apply power of the specified ratings
described in the manual.
Applying excess power voltage to the model
2000 can cause explosion or fire.

🔴
Mandatory

It is assumed that the users have general
knowledge of industrial electrical control
systems.

4. Precautions for Operation

⚠ WARNING

Mandatory

Configure emergency stop interlocking circuit outside the model 2000. Otherwise, failure and malfunction of the model 2000 can cause human injury, machine damage or serious accidents.

Mandatory

Be sure to keep the terminal block covers closed during power ON. Do not touch the terminals. Otherwise, it can cause electrical shock or injury.

⚠ CAUTION

Forbidden

The power supply modules, the CPU modules, the direct I/O modules and the expansion interface are dedicated to the model 2000. Mount them on the bases of the model 2000. Do not use them by themselves for other purposes.
Otherwise, it can cause electrical shock or injury or malfunction.

Mandatory

Mount the modules on the base securely until they click, and fix them on the base with screws.
Insufficient installation can cause failure or malfunction.

Mandatory

Sample programs and circuits described in this manual are provided for explaining the operations and applications of the S2. You should test completely before using them as a part of your application system.

Mandatory

When you attempt to perform program change, forced output, RUN/HALT controls, etc during operation, carefully check for safety.
Improper operation or negligence in checking safety conditions can cause machine damage or serious accidents.

Mandatory

Set the operating switches of the model 2000 according to this manual.
Improper setting can cause failure or malfunction.

Mandatory

Install fuses suited to the load current capacity in the external circuits for the relay output module, preventing from overload. Otherwise it can cause machine damage or accidents.

Mandatory

Configure the external circuit to turn on power according to the following sequence.
Turn on the power of model 2000
→ Turn on the power for the I/O module and external load power supplies
Otherwise, it can cause machine damage, malfunction or accidents.

Forbidden

Turn off power immediately if the S2 or related equipment emitting smoke or odor. Operation under such situation can cause fire or electrical shock. Also unauhorized repairing will cause fire or serious accidents. Do not attempt to repair. Contact Toshiba for repairing.

Mandatory

It is recommended to use an external power supply that provides power for both the I/O module and the loads. If not possible, configure the external circuit so that the external power required for output modules and power to the loads are switched ON/OFF simultaneously.
Also, be sure to turn off power to the loads before turning off power to the S2 for system safety.

5. Safety Precautions on Maintenance and Inspection

⬦ WARNING

Mandatory

Turn off power when removing any units, modules, terminal blocks or wired cables after installing.
Otherwise exposed conductive pants of wire or on the rear of terminal blocks can cause electrical shock.

Forbidden

Do not disassemble or modify the S2 and related equipment in hardware nor software. Otherwise it can cause failure, malfunction, electrical shock or injury.

Forbidden

Be sure not to connect the opposite electrode of the battery or charge, the battery.
Also, do not try to disassemble the battery or make it short-circuited or throw it into fire or use it in overheated condition.
Otherwise it can cause fire or explosion.

⚠ CAUTION

🚫 Forbidden

Be careful not to hit or fall off the model 2000 by accident.
Excess shock can cause failure.

🔴 Mandatory

Touch a grounded metal part to discharge the static electricity on your body before touching the model 2000.
Otherwise, charged static electricity on your body can cause malfunction or failure.

🔴 Mandatory

Use soft cloth to clean the model 2000.
Use water-dipped and squeezed cloth to clean it if dirty.
Leaving the model 2000 dirty can cause mistaking or malfunction.

🔴 Mandatory

Place any modules removed from the unit on a conductive mat or conductive bag (containing a spare board, etc.) on an grounded desk.
Otherwise, static electricity can damage components of the module.

🚫 Forbidden

Do not apply benzene and thinner when cleaning the model 2000.
Otherwise, it can cause deformity or descoloration the panel or case of the model 2000.

6.Safety Precautions on Replacing Components

◇ WARNING

🔴 Mandatory

Turn off power of the model 2000 before replacing the power fuse or warning fuse.
Otherwise, it can cause electrical shock or fire.

🔴 Mandatory

Replace the fuse or battery with a new one specified.
Otherwise, it may malfunction or cause fire.

Mandatory

The relays used in the relay output module
have ON/OFF life mechanically.
Use them within their mechanical life times is
described in this manual.
Replace the module if exceeded.

⚠ CAUTION

Mandatory

In an annual average temperature of 30°C or
less, replace the battery every four years;
replace it every two years in an average
annual temperature higher than 30°C.
An exhausted battery can cause malfunction
and lose data and programs stored in S2,
resulting in machine damage or accidents,
depending on the application.

7. Safety Precautions in Daily Operation

◇ WARNING

Mandatory

Apply power of the specified ratings (voltage
fluction range, frequency, output rating, etc.)
described in this manual.
Otherwise, it can cause malfunction, machine
damage or fire due to overheat.

Mandatory

Turn off power immediately if the ambient
temperature or internal temperature exceeds
beyond normal range or if failure is occurred in
the model 2000.
Contact Toshiba for repairing.
Operation under such situation can cause fire
or electrical schock.

⚠ CAUTION

🚫 Forbidden

Do not touch any components, terminals, connectors or printed circuit boards in the module.
Otherwise, it can cause the IC or LSI or the like to be broken by static electricity, resulting in failure or malfunction.
Also, the edge of components can cause injury.

🚫 Forbidden

Do not forcibly bend or pull or distort the power cord and other cables. Otherwise, they can be cut off or cause overheat.

🚫 Forbidden

Do not disassemble or modify the S2 and related equipment.
Otherwise, it can cause malfunction or failure.

🚫 Forbidden

Do not enter wire scraps or other foreign debris into the S2 and related equipment.
Also, do not insert metal parts into them.
They can cause fire or accidents.

8. Safety Precautions on Disposal

◇ WARNING

🚫 Forbidden

Do not throw lithium batteries into fire.
Otherwise, they can explode.

⚠ CAUTION

❶ Mandatory

Observe local regulations for disposal of the lithium batteries or the model 2000.

Limitation of Applications

- The model 2000 has been designed and manufactured for use in an industrial environment. However, the model 2000 is not intended to be used for systems which can endanger human life (note 1).
- Consult Toshiba if you intend to use the model 2000 for a special application which involves human life and has great influence on the maintenance of the public function (note 2). This is why such application requires special care on the operation, maintenance, and control of the system (note 3).

(Note 1)   The systems which can endanger human life are life maintenance systems, equipment installed in the surgery, and other medical equipment.

(Note 2)   The systems which involve human life and have great influence on the maintenance of the public function mean the main control system of a nuclear power plant, safety and protection system of a nuclear power facility, transport operation and control systems for mass transportation, control systems of aviation and space systems, and other systems and subsystems where safety is critical.

(Note 3)   "Special care" means to build a safety system (foolproof design, fail safe design, redundancy design, etc.) in full consultation with Toshiba's engineers.

Immunity

- Toshiba is not liable for any loss caused by fire, earthquake, action by a third party, or other accidents, or the operator's intentional or accidental misuse, incorrect use, or use under abnormal condition.
- Toshiba is not liable for any incidental loss caused by the use or non-use of this product, such as loss of business profits, suspension of business, or loss or change of data on memory.
- Toshiba is not liable for the loss caused by an operation contradictory to any of the instructions stated in this manual.
- Toshiba is not liable for the loss caused by an incorrect operation in combination with other equipment.
- Toshiba is not liable for the loss caused by a malfunction in combination with an application program made by the customer.

> NOTE:
>   Use cellular phones and PHSs at least one meter away from the working the model 2000 transmission cables, and I/O bus cable. Otherwise, the system can malfunction.

Thank you for purchasing the Toshiba Integrated Controller V Series model 2000 Computer Module (hereafter referred to as C2. Or as model 2000 or simply device if no distinction necessary).

This manual describes the operating procedure and precautions for the C2.

Be sure to read this manual and understand the content before using the equipment. After you have read it, keep this manual handy so that you can refer to it when necessary.

The V series uses operating system, peripheral devices, and options appropriate for the industrial system and equipment in which it is installed. For information concerning these products, refer to the manual included in the respective product.

Related Manuals

In addition to this manual, the following model 2000 related manuals are available for your reference:

Related to other modules

- Integrated Controller V Series model 2000

  Sequence Controller S2 User's Manual – Basic-Hardware   6F8C0836

  Provides information for the handling and maintenance of the main unit, power module, and basic I/O.
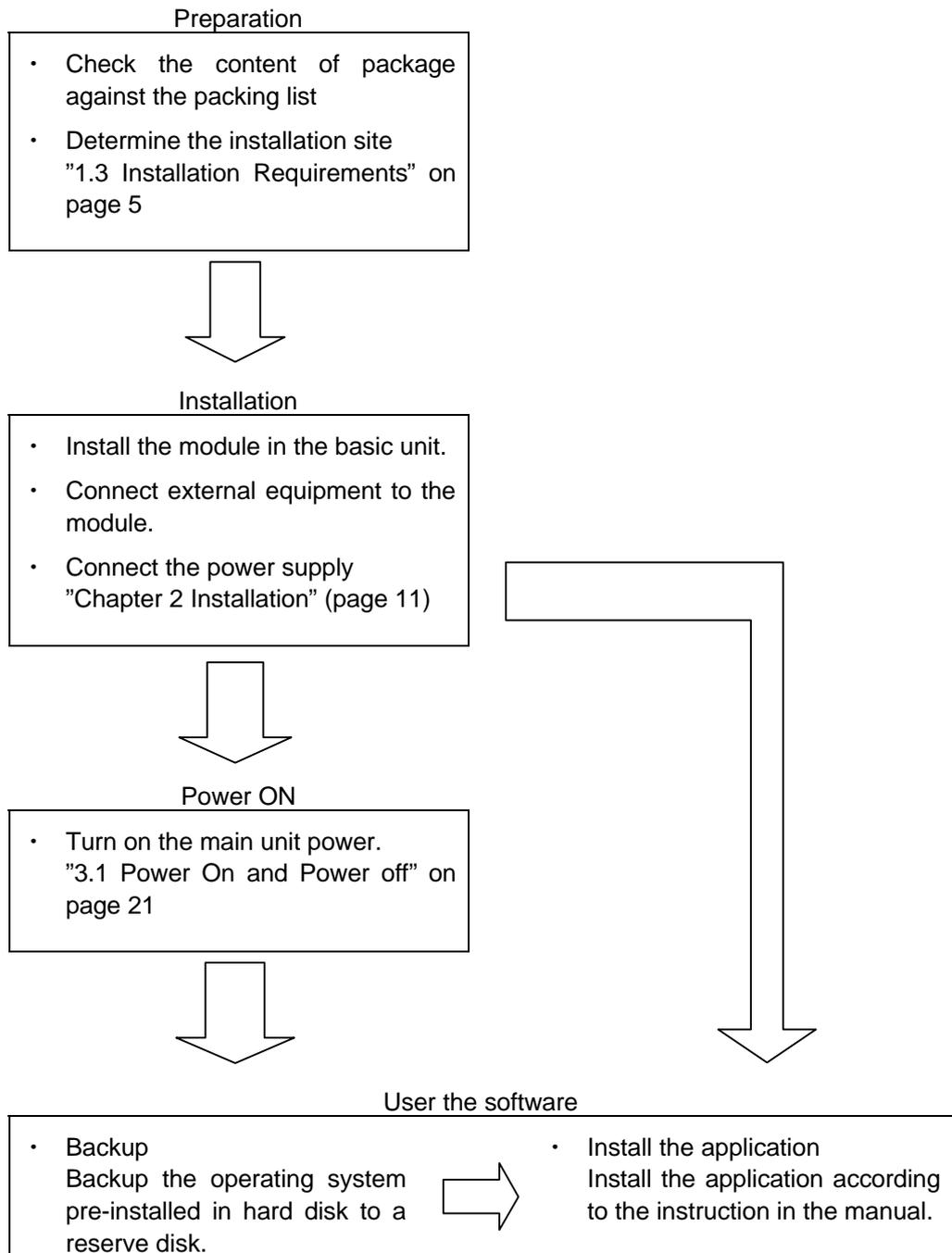
Windows related

- Integrated Controller V Series

  Computer module C2/C3 Windows User's Manual   6F8C0894

  This manual describes the Windows and addition or extension to Windows installed on C2.

