DIGITAL
Human Machine Interface

Pro-face

PL-6700 43Series
Panel Computer
User's Manual

DIGITAL
Digital Electronics Corporation

Introduction

Digital's PL-6700 series of Panel Computers are multipurpose factory automation (FA) computers, which embody Digital's latest, cost-effective architecture.

Before using Digital's PL-6700 Series of Panel Computers, which includes the PL-6700T and which is hereafter referred to as the " PL ", be sure to read this manual thoroughly to familiarize yourself with the PL's operation procedures and functions. Be sure to keep this manual handy for future reference.

NOTE:

1. It is forbidden to copy the contents of this manual in whole, or in part, without the permission of the Digital Electronics Corporation.

2. The information in this manual is subject to change without notice.

3. This manual was written with care; however, if you should find any error or omissions, please contact Digital Electronics and inform them of your findings.

4. Please be aware that we are not responsible for any damages resulting from the use of our products, regardless of article 3 above.

5. Specifications set out in this manual are for overseas products only, and, as a result, some differences may exist between the specifications given here and the Japanese ones.

All Company / Manufacture names used in this manual are the registered trademarks of their respective companies.

Safe Product Usage

This manual contains a variety of safety markings to help you safely and correctly operate Digital's PL-6700 series of Panel Computers.

■ Safety Icons

This manual uses the two icons below to call attention to information important for the safe and correct use of the PL. Please pay attention to these icons and follow all instructions given by them.

The safety icons and their meanings are:

Indicates a potentially hazardous situation which could result in serious injury or even death, if the instructions are not followed.

Indicates a potentially hazardous situation which could result in minor injury or equipment damage if the instructions are not followed.

⚠ Essential Safety Precautions

Be sure to follow the instructions given below to ensure the safe use of the PL.

■ To avoid a possiblity of electrical shock, be sure to connect the power cord to the PL before connecting it to the main power supply.

■ A fire or electrical shock may result if voltages are used with the PL that are beyond the specified range. Be sure to only use the specified voltage.

■ Before opening the PL's protective cover, be sure to turn the unit's power OFF. This is because the PL's internal parts carry high voltages.

■ To avoid fires or electrical hazards, do not modify the product in any way.

■ Do not create touch panel switches that are used to either control or to ensure the safety of equipment and personnel. Mechanical switches, such as an emergency stop switch, a deadman (two-handed) start switch, etc., must be installed and operated via a separate control system.

■ If metal particles, water or other types of liquids contact any of the PL's internal parts, immediately turn the unit's power OFF, unplug the power cord, and contact either your dealer or Digital Electronics Corporation.

■ Read and understand Chapter 4 "Installation and Wiring" thoroughly in order to select an appropriate installation location for the PL.

■ Before either plugging in or unplugging a board or interface connector, be sure to turn the PL's power OFF.

■ To prevent a possible explosion, do not install the PL in areas containing flammable gases.

■ The PL is not appropriate for use with aircraft control devices, aerospace equipment, central trunk data transmission (communication) devices, nuclear power control devices, or medical life support equipment, due to these devices' inherent requirements of extremely high levels of safety and reliability.

■ When using the PL with transportation vehicles (trains, cars and ships), disaster and crime prevention devices, various types of safety equipment, non-life support related medical devices, etc. redundant and/or failsafe system designs should be used to ensure the proper degree of reliability and safety.

■ Do not push on the PL's screen too strongly, with either your finger or

⚠ General Safety Precautions

Follow the instructions given below for correct and safe use of the PL.

■ Do not push on the PL's screen too strongly, with either your finger or with a hard object. Excessive pressure can scratch, crack or damage the screen.

■ If the screen becomes dirty or smudged, moisten a soft cloth with diluted neutral detergent, wring the cloth well, and wipe the display. Do <u>not</u> use thinner or organic solvents.

■ Do not use a pointed object, such as a mechanical pencil or screwdriver, to press any of the touch panel's switches, since they can damage the display.

■ Avoid exposing and operating the PL in direct sunlight, high temperatures and humidity, and in areas where excessive dust and vibration will occur.

■ Avoid using the PL in areas where sudden, extreme changes in temperature can occur. This may cause condensation to form inside the unit, possibly leading to an accident.

■ To prevent the PL from overheating, be sure its air circulation vents are clear and clean, and keep the unit's operation area well-ventilated.

■ Avoid operating or storing the PL near chemicals, or where chemicals can come into contact with the unit.

■ Since the PL-6700's hard disk drive (HDD) is a consumable item, i.e. it has a definite usage lifetime, be sure to back up its data frequently and perform regular maintenance.

■ To prevent file damage, be sure to shut down your PL's OS before turning the PL OFF.

Notes on Handling the LCD

■ The PL's LCD contains a strong irritant. If the panel is ever cracked and the LCD's liquid contacts your skin, be sure to wash it with running water for at least 15 minutes. If any of this liquid should enter your eye, be sure to flush your eye with running water for more than 15 minutes, and see a doctor immediately.

■ The current brightness of the LCD screen will depend on the screen's current display and the LCD's contrast adjustment. Any brightness variations that result are normal for LCD displays.

■ There are minute grid-points (Dark or light points) on the LCD surface. These points are not defects and are a part of the PL panel's design.

■ Occasionally crosstalk (shadows appearing on extended display lines) will appear on the display. This phenomenon is a common attribute of LCDs and is not a defect.

■ The displayed color will look different when viewed from an angle outside the specified view angle. This is also normal.

■ Displaying a single screen image for long periods of time can cause an afterimage to remain on the screen. To correct this, turn the unit OFF for 5 to 10 minutes, then ON again. This phenomenon is a common attribute of the LCDs, and is not a defect. To prevent this effect, you can:

- use the Display OFF feature; if the same image is to be displayed for a long period of time.

- change the screen display periodically to prevent the displaying of a single image for a long period of time.

For further information about the PL's LCD panel, please contact your local PL distributor.

Important

• **The Digital Electronics Corporation cannot be held responsible or provide any compensation for damage(s) caused by the loss of data stored in the PL-6700's hard disk drive (HDD). It is therefore strongly suggested that all important data and software be backed up regularly to an external data backup device.**

• **Please be aware that the Digital Electronics Corporation bears no responsibility for any damages resulting from the customer's application of this unit's hardware or software.**

• **Please be aware that the Digital Electronics Corporation will not provide compensation for any damages occurring as a result of problems with this unit's software or hardware.**

Notes on UL Application

The PL6700-T4* are (c)UL 1950 recognized products. (UL File No. E177793). Please pay special attention to the following instructions when applying for UL approval for machinery which includes one of these PL units built in. Machinery with a PL mounted in it requires UL inspection for the combination of the PL and the machinery.

- PL conforms as a component to the following standards:

  UL 1950, Third Edition, dated July 26, 1995 (Standard for Safety of Information Technology Equipment, including Electrical Business Equipment)

  CSA-C22.2 No. 950-M93 (Standard for Safety of Information Technology Equipment, including Electrical Business Equipment)

  PL6700-T4* (UL Registration Model No.: 0880044-1)

- If the PL is installed so as to cool itself naturally, be sure to install the PL in a vertical position. Also, be sure that the PL is installed so that it is at least 50mm away from any adjacent structures or devices. If these requirements are not met, the heat generated by the PL's internal components may cause the unit to fail to meet UL standard requirements.

Notes on CE Marking

The PL6700-T4* are CE marked, EMC compliant products.
<Complies with the following EC Directives>
89/336/EEC, 92/31/EEC, 93/68/EEC, 73/23/EEC
<Complies with the following Standards>
- **Safety**
  IEC950 (A3:1995), EN60950 (A3:1995)
- **EMI (EN50081-2)**
  EN55022 (Class A) (1994), EN61000-3-2 (1995), EN61000-3-3 (1995)
- **EMS (EN50082-2)**
  EN61000-4-2 (1995), EN61000-4-4 (1995), EN61000-4-5 (1995), EN61000-4-8 (1993), EN61000-4-11 (1994), ENV50140 (1993), ENV50141 (1993), ENV50204 (1995)

What is IP65f?

This unit's protection rating of IP65f is actually a composite code, consisting of the internationally recognized British "Ingress Protection" standard (BS EN 60529:1992) - "IP65", and the standard developed by the Japanese Electronics Manufacturer's Association (JEM) - "f". This code is used in this manual to identify a given product's degree of structural resistance to a variety of environmental elements and thus, prevent problems or accidents related to the inappropriate use of a product.

The individual meaning of each character of this code is explained below. This code indicates the degree of ingress protection provided from the front face of the PL, and assumes that the PL is securely mounted into a metal panel.

IP   6   5   f

(1)   (2)   (3)   (4)

(1) Designates the type of protection provided.

(2) Indicates the degree of protection provided to the human body by the unit, and the degree of protection provided by the unit's front face from particles/dust intrusion into the interior of the unit.

Here, "6" indicates that the unit is completely protected from dust intrusion.

(3) Indicates the degree of protection provided by the unit's front face from water intrusion into the interior of the unit.

Here, "5" indicates that the unit is protected from water intrusion from a direct water jet.

(4) Indicates the degree of protection provided by the unit's front face from oil particle intrusion into the interior of the unit.

Here, "f" indicates that the unit is completely protected from oil intrusion via either oil particles or oil splashes from any direction (to the front panel).

Note: **For information about the PL's protective structure, refer to page 2-3.**

Table of Contents

Chapter 3 Installing Optional Units and Expansion Boards

Chapter 4 Installation and Wiring

Chapter 5 System Setup

Chapter 6 Bundled Software

Chapter 7 Maintenance and Inspection

Appendix

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Prior To Using the PL

Prior to actual use, be sure to setup your PL as follows.

| Turn PL ON | ▼ Reference | *4-3 Wiring the PL* |

↓

| Setup System | ▼ Reference | *Chapter 5 System Setup* |

↓

| Install the OS | ▼ Reference | *OS maker's Installation Manual.* |
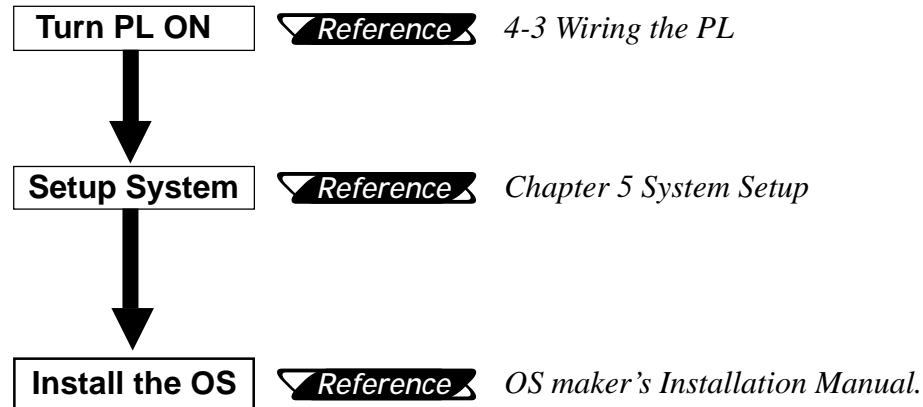
After completing the hardware setup, before any data or applications can be placed on the drive, the OS (Windows or MS DOS, etc.) must be used to initialize the HDD and create partitions. For details concerning these procedures, refer to the OS maker's installation manual.

⚠ Important

- *For system setup and OS installation, a PS/2 type keyboard is necessary.*

- *When using Windows® NT4.0, be sure to install the PL-6700 Driver & Utility Disk's Display Driver (For installation procedures, see the disk's README files).*

- *For information on the PL-6700's bundled utility software, see the README files on the Driver & Utility Disk.*

- *Since the PL-6700's hard disk drive (HDD) is a consumable item, i.e. it has a definite usage lifetime, be sure to back up its data frequently and perform regular maintenance.*

New PL-6700 Features

The PL-6700 series displays are equipped with the following features:

■ The Latest, High-Performance Architecture

Designed around the MMX Pentium®200(MHz) CPU, the PL utilizes the type of high performance architecture that offers you superior compatibility. Add to this unrivalled support of the Windows®95 / NT® and other operating systems.

■ Bright 12.1" LCD with a Wide Viewing Angle

The PL's large 12.1-inch 800 x 600 dot LCD display is available with TFT color, offering excellent visibility and brightness.

Note: • **Digital's top of the line TFT color LCD model allows you to create detailed and powerful visual images, with excellent brightness, a wide viewing angle, and a display capable of 260,000 colors.**

■ Easy Front Panel Installation

The PL is designed to be installed easily into the front of any panel or device. It is also rugged enough for use in harsh, industrial environments, such as those found in the factory automation industries and boasts an IP65f rating.

■ High Resolution, Analog-Resistance-Film Touch Panel

Standard equipment with the PL is a high resolution 1024×1024 touch panel. Also, the WindowsNT® 4.0 / Windows® 95 mouse emulation utilities provide mouse-like functionality and pointer control.

■ Highly Expandable

For the easy enhancement of your PL unit, 4 ISA-bus expansion slots are provided. (2 PCI slots are also available) These slots can accommodate both Digital's own optional boards as well as other commercially available expansion boards.
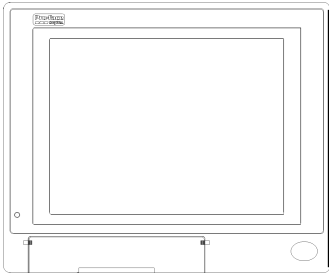
Digital also offers a wide variety of optional products, such as an -5/-12V DC power unit, DIM memory modules, etc. to name just a few.
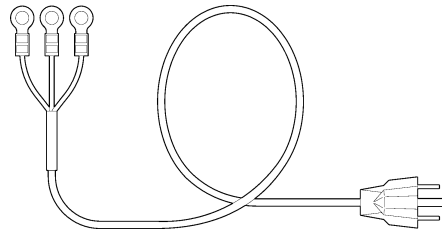
PL Package Contents

The PL package should include the following items:

■ **PL-6700 Unit**

(PL-6700T)

■ **Power Cord**

⚠**!** *Important* • *Be careful when installing the PL -6700 to not damage the built-in HDD*

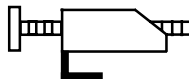⚠**!** *Important* • *This cord is designed only for 100V use. Any other voltage will require a different cable.*
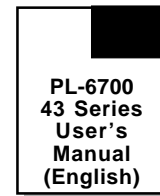
■ **PL- 6700 Floppy Disks (2)**

■ **Installation Brackets (8)**
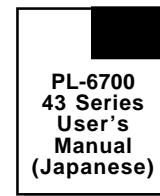
■ **Panel Computer PL-6700 43 Series User's Manual (English)**

PL-6700 43 Series User's Manual (English)

■ **Angle Plate (1)**

■ **Panel Computer PL-6700 43 Series User's Manual (Japanese)**

PL-6700 43 Series User's Manual (Japanese)

Symbol Information

The list below describes the symbols used in this manual.

Symbol	Description
⚠ **Warning**	Incorrect operation resulting from negligence of this instruction may cause death or serous injury.
⚠ **Caution**	Incorrect operation resulting from negligence of this instruction may cause injury or damage to equipment.
Important	Failure to observe this instruction may cause abnormal operation of equipment or data loss.
Note:	Provides hints on correct use, or supplementary information.
*	Indicates useful or important supplemental information.
Reference	Indicates related (manual name, page number) information.
1) 2)	Indicates steps in a procedure. Be sure to perform these steps in the order given.

Overview

1. System Configuration
2. Options
3. PL Series Panel Types

1-1 | System Configuration

The following figure shows the peripheral devices that can be connected to the PL.