Related to controller communication functional

- Integrated Controller

  C3/C2 Windows Control Communication Library   6F8C0894

  This manual has described the support software for the communication between controllers, and using the network module for control from C2.

Procedure flow

Preparation

Check the content of package against the packing list

Determine the installation site
"1.3 Installation Requirements" on page 5

Installation

Install the module in the basic unit.

Connect external equipment to the module.

Connect the power supply
"Chapter 2 Installation" (page 11)

Power ON

Turn on the main unit power.
"3.1 Power On and Power off" on page 21

User the software

Backup
Backup the operating system pre-installed in hard disk to a reserve disk.

Install the application
Install the application according to the instruction in the manual.

Notational convention

Description of symbols

In addition to the Safety Precautions, the following symbols are used to indicate important notes when using:

Important
Describes items that require special attention in order to properly use the product.

NOTE
Describes items that should be remembered in order to properly use the product.

See
Indicates reference to section in this manual or other manual. References to section in this manual are enclosed in single quotes (' ') and references to section in other manuals are enclosed in double quotes (" ").

[Remark] Provides supplementary description.

Guide to Reading this Manual

This manual is organized as follows: You may start from the appropriate chapter as necessary.

Chapter 1 Before Turning on the Power	Summarizes items and caution that you should know before using this equipment.
Chapter 2 Installation	Describes how to install the equipment to the base and connect the cables.
Chapter 3 Handling	Describes how turn on/off the power and the handling of each unit.
Chapter 4 Maintenance	Describes the product life of main components in addition to the daily maintenance procedure.
Chapter 5 RAS Function	Describes the standard RAS function.
Chapter 6 Hardware Setup	Hardware setup is not necessary for normal use. This chapter describes how to set BIOS in case the setting needs to be verified or changed.
Appendix A Q&A	Provides answers to problems such as "The power does not turn on."
Appendix B Device Specifications	Provides specifications of this equipment and specifications and pin map of external connectors.

Refer to the operation manual of the respective operating system (OS) for information concerning the operating system used by this device.

Functions and Features

The integrated controller model 2000 is a CIE integrated controller integrating continuous control, high-speed sequence control, maintenance/monitoring, and information processing control in a single unit.

C2 is a computer module that implements the maintenance/monitoring and information processing control functions among various functions of the model 2000.

Excellent system performance
- Runs Windows smoothly using a Intel Mobile Pentium III 500MHz CPU with maximum system memory of 256MB.

Windows2000
- Runs under Windows2000 to enable use of commercial software that supports GUIenvironment and connectivity with host network.

Consolidation of CIE
- Improves system performance through inter-controller communication using 33MHz clock high-speed bus.
- A variety of sequencer I/O modules can be controlled with the computer module alone enabling a compact system.

Ease of use
- The hard disk fits inside a 70mm x 135mm x 115mm module and runs Windows without using an additional module.
- Fully equipped with keyboard, mouse, floppy disk, RS-232C, USB, and Ethernet connecters, and 2 slots CARDBUS PC card.

Improved reliabillity
- Comes equipped with RAS function which monitors the operating status and provides detail trouble report. And enables automatic power OFF shutdown eliminating the trouble of shutting down Windows.
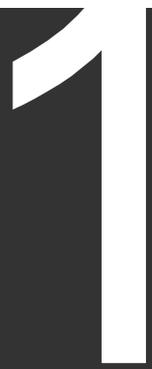
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CONTENTS ——————————————

Chapter 1 Before Turning on the Power

1

1.1 Checking the Content of the Package

Check the content of the package against the packing list included with the product and make sure everything is included.

1.2 Name and Function of Each Part
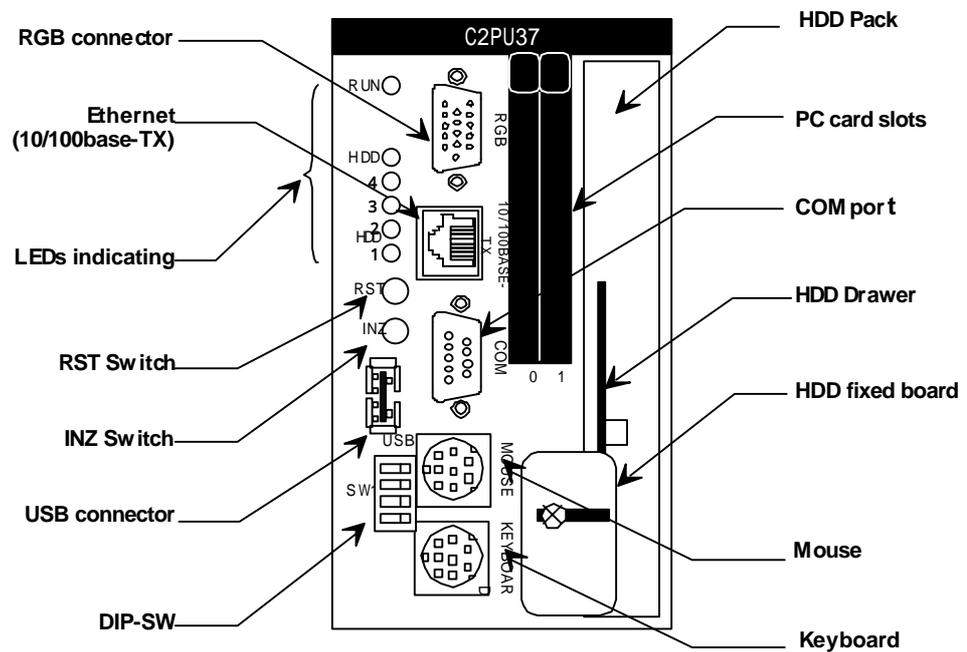
10/100BASE-TX connector	Connector for the Ethernet 10BASE-T/100BASE-TX connector.
Mouse connector	Connector for the PS/2 mouse.
Keyboard connector	Connector for the PS/2 keyboard.
RGB connector	Connector for the analog RGB display
FDD connector	Connector to connect the 3.5-inch (2HD, 2DD) external floppy disk drive.
RS-232C connector (COM1)	Connector to connect the RS-232C interface device (such as mouse or modem).
USB connector	Connector to connect USB compatible device.
LEDs and push button switches	LEDs indicating the module status and RESET/INZ button.
DIP switch	User settable switches. The setting can be read from user application program in the C2.
PC card slots	Slot to insert the PC card.
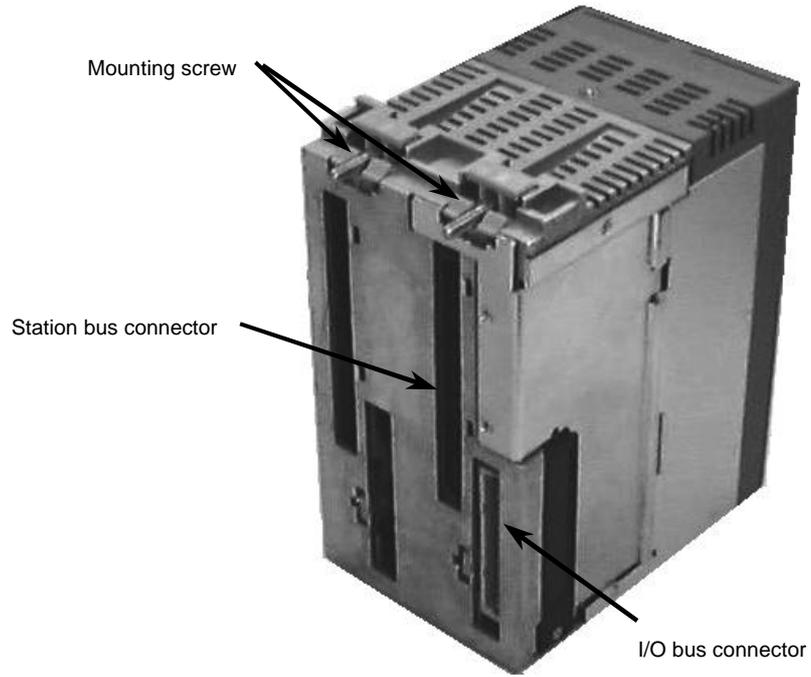
Mounting screw	A screw to mount the module to the basic unit.
Station bus connector	Station bus connector for the V series model 2000.
I/O bus connector	Connector for the I/O bus.

Dedicated LED	LEDs to indicate the CPU and HDD operating status.
RUN (green)	Indicates the operating status of the watchdog timer (WDT). • When WDT is active ON: WDT timeout has not occurred Blink: WDT timeout has occurred (Alternating interval is the WDT timeout interval set by the user) • When WDT is not used Blink at approximately 1 second interval General LEDs 1 - 4
HDD (green)	Hard disk drive (HDD) access lamp. Turns ON when the internal hard disk drive is operating.

General LEDs 1-4	
(Green/Red: 2 colors x 4)	Switches to perform standalone initialization of the module.

Push button switches	Switches to perform standalone initialization of the module.
RST	Switch to perform hardware reset of the module.
INZ	Switch to shut down Windows and restart.

1.3 Installation Requirements

Observe the following when planning and designing the installation environment.

The installation environment must satisfy the conditions described below.

Item	Hard Disk Drive model	Flash Disk Drive model
Operating ambient temperature	5 – 40°C	0 – 50°C
Storage temperature	-10 – 50°C	-25 – 70°C
Relative humidity	10 to 90%RH, no condensation	5 to 90%RH, no condensation
Dust density	10mg/m^3 or less	
Corrosion resistance	No corrosive gas is present.	
Vibration resistance	1.96m/s^2 (0.2G) continuously for 30 minutes in X, Y, Z direction	9.8m/s^2 (1G) continuously for 30 minutes in X, Y, Z direction
Shock resistance	98m/s^2 (10G) 3 times each X, Y, Z direction	
Usable altitude	Up to 2000m	
Dielectric strength	1500Vac/1 min.	
Ambient atmosphere	No corrosive gas is present.	
Structure	Built-in control panel	
Cooling	Natural air cooling	
EMC	6 KV : Static electricity discharge resistance	
	10 V/m : Radiation field	
	2 KV/1 KV/0.25 KV: Fast transient	
Grounding	Grounding resistance 100 or less	

1

Follow the precautions described below for the installation of the board housing the model 2000:

(1) House in a dust proof control board because the module itself is not dust proof.

(2) Avoid installing on top of devices that emit considerable amount of heat (such as heater, transformer, or large resistor).

(3) Do not install inside the same board with high voltage equipment.

(4) Maintain a distance of at least 200mm from high voltage or power line.

(5) Provide a space of at least 70mm around the base for ventilation.

(6) Keep away from high voltage equipment and power equipment or provide metal shielding for safety during maintenance and operation.

(7) Be careful not to drop foreign objects such as loose wires inside the module or unit.

(8) Always mount the base on a vertical panel with the power supply module on the left. C2 cannot be used in a horizontal position.

(9) Use M4 size screws to mount the unit and fasten securely (recommended torque: 1.47N=15kgf • cm).

The unit mounting dimensions are as follows:
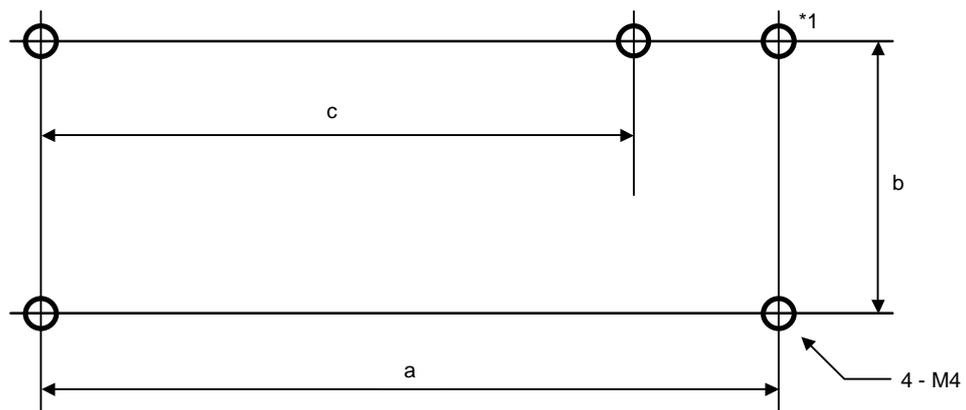
Model	a [mm]	b [mm]	c [mm]	Weight [g]
BU648E	402.5	95	–	900
BU643D	224.5	95	203.0	850
BU610	155.5	95	–	400

[Note] No hole for BU643D

1.4 Power Requirements

Use power module designed exclusively for the V Series. Using other power supply may result in operation error or device malfunction.

ITEM		Specification				
		PS691	PS693	PS694	PS632	PS652
Basic function	Rated Voltage	100-120VAC 200-240VAC	100-240VAC	100-240VAC	24VDC	100/110VDC
	Max. power consumption	160VA(60W) or less	120VA(50W) or less	150VA(50W) or less	50W or less	50W or less
	Allowable voltage range	85-132VAC 170-264VAC	85-264VAC	85-264VAC	20.4-28.8VDC	85-132VDC
	Rated frequency	50/60Hz (47-63Hz)			DC	
	Retentive power interruption	20ms or less	20ms or less	20ms / 1s± 30% / 20s± 30% or less	1ms or less	1ms or less
	Distortion rate	10% or less of rated input voltage			–	
	Inrush current	240VAC-25A peak or lower *1	220V-30A peak or lower *1	240VAC-25A peak or lower *1	6.5A/10ms or lower of rated	25A or lower of rated
	Ground current	1.5mA or lower (IEC-950)			–	
	Insulation resistance	10M or higher (between input and each insulation)				
	Withstand voltage	1500VAC/1 min.				
	Grounding	Grounding resistance 100 or less				
	Output rating	5V-8A, 3.3V-1A total of 43W or less	5V-7A, 3.3V-1A, 24V-0.8A total of 35W or less	5V-6A, 3.3V-1.0A total of 30W or less	5V-7A, 3.3V-1A total of 35W or less	
	Protective circuit	Over voltage, currnet protection				
Auxilialy function	Status display	POWER (5V output, green)		CHARGE*2	POWER (5V output, green)	
	RUN contact	Dry A contact (240VAC/24VDC-0.2A max.)				
External	Weight	650g or less	600g or less			
	Line terminal unit	10 terminals -M3.5 screw (detachable)	9 terminals -M3.5 screw (fixed)	10 terminals -M3.5 screw (detachable)	9 terminals -M3.5 screw (fixed)	

*1 After instantaneuous power failure of 5 second or longer.

*2 Battery initial charge indicator, green/red.

Important

• Do not connect to the same electrical outlet with equipment that has high power consumption or emits noise, such as air conditioner or copier.

• Use of uninterruptible power supply is recommended in order to prevent loss of power and to protect the content of the hard disk in the event of a power failure.
The content of the hard disk is not guaranteed if power is lost due to power failure.

1.5   Precautions when using

1.5.1   Daily use

Observe the following insturctions during daily use of this equipment.

<div style="border:1px solid">

◇ WARNING

- Turn off the power if there is smoke, unusual odor, excessive heat, or damage.

- Do not block the ventilation port.
  If the ventilation ports are blocked, heat cannot escape and fire may occur due to overheating. When there is a need for repair, contact the Toshiba service desk.

- Do not touch the C2 module when the power is on. The heat radiating side covers become extremely hot (ambient temperature+25°C) when power is on. It cools (ambient temperture+10°C) in 10 minutes when the power is turned off.

</div>

1.5.2   When turning Off the Power

Important

- After turning off the power, wait at least 5 seconds before turning on the power.
  Faulty operation may occur if you do not wait 5 seconds.

- If an application program is running, quit the program to return to the operating system (OS).

See

- "Description manual of each application program"

1.5.3   About the Hard Disk Drive

Important

- Do not apply shock or vibration to the equipment when the power is on.
  The read/write head of the hard disk drive is at a data area even when the HDD lamp is off.

- Wait at least 30 seconds after turning off the power before moving the equipment.
  The read/write head of the hard disk drive retracts automatically when the equipment power is turned off. However, it takes approximately 30 seconds for the hard disk to stop rotating.
  The shock may damage the data area.

- Always turn off the power before removing/installing the hard disk drive.
  Failure to do so can cause malfunction of the drive.

1.5.4 About the External FDD

Important

- Avoid performing the following when the FDD lamp of the external FDD (floppy disk drive) is ON:

  - Pressing the button
  - Turning off the main power
  - Removing the cable

  The floppy disk may be in the middle of reading or writing data and content of the floppy disk may be damaged.

NOTE:

- Always remove the floppy disk from the drive when you are not using the floppy disk drive.

1.5.5 Daily Cleanup and Storage/Transportation

- Wipe with soft cloth when cleaning. If this is not sufficient, wipe gently with cloth wetted in water.
- Using benzene, paint thinner, or other chemicals can cause distortion or discoloration. Also avoid spraying with insecticide.
- Save the box so you can use it when transporting the unit.
- Do not drop of exert excessive shock when transporting. This can cause operation error or malfunction.

1.5.6 Radio Wave/Power Voltage Interference

If you experience radio or television interference when using this equipment, try the following:

- Change the direction of the radio or television antenna.
- Change the direction of unit with respect to radio or television.
- Move the unit away from radio or television.
- Use separate electrical outlet from the radio or television.
- Use an outdoor antenna.
- Change the feeder to a coaxial cable.
- Insert a commercially available filter between the electrical outlet and the power plug of the unit.

1.5.7 Repair and Service

Contact your Toshiba service desk for information concerning maintenance and service.

1.5.8　Disposal

10

Module disposal

The C2 contains parts such as Lithium battery that must be disposed properly according to local government ordinance.
Do not attempt to dispose the C3 on your own. Please contact your dealer and submit a request for return and disposal when disposing.
Dispose other 2000 base and modules according to your local government ordinance.

Battery disposal

Dispose the battery in the same manner as ordinary batteries.
Do not disassemble or incinerate the battery because it may explode. Dispose without disassembling or burning.
Also note that short circuiting the positive and negative end of the Lithium battery may result in smoke or flame. Do not cut the lead wires and be careful not to short the positive and negative terminals when disposing.

◇ WARNING
Do not connect the positive and negative terminal of the battery in reverse, or attempt to charge, disassemble, heat, or short the battery. It may explode or ignite.

Dispose the battery according to your local government ordinance.

Chapter   Installation

2.1   Before Getting Started

2.1.1   Procedure

NOTE:

- Do not touch parts that are not necessary for the work at hand.

- Be careful not to loose the removed screws. Also be careful not to drop them inside the device.

- If an error or malfunction occurs, contact your Toshiba service desk.

- Use drivers that is appropriate for the screw when assembling or fastening parts. Improper driver will not fit tightly in the cross hole. Using improper driver can wear out the cross hole of the screw.
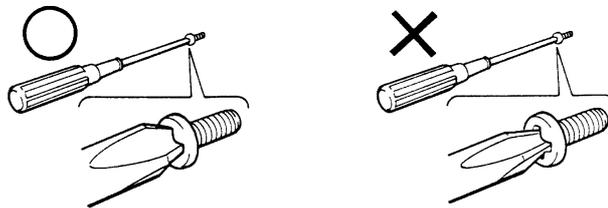
2.2 Installing Bases

2.2.1 Precautions when Installing in the Case

Observe the following when installing in the case.

⚠ CAUTION

Do not attempt to mount or remove the unit from the case alone (work in two or more). Be especially careful when mounting in the case because you may lose your balance and injure yourself.

Important

Use within the following temperature and humidity range.

	Temperature range	Humidity range
Hard Disk Drive model	5 – 40°C	10 – 90%
Flash Disk Drive model	0 – 50°C	5 – 95%

Avoid sudden change in temperature that may cause condensation.

- Provide a door or removable panel in front and rear of the case in a manner that facilitates removal of the housed units (main unit and peripheral devices) for maintenance.

- Provide forced cooling if the temperature inside the case is not within specification.

- Carefully consider the ventilation direction of the main unit, peripheral device, and case so that the flow of the air is not blocked.

2.3   Module Installation

Install the module according to the following procedure:

(1)   Match the guides at top and bottom of the base and insert the module vertically on the base. Check that the top and bottom lock levers are fasten to the base and click.

(2)   Pass an M3 screw through the hole at the top of the module and secure the base and the module (recommended torque: 1.47N•m=15kgf•cm).

Remove the module according to following procedure:

(1)   Turn off the power supplied to the model 2000. Turn off the external power to the I/O module.

(2)   Detach cables from the module.

(3)   Remove the screw at the top of the module.

(4)   Push the lock lever at the top of the module, hold the bottom of the module with the other hand, and pull the entire module vertically from the base to remove the module.

⚠ CAUTION

• Tighten the screws securely so that they do not become loose with vibration.
  They can cause injuries if they become loose and fall off.

• Always turn off the power before removing/installing the module.
  Removing or installing the module with the power on can cause malfunction or operation errors.

• The device will not operate normally if installed where there is no station bus connecter.

• Do not touch the C2 module when the power is on. The heat radiating side covers become extremely hot (ambient temperature+25°C) when power is on. It cools (ambient temperature+10°C) in 10 minutes when the power is turned off.