Analog Resistance Film Touch Panel
Display Unit (COLOR TFT)
Backlight Lamp (CFL type)

Inverter Unit

Main Circuit Board

CRT

CD-ROM drive — Slave Adapter

HDD(2.5")

Peripheral Devices — RS232C×3

Printer

Keyboard

Mouse

Optional Unit(s)

Commercial items

ISA Slots (4) (2 PCI slots are also available)

Power Supply Unit DC -5V/ -12V

32MB RAM Memory (standard)

DIMM sockets (2)

Power Supply Unit DC 5V/12V

AC IN 85 to 132V
170 to 265V

Inside Front Maintenance Cover

Front Keyboard Connector

Reset Switch

Front Mount FD Unit

IrDA I/F Unit

- Boxes marked with a [ ] border represent optional items.
- Boxes marked with a [ ] border represent User supplied items.

⚠ **Important**

- ***The figure above shows simply the internal data flow and the PL's peripheral connections, and may differ from the actual layout used by the customer.***

1-2	**Options**

The following table provides a list of optional products for the PL.

Expansion Options

Name	Model number	Description
DIM Module	PL-EM200	Main Memory Board
FDD Unit	PL-FD100	PC/AT Compatible 3.5″ FDD unit
IDE Slave Adapter	PL-SA100	Adapter used for attaching an IDE (ATAPI) compliant CD-ROM drive (DC power cord included)
IrDA Unit (under development)	PL-IR100	IrDA (Ver. 1.0) compatible infrared data transmission module.
-5V/-12V Power Unit	PL-PW100	Provides –5V and –12V power to expansion slots. Can provide a total of 200mA of current (sum of all four slots).
CD-ROM Drive Unit	PL-DK200	IDE (ATAPI) compliant CD-ROM drive unit (Connection cable is included in unit)

Accessories

Name	Model number	Description
Screen Protection Sheet	PL-CS100	Disposable overlay sheets for display face protection and stain resistance. Touch panel senses User's touch through sheet.

Maintenance Options

Name	Model number	Description
Mounting Brackets	GP070-AT00-MS	Used to install the PL into a panel or cabinet. Same as original equipment brackets.
Moisture Resistant Gasket	PL-WS100	Used to prevent moisture from entering into the PL's case from the front face. Same as original equipment gasket.
HDD Unit [1]	PL-HD100	Built-in 2.5″ HDD unit
Full Sized Cover	PL-FC100	Attached when ISA bus full-sized board is installed in expansion slot.

Software Options

Name	Model number	Description
TT-WIN/95[2]		Touch Panel mouse driver that provides mouse-like operability to the PL's touch panel. (for Windows 95 OS)
TT-WIN/NT[2]		Touch Panel mouse driver that provides mouse-like operability to the PL's touch panel. (for Windows NT OS)

1 Since the PL's hard disk drive (HDD) is a consumable item, i.e. it has a definite usage lifetime, be sure to back up its data frequently and perform regular maintenance.

2 Depending on the customer's OS (Operating System) one of these drivers will be required to allow this type of touch operation. Please contact your local PL distributor for ordering details.

1-3	PL Series Code Name Explanation

Model Number:

P L 6 7 00 - T4 3 - HU 01 x

PL-6700 series

Display Type:
TFT Color
LCD

This unit is a (c)UL
recognized, CE marked
and EMC Compliant
product.

PL-6700's
revision no.

F	: FDD Installed
(no char.)	: No FDD

HDD Revision No.

Hard Disk Type

HU : OS Not Installed.
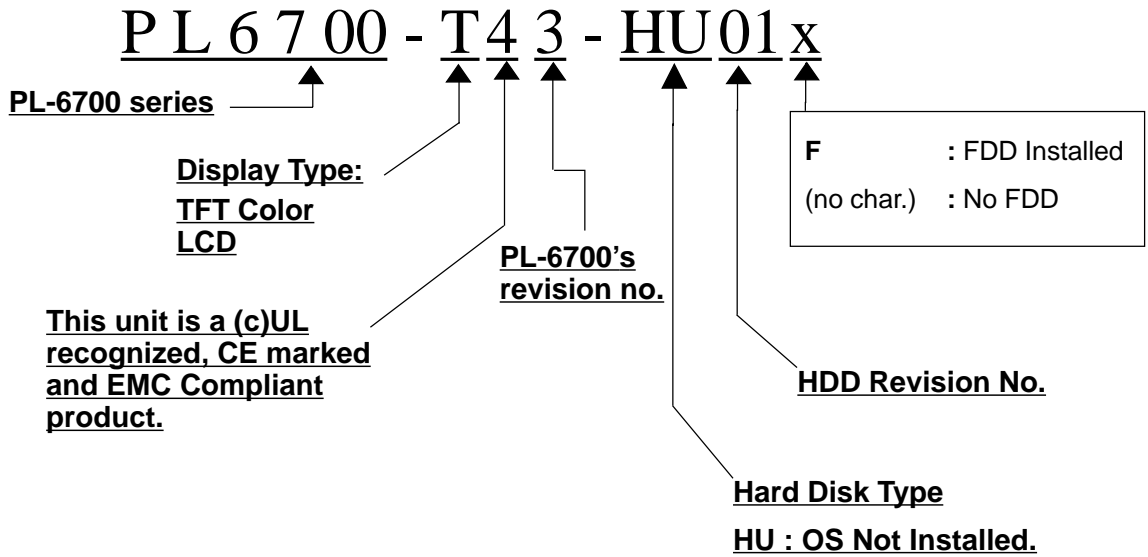
MEMO

Specifications

1. General Specifications
2. Performance Specifications
3. Interface Specifications

4. PL External Features
5. PL Dimensions

2-1 General Specifications

1. Electrical Specifications

Operating Voltage	85V AC to 132VAC / 170V AC to 265V AC 50/60 Hz
Power Consumption	Less than 150W
Allowable Voltage Drop	less than 20ms
Voltage Endurance	1500V AC at 20mA for 1 minute (between the live wire and the grounding (FG) terminal)
Isolation Resistance	Greater than 10MΩ at 500V DC (between the live wire and the grounding (FG) terminal)

2. Environment Specifications

Operating Temperature	5 to 40º C (with HDD and FDD not installed, 0 to 40º C)
Operating Humidity	30 to 85% RH (no condensation)
Storage Conditions	-10 to 60º C/ 30 to 85% RH (no condensation)
Operating Atmosphere	Free of corrosive gas
Noise Immunity (via noise simulator)	Noise Voltage: 1500Vp-p Pulse Duration: 50ns, 500ns, 1μs
Electrostatic Voltage Endurance	4kV
Vibration Endurance	2G: 10 to 25Hz applied in X, Y, and Z directions for 30 minutes each (0.5G when using HDD unit, 1.0G when using FDD)
Rating[1] (with front panel closed)	Equivalent to IP65f (JEM1030)

*1 The front face of the GP unit, installed in a solid panel, has been tested using conditions equivalent to the standard shown in the specification . Even though the GP unit's level of resistance is equivalent to the standard, oils that should have no effect on the GP can possibly harm the unit. This can occur in areas where either vaporized oils are present, or where low viscosity cutting oils are allowed to adhere to the unit for long periods of time. If the GP's front face protection sheet becomes peeled off, these conditions can lead to the ingress of oil into the GP and separate protection measures are suggested. Also, if non-approved oils are present, it may cause deformation or corrosion of the front panel's plastic cover. Therefore, prior to installing the GP be sure to confirm the type of conditions that will be present in the GP's operating environment.
If the installation gasket is used for a long period of time, or if the unit and its gasket are removed from the panel, the original level of the protection cannot be guaranteed. To maintain the original protection level, you need to replace the installation gasket regularly.

⚠️
Important

- *When using any of the PL's optional devices, be sure to check that device's specifications for any special conditions or cautions that may apply to its use.*

- *When using a full sized expansion board, be sure to check its dimensions and shape, since they will affect the board's environment specifications, such for vibration, etc.*

3.   Dimensions

External Dimensions	346W x 287H x 174D (mm)
Weight	less than 7.4kg (with HDD and FDD installed)
Dimensions (w/cover)	419W x 287H x 174D (mm)

2-2   Performance Specifications

1.   Performance Specifications

CPU	MMX Pentium® (200MHz) (Intel Corporation)			
DRAM	Equipped with 32MB (2 DIMM sockets – max. of 64MB)			
BIOS	AWARD PC/AT Compatible			
Secondary Cache	512K			
Graphics	SVGA (800 x 600 dots) VESA 16 colors/256 colors/32K colors/64K colors			
Touch Panel	**Type**	Analog Resistant Film		
	Resolution	1024 x 1024		
	Interface	COM4 (uses Mouse Emulator)		
Front and Rear Interfaces	**Serial**	RS-232C (w / FIFO)	COM1	D-Sub 9 pin (male)
			COM2	D-Sub 9 pin (male)
			COM3	D-Sub 9 pin (male)
	Printer	Centronics Standard (DB 25-pin female connector)		
	Keyboard	PS/2 Interface (mini DIN 6 pin female connector) side & front		
	Mouse	PS/2 Interface (mini DIN 6 pin female connector) side		
	RGB Output	Analog RGB Output		
	Disk I/F	FD Unit	Front Access 2 modes	
		IDE	2.5 inch HDD I/F	

⚠️ **Important**
- *Be aware that not only does the Hard Disk have a fixed lifetime, but that accidents can always occur. Therefore, be sure to back up your Hard Disk's data regularly, or prepare another Hard Disk unit that can be used for backup.*

- *The Hard Disk lifetime value in this manual is for reference purposes only. At 25 °C, it is approximately five years or 20,000 operating hours, whichever comes first. Unforeseen factors (environmental changes, etc.) may cause it to actually be shorter.*

2. Display Functions

	PL6700T
Display Type	TFT Color LCD
Pixel Density	800 x 600 (pixels)
Effective Display Area	247W x 185H (mm)
Dot Pitch	0.3 x 0.3 (mm)
Display Colors	260,000 colors
Contrast Adjustment	Not Possible
Backlight [*1]	Replaceable (under normal temperatures and humidity, lifetime = 25,000 hours)

⚠️ **Important**
*[*1] The PL's backlight should be replaced by only an authorized repairman. For information about this service, please contact your nearest authorized distributor.*

3. Expansion Slots

|	Board Size	Power Supply
1st Slot (ISA)	163 x 122 (mm)	5V : 4A
2nd Slot (PCI/ISA)	163 x 122 (mm)	
3rd Slot (PCI/ISA)	250 x 122 (mm)	12V : 1.5A
4th Slot (ISA)	250 x 122 (mm)	(total for all 4 slots)

Note:
- **Slots 2 and 3 can be used for either PCI or ISA cards.**

- **The distance (pitch) between the 1st and 4th slots and their adjacent slots is 20mm. The pitch between the 2nd and 3rd slots is 25mm.**

- **Slots 3 and 4 can support full-sized boards. However, when using a full-sized board, the top edge of the board will extend beyond the standard case. In this case the optional full-sized cover is recommended.**

▼**Reference** *3-2-5 Installing an Expansion Board*

2-3　Interface Specifications

1.　Printer Interface (LPT1)

D-sub 25 Pin (Female)
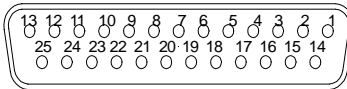
**Note:** **O.D**　　: Open Drain
　　　T.S　　: 3 state I/O
　　　TTLIN　: TTL Input

Pin No.	Signal Name	Dire-ction	Elect. Specif.	Pin No.	Signal Name	Dire-ction	Elect. Specif.
1	STROBE	OUT[*1]	O.D	14	AUTOFD	OUT	O.D
2	DATA0	OUT[*1]	T.S	15	ERROR	IN	TTLIN
3	DATA1	OUT[*1]	T.S	16	INIT	OUT	O.D
4	DATA2	OUT[*1]	T.S	17	SLCTIN	OUT	O.D
5	DATA3	OUT[*1]	T.S	18	GND		
6	DATA4	OUT[*1]	T.S	19	GND		
7	DATA5	OUT[*1]	T.S	20	GND		
8	DATA6	OUT[*1]	T.S	21	GND		
9	DATA7	OUT[*1]	T.S	22	GND		
10	ACKNLG	IN	TTLIN	23	GND		
11	BUSY	IN	TTLIN	24	GND		
12	PE	IN	TTLIN	25	GND		
13	SLCT	IN	TTLIN				

Important

• *The software protection Key used by some software applications, if left attached to the PC while a " Windows Printing System " printer or a " Windows " type cable are used (for bi-directional commnication), there is a possibility that the protection Key will be damaged. Therefore, be sure to remove this Key before performing printing.*

2.　Keyboard Interface

Mini - DIN 6 pin (Female)
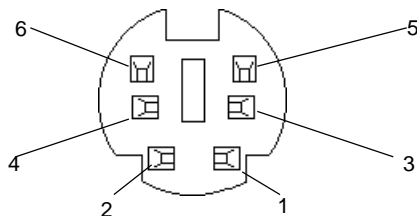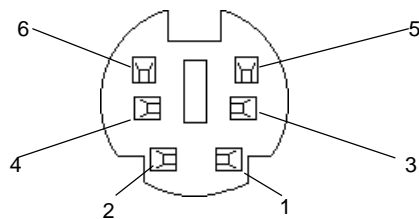
(The PL's front and side connectors are the same)

Pin No.	Signal Name
1	KEY DATA
2	NC
3	GND
4	+5
5	KEY CLK
6	NC
SHIELD	GND

Recommended Keyboard: Any PS-2 type keyboard

*1 *Output: The Input and Output settings used will depend the BIOS set up screen settings used.*
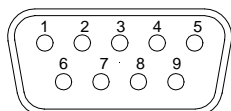
3. Mouse Interface

Mini - DIN 6 pin (Female)

Pin No.	Signal Name
1	Mouse DATA
2	NC
3	GND
4	+5
5	Mouse CLK
6	NC
SHIELD	GND

4. RS-232C Interface (COM1/COM2/COM3)

D-sub 9 pin (Male)

Pin No.	Signal Name	Pin No.	Signal Name
1	CD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	GND		

Screw Size: (4-40): Inch Type

5. CRT Interface (Video)
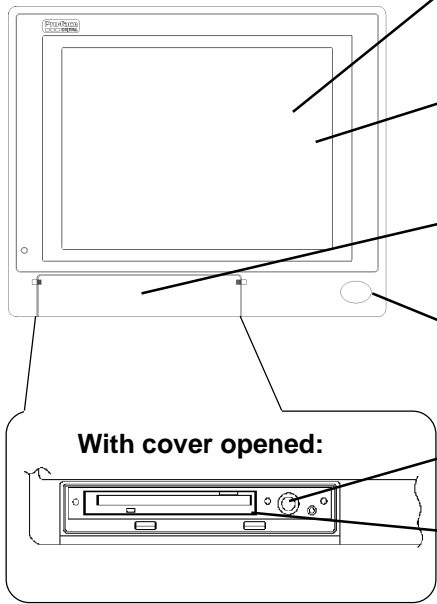
Mini - D-sub 15 pin (Female)
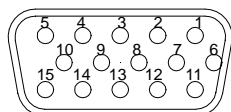
Pin No.	Signal Name	Pin No.	Signal Name
1	R	9	NC
2	G	10	GND
3	B	11	NC
4	NC	12	RESERVE (NC)
5	GND	13	H.SYNC
6	R-GND	14	V.SYNC
7	G-GND	15	RESERVE (NC)
8	B-GND		

2-4	**PL External Features**

Display Area

Display output area. The built-in SVGA controller supports PC compatible architecture.

Touch Panel

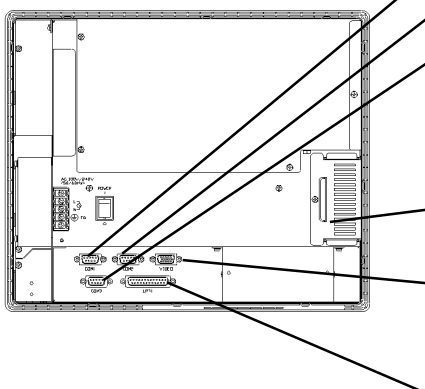This high-resolution analogue touch panel allows you to configure a keyboard-less system.

Front Maintenance Cover

Open this cover to connect the optional FDD unit or memory card interface unit.

IrDA

When the optional PL-IR100 is installed, infra-red signals are sent and received by this unit.

With cover opened:

Keyboard Connector

A PS/2 compatible keyboard is connected here.

Floppy Disk Insertion Slot

This slot is used if the optional FDD unit or memory card interface is installed.
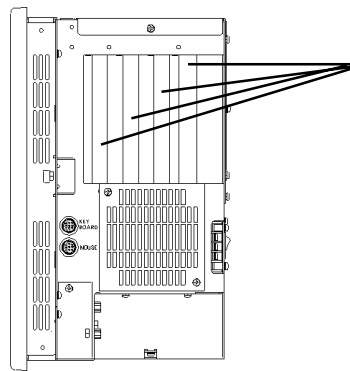
RS-232C Connector (COM1)
RS-232C Connector (COM2)
RS-232C Connector (COM3)

RS-232C interfaces (DB 9-pin male connectors), which allow communication with other computers or connection to peripheral devices.

HDD Cover

When an HDD is installed, this cover is removed.

Analog RGB Connector

A PC/AT compatible multi-scan monitor can be connected here.

(Drawings shown here are for the PL-6700T unit)

Printer Connector (LPT1)

Centronics standard interface (DB 25-pin female connector), which connects a parallel device, such as a printer (supports ECP/EPP)

Expansion Slots

A variety of expansion boards, both Digital's and other makers, can be installed here.
"*3-1 Available Options andExpansion Boards*"
The PL-6700T is equipped with four (4) expansion slots. Seen from the front of the unit, these slots are numbered 1, 2, 3 and 4.
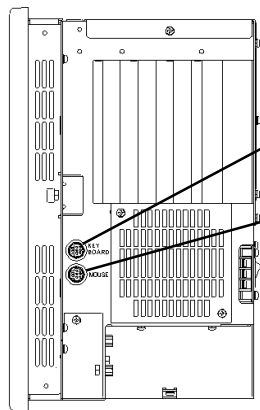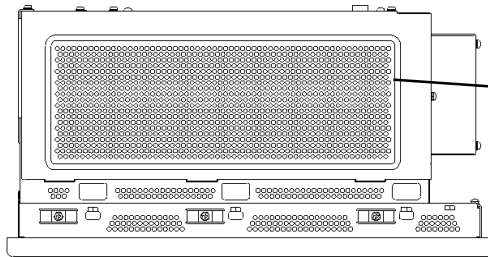
Keyboard Connector

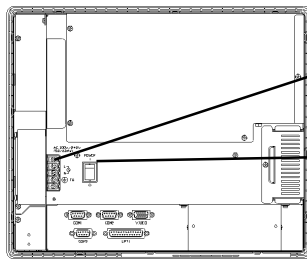A PS/2 compatible keyboard can be connected here.

Mouse Connector

A PS/2 compatible mouse can be connected here.

Rear Maintenance Cover

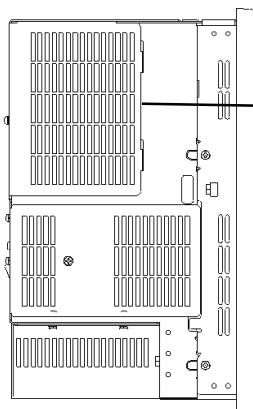Remove this cover to install the optional DIM module, or an expansion board.

Power Input Terminal Strip

Connect the 100V/240V AC power cord here.

Power Switch

Use this switch to turn the PL's power ON or OFF.

Half Cover

When attaching the optional DIM module or other optional expansion boards, you will need to remove this cover.

⚠ **Warning** • **When attaching peripheral units to the PL, be sure the PL's power cord is disconnected from the main power supply.**

• **To avoid an electrical shock, be sure to disconnect the PL's power cord from the power supply before connecting the cord's power terminals or any peripheral devices to the PL.**
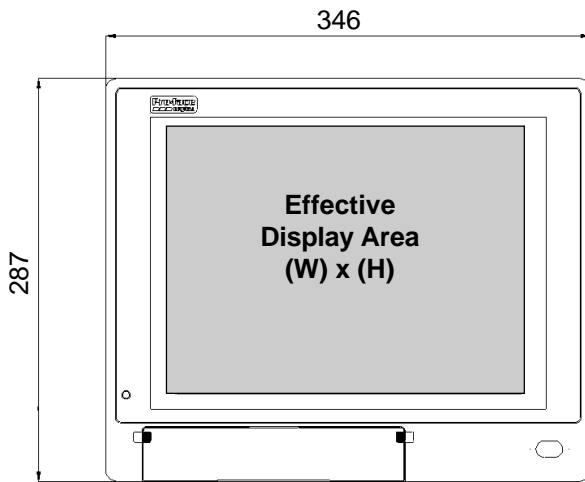
2-5	**PL Dimensions**

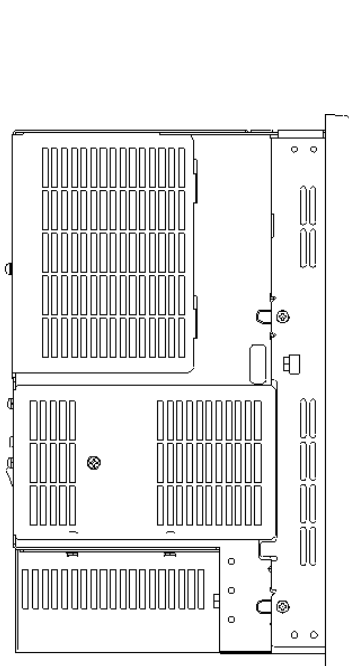| 1.	**PL-6700T General Dimensions**

Note: • **For detailed dimension information, please contact your local GP distribu-
tor.**

Unit: mm
(excluding
projections)

346

287

**Effective
Display Area
(W) x (H)**

Front Face

174

13

271
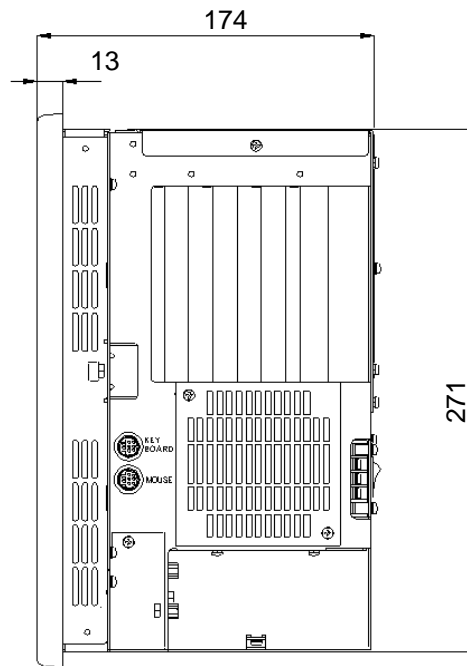
Side View

**Side View
(Opposite Side)**
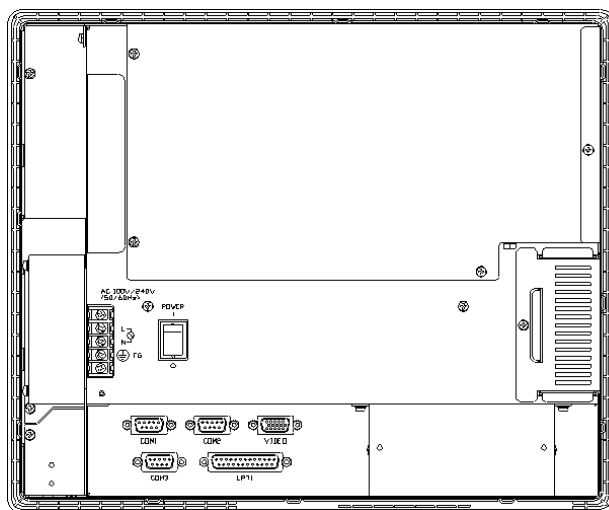
Rear Face
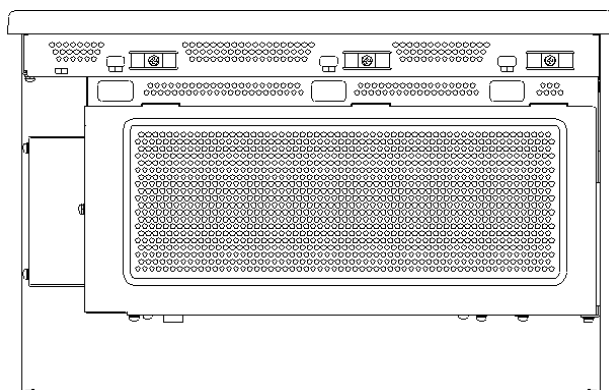
Top Face

330

2.   Full Sized Cover Attachment Dimensions

Rear Face

Top Face

330   80

67   94   8

⚠ *Important*
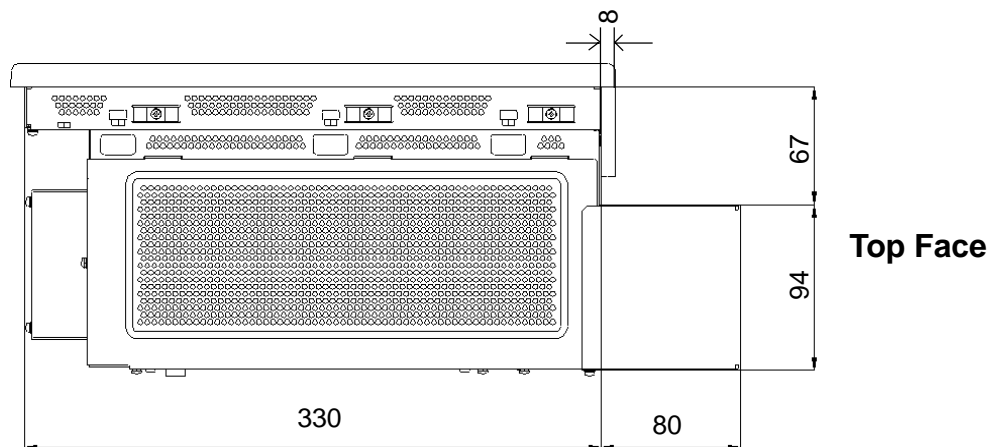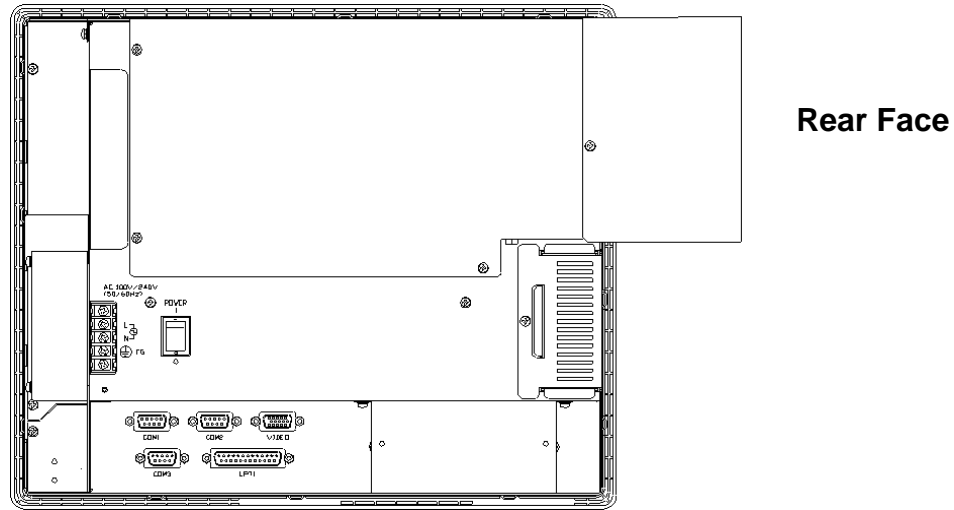
• **When using a full-sized board and the PL's full-sized cover (PL-FC100), be sure that the PL is mounted in its atatchment panel/cabinet before starting this work. The PL's full sized board and cover cannot be attached first and then the unit installed, due to size differences.**

• **When using a full sized expansion board, be sure to check its dimensions and shape, since they will affect the board's environment specifications, such for vibration, etc. The specifications given in this manual are without the full-sized cover attached. Please contact your nearest Pro-face dealer when using a full-sized expansion board.**

3. Installation Slot Dimensions

(Unit: mm)
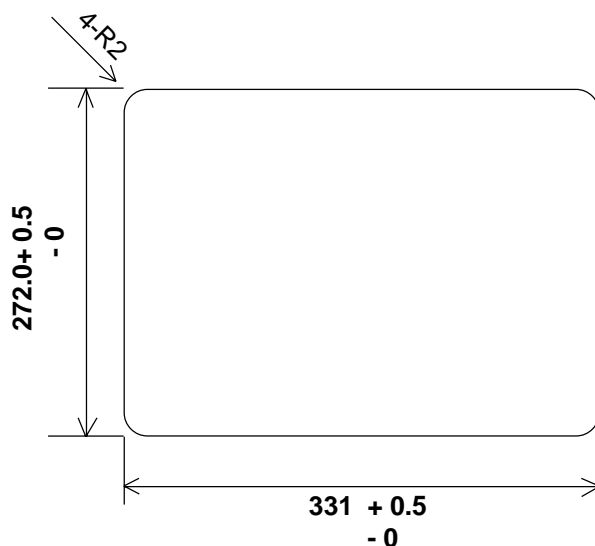
Important • **Be sure the thickness of the panel is from 1.6 to 10 mm.**

• **To insure that the PL's water resistance is maintained, be sure to install the PL into a panel that is flat and free of scratches or dents.**

MEMO

Chapter 3

Installing Optional Units and Expansion Boards

1. Available Options and Expansion Boards
2. Installing Options and Expansion Boards

3-1 | Available Options and Expansion Boards

The User can install a variety of optional units and expansion boards made by Digital in the PL, as well as a number of commercially available ISA-bus compatible boards. This chapter describes both the products that can be installed in the PL and how to install them.
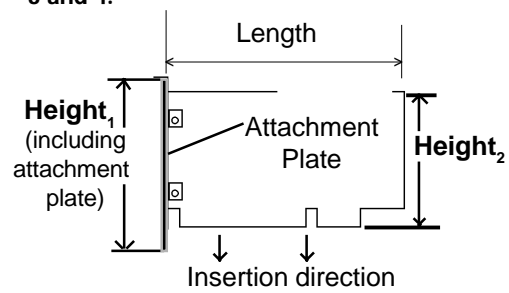
Digital Electrical Corporation Optional Products

Name	Model	Description	Installation Location
DIM Module	PL-EM220	32MB SDRAM Main memory module for expansion.	Installed inside the PL.
	PL-EM230	64MB SDRAM Main memory module for expansion.	Installed inside the PL.
HDD Unit	PL-HD200	Built-in type special purpose 2.5 inch HDD unit.	Used when replacing the existing HDD unit.
FFD Unit	PL-FF200	20MB flash file disk with IDE interface.	Installed inside the PL.
FDD Unit	PL-FD200	PC/AT compatible 3.5 inch FDD unit.	Installed inside the PL.
-5V/-12V Power Unit	PL-PW100	Provides -5V and -12V power to the expansion slots. Allows each of the 4 slots to draw up to 200mA.	Installed inside the PL.
CD-ROM Unit	PL-DK200	IDE compliant CD-ROM unit (Includes special connection cable)	Attached to the connector on the rear side of PL.
Full-sized cover	PL-FC200	Attached when ISA bus full sized board is used in the expansion slot.	Installed inside PL's Maintenance Cover.
IrDA Unit (under development)	PL-IR100	IrDA (Ver. 1.0) compatible infrared data transmission module.	Installed inside PL's IrDA cover.