Station bus Connector

Mounting screw

I/O bus connector
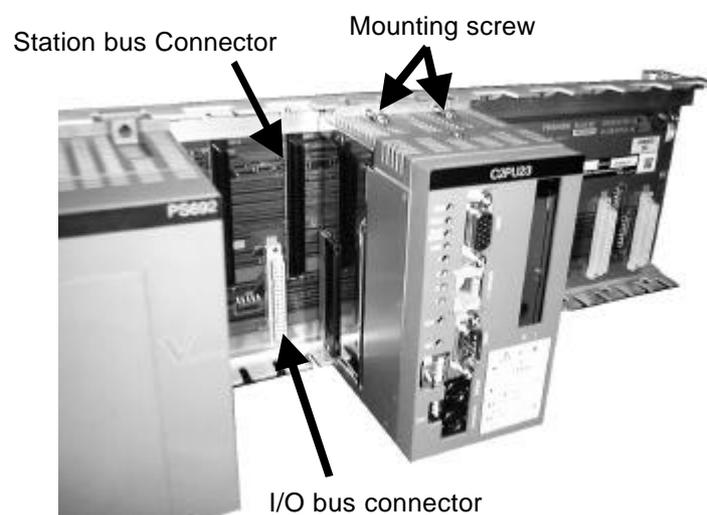
2.4   Grounding

The electrical devices should be grounded separately from power system and the two or more electrical devices should be grounded at a single point. The model 2000 is designed to resist actual noise and the device is sufficiently capable of withstanding noise, but grounding is very important in order to assure safe and stable system operation. Observe the following instructions and provide proper grounding.

When using the Ethernet module, refer to the 'Ethernet installation and Wiring Guide' (6F8C0879)

⚠ CAUTION
Always ground the model 2000. Failing to ground the unit can cause electrocution or malfunction.

2.4.1   Grounding Tips

Note the following when grounding:

(1) The model 2000 unit must not be a conductor for grounding current of other devices.
  (Especially, high frequency current can cause trouble.)

(2) The grounding potential of the model 2000 base and expansion unit must be equal.
  (Ground at single point.)

(3) Do not connect to ground of motorized system (require high frequency separation)

(4) Do not connect to unstable ground (parts with unstable impedance such as screwed on painted parts or parts affected by vibration)

2.4.2   Grounding method

(1) Grounding of control panel
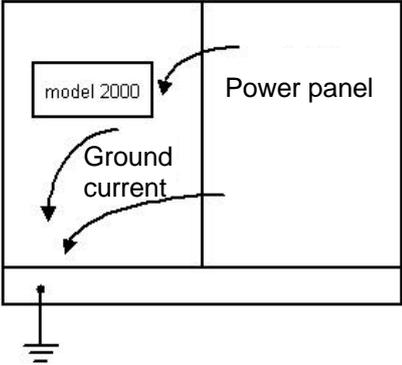
In the case of connecting panel, the ground current flowing from the high frequency device or power panel may flow through the PC housing panel.

Isolate model 2000 mounting panel and connect to the ground point separately

Isolate model 2000 from the mounting frame and connect to the ground point separately.
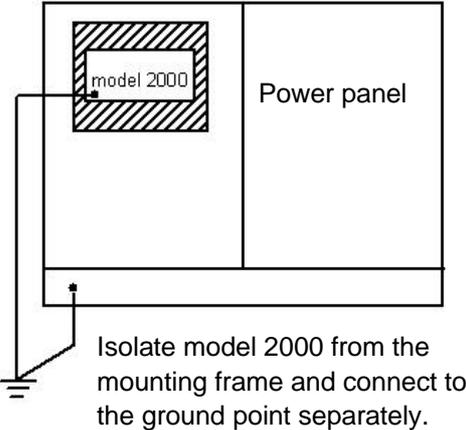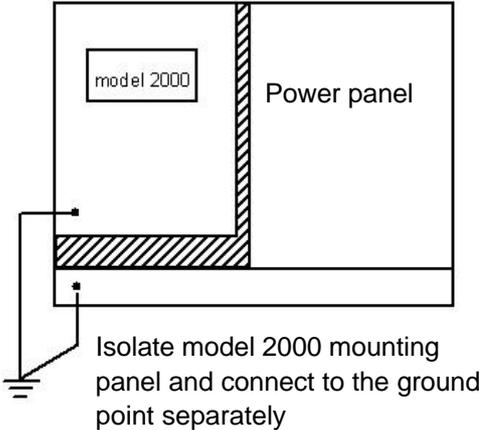
(2) Grounding connection between base
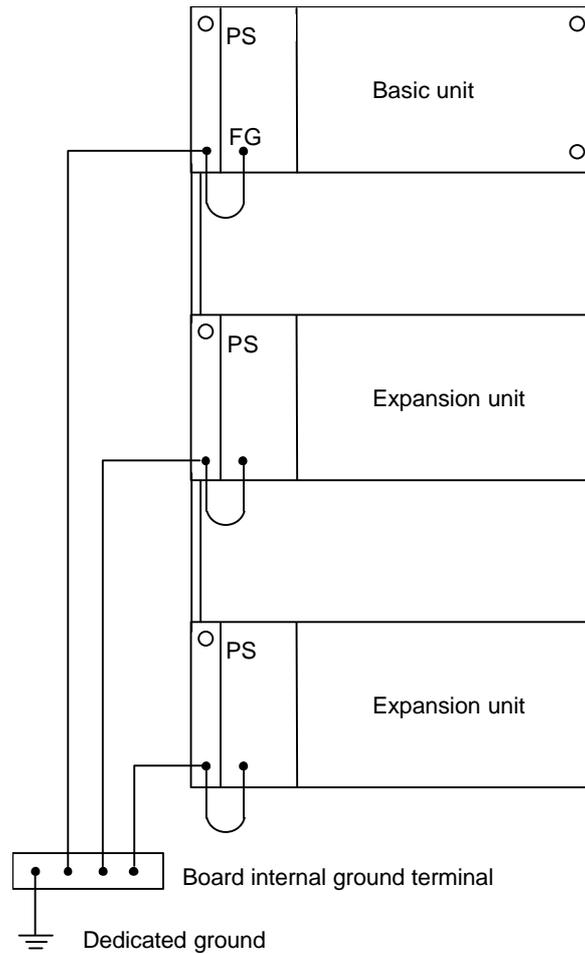
- Connect the FG terminal of the power supply module to the unit mounting screw, and to the ground bar in the panel by 2mm^2 or larger wire in shortest possible distance.
- Use a dedicated ground for the control circuit, and keep the ground cable away from that for high-power systems.
- 100   or less to earth is recommended.

(3) Line Filter ground (LG) terminal

The LG terminal is a neutral point of the primary power supply line filter. It can suppress the effect caused by the noise from power supply line, by grounding the LG terminal.

Therefore, normally, ground the LG terminal together with the FG terminal.

However, depending on the power system, leakage current to the ground from the LG may cause problems. In this case, install an isolated transformer in the power line, or open the LG terminal. If the unit is installed in isolation, open the LG terminal.

Do not connect the LG and FG terminals without grounding them.

(4) Frame ground (FG) terminal

The FG terminal is a protective ground point of the model 2000. The FG terminal voltage is equalized to that of the base. For safety, ground them at single-point in order to minimize the risk of electrical shock.

2.5   Wiring of the power supply

Wire the external power supply to model 2000 power supply module in the following manner.

When using expansion units, arrange for power to be supplied simultaneously to the basic unit and the expansion units (or to the expansion units before the basic unit).

(1) Power conditions

    Rated voltage   : 85 to 264VAC, 50/60Hz (PS694)

    Power consumption   : 150VA or less (PS694)

    Retentive power interruption   : 20ms or less

(2) Install an electrostatic shielded transformer or a noise filter if the power contains noise. See figurer at the bottom.

(3) Use twisted-pair cables (1.25mm^2) as the power supply cable. Keep the cable as far as possible from I/O cables.

(4) If the expansion unit with a power supply module is used, the power of the basic and expansion units should be supplied from the same source. Apply power at the same time or in the order of the expansion unit then the basic unit.

(5) If a CVCF or UPS supplies power to model 2000, observe waveforms of the power supply; the peak voltage must be more than 130V for the 100VAC range or 260V for the 200VAC range.
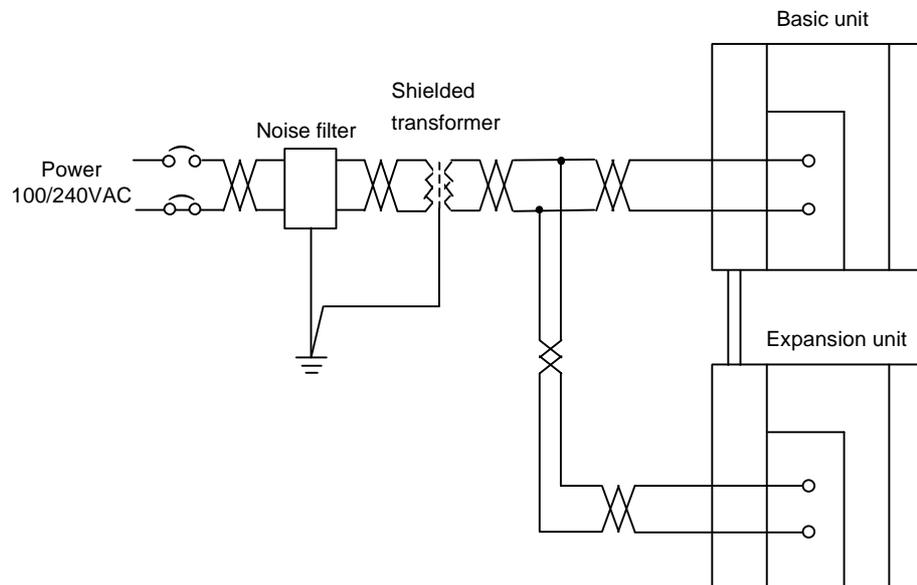
Wiring of the power supply

PS694

PS691

RUN signal contact output

100-240VAC input

NC
NC

NC
NC

L
N
LG
FG

*1   *2

RUN signal contact output

100VAC   short
200VAC   open

100-120VAC or 200-240VAC input

NC
NC

L
N
LG
FG

*1   *2

PS693

PS632/PS653

24V output

DC24V

0V

RUN signal contact output

100-240VAC input

NC

L
N
LG
FG

*1   *2

RUN signal contact output

24VDC input (PS632)
100/110VDC input (PS653)

NC
NC

NC

L
N

*1   *2

*1 Line filter ground (LG)

Power supply input

5000PF or less

5000PF or less
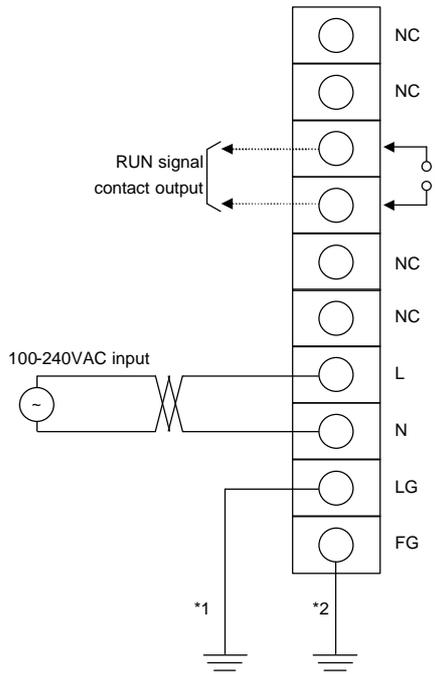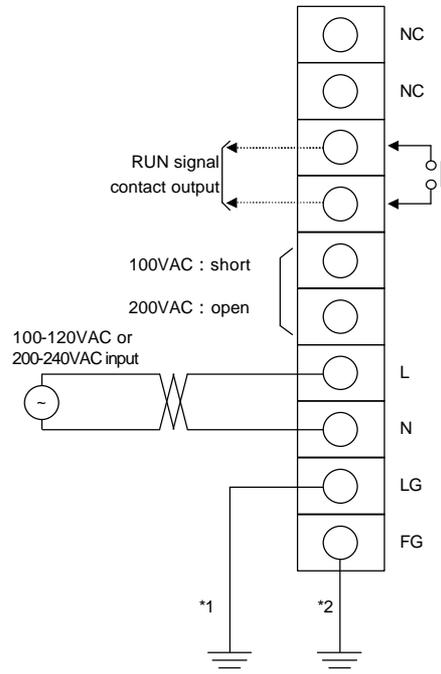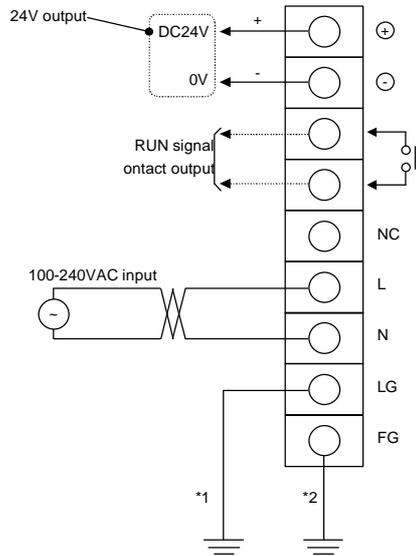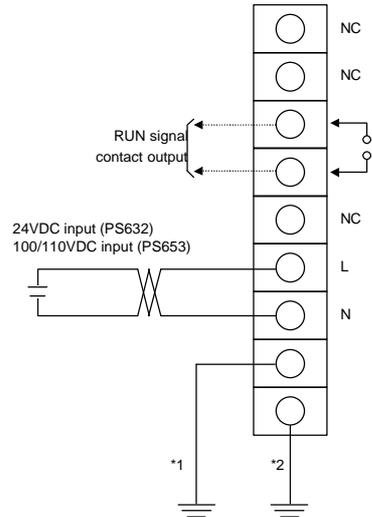
LG
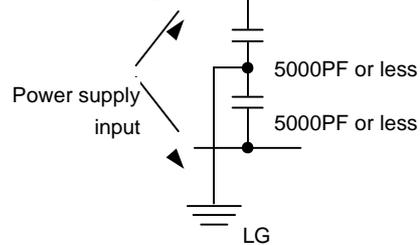
*2 Frame ground (FG)
   Connected to base unit.
See '2.4 Grounding'

⚠ CAUTION

1. Always turn off the power before wiring the cables.
   Working with the power on can cause electrocution.

2. Use covered crimp terminals or cover the module wire with tape so that there
   is no exposed conducting parts.
   Fasten the terminal covers securely to the terminals when wiring is finished.
   Exposed parts can cause electrocution.

3. Always ground the model 2000.
   Failing to ground the unit can cause electrocution or malfunction.

4. Connect to rated power supply.
   Connecting to wrong power supply can cause explosion or fire.

5. Wiring must be performed by an experienced person.
   Wiring error can result in fire, malfunction, or electrocution.

6. Do not connect any cables to the NC terminals.

NOTE:

Terminal screw size is M3.5. Use crimp terminal with width of 7mm or less for M3.5 screw.

2.6   Connector Connection

Connect each connector to the peripheral device as described below.

<div style="border:1px solid">

⚠ CAUTION

• Turn off the power of the main unit and peripheral device when connecting peripheral devices.
  Connecting with the power on may cause injury or burn.

• Be sure to hold the connector when attaching/removing signal cables.
  Otherwise, the cable may be damaged causing fire or electrocution.

</div>

Important

• Check the shape of the connector and insert the cable properly into the main unit.
  The pins may break or bend if unnecessary force is applied.

• If the cable connector is equipped with fastening screws, tighten them so that the cable does not come loose.

(1) Check that the switch of the power module is in the OFF position.

(2) Connect the cable of each peripheral device to the main unit connector.
     After connecting, tighten two screws and fasten the connector to the module.
     Match the connectors properly when connecting and connect firmly.

3.1   Power On and Power Off

If you are using peripheral devices, connect them before turning on the main unit power.

Important

- Wait at least 5 seconds when turning on the power after turning it off.
  If the power is turned back on too quickly, the rush current prevention circuit may not function properly and a sudden flow of current (approximately 100A) may cause the power supply fuse to blow out.

3.1.1   Turning On the Power

Configure the external circuit to power on in the following sequence:
(1) Turn on the AC power to the power supply module.
(2) Turn on the power of the peripheral devices (CD-ROM drive connected through PC card, etc.) connected to C2.
(3) Turn on the model 2000 main unit.
(4) Turn on the I/O module and external load power.

3.1.2   Turning Off the Power

Turn off the power in the reverse order of the power on procedure.

NOTE:

If an application program is running, quit the program to return to the operating system (OS).
Then shut down the operating system and get ready to power off.

If PS694 or PS691 is used for a power supply module, a shutdown will be performed automatically and a module power supply will be shut off.
Please refer to the following page for details.

3.1.3 Power Off with Windows

If a power supply is turned off without shutdown of Windows, the data in a hard disk is destroyed and it may be unable to reboot.

Model 2000 is supporting the automatic shutdown of Windows, and the power supply off-sequence. If the power supply module of exclusive use is used, the shutdown of Windows can be performed without carrying out operation of a mouse and a keyboard.

Important
• In order to use an automatic shutdown function, the RAS support software installed in C2 as standard is required.

3.1.4 Power Supply module PS694 with Battery
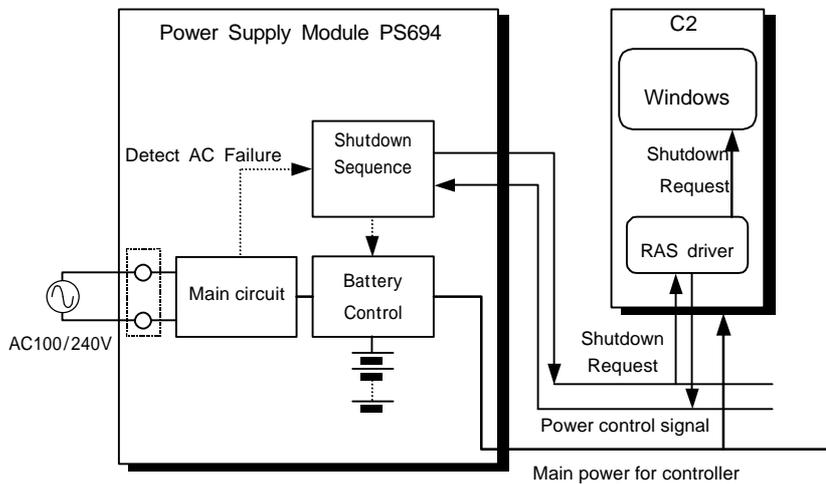
● Operation during power off

(1) An AC input power failure exceeding the preset allowable limit is detected as a power failure. (Normal operation continues if power fails shorter than that.)

(2) Shutdown is requested to the C2 and the C2 starts shutdown processing.

(3) When the C2 finishes shutdown processing, the power module PS694 cuts power off by stopping power supply from the battery.

> **Important**
>
> • If the running application cannot be terminated normally for some reason or other, Windows is forcibly terminated subject to the completion waiting time set with the RAS driver.
>   In this case, the file data of application or Windows may be destroyed.
>   Fully confirm application operation in advance that it is free of problems.

> **Important**
>
> • If an input power supply is turned off during Windows starting, power supply OFF may be carried out without carrying out shutdown processing.

> **Important**
>
> • When it mounts two or more sets of C2 in one base unit, after all C2 carries out the completion of a shutdown, power supply OFF is carried out.

● Operation after power recovery

If AC power is restored during the shutdown processing, power is automatically turned back on after the operation described in step (3).

● Hold time and charge time of a built-in battery

The battery's hold time is 4 minutes maximum (when the battery is fully charged and operates at the rated output level). A recharge of about 2 hours is necessary for the battery to make up for the loss of its capacity by a single Windows shutdown after AC input power is back on.

> **Important**
>
> • When battery capacity runs short during battery operation, a power supply is turned off compulsorily.
>   In this case, the file data of application or Windows may be destroyed.
>   Do not repeat OFF of an input power supply.

> **Important**
>
> • PS694 is not a thing supposing use in the inferior input power supply state.
>   Battery operation is performed, while the input power supply turns off, even if it is less than the set-up time at the time of retentive power interruption.
>   When there is extremely much generating frequency of a power interruption, the charge capacity of a battery runs short and power supply OFF may be carried out before the completion of a shutdown at the time of input power supply OFF.

3.1.5   Power Supply module PS691 with UPS I/F
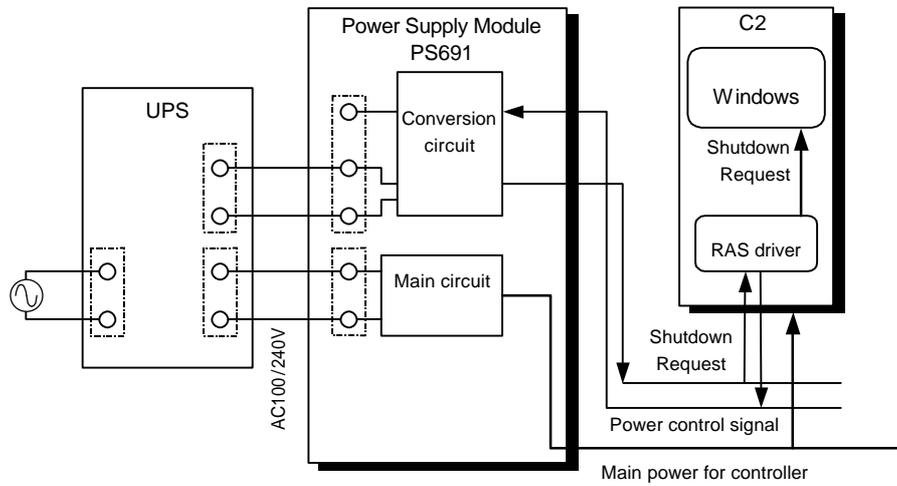
UPS turns off secondary side power supplies in timer setting of UPS. A timer should set up sufficient time for shutdown of Windows.

3.2   About the Hard Disk

Hard Disk Handling

The C2 hard disk drive is likely to be misused because it can be replaced or carried easily. Observe the following precautions and treat it with care:

- Do not drop it or exert strong shock.
  The magnetic surface of the hard disk may be damaged making it unusable. Scars on the magnetic surface cannot be repaired. Handle it with extreme care.
- Carrying it without installing it on C2 can make it more susceptible to shock and the data may be lost or become unreadable. Place it in a box and handle with care. Be especially careful when transporting.
- Place the removed hard disk drive in an anti-static bag and store it in a box.
- The hard disk pack may be replaced approximately 500 times. This is the life of the connector.
- Avoid spilling coffee, other fluids, or metal particles.
- Do not disassemble. Failure to do so can cause malfunction of the drive.

Important
• Toshiba will not be responsible for the content of the hard disk regardless of the cause of failure or error. Please backup your data to guard against accidents. • Use only C2 custom hard disks.

3

3.3   About the External FDD

An external floppy disk drive is necessary if you must install OS or application programs from floppy disks or save data to floppy disks.
In general, a floppy disk drive has an access lamp in front as shown at right. This lamp flashes when the drive is being accessed.
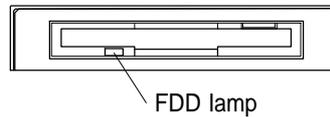
FDD lamp

⚠ CAUTION

- Turn off the AC power of the main unit when removing/inserting the FDD cable.
  Removing or inserting the cable with the main unit power on can cause burn or electrocution.