CAUTION!
• *Since the PL-6700's hard disk is a precision instrument, periodic maintenance is recommended to insure its correct operation.*

Commercially Available Products

Product	Description	Installation Area
PCI/ISA Bus compatible board	In all PL-6700 units, slots 1 and 2 can accommodate boards up to 163mm long. Slots 3 and 4 can accommodate boards up to 250mm long. ■ All PL-6700 slot heights are 122mm. When using the full-sized cover (PL-FC100), be sure to use boards that are no more than 338mm long in slots 3 and 4. Length **Height₁** (including attachment plate) — Attachment Plate — **Height₂** Insertion direction	Into the PL's expansion slots.

Since the steel attachment plate for the board is longer than the board (Height$_1$), be sure to measure the board's height from Height$_2$

Important *<Expansion Slot's Width>*
• Check that your expansion board's "foot" matches the width of the expansion slot. Slots 1 and 4 are 20 mm wide, and slots 2 and 3 are 25 mm wide. Be sure the width of your expansion board's width matches that of the intended slot.
<Expansion Slot's Power Supply>
• Since the PL does not supply -5 and -12 V current, ISA(AT)-bus compatible boards requiring -5 or -12 volts can be used only if the optional PL-PW100 power supply is installed.
<Commercially Available Boards>
• Certain commercially available boards may not be compatible with Digital's PL unit. Installing incompatible boards may result in either damage to or failure of the PL and will void our warranty.
<PCI Bus>
• Within the entire range of PCI buses currently available on the market, there may certain devices which will not operate when used with the PL-6700. Prior to the use of any PCI Bus, be sure to contact your local PL distributor.
<Main Memory>
• Be sure to use only DIM modules manufactured by Digital. Installing other DIM modules may result in either damage to or failure of the PL, and will void your warranty.
<When using Standard PC Peripheral Devices>
• Within the range of peripheral devices currently available on the market, there may certain devices which will not operate correctly when used with the PL-6700. Prior to using any peripheral device, be sure to confirm that it will operate normally with the PL. Installing incompatible boards may result in either damage to or failure of the PL and will void your warranty.

3-2	**Installing Options and Expansion Boards**

⚠ **WARNING**

To avoid electric hazards, be sure to turn the PL's power OFF before installing any optional units or expansion boards.


⚠ **Important**

- *Use a screw driver to loosen or tighten the screws. Be careful not to over-tighten any screws, since it may damage the equipment.*

- *Be careful when removing or inserting any screws inside the body of the PL.*

1.	**Attaching the PL's Support**

⚠ **Important**

- *Be sure to remove the support "leg" when placing the PL into a panel or cabinet, since this could damage either the leg, the PL or the panel.*

In order to perform development using the PL-6700, an additional "leg" (support) is supplied with the unit to stabilize it when placing it on a table top (i.e. when the unit is not mounted in a panel), due to the irregular shape of the unit's chassis. The procedure for attaching this leg is described below.
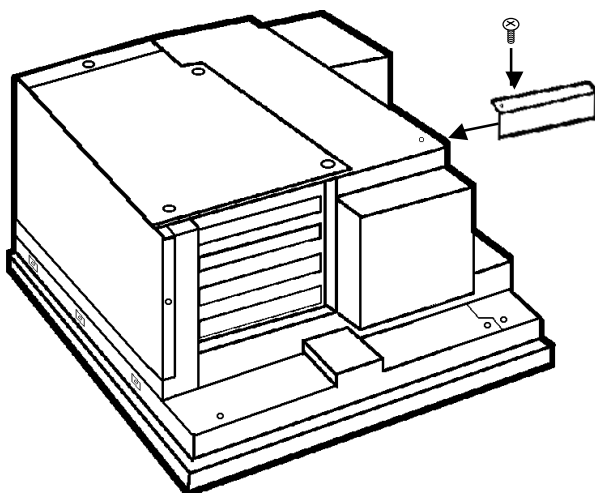

1) Attach the support leg to the PL's chassis, as shown here.

2. Installing the DIM Module (PL-EM200)

⚠️
Important • *Since DIM module sockets are easy to break, be sure to install the DIM module very carefully.*

The PL-6700 comes with a single, 32MB module pre-installed. There is one more empty socket that can be used and the procedures that follow describe how to install a second DIM module in that socket.
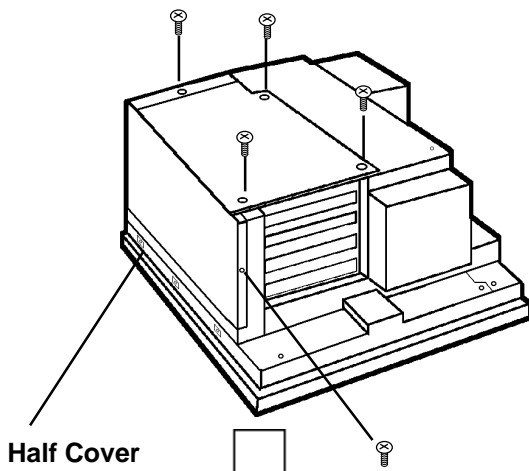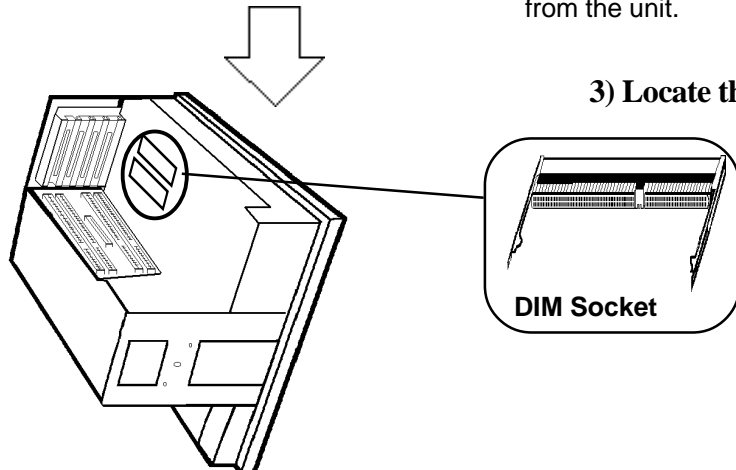

Half Cover

1) Unscrew the five (5) attachment screws used to hold the rear maintenance cover and half-cover in place.
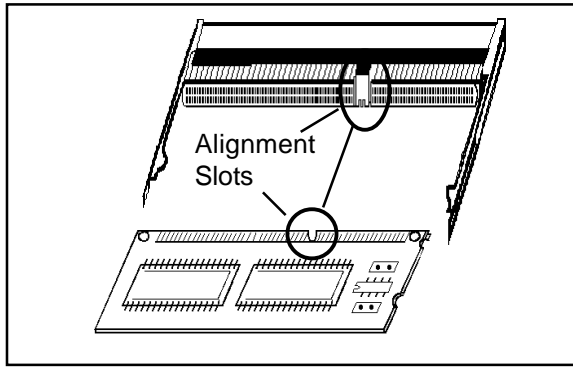
⚠️
**Important** • *First, remove the half-cover, and then the rear maintenance cover.*

**2) Remove the half-cover (it will pivot out and away from the unit) and then the rear maintenance cover.**

Hinged section
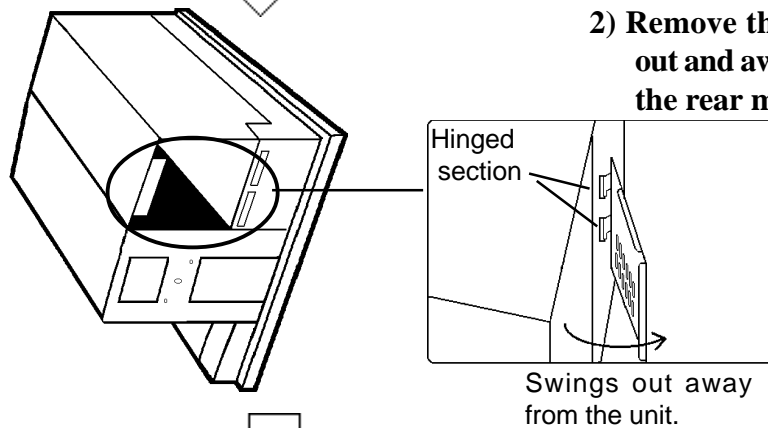
Swings out away from the unit.

3) Locate the two DIM socket holders.

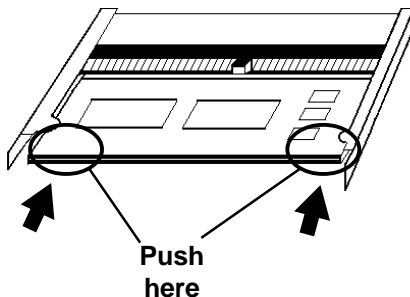**DIM Socket**

Alignment
Slots

4) **Position the module so that its align-
ment slot and the DIM module's
alignment slot are aligned.**
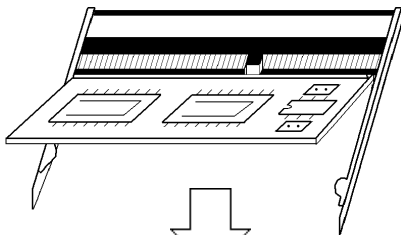
5) **Position the module so that its con-
tacts are directly in front of the DIM
socket and tilted up slightly.**
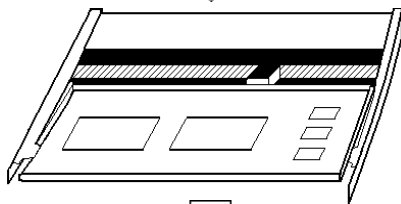
6) **Then, tilt the module down so that the
module and socket's contacts are par-
allel.**

7) **Push the module slowly but firmly into
the socket, until the module's clips lock
in place.**
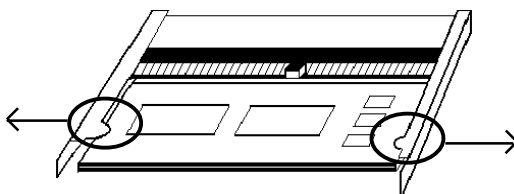
**Push
here**

Important

• *Be sure to only push
on the points shown
here. Pushing on any
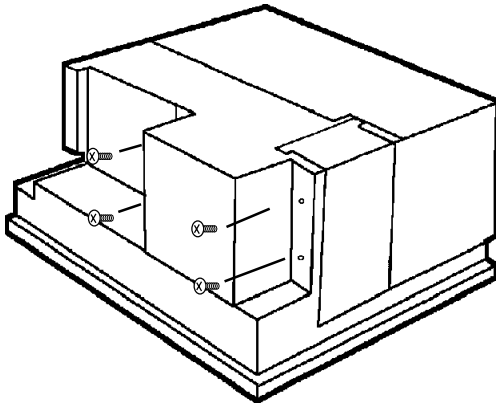other point may cause
the module to break.*

8) **After the DIM module is inserted into
its socket, reattach the rear mainte-
nance cover, half cover and secure
them in place.**
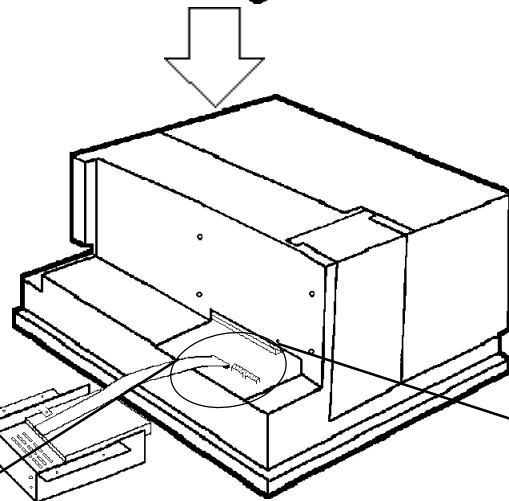
[To Remove the DIM Module]

When removing the module from the socket, please spread the socket's sides as shown.

3. Removing or Installing the FDD Unit (PL-FD100)

1) Remove the floppy disk unit cover's four attachment screws.

2) Around the FDD connection cable is fitted a black plastic pinch collar (Part of the PL's connector - see below).

<u>This pinch collar must be pulled up to release the connection cable's end tab.</u>

← **FDD Connector Cable**

← **Pinch Collar**

Raise Pinch Collar   **Slide collar sideways**   **Remove FDD cable**
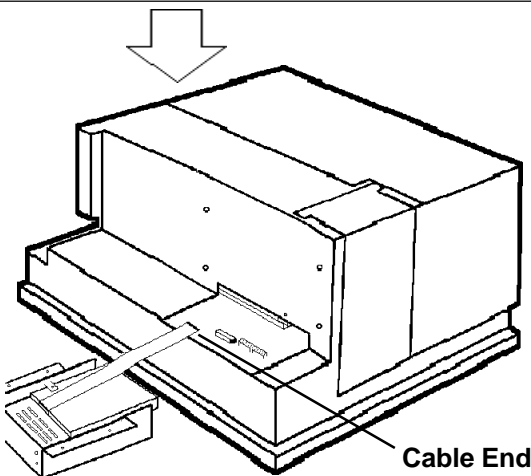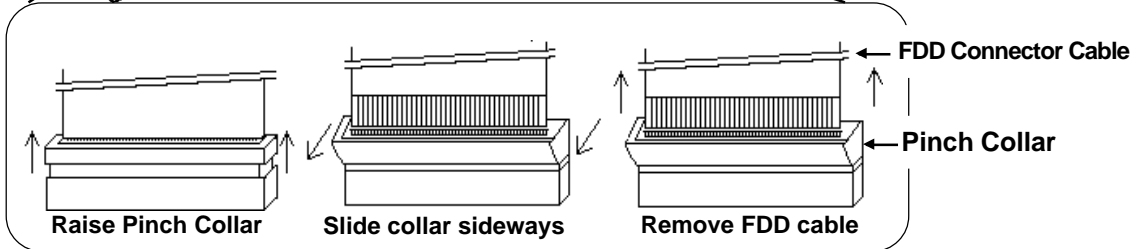
3) Remove the cable end from the FDD connector.

Note: • **When either exchanging or installing the PL-FD100, before screwing in the unit's attachment screw, be sure that the FDD Connection Cable is attached and the above-mentioned connector's pinch collar is in place.**

Cable End

4. Removing or Installing the HDD Unit (PL-HD100)

Follow the steps given below when attaching or detaching the PL-HD100.