- Do not press the eject button or turn off the power when the FDD lamp of the external floppy disk drive is on.

3.3.1   Floppy Disk Handling

Important

- Do not open the shutter and touch the magnetic surface.

- Avoid extreme environment such as direct sunlight, strong magnetic field, or high temperature.

- Do not put heavy object on top.

- Do not paste labels on top of each other.

[Write Protecting a Floppy Disk]

To prohibit write
Slide the write protect tab to the outside as shown in (1).

To enable write
Slide the write protect tab to the inside as shown in (2).

In either case, slide the write protect tab until it clicks

Write disabled state Write enabled state
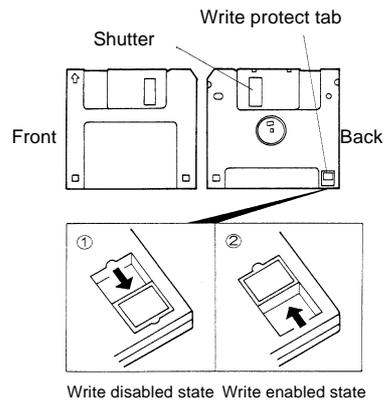
3.4   About the PC Card

Two PC Cards Standard TYPE I/II (3.3V, 5V) PC cards can be inserted in the PC card slot of the C2. Or, one TYPE III PC card can be inserted when the left and right slots are combined.

PC card slot 0   PC card slot 1
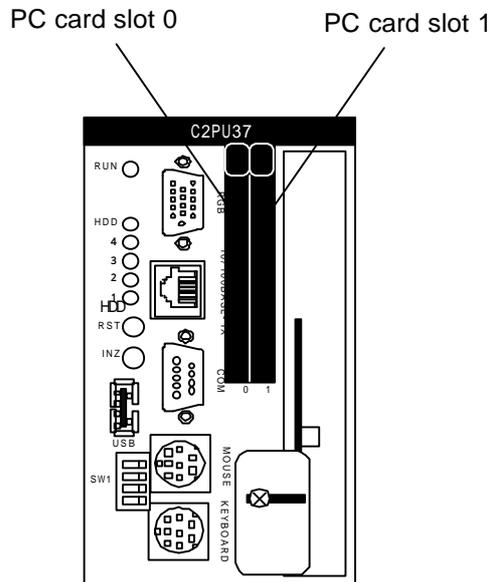
⚠ CAUTION

• Do not touch the PC card that is being used or just after it has been used. It may become extremely hot and cause burns.
  Persons with weak skin condition should be especially careful.

Important

• When using a card that requires a cable, the cable may be short. Check the location of the main unit and the peripheral device to be connected.

• The size of a cable or a connector of a PC card are large, and may be unable to insert two cards simultaneously. Please check the size of the card to be used etc. beforehand. If a PC card is inserted by force, it may become the cause of incorrect operation and failure.

Memo

• Some commercially available PC cards may emit considerable amount of heat. The function of such card may become unstable when it is used for an extended period. Also, if it is used together with other cards, the heat may affect the other card.

Examples of PC card
• Modem card   • Flash memory
• SCSI adapter   • LAN card

3.4.1 Installation

(1) Press the eject button of the PC card slot until the eject button pops out.
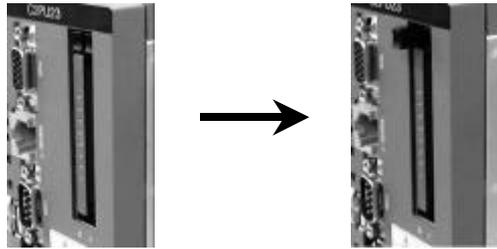
(2) Press the eject button once more.
The dummy card ejects.

(3) Remove the dummy card.
Store the dummy card in a safe place.

(4) Check the direction and insert the PC card.
Gently press the PC card all the way in and connect securely. Do not exert excessive force.

(5) Connecting cable to the PC card.
Connect the cable in case of a card that needs a cable such as LAN card or modem card.

After connecting the card, check that the card is ready.
Refer to the PC card environment setup in the "PC Card Manual."

⚠ CAUTION

- Do not transport with the cable attached.
  If you do, the cable connector may be damaged.

- Do not pull on the cable strongly with the cable attached. The PC card may become loose.

3.4.2   Removal

(1) Press the eject button of the PC card slot until the eject button pops out.

(2) Press the eject button once more.
The card ejects.

(3) Hold the card firmly and pull.

(4) Insert a dummy card.

Chapter 4 Maintenance

4.1   Daily Inspection

The following items should be inspected daily in order to maintain normal system operation and prevent unnecessary trouble from occurring.

Item	Inspection Description	Action
Check the LED in front of the power module.	POWER (green): On when 5V power supply is normal	Inspect the power supply related items under "Periodic Inspection" below.
Check the LED at the front of the C2 module.	RUN (green): ON when program is running normally.	See below
Check the LED of the input module. (Digital input)	When external input signal is ON, the corresponding LED is ON.	• Check that the input voltage is within specification. • Check that the input terminal is secure. • Check that the module is secured.
Check the LED of the output module. (Digital output)	When output is ON, corresponding LED is ON and corresponding external load is active. LEDs indicating blown fuse and external power failure (FL, FH, or F) are OFF.	• Check that the external load voltage is within specification. • Check the internal fuse. • Check that the output terminal is secure. • Check that the module is secured.

Action
• When the C3 module LED status is abnormal
  The application program may be at fault if the error is not corrected after performing the following. Check the application program once more.

(1) Restarting the C2 module.
(2) Replacing the C2 module.

4.2 Periodic Maintenance

Check the following items periodically (once every six month is recommended). Also check these items when the surrounding condition or environment is changed.

Item	Inspection Description	Action
Power supply related	Power supply voltage (measure at the power supply terminal of the module)	AC85 - 132VAC/170 - 264VAC
	Check for loose power supply terminal screws	Must be secure
	Check for damaged cables	Must not be damaged
Installation	Check that the base unit is securely in place	Must not be loose
	Check that each module is securely in place	Must not be loose
	Check for loose connector in front of the module and damaged cables	Must not be loose or damaged
I/O module related	Measure voltage of each I/O terminal	Must be within specification
	Check the input status LED	Must turn ON normally
	Check the output status LED	Must turn ON normally
	Check that the I/O terminal is secure	Must not be loose
	Check that the terminal screws are secure and not touching each other	Must not be loose or touching each other
	Check for damaged cables	Must not be damaged
Environment	Check the temperature, humidity, vibration, and dust	Must be within installation environment specification
Battery related	C2 built-in Litium battery	Should be replaced after 10 years by C2 overhaul
	PS694 battery	Should be replaced after 3 years (Ni-Cd battery) after 1 year (Ni-MH battery)
	Other battery	Should be replaced after two years
	Check that the battery connector is connected securely	Must be secure

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◈ WARNING

• Do not attempt to disassemble, modify, or repair.
   This can cause electrocution, fire, or injury.
   Contact the Toshiba service desk for repair.

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⚠ CAUTION

• Take extreme precaution when measuring the power supply voltage at the power supply terminal of the module during inspection.
  There is a danger of electrocution.

• Do not touch the C2 module when the power is on. The heat radiating side covers become extremely hot (ambient temperature+20°C) when power is on. It cools (ambient temperature+10 ^{o}C) in 10 minutes when the power is turned off.

</div>

4.3   Replacement Timing of Major Parts

Listed below are the product life of major components. Periodically replace parts using this table as reference. Contact your Toshiba service desk for information concerning the price and ordering method of replacement parts.

Product life of major components

Parts	Location of wear	Description	Product Life	Replacement Interval	Action
Hard disk drive	Mechanism	Wear	5 years or 20,000 cumulative power on hours which ever comes first.	2 years	Replace
Battery (PS694 built-in Ni-Cd)	Capacity	Depletion	500 power interruptions or 3 years, whichever come first. (Ambient temperature 35° C)	—	Replace
Battery (PS694M built-in Ni-MH)	Capacity	Depletion	450 power interruptions or 1 year, whichever come first. (Ambient temperature 35° C)	—	Replace
Battery (C2 built-in)	Capacity	Depletion	10 years (Ambient temperature 35° C)	10 years	Parts replacement by overhaul
PC Card slot	Functional parts	Wear	10000 insertions/removals	—	Parts replacement by overhaul
External FDD	Mechanism	Wear	5 years or 15,000 cumulative power on hours which ever comes first.	2 years	Replace

Product life of major components

Parts	Location of wear	Description	Product Life	Replacement Interval	Action
Keyboard	Mechanism	Wear	100,000 strokes	—	Replace
Mouse	Mechanism	Wear	100,000 clicks	—	Replace
CRT	Displays		10,000 cumulative power on hours	—	Replace

In addition to the main unit, disk drives such as the CD-ROM, and MO drive also have a product life. Check the product life of the peripheral devices being used and replace them before their product life expires.

4.4 Replacing the Hard Disk Drive

The main unit is equipped with one 2.5 inch hard disk drive in the HDD pack.
The HDD pack replacement procedure is as follows:

Important
• Be careful not to exert excessive shock to the HDD pack.
• Always turn off the power before removing/installing the HDD pack. Removing/installing the HDD pack with the power turned on can damage the content of the hard disk.
• Exchange of an HDD pack should shut off a power supply, and after 30 seconds or more pass, perform it. The contents of a disk may be destroyed if it exchanges immediately after turning off a power supply.
• Be sure to pull out HDD Drawer metallic ornaments using tools, such as a minus driver. If a finger pulls directly, there is a possibility of removing a nail.

4.4.1 How to Remove the HDD pack

(1) It checks that the power supply is off.

(2) The screw of the HDD fixed board is loosened and the HDD fixed board is made to slide to the left.

(3) A minus driver is united with the slot in front of an HDD pack, and HDD pack drawer metallic ornaments are pulled out.

(4) An HDD pack is removed pulling HDD pack drawer to the front.

4.4.2 Intalling the HDD pack

(1) It checks that the power supply is off.

(2) The direction of up-and-down is checked and an HDD pack is inserted.

(3) If it enters to the back, the upper part and the lower part of an HDD pack will be pushed with a finger, and a connector will be combined certainly.

(4) An HDD fixed board is made to slide to the right, and it fixes with a screw.

Chapter 5 RAS Function 5

RAS function (Reliability, Availability, Serviceability) represents the function which increases the operating performance of the C2. C2 is equipped with RAS hardware and RAS support software to facilitate the use of RAS functions.

Persons in charge of design, operation, or maintenance of the C2 should have sufficient knowledge of these function in order to be ready in case of trouble.

This chapter provides an overview of the RAS hardware and software and describes the hardware operation.

5.1 RAS Function Overview

The RAS hardware and software provide the following functions.

5.1.1 RAS Hardware

Internal diagnosis	Circuit that detects internal abnormal conditions. • WDT monitoring • DRAM ECC error detection • CPU temperature/CPU peripheral temperature rise detection • Power voltage drop detection • C2 built-in Battery failure detection
Power ON/OFF function	OFF detection of an input power supply, and control of a power supply.
Reset function	The function reset at the time of abnormalities • Compulsive initialization switch (INZ switch) • Compulsive hardware reset switch (RST switch)
Interrupt output function	Non-maskable interrupts (NMI) and maskable interrupts (MI) are available. 　NMI: Power off, WDT, initialize switch control 　MI: CPU peripheral temperature rise, interval timer 　　　(MI can be enabled/disabled by software)
RAS memory function	Equipped with battery backed RAS memory (64K bytes) to save information while running. • Saving of error information • Saving of user information

5.1.2 RAS Support Software

This section provides a general description of the RAS support software. Refer to the "Computer module C2/C3 Windows User's Manual (6F8C0894)" for more information concerning RAS function software processing.