⚠
Important

* *Since the PL-6700 is a precision instrument, be sure not to jar or shake it unecessarily.*
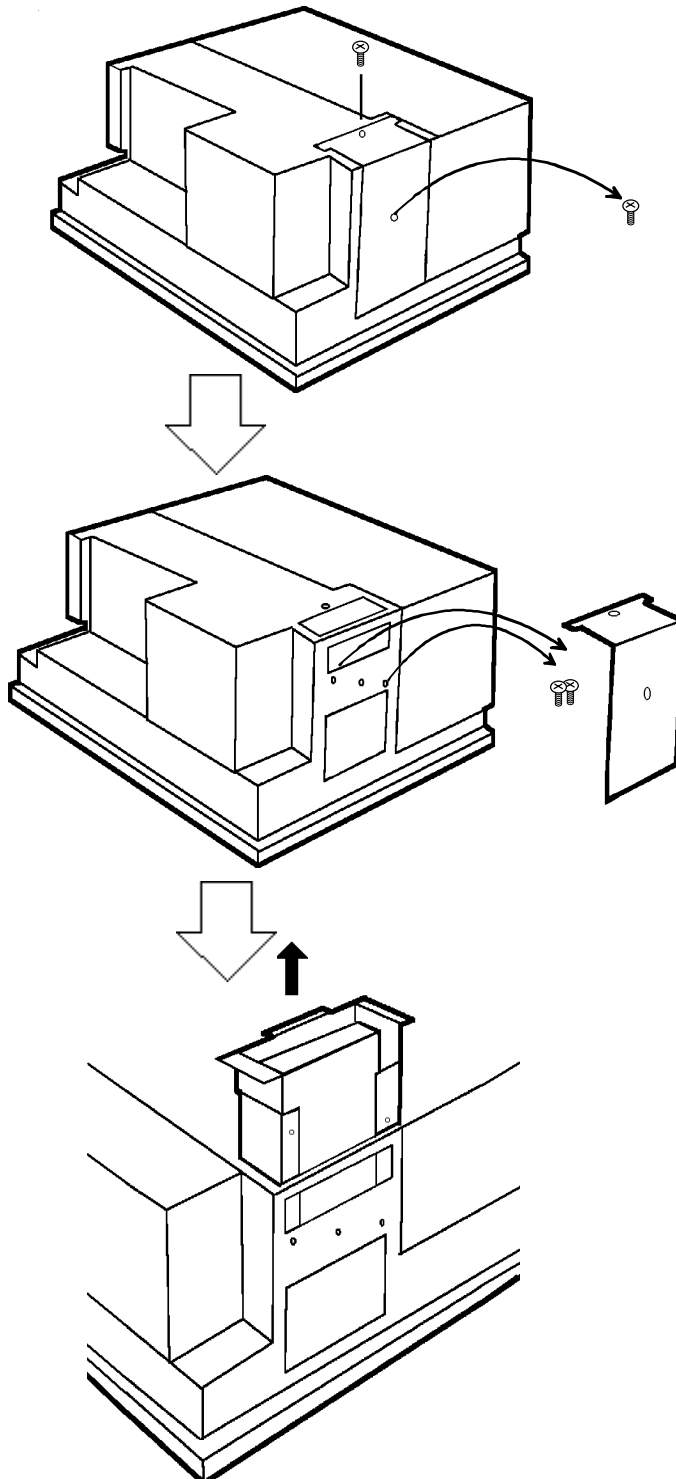
1) **Unscrew the HDD unit's protective cover's 2 attachment screws.**

2) **Remove the HDD unit's cover and unscrew the HDD unit's 2 set screws.**

3) **Pull out the HDD unit from the PL-6700.**

4) Detach the PL-HD000's connection cable from the unit.

PL- HD000

HDD Connector Cable

⚠️ **Important** • *Be sure not to bend any of the HDD's connector pins while removing the cable's connector.*

Connect to the PL-HD100

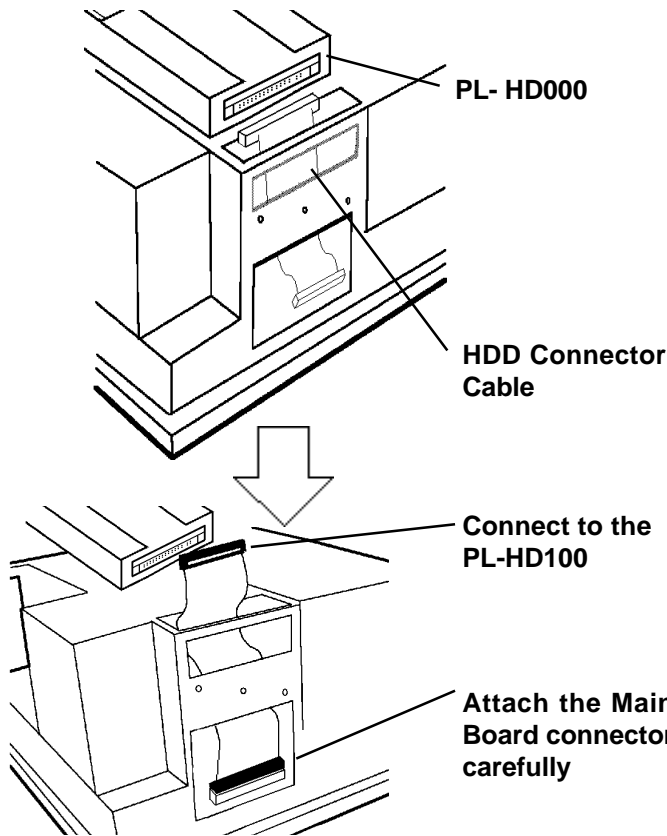**5) Reattach the connection cable to the PL-HD100's connector (See note below).**

Attach the Main Board connector carefully

⚠️ **Caution**

If the hard disk unit's connector is attached incorrectly, there is a possibility of damage to the unit. Please follow the instructions given here carefully.

X   X

<Figure 1 - PL-HD100 Connector>
Cable Inversion Prevention Pin (Removed)

Connect the cable here   Do not use these pins

Be sure the hard disk unit cable's main board connector is not skewed from its correct attachment position (see above examples). Incorrect attachment can cause damage to the unit.

---
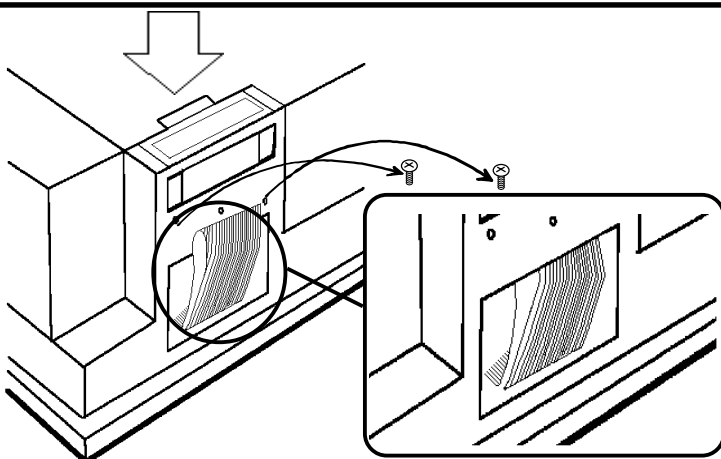
6) Secure the HDD unit in place with its 2 attachment screws.

7) Fold the HDD's cable so that it looks like the picture, and insert the folded cable's end into the HDD's holder slot.

⚠️ **Important** • *Be sure that the cable is not pinched by either the PL's chassis or the attachment screws.*

5. Installing an Expansion Board
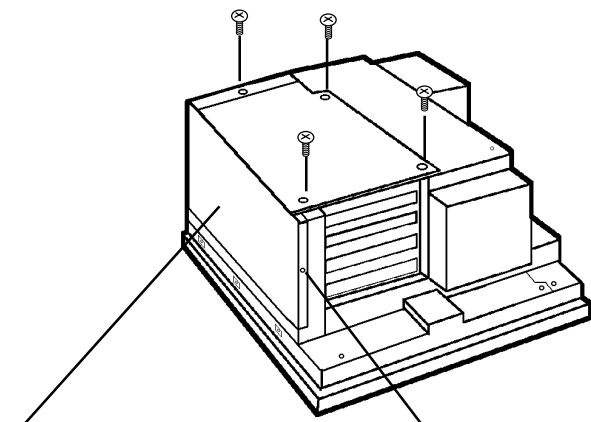
Rear Maintenence Cover

1) Unscrew the five (5) attachment screws used to hold the rear maintenance cover and half-cover in place.

⚠️ **Important**
- *First, remove the half-cover, and then the rear maintenance cover.*

2) Remove the half-cover (it will pivot out and away from the unit) and then the rear maintenance cover.

Hinged section
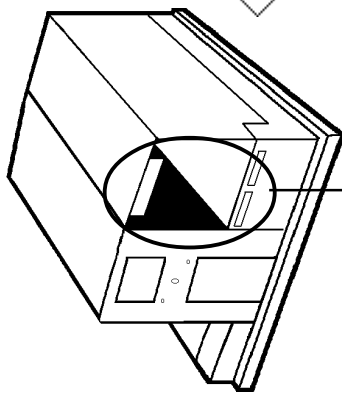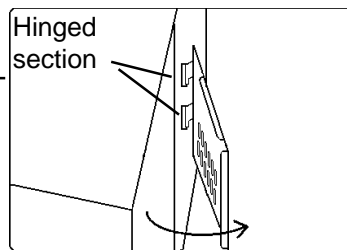
Swings out away from the unit.
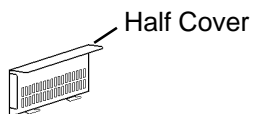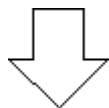
Half Cover

3) Remove the rear maintenance cover and the half cover.

Rear Maintenance Cover

**Panel
Spacer**

**Insert board
here**

**Expansion
Board**
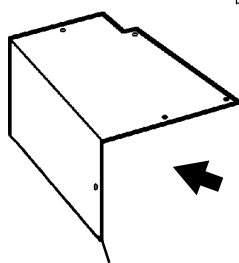
**Insert
board
here**
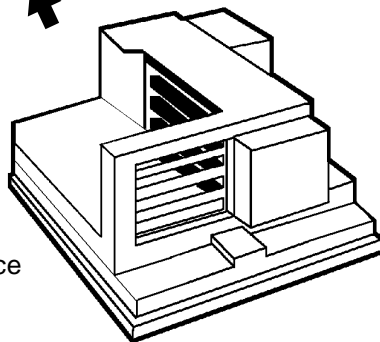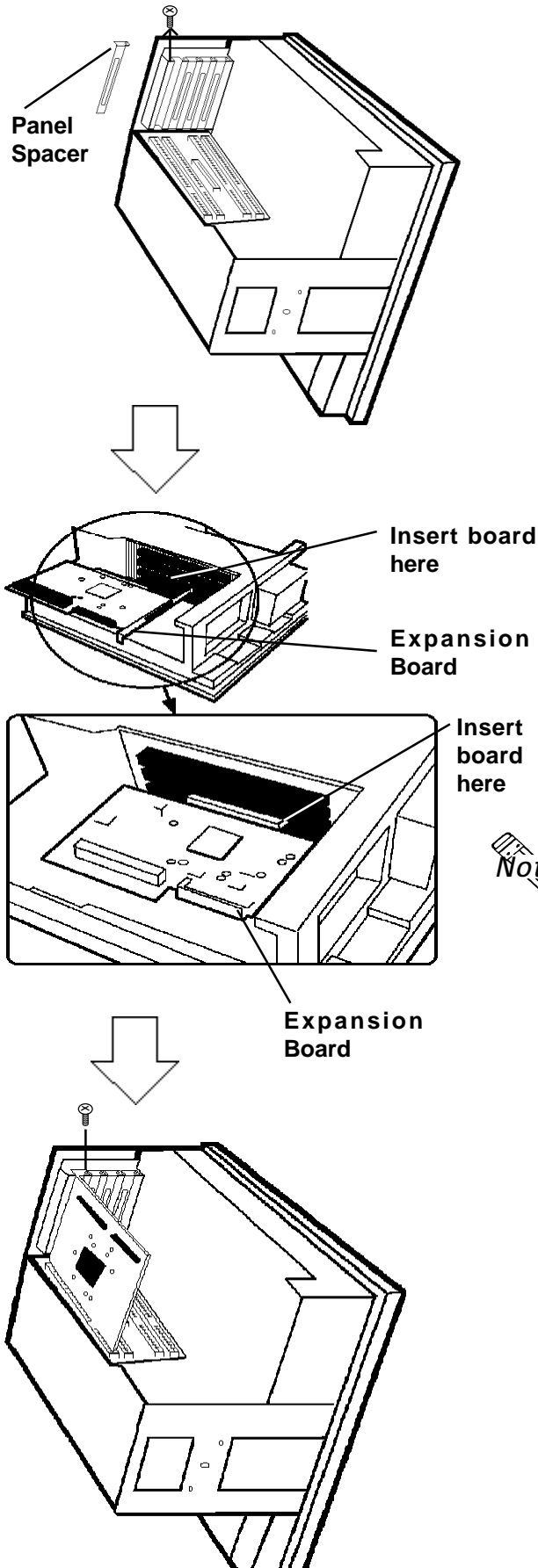
**Expansion
Board**

**4) Remove the desired expansion slot's
blank panel by unscrewing the
panel's attachment screw.**

**5) Gently insert the expansion board
into the expansion slot.**

Note: • **Attaching a full-sized expansion
board will cause the end of the board
to extend outside of the expansion
board area.**

Reference *3-1 Available Options
and Expansion Boards*

**6) Re-attach the blank panel's attach-
ment screw (1).
After the board is secured in posi-
tion, replace the rear maintenance
cover and attach it in place with the
attachment screws.**

**7) After the rear maintenance cover is
secured in position, reattach the
half cover and secure it in place.**

6. Installing the IDE Slave Adaptor (PL-SA100)
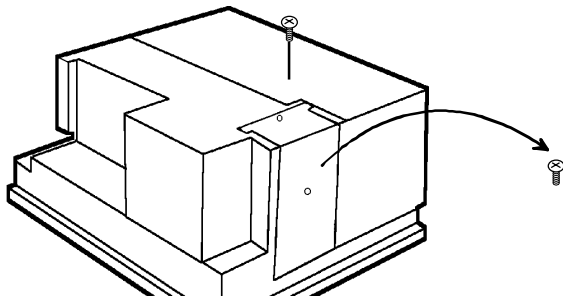
1) Unscrew the HDD unit's protective cover's 2 attachment screws.
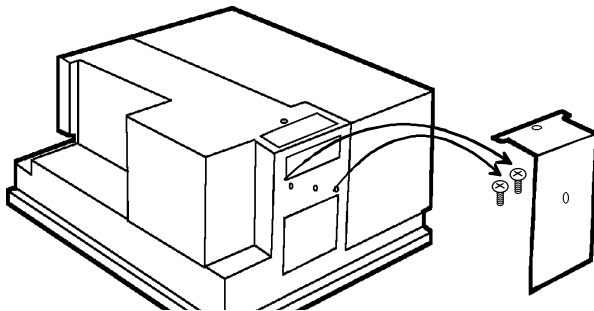
2) Remove the HDD unit's cover and unscrew the HDD unit's two (2) set screws.