The Windows version C2 is shipped with the RAS support software installed.

The RAS support software consists of RAS hardware drivers and RAS software libraries and there are two ways to use it.

From the RAS windows	It can be used simply by registering the RAS window parameter during installation.
From the user program	Used by creating a user application program using RAS commands in VC (Visual C++) or VB (Visual Basic) for the specific purpose. Sufficient knowledge of the hardware functions is necessary to create the program.

5.2   Hardware Processing RAS Functions

5.2.1   WDT Circuit and Hardware Reset

The WDT circuit issues an NMI to the main unit when the WDT counter is not reset within a certain interval (WDT monitoring interval). The WDT monitoring interval can be set up to 500ms x 255 (approximately 2 minutes) in 500ms units.

If an NMI is not accepted within 500ms after a WDT timeout NMI is issued, the system is reset by the hardware reset function.
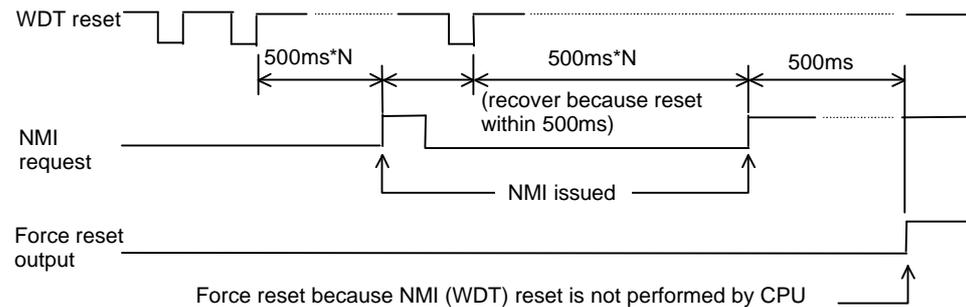
<WDT and forced reset time chart>

Important

• Do not enable the suspend function when using the WDT function. This may cause a mal-function.
   The suspend function is a power saving method and cannot be used together with the WDT function.

5.2.2   RAS Memory

RAS memory is a 64K-byte battery backed non-volatile memory and is used to store NMI events and RAS information. It is also used by the RAS support software to save shutdown information.

RAS memory is designed to be accessed using the I/O space and does not use any memory space.

RAS memory is backed up by the backup battery (Lithium battery) installed inside the main unit.

5.2.3   Interrupt Signals

Interrupts detected by RAS board and sent to CPU are classified into NMI events and MI events.

   • Examples of NMI events are: WDT timeout, events requiring immediate action such as power failure, system shutdown, and remote input for power control.

   • An example of MI event is fan stop.

[NMI events]

NMI events are the following:
- power off
- WDT timeout
- Pressing of the INZ switch

An NMI signal is sent to the main unit when any one of these events occur. An NMI event is latched inside the RAS board and held until it is processed by the RAS support software.

A forced reset (hardware reset) is issued and the system is reset unless an NMI processing RAS support software is executed within 500ms after the occurrence of these NMI events. (NMI process monitoring timer)

If a RAS support software is installed, monitor timer reset for the NMI is performed by the software so that the NMI need not be processed by user application.

[MI events]

MI events are the following:
- Rise in temperature (main unit internal temperature)
- Interval timer
- Fan stop

An interrupt occurs when the temperature becomes abnormal, fan stops, or when the interval timer expires.

Chapter   Hardware Setup   6

The C3 hardware can be set from the BIOS screen. Normally, the setting need not be changed. Do not change the setting unnecessarily. If it is set incorrectly, the hardware may be damaged.

If you inadvertently changed it incorrectly, you must change it back to the correct setting.

This section describes how to set the BIOS in such case.

6.1 Setting the BIOS

The method of displaying the BIOS screen and the displayed content (default value) are shown below. Check the content before using or when there is an abnormal condition.

> Important
>
> • Do not enable the suspend function when using the WDT function. This may cause a mal-function.
> The suspend function is a power saving method and cannot be used together with the WDT function.

(1) Turn on the main unit power.
The following BIOS startup screen appears.

```
PhoenixBIOS X.X   Release X.X.X
Copyright 1985-2002 Phoenix Technologies Ltd.
All Rights Reserved

CPU = Pentium(R) III prosessor 500MHz
636K System RAM Passed
XXXM Extended RAM Passed
256K Cache SRAM Passed
System BIOS shadowed
Video BIOS Shadowed
UMB upper limit segment address:F0DF
Fixed Disk 0:(DISK Maker/Type)




Press <F2> to enter SETUP
```

BIOS startup screen

(2) Press F2 when the BIOS startup screen appears.
     The BIOS main menu appears.

Phoenix BIOS Setup Utility		
Main Advanced Boot Exit		
System Time	[XX:XX:XX]	Item Specific Help
System Date	[XX/XX/2000]	
Legacy Diskette A:	[Disabled]	
Primary Master	[DISK]	
Primary Slave	[None]	
Secondary Master	[None]	
System Memory:	640 KB	
Extended Memory:	XXXXXX KB	
Memory Cache:	[Enabled]	
F1 Help Select Item -/+ Change Values		F9 Setup Defaults
Esc Exit Select Menu Enter Select Sub-Menu		F10 Save and Exit

BIOS main menu screen

(3) Select each item from this main menu and check the content.
     The content of each screen is as follows.

Phoenix BIOS Setup Utility		
Main **Advanced** Boot Exit		
Installed O/S:	[Other]	Item Specific Help
Reset Configuration Data:	[No]	
PS/2 Mouse	[Auto Detect]	
I/O Device Configuration		
Large Disk Access Mode:	[Dos]	
Local Bus IDE adapter:	[Primary]	
Advanced chipset Control		
Legacy USB Support:	[Enabled]	
PCI IRQ line1:	[11]	
F1 Help Select Item -/+ Change Values		F9 Setup Defaults
Esc Exit Select Menu Enter Select Sub-Menu		F10 Save and Exit

Advanced screen

```
┌─────────────────────────────────────────────────────────────────┐
│                   Phoenix BIOS Setup Utility                      │
├─────────────────────────────────────────────────────────────────┤
│   Main    Advanced   Boot    Exit                                 │
├──────────────────────────────────────────┬──────────────────────┤
│                                           │ Item Specific Help    │
│ + Removable Devices                       │                      │
│         Legacy floppy Drives              │                      │
│ + Hard Drive                              │                      │
│         (DISK Maker/Type)                 │                      │
│         bootable Add-in cards             │                      │
│ CD-ROM Drive                              │                      │
│                                           │                      │
│                                           │                      │
│                                           │                      │
│                                           │                      │
│                                           │                      │
│                                           │                      │
├──────────────────────────────────────────┴──────────────────────┤
│ F1 Help      Select Item   -/+ Change Values    F9 Setup Defaults │
│ Esc Exit     Select Menu   Enter Select  Sub-Menu F10 Save and Exit│
└─────────────────────────────────────────────────────────────────┘
```

BOOT screen

```
┌─────────────────────────────────────────────────────────────────┐
│                   Phoenix BIOS Setup Utility                      │
├─────────────────────────────────────────────────────────────────┤
│   Main    Advanced   Boot    Exit                                 │
├──────────────────────────────────────────┬──────────────────────┤
│                                           │ Item Specific Help    │
│ Exit Saving Changes                       │                      │
│ Exit Discarding Changes                   │                      │
│ Load Setup Defaults                       │                      │
│ Discard Changes                           │                      │
│ Save Changes                              │                      │
│                                           │                      │
│                                           │                      │
│                                           │                      │
│                                           │                      │
│                                           │                      │
│                                           │                      │
│                                           │                      │
├──────────────────────────────────────────┴──────────────────────┤
│ F1 Help      Select Item   -/+ Change Values    F9 Setup Defaults │
│ Esc Exit     Select Menu   Enter Select  Sub-Menu F10 Save and Exit│
└─────────────────────────────────────────────────────────────────┘
```

Exit screen

Phoenix BIOS Setup Utility	
Main	
Primary Master [DISK Maker/Type]	Item Specific Help
Type: [Auto]	
Multi-Sector Transfers [XX Sectors] LBA Mode Control [Enabled] 32 Bit I/O [Disabled] Transfer Mode [FPIO X DMA X]	
F1 Help Select Item -/+ Change Values Esc Exit Select Menu Enter Select Sub-Menu	F9 Setup Defaults F10 Save and Exit

Primary Master (Sub-Menu) screen

Phoenix BIOS Setup Utility	
Main	
Primary Slave/Secondary Master [None]	Item Specific Help
Type: [Auto]	
Multi-Sector Transfers: [Disabled] LBA Mode Control: [Disabled] 32 Bit I/O [Disabled] Transfer Mode: [Standard] SMART Monitoring: Disabled	
F1 Help Select Item -/+ Change Values Esc Exit Select Menu Enter Select Sub-Menu	F9 Setup Defaults F10 Save and Exit

Primary Slave/Secondary Master (Sub-Menu) screen

Phoenix BIOS Setup Utility		
Advanced		
I/O Device Configuration		Item Specific Help
Serial port A	[Auto]	
Serial port B	[Disabled]	
Parallel port	[Disabled]	
Floppy disk controller	[Enabled]	
Base I/O address	[Primary]	
F1 Help Select Item -/+ Change Values		F9 Setup Defaults
Esc Exit Select Menu Enter Select Sub-Menu		F10 Save and Exit

I/O Device Configuration screen

Phoenix BIOS Setup Utility		
Advanced		
Advanced Chipset Control		Item Specific Help
8-bit I/O Recovery:	[4.5]	
16bit I/O Recovery:	[4.5]	
Enable memory gap:	Disabled	
ECC Config:	[ECC]	
SERR signal condition:	[Multiple bit]:	
F1 Help Select Item -/+ Change Values		F9 Setup Defaults
Esc Exit Select Menu Enter Select Sub-Menu		F10 Save and Exit

Advanced Chipset Control screen

(4) If the displayed content is different, correct the setting and perform SAVE & EXIT (F10) to save the content.

Sometimes, the device does not function as you expected or you may not know what to do next. Read this section before you suspect that the device is faulty.

If an error message appears while using an operating system command, refer to the operating system manual.

For information concerning the use of each application program, refer to the operation manual of the respective application program.

Power does not turn on.

Q	A	
Symptom	Check	Action
The main unit power does not turn on.	Is the power cable connected to the electrical outlet?	Turn off the AC power switch of the power module and plug into the electrical outlet. See "3.1.1 Turning On the Power"
	Is power supplied to the electrical outlet?	Plug into proper electrical outlet.

An error message appears.

Q	A	
Symptom	Check	Action
An error message appears during startup.	Did you turn the power off and then back on immediately?	Wait at least 5 seconds after turning off the power before turning it back on.
	Is the BIOS set correctly?	Refer to "6.1 Setting the BIOS" and check.
An error message appears when using an application program.		Refer to your application program's operation manual.

Screen display is improper.