PL-HD100

HDD Connection Cable
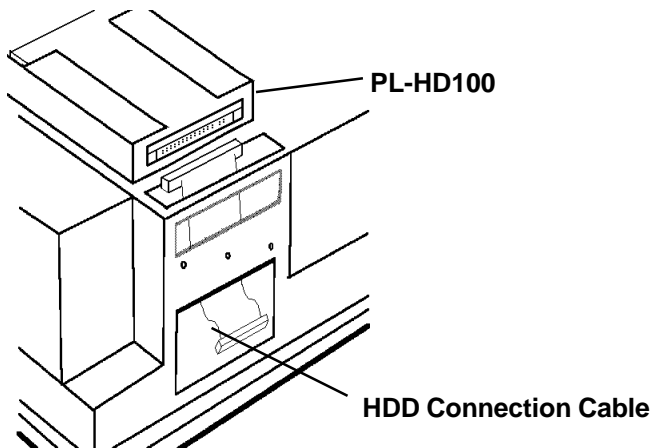
3) Disconnect the PL-HD100 unit from the HDD connection cable.

HD Connection cable
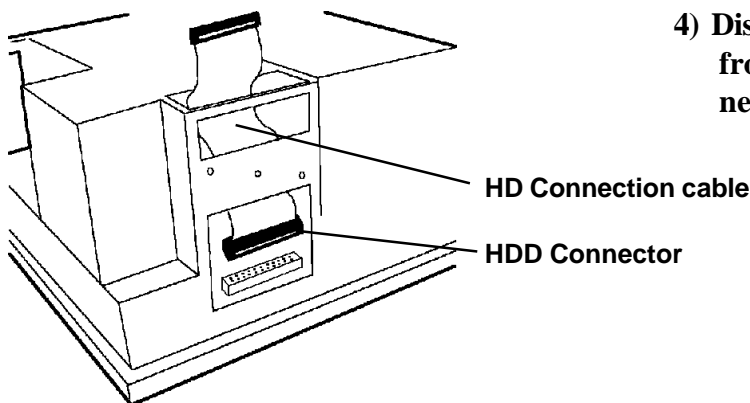
HDD Connector

4) Disconnect the HD connection cable from the Main Board's HDD connector.
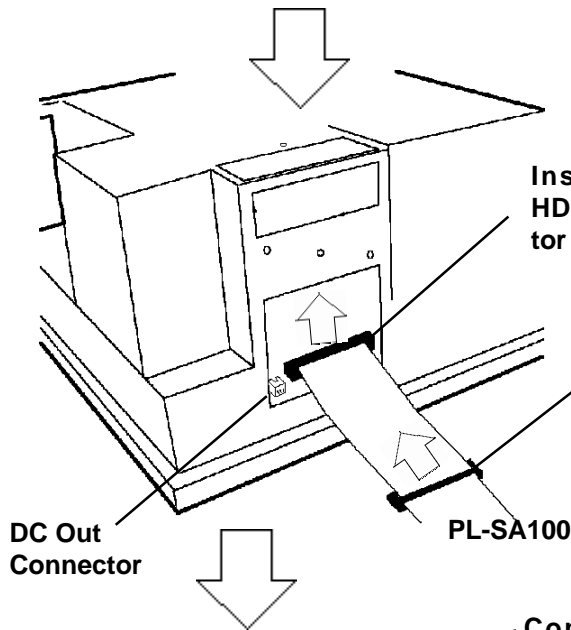
5) Thread the PL-SA100 connection cable's PL-HD100 cable conector through the slot shown here and up through to the top of the chassis. Then, connect the cable's middle connector to the main board's HDD connector.

Insert the PL-HD100 connector here

Middle Connector

(Insert into main board's HDD connector)

PL-SA100

DC Out Connector
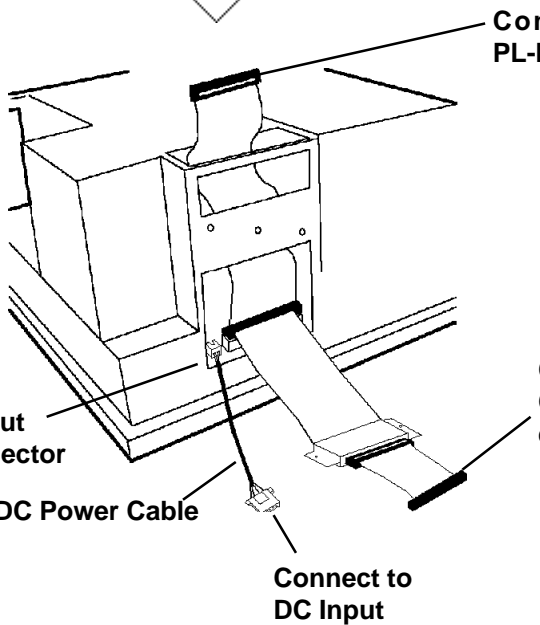
Connect to PL-HD100

6) Connect the PL-SA100's additional DC power cable to the DC OUT connector.

⚠ **Important**

• *Be sure to connect the CD-ROM drive connector cable's #1 pin mark side with the IDE interface's #1 pin.*

Connect to CD-ROM drive

DC Out Connector

DC Power Cable

Connect to DC Input

7) Last, connect the PL-HD100 to the end of the cable and use the attachment screws to fix the HD unit in place.

⚠ **Caution**

If the hard disk unit's connector is attached incorrectly, there is a possibility of damage to the unit. Please follow the instructions given here carefully.

X   **X**

<Figure 1 - PL-HD100 Connector>

Cable Inversion Prevention Pin (Removed)

Connect the cable here   **Do not use these pins**
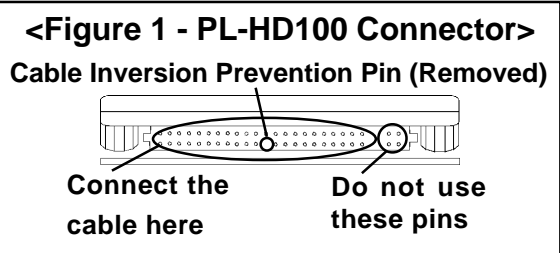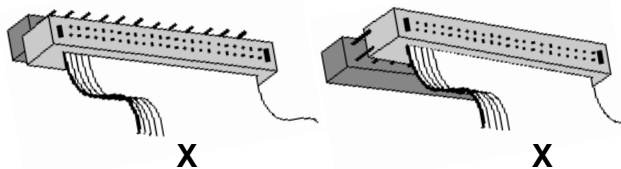
Be sure the hard disk unit cable's main board connector is not skewed from its correct attachment position (see above examples). Incorrect attachment can cause damage to the unit.

Installation and Wiring

1. **Installation Cautions**
2. **Installing the PL**
3. **Wiring the PL**

This chapter explains how to install and wire the PL-6700, as well as the cautions required both before and during installation.

4-1 | Installation Cautions
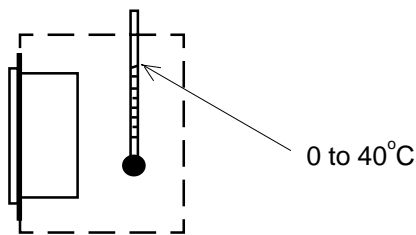
■ Temperature Related Cautions

0 to 40°C

Be sure to confirm that the area near the PL will be within the allowable temperature range. If this area's temperature exceeds the allowed limit, a machine breakdown can occur.
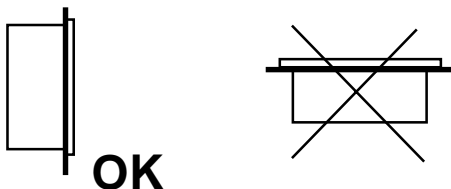
■ Installation Positioning Cautions

OK

Be sure to install the panel in an upright (vertical) position.
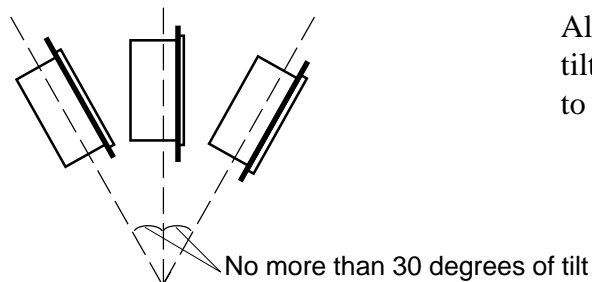
Also, be sure that the panel's viewing angle is tilted no more than 30 degrees from parallel to the operator (i.e. directly in front).

No more than 30 degrees of tilt
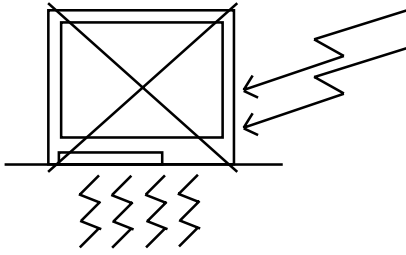
■ **Vibration Related Cautions**

Be sure to protect the PL from excessive vibration or jolting. These kinds of shocks can cause the PL to malfunction.

PL Condition	Shock Strength
When using the HDD	Up to 0.5G
When using the FDD	Up to 1.0G
When using no drives	Up to 2.0G

Important

• *Be sure to not move the PL unit while the HDD is starting up. This can lead to a machine breakdown.*

• *When using a fan to cool the PL unit, be sure that the fan does not point directly at either of the PL's disk drive units, i.e both the hard disk and the floppy disk.*

4-2	**Installing the PL**

1.	**Installation Procedures**

Follow the steps given below when installing the PL-6700.

■ Confirm the moisture resistant seal's seating

Moisture resistant seal

Rear panel
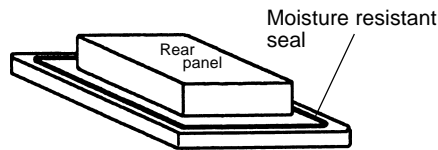
Place the PL on a level surface with the display panel facing downward. Check that the PL's moisture resistant seal is seated securely into the seal's groove, which runs around the perimeter of the panel's frame.

■ Create a mounting hole

Panel
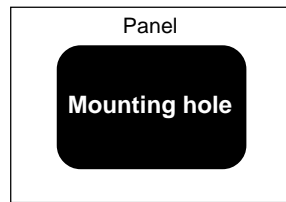
Mounting hole

Create a hole for mounting the PL, like that pictured here. These two items, the moisture resistant packing and the mounting brackets are required when installing the PL. ▼ *Reference* "*2-5 PL Dimensions*"

1.6 - 10.0 mm
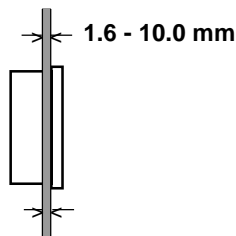
Note:
- **To obtain the maximum degree of moisture resistance, be sure to mount the PL on a smooth, flat surface.**
- **The panel itself can be from 1.6 to 10 mm thick.**

Note:
- **To enhance the PL's maintainability, operability and ventilation, allow at least 50 mm or more clearance between the PL and any other objects. (The clearance must be large enough to allow you to insert or remove expansion boards and to attach connectors.)**

Side View

50mm

50mm PL

50mm

Rear View

50mm

50mm PL 50mm

50mm
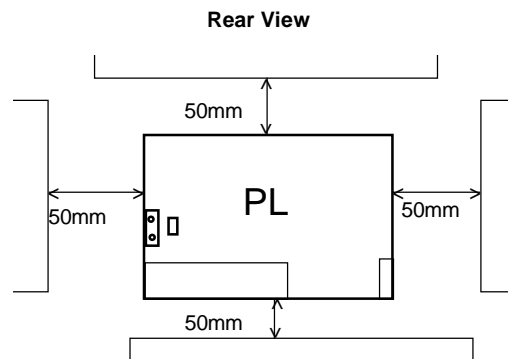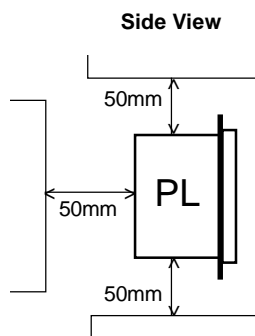
Note: • **Be sure that the panel's viewing angle is tilted no more than 30 degrees from parallel to the operator (i.e. operator is directly in front).**

Must be 30 degrees or less
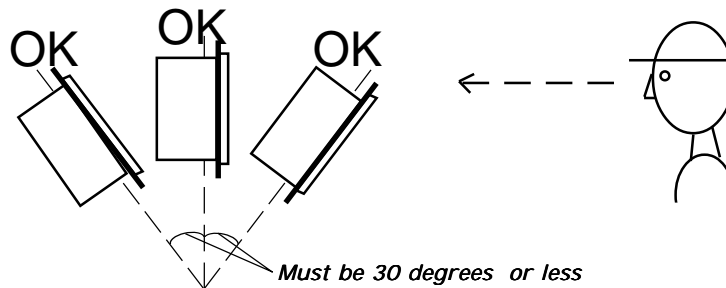
• **Avoid placing the PL next to other devices that might cause overheating.**

• **Avoid using the PL where the ambient temperature will exceed 40°C.**

• **Keep the PL away from arc-generating devices such as magnetic switches and non-fuse breakers.**

• **Avoid using the PL in environments where corrosive gases are present.**

■ Insert the PL into the installation slot
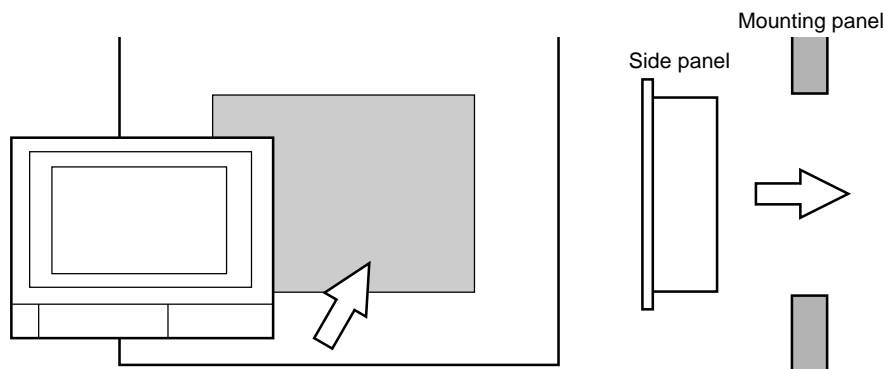
■ Attach and Secure the Rear Attachment Brackets

1) Locate the PL's eight (8) attachment holes, located on the top, bottom, and sides of the PL.
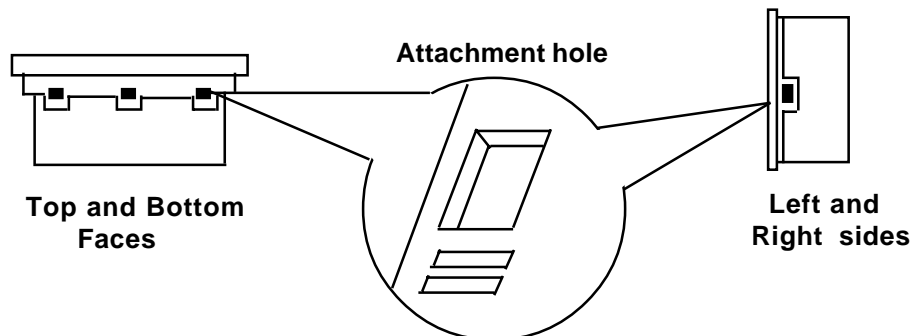
2) Insert each bracket into its attachment hole.

Mounting panel

Mounting
bracket

Hook

Front
panel
of PL

Attachment
hole

Rear
panel
of PL
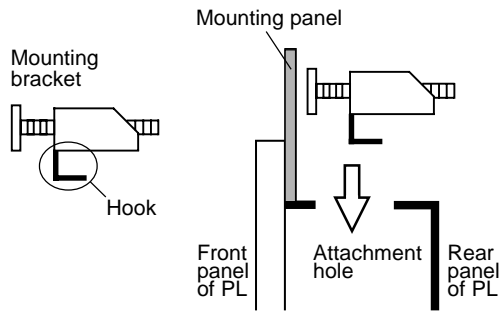
3) Insert each mounting bracket into aattachment hole, and slide the bracket
   backwards until it stops.
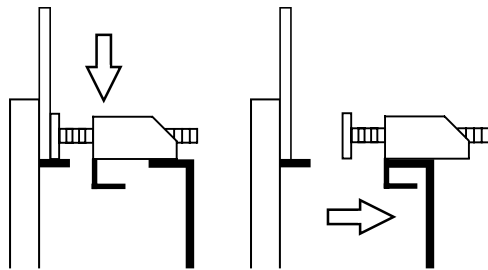
4) Use a screwdriver to tighten the bracket's adjustment screw. To ensure a
   high degree of moisture resistance, the torque should be 0.5 to 0.6 N•m.

Panel

PL
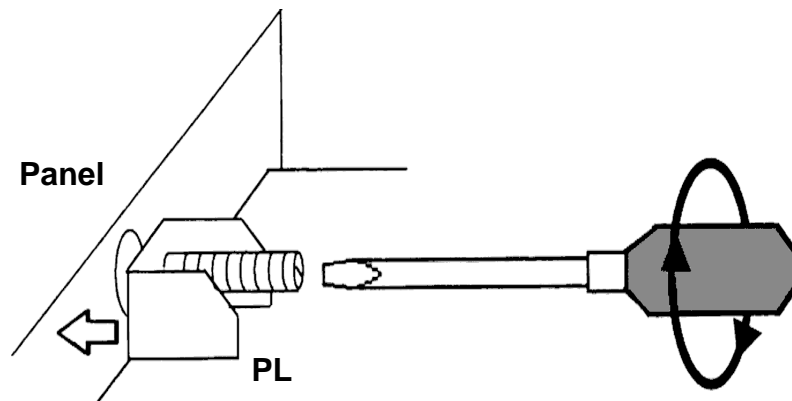
⚠!⚠
Important   • ***Excessive torque may damage the panel or bracket.***

4-3	**Wiring the PL**

1.	**Connecting the Power Cord**

(Rear of PL)

Power
Terminals

Power
Switch

Power Input Terminals

Connecting these two termi-
nals provides 100V to 240V
AC power.

L= live and N= Neutral

(screw size: M3)

This terminal is connected
to the PL's frame (chassis).
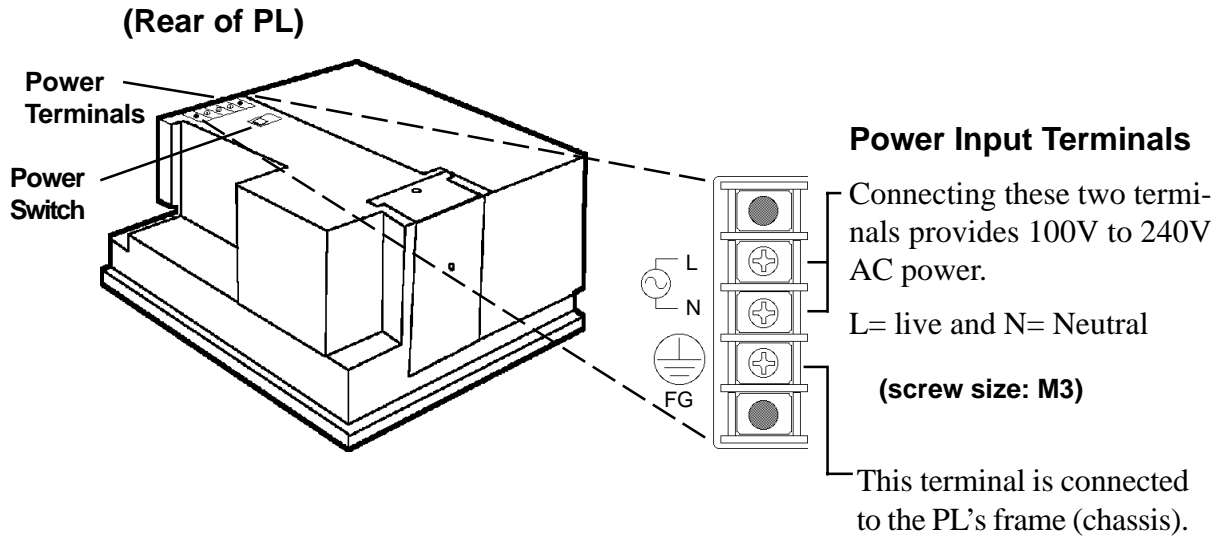
⚠ WARNING

- **To prevent electric shocks, be sure to turn the PL OFF before connecting the power cord.**

- **To avoid the dangers of fire, electric hazards and equipment damage, be sure to use only the specified power supply voltage when operating the PL-6700.**

Use the following steps when connecting the power cord to the PL's power
terminals.
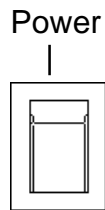
Power

1) Confirm that the power switch is turned OFF. Then, remove the power terminal's transparent plastic cover.

Plastic Cover

Screw

Attachment Screws

Transparent Cover
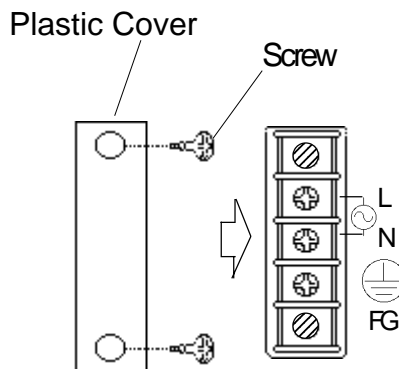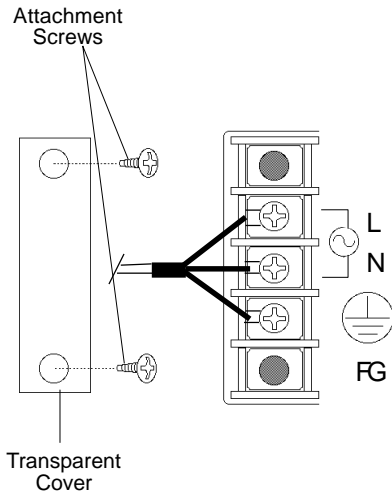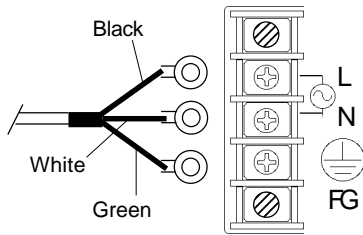
2) Loosen and remove the middle three screws from the terminal strip. Align the crimp terminals with each screw hole, and tighten the screws.

Note: • **Crimp Terminal Types : V1.25-3, by J.S.T. or equivalent (JIS standard part number : RAV1.25-3)**

• **Crimp terminals must be the same as shown below.**

φ **3.2 mm or larger**

Max. 6.0 mm

Important • ***The colors in the figure above are for the cable which came with the PL.***

• ***This power cable is designed only for 100V use. Be sure to use a different cable when using other than 100V power.***

3) Reattach the terminal strip's transparent cover.

2.   Power Supply Cautions

When connecting power to the PL unit's AC power terminals, please be aware of the following:

Fig. 1
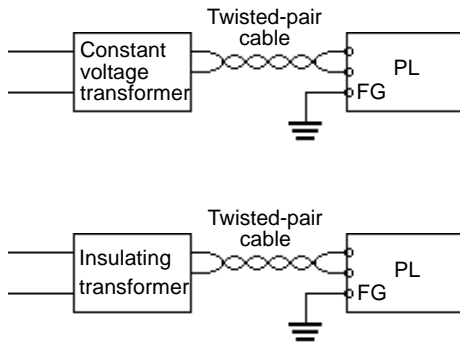
- If voltage fluctuations are expected to vary beyond the specified range, connect a constant voltage transformer.

  For information about the specified voltage, ▽ *Reference* **"2-1 General Specifications"**

- Use a low-noise power supply both between the lines and between the PL and its ground. If there is still excess noise, connect an insulating transformer (noise-prevention type) .

  Note: • **Be sure any constant or insulating transformer used has a capacity of 200VA or more.**

Fig. 2
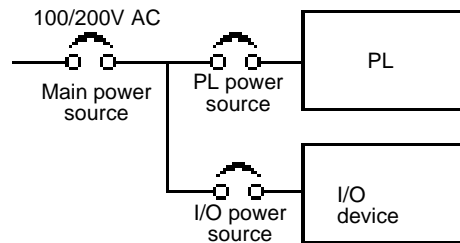
- Wire the power cords of the PL, I/O devices, and power supply devices separately.

Fig. 3
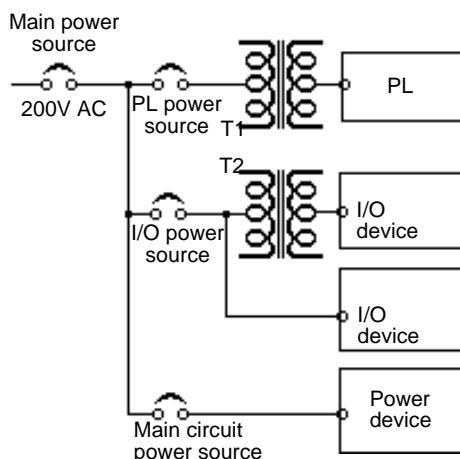
- To improve noise immunity, it is recommended to attach a ferrite core to the power cord.

- Isolate the main circuit (high voltage, large current) line, I/O signal lines, and power cord, and do not bind or group them together.

Fig.4

Twisted-pair cable

PL

AC

FG

E2

E1

Lightning surge absorber
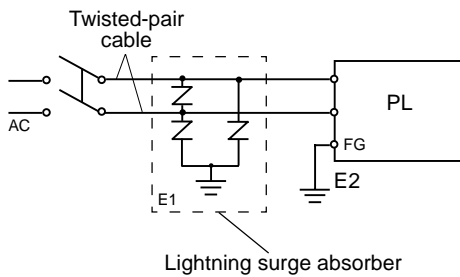
- To prevent damage from lightning, connect a lightning surge absorber.

⚠!⚠
Important

- *Ground the lightning surge absorber (E1) and the PL (E2) separately.*
- *Select a lightning surge absorber which will not exceed the allowable circuit voltage, even when the voltage rises to the maximum.*

3.   Grounding Cautions

(a) Dedicated Ground [1]

PL

Other device

- **Set up a dedicated ground when using the rear panel's FG terminal.**

(b) Shared ground allowed [1]

PL

Other device
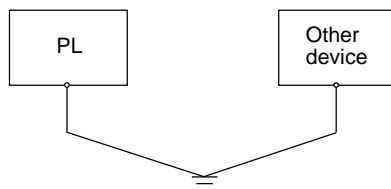
- **If a dedicated ground is not possible, use a shared ground, as shown in figure (b).**

  The grounding point must be as close to the PL as possible, and the grounding wires must be as short as possible. If the wires must be long, use thick, insulated wires and run them through conduits.

(c) Shared ground **not** allowed

PL

Other device

---
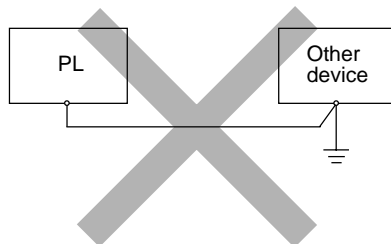
[1] Use a grounding resistance of less than 100 Ω and 2 mm^2 or larger wire , or your country's applicable standard. For details, contact your local PL distributor.

4. Cautions When Connecting I/O Signal Lines

- I/O signal lines must be wired separately from the power circuit cable.

- If the power circuit cable needs to be wired together with the input/output (I/O) signal lines for any reason, use shielded cables and ground one end of the shield to the PL's FG terminal.

- To improve noise immunity, it is recommended to attach a ferrite core to the power cord.

System Setup

1. **Setup Procedures**
2. **System Parameters**

This chapter explains how to enter the PL-6700's system settings, as well as the cautions required both before and during set up.

5-1 Setup Procedures

⚠ Important

• *Normally, use only the factory (default) settings.*

Note:

• **The following settings are those pre-set at the factory.**

1) Connect the keyboard to the PL.

2) Turn the PL's power ON.

3) After the message "Press <DEL> to Enter SETUP"appears, press the [DEL] key until the following screen appears.

```
                    ROM PCI/ISA BIOS(2A5IIUIC)
                       CMOS SETUP UTILITY
                      AWARD SOFTWARE, INC.

   STANDARD CMOS SETUP           INTEGRATED PERIPHERALS

   BIOS FEATURES SETUP           SUPERVISOR PASSWORD

   CHIPSET FEATURES SETUP        USER  PASSWORD

   POWER MANAGEMENT SETUP        IDE HDD AUTO DETECTION

   PNP/PCI CONFIGURATION         HDD LOW LEVEL FORMAT

   LOAD BIOS DEFAULTS            SAVE & EXIT SETUP

   LOAD SETUP DEFAULTS           EXIT WITHOUT SAVING


   ESC  :  Quit                  ← → ↑ ↓      : Select Item
   F10  :  Save & Exit Setup     (Shift)F2    :  Change Color
              Time,DATE,Hard  Disk Type •••
```

KEYBOARD ACTION KEYS

Provides a summary of the keyboard keys used to carry out the setup.

SYSTEM SETTING SELECTION AREA

Each of the titles (areas) listed here contains system setting items.

4) Use the arrow keys to move the cursor to the desired selection.

5-2	System Parameters

1. STANDARD CMOS SETUP

Selecting the STANDARD CMOS SETUP menu item produces the following screen.

```
                    ROM PCI/ISA BIOS(2A5IIU1C)
                       CMOS SETUP UTILITY
                       AWARD SOFTWARE, INC.

   Date (mm:dd:yy): Wed,Jul 2 1997

   Time (hh:mm:ss): 14 : 50 : 3

   HARD  DISKS     TYPE SIZE CYLS  HEAD  PRECOMP  LANDZ  SECT0R   MODE
   Primary  Master  :Auto  0    0    0       0        0      0     AUTO
   Primary  Slave   :Auto  0    0    0       0        0      0     AUTO

   Drive  A  :  1.44M , 3.5 in.
   Drive  B  :  None
   VGA Text Mode:Expansion                  Base Memory :    640K
   VGA Graphic Mode:Expansion               Extended Memory : 31744K
   Floppy3 Mode Support:Disabled             Other Memory :   384K
   LCD & CRT : Both                         _____
   Halt On : All Errors
                                            Total Memory :  32768K

   ESC   :   Quit      ← → ↑ ↓  :  Select Item       PU/PD/+/- : Modify
   F1    :   Help      (Shift)F2 :  Change Color
```

■ **Date / Time**

This data sets the PL's internal time and date.

Hours   :00 - 23
Minutes :00 - 59
Seconds :00 - 59

■ **Primary Master**

This data sets the ISE hard disk's parameters. When this setting is set to [AUTO], the hard disk's parameters are automatically read in. Also, if the "IDE HDD AUTO DETECTION" is in use, the value entered there is automatically set. The three options are [User],[Auto], or [None]. The [Auto] setting is factory set and recommended for most users.

■ **Primary Slave**

The three options are [User],[Auto], or [None]. The [Auto] setting is factory set and recommended for most users.