Q	A	
Symptom	Check	Action
Nothing is displayed.	Is the main unit and CRT power on?	Turn on the power. See "3.1.1 Turning On the Power"
	Is the CRT power cable connected?	Turn off the power once and plug into an electrical outlet.
	Is the CRT signal cable connected properly?	Connect the cable securely. See "2.5 Power Supply Connection"
Screen display is distorted, size or position is improper.	Are the CRT brightness and contrast adjusted properly?	Turn the brightness and contrast knobs to adjust. Refer to the CRT operation manual for details.

No character is entered when a key is pressed.

Q	A	
Symptom	Check	Action
Unable to enter from the keyboard.	Is the keyboard cable plug connected to the mouse connector?	Connect the keyboard cable plug to the keyboard connector.
There is no response from any key.		Turn the power off and then back on after a while.
There is no response when power on is repeated.		Press the {Del} key while pressing the [Ctrl] key and [Alt] key.
The desired character cannot be entered.	Are the CapsLock, NumLock, and ScrollLock lamps lit properly?	Use the [Caps Lock] key and [Num Lock] key to obtain the desired state.

The mouse does not work

Q	A	
Symptom	Check	Action
The mouse does not Respond	Is the mouse connected to the keyboard connector?	Connect the mouse to the mouse connector.

Operating system does not start.

Q	A	
Symptom	Check	Action
An error message appears during startup.	Did you turn the power off and then back on immediately	? Wait at least 5 seconds after turning off the power before turning it back on.
	Is the BIOS set correctly?	Check "6.1 Setting the BIOS"
An error message appears when using an application program.		Refer to your application program's operation manual.

Application program cannot be used

Q	A	
Symptom	Check	Action
Application program does not work as expected.	Is the system configuration set correctly?	Refer the operation manual of the application program and change the system configuration if instructed.
Application program does not run.	Does the application program support the current operating system?	The application program must support the current operating system. Purchase an appropriate application program.

The floppy disk drive cannot be used

Q	A	
Symptom	Check	Action
FDD lamp does not go off.		Wait until the lamp goes off when processing large data. If the lamp still does not go off, quit the task (turn off the power) and contact the service desk.

The floppy disk cannot be used

Q	A	
Symptom	Check	Action
An error message "Write protected" appears.	Is the floppy disk write protected?	Take out the floppy disk and enable it for write.
An error message "Unable to create file" appears.	Is the sub directory created? e.	Create a sub directory and then create the fil
An error message "Disk full" appears.	Is there sufficient disk space?	Delete unnecessary file and retry. Use a different floppy disk.

Television and radio interference appears

Q	A	
Symptom	Check	Action
There is TV and radio interference.	Is the device near the TV or radio? Is the device plugged into the same outlet as TV or radio?	Change the direction of the indoor radio or television antenna.
		Change the direction of the unit with respect to radio or television.
		Move the unit away from radio or television.
		Use separate electrical outlet from the radio or television.
		Insert a commercially available filter between the electrical outlet and the power plug of the unit. Use an outdoor antenna.
		Change the feeder to a coaxial cable.

In case of trouble or malfunction

Q	A	
Symptom	Check	Action
There is abnormal smell or heat.		Turn off the power and pull out the plug.
Trouble or malfunction has occurred.		Contact the service desk. Have the following information ready: • System code • Name of the equipment • Date of purchase • Current status Please provide detail information.

If the problem is still not solved

If you still cannot determine the cause of trouble, contact the service desk.
Have the following information ready:
• System code
• Name of the equipment
• Date of purchase
• Current status

Appendix B   Device Specifications

B.1   Specifications

Item		Specification
OS		Windows 2000 Professional
processor	Main processor	Mobile Pentium III 500MHz
	Cache memory	Primary 32KB (CPU on-die) Secondary 256KB (CPU on-die)
Main memory	Size	256MB/128MB
	Configration	PC100, SO-DIMM socket
	Memory check	ECC check
Auxiliary storage	Internal storage	Hard disk 30GB /Flash disk 2GB
Standard interface	Floppy disk	1ch. (1.44MB(2HD) / 720KB(2DD))
	Serial	1ch. RS-232C (9-pin DSUB)
	Keyboard interface	PS/2 1ch.
	Mouse interface	PS/2 1ch.
	USB interface	1ch. (TYPE A USB 1.0)
	CRT interface	Analog RGB 1ch (15-pin shrink DSUB)
	LAN interface	Ethernet:10base-T/100base-Tx 1ch. (RJ45)
Extension interface	PC card	CARD-BUS/PCMCIA TypeII 2slots
	TOSHIBA integrated controller	V series model 2000 station bus I/F
	I/O	V series model 2000 G2I/O module I/F
Input device	Keyboard	PS/2, 106 key (OADG specification)
	Mouse	PS/2, 2 button
Display function	Video RAM	4MB
	CRTdisplay output	Max. 1600x1200 65,536 colors
RAS function		CPU failure detection(WDT), thermal failure detection, auto shutdown by Power failure, user RAS program operation
Consumption current		5V/3.0A (without USB, PC card)
Dimension, weigt		70 x 135 x 115 mm (W x H x D) 0.72Kg

Models

Product Code	OS	Memory	Auxiliary storage
GC2PU37ES	Windows 2000	128MB	HDD 30GB
GC2PU37GS	Windows 2000	256MB	HDD 30GB

B.2　Interface Specifications

B.2.1　RGB Interface
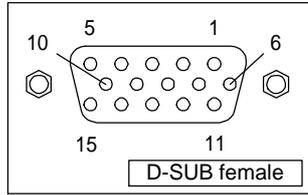
(Note) I/Os are input/output as viewed from this device.

Pin no.	Signal name	Description	I/O
1	CRV	Red video signal	O
2	CGV	Green video signal	O
3	CBV	Blue video signal	O
4	Unused	Unused	-
5	GND	Signal ground	-
6	GND	Signal ground	-
7	GND	Signal ground	-
8	GND	Signal ground	-
9	Unused	Unused	-
10	GND	Signal ground	-
11	Unused	Unused	-
12	MID1	MID1	I/O
13	-CHSYNC	H synch. signal (TTL)	O
14	-CVSYNC	V synch. signal (TTL)	O
15	MID3	MID3	I/O

B.2.2　Serial Interface (RS-232C)
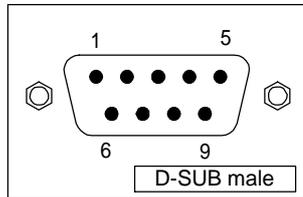
(Note) I/Os are input/output as viewed from this device.

Pin no.	Signal name	Description	I/O
1	CD	Carrier detect	I
2	RXD	Receive data	O
3	TXD	Transmit data	O
4	DTR	Data terminal ready	
5	GND	Signal ground	I
6	DSR	Dataset ready	O
7	RTS	Request to send	I
8	CTS	Clear to send	I

[Remark]

For the C2, the 17JE series by DDK Electronics is recommended for the cable side D-SUB connector.
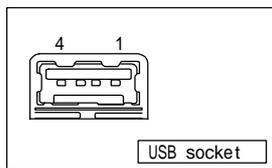
B.2.3   Keyboard and Mouse Interface

mini DIN female
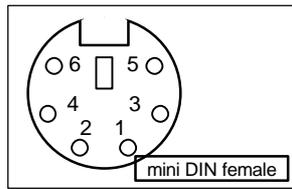
(Note) I/Os are input/output as viewed from this device.

Pin no.	Signal name	Description	I/O
1	DATA	Data	I/O
2	Unused	Unused	
3	GND	Signal ground	
4	+5V	+5V	
5	CLOCK	Clock	I/O
6	Unused	Unused	

B.2.4   USB Interface

USB socket

(Note) I/Os are input/output as viewed from this device.

Pin no.	Signal name	Description	I/O
1	+5V	+5V	
2	SBD0 -	Data -	
3	SBD +	Data +	
4	GND	Signal ground	

B.2.5   Ethernet Interface

10/100baseT

Ethernet socket
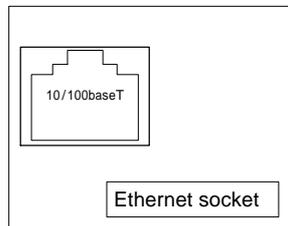
(Note) I/Os are input/output as viewed from this device.

Pin no.	Signal name	Description	I/O
1	TPO+	Twisted pair output	O
2	TPO-	Twisted pair output	O
3	TPI +	Twisted pair input	I
4	NC	-	-
5	NC	-	-
6	TPI -	Twisted pair input	I
7	NC	-	-
8	NC	-	-

B.2.6   FDD Interface

13   1

26   14

Half pitch female

(Note) I/Os are input/output as viewed from this device.

Pin no.	Signal name	I/O	Pin no.	Signal name	I/O
1	SIDE1 SEL	O	14	WRITE PROTECT*	I
2	READ DATA	O	15	TRACK 00*	I
3	GND	-	16	GND	-
4	GND	-	17	WRITE GATE*	O
5	GND	-	18	GND	-
6	WRITE DATA	O	19	GND	-
7	DENSITY SEL	O	20	STEP*	O
8	RESERVE	-	21	DIRECTIOEN*	O
9	READY	-	22	MOTOR ON	O
10	DRIVE SEL	O	23	MEDIA	I
11	P5	-	24	DISK CHANGE	I
12	P5	-	25	NC	-
13	INDEXL	O	26	P5	-

B.2.7   PCMCIA card slot

Pin no.	PC Card I/O Function	PC Card ATA Function	Pin no.	PC Card I/O Function	PC Card ATA Function
1	GND	GND	35	GND	GND
2	CDD3	CDD3	36	-CD1	-CD1
3	CDD4	CDD4	37	CDD11	CDD11
4	CDD5	CDD5	38	CDD12	CDD12
5	CDD6	CDD6	39	CDD13	CDD13
6	CDD7	CDD7	40	CDD14	CDD14
7	-CE1	-CS0	41	CDD15	CDD15
8	CA10	N.C.	42	-CE2	-CS1
9	-OE	0	43	-	-
10	CA11	N.C.	44	-IORD	-IORD
11	CA9	-CS1	45	-IOWR	-IOWR
12	CA8	N.C.	46	CA17	N.C.
13	CWA13	N.C.	47	CA18	N.C.
14	CA14	N.C.	48	CA19	N.C.
15	-WE	N.C.	49	CA20	N.C.
16	-IREQ	-IREQ	50	CA21	CA21*2
17	VDD	VDD	51	VDD	VDD
18	VPP1	N.C.	52	VPP2	VPP2
19	CA16	N.C.	53	CA22	CA22*2
20	CA15	N.C.	54	CA23	VU*1
21	CA12	N.C.	55	CA24	M/S*2
22	CA7	N.C.	56	CA25	CSEL*2
23	CA6	N.C.	57	RFU	N.C.
24	CA5	N.C.	58	RESET	-RESET
25	CA4	N.C.	59	-WAIT	IOCHRDY
26	CA3	N.C.	60	-INPACK	DREQ*1
27	CA2	CA2	61	-REG	-DACK*1
28	CA1	CA1	62	-SPKR	-LED
29	CA0	CA0	63	-STSCHG	-PDIAG*1
30	CDD0	CDD0	64	CDD8	CDD8
31	CDD1	CDD1	65	CDD9	CDD9
32	CDD2	CDD2	66	CDD10	CDD10
33	-IOIS16	-IOIS16	67	-CD2	-CD2
34	GND	GND	68	GND	GND

Integrated Controller   Vseries
model 2000
Computer module C2PU37 User's Manual