■ **DriveA**

This setting determines the format used by the PL's internal floppy disk drive. The selection [1.44MB - 3.5in] is recommended. The other available settings are [720K - 3.5in], [1.2M - 5.25in], [360 - 5.25in], [2.88M - 3.5in.], or [None]. The[1.44M - 3.5in] selection is factory set and recommended for most users.

■ **DriveB**
The selection [None] is recommended. The other available settings are [1.44MB - 3.5in], [720K - 3.5in], [1.2M - 5.25in], [360 - 5.25in], [2.88M - 3.5in.], or [None]. The [None] selection is factory set and recommended for most users.

■ **Floppy 3 Mode Support**
The possible selections include [Disabled],[DriveA],[DriveB]or[Both].The [Disabled] selection is factory set and recommended for most users.

■ **LCD & CRT**
This setting determines the type of display device used.
The list of selections include [Both], [LCD] or [CRT]. The [Both] selection is factory set and recommended for most users.

[Both]   :   Displays on both the PL-6700's [LCD] and the external CRT.
[LCD]   :   Displays on the PL-6700's [LCD].
[CRT]   :   Displays on the CRT.

■ **VGA Text Mode**
Designates if the characters displayed in English Text Mode are displayed in expanded or normal form.The selections are [Expansion] or [Normal]. The [Expansion] selection is factory set and recommended for most users.

■ **VGA Graphics Mode**
Designates if the display used in VGA graphics Mode shows screen data in the expanded or normal form. The selections are [Expansion] or [Normal]. The [Expansion] selection is factory set and recommended for most users.

■ **Halt On**
Designates the type of processing that will be performed when an error occurs during the Initial Start-Up's Self Test. The [All Errors] selection is factory set and recommended for most users.

[All Errors]   :   Displays all errors and stops the unit.
[No Errors]   :   Displays all errors and does not stop the unit.
[All,But Keyboard] :   Displays all errors, except for those related to the keyboard, and stops the unit. If the User has no keyboard connected, please use this setting.
[All,But Diskette]   :   FDisplays all errors, except for those related to the disk drive (FDD), and stops the unit.
[All,But Disk/Key]   :   Displays all errors, except for those related to the disk drive (FDD) and keyboard, and then stops the unit.

2. BIOS FEATURES SETUP

Selecting the BIOS FEATURES SETUP menu item calls up the following screen.

```
                    ROM PCI/ISA BIOS(2A5LLU1C)
                        BIOS FEATURES SETUP
                       AWARD SOFTWARE, INC.

   Virus Warning              :Disabled    Video BIOS  Shadow  :  Enabled

   CPU Internal Cache         :Enabled     C8000-CBFFF Shadow  :  Disabled

   External Cache             :Enabled     CC000-CFFFF Shadow  :  Disabled

   Quick Power On Self Test   :Enabled     D0000-D3FFF Shadow  :  Disabled

   Boot Sequence              :C,A         D4000-D7FFF Shadow  :  Disabled

   Swap Floppy Drive          :Disabled    D8000-DBFFF Shadow  :  Disabled

   Boot Up NumLock Status     :Off         DC000-DFFFF Shadow  :  Disabled

   Gate A20 Option            :Fast

   Memory Parity Check        :Disabled    ESC   :Quit    ← → ↑ ↓   :Select Item

   Security Option            :Setup       F1  : Help      PU/PD/+/-    :Modify

   PCI/VGA Palette Snoop      :Disabled    F5  : Old Values (Shift)F2   :Color

   OS Select For DRAM > 64MB  :Non-OS2     F6  : Load BIOS Defaults

                                           F7  : Load Setup Defaults
```

■ **Virus Warning**
Designates whether a warning message appears when an error occurs during a write to the Hard Disk's Boot Sector. The two selections are [Disabled]or[Enabled]. The [Disabled] selection is factory set and recommended for most users.

■ **CPU Internal Cache**
Designates if the CPU's Internal Cache Memory is used or not. The two selections available are [Disabled]or[Enabled]. The [Enabled] selection is factory set and recommended for most users.

■ **External Cache**
Designates if the CPU's External Cache Memory (L2) is used or not. The two selections available are [Disabled]or [Enabled]. The [Enabled] selection is factory set and recommended for most users.

■ **Quick Power On Self Test**
Designates if a simplified Self Test is used after the power is turned ON. The two selections available are [Disabled]or[Enabled]. The [Enabled] selection is factory set and recommended for most users.

■ **Boot Sequence**
Designates the drive order used by the OS during start up. The possible selections are [C only], [A,C], [C,A], [C,CDROM,A] or [CDROM,C,A]. The [C,A] selection is factory set and recommended for most users.

■ **Swap Floppy Drive**

When two (2) floppy disk drives (FDD) are installed, setting this selection to [Enabled] will cause the order of the A and B drives to be swapped. The two selections available are [Disabled]or [Enabled]. The [Disabled] selection is factory set and recommended for most users.

■ **Boot Up Numlock Status**

Designates the condition of the NumLock key at startup. The two selections are either [On] or [Off]. The [Off] selection is factory set and recommended for most users.

■ **Gate A20 Option**

The two selections available are [Fast] or [Normal]. When [Normal] has been selected, Keyboard Control is used for Gate A20 control. When [Fast] is selected, the Chipset is used. The [Fast] selection is factory set and recommended for most users.

■ **Memory Parity Check**

Designates if a Parity Check is used for Parity Memory. The two selections available are [Disabled]or [Enabled]. The [Disabled] selection is factory set and recommended for most users.

■ **Security Option**

Designates the location of the Password Entry, [Setup], used during BIOS setup, or [System], which is used during BIOS setup and Startup. When the [Supervisor Password] or User Password] area's password has not been designated, this setting is disabled. The two selections available are [Disabled]or [Enabled]. The [Disabled] selection is factory set and recommended for most users.

■ **PCI/VGA Palette Snoop**

When the PCI/VGA and the MPEG ISA/VESA VAG cards are both used, this setting is set to [Enabled]. In all other cases, this should be set to [Disabled]. The [Disabled] selection is factory set and recommended for most users.

■ **OS Select For DRAM >64MB**

Select either [Non-0S2]or[OS2]. The [Non-OS2] selection is factory set and recommended for most users.

■ **Video BIOS Shadow**

Designates whether Video BIOS ROM is expanded into RAM and used from there (C0000-C7FFF). The two selections available are [Disabled] or [Enabled]. The [Enabled] selection is factory set and recommended for most users.

■ **C8000-CBFFF Shadow to DC000-DFFFF Shadow**

When the Expansion Board's ROM is placed in this area, this setting designates if the ROM expands into the RAM area. The two selections available are [Disabled] or [Enabled]. The [Disabled] selection is factory set and recommended for most users.

3. CHIPSET FEATURES SETUP

Selecting the CHIPSET FEATURES SETUP menu item calls up the following screen.

Since the CHIPSET FEATURES SETUP screen is a view only screen, no selections or input can be performed.

```
                    ROM PCI/ISA BIOS(2A5IIU1C)
                    CHIPSET FEATURES  SETUP
                      AWARD SOFTWARE, INC.

  Auto Configuration      : Disabied    CPU to PCI Post Write    : 4T
                                        CPU to PCI Burst Mem.WR :  Disabled
  L2 (WB) Tag Bit Length  : 8bits       ISA Bus Clock Frequency  :  PCICLK/4
  SRAM Back-to-Back       : Enabled
  NA# Enable              : Enabled
  Starting Point of Paging  : 1T
  Refresh Cycle Time (us)  : 15.6
  RAS Pulse Width Refresh   : 6T
  RAS Precharge Time      : 5T
  RAS to CAS Delay        : 5T
  CAS# Pulse Width(FP)    : 2T     ESC: Quit      ←→↑↓     :Select Item
  CAS# Pulse Width(EDO)   : 1T
  RAMW# AssertionTiming   : 3T     F1 : Help      PU/PD/+/-   :Modify
  CAS Precharge Time(FP)  : 2T     F5 : Old Values (Shift)F2     :Color
  CAS Precharge Time(EDO) : 2T
                                   F6 : Load BIOS Defaults
   Enhanced Memory Write    : Disabled
   Read Prefetch memory RD  :Disabled   F7 : Load Setup Defaults
```

4.   POWER MANAGEMENT SETUP

Selecting the POWER MANAGEMENT SETUP menu item calls up the following screen.

```
                    ROM PCI/ISA BIOS(2A5IIU1C)
                    POWER MANAGEMENT SETUP
                       AWARD SOFTWARE, INC.

                                          HDD Ports Activity    : Enabled
   Power Management     : Disabled        VGA Activity          : Disabled
   PM Control by APM    : Yes             IRQ3   (COM  2)       : Enabled
   Video Off Option     : Always on       IRQ4   (COM  1)       : Enabled
   Video Off method     : DPMS Supported  IRQ5   (LPT  2)       : Enabled
                                          IRQ6   (Floppy Disk)  : Enabled
   Doze Speed (div by)  : 2               IRQ7   (LPT  1)       : Enabled
   Stdby Speed (div by) : 3               IRQ3   (RTC Alarm)    : Disabled
   Suspend Option       : Static Suspend  IRQ9   (IRQ2 Redir)   : Enabled
   MODEM Use IRQ        : 3               IRQ10  (COM  4)       : Enabled
   FAN Control          : Disabled        IRQ11  (COM  3)       : Enabled
          **PM Timers**                   IRQ12  (PS/2 Mouse)   : Enabled
   HDD Off After        : Disabled        IRQ13  (Coprocessor)  : Enabled
   Doze Mode            : Disabled        IRQ14  (Hard Disk)    : Enabled
   Standby Mode         : Disabled        IRQ15  (Reserved)     : Enabled
   Suspend Mode         : Disabled
                                          ESC: Quit    ←→↑↓   :Select Item
                                          F1 : Help    PU/PD/+/-  :Modify
          **PM Events**                   F5 : Old Values (Shift)F2  :Color
   COM Ports Activity   : Enabled         F6 : Load BIOS Defaults
   LPT Ports Activity   : Enabled         F7 : Load Setup Defaults
```

■ **Power Management**
  You can choose from four power management options. These are [User Defined],[Disabled], [Min Saving] or [Max Saving]. The [Disabled] selection is factory set and recommended for most users.

■ **PM Control by APM**
  Designates if the power management is controlled by the APM. The two selections available are [Yes]or [No]. The [Yes] selection is factory set and recommended for most users.

■ **Video Off Option**
  Turns the PL-6700's display OFF. The selections include [Always on], [Suspend→Off], [Susp,Stby→Off] and [All Modes→Off].

■ **Video Off method**
  When Auto Configuration [Enabled] has been selected, this selection cannot be used.

■ **Doze Speed (div by)**
  Selections for this feature include [1],[2],[3],[4],[5],[6],[7]or[8]. The [2] selection is factory set and recommended for most users.

■ **Stdby Speed (div by)**
  Selections for this feature include [1],[2],[3],[4],[5],[6],[7]or[8]. The [3] selection is factory set and recommended for most users.

■ **Suspend Option**
When Auto Configuration Enable has been selected, this selection cannot be used. The [Static Suspend] selection is factory set and recommended for most users.

■ **MODEM Use IRQ**
Selections for this feature include [1],[2],[3],[4],[5],[6],[7]or[8]. The [3] selection is factory set and recommended for most users.

■ **FAN Control (CPU Fan)**
The two selections available are [Disabled]or [Enabled]. The [Disabled] selection is factory set and recommended for most users.

■ **HDD Off After**
Designates the period of time to elapse before the HDD's motor turns itself OFF. The selections include [1Min]→[15Min], [1-15Min]or[Disabled].The [Disabled] selection is factory set and recommended for most users.

■ **Doze Mode**
Only after Auto Configuration has been set to [User Define] can the Doze Mode be used. The [Disabled] selection is factory set and recommended for most users.

■ **Standby Mode**
Only after Auto Configuration has been set to [User Define] can the Standby Mode be used. The [Disabled] selection is factory set and recommended for most users.

■ **Suspend Mode**
Only after Auto Configuration has been set to [User Define] can the Suspend Mode be used. The [Disabled] selection is factory set and recommended for most users.

■ **COM Ports Activity**
Designates if the COM Port is monitored or not. The two selections available are [Disabled]or [Enabled]. The [Enabled] selection is factory set and recommended for most users.

■ **LPT Ports Activity**
Designates if the LPT (Parallel) Port is monitored or not. The two selections available are [Disabled]or [Enabled]. The [Enabled] selection is factory set and recommended for most users.

■ **HDD Ports Activity**
Designates if the HDD (Hard Disk) Port is monitored or not. The two selections available are [Disabled]or [Enabled]. The [Enabled] selection is factory set and recommended for most users.

■ **VGA Activity**
Designates if the VGA Port is monitored or not. The two selections available are [Disabled]or [Enabled]. The [Disabled] selection is factory set and recommended for most users.

■ **IRQ3-IRQ15**
Designate if the COM Port is monitored or not. The two selections available are [Disabled]or [Enabled].

5. PNP/PCI CONFIGURATION SETUP

Selecting the PNP/PCI CONFIGURATION SETUP menu item displays the following screen.

```
                    ROM PCI/ISA BIOS(2A5IIU1C)
                      PNP/PCI CONFIGURATION
                      AWARD SOFTWARE, INC.

  Resources Controlled By :Manual        PCI IRQ Activated By: Leve1
  Reset Configuration Data:Disabled
  IRQ3   assigned to :  Legacy ISA
  IRQ4   assigned to :  Legacy ISA       PCI IDE IRQ Map To    : PCI-AUTO
  IRQ5   assigned to :  PCI/ISA PnP      Primary   IDE INT#    : A
  IRQ7   assigned to :  Legacy ISA
  IRQ9   assigned to :  PCI/ISA PnP
  IRQ10  assigned to :  Legacy ISA
  IRQ11  assigned to :  Legacy ISA
  IRQ12  assigned to :  PCI/ISA PnP
  IRQ14  assigned to :  Legacy ISA       ESC  :Quit        ←→↑↓  :Select Item
  IRQ15  assigned to :  Legacy ISA       F1  : Help      PU/PD/+/-  :Modify
  DMA-0  assigned to :  PCI/ISA PnP      F5  : Old Values   (Shift)F2  :Color
  DMA-1  assigned to :  PCI/ISA PnP
  DMA-3  assigned to :  PCI/ISA PnP      F6  : Load BIOS Defaults
  DMA-5  assigned to :  PCI/ISA PnP      F7  : Load Setup Defaults
  DMA-6  assigned to :  PCI/ISA PnP
  DMA-7  assigned to :  PCI/ISA PnP
```

■ **Resources Controlled By**
Designates whether the allocation of I/O Port, IRQ and DMA resources is done automatically or manually. The two selections available are [Manual]or [Auto]. The [Manual] selection is factory set and recommended for most users.

■ **Reset Configuration Data**
Designates whether all current setting data should be erased or not. The two selections available are [Disabled]or [Enabled]. The [Disabled] selection is factory set and recommended for most users.

■ **IRQ-3 assigned to ‑ RQ-15 assigned to**

Only after the "Resources Controlled By" setting is set to [Manual] can the following <u>IRQ-3assigned to - IRQ-15assigned to</u> settings be changed. These settings are used for the [PCI/ISA PnP] and [Legacy ISA] items.

[PCI/ISA PnP]   :Used for PCI or ISA's PnP Card
[Legacy ISA]   :Used for ISA Cards that do not comply with PnP

	INITIAL SETTING		INITIAL SETTING
IRQ-3 assigned to	Legacy ISA	IRQ-10 assigned to	Legacy ISA
IRQ-4 assigned to	Legacy ISA	IRQ-11 assigned to	Legacy ISA
IRQ-5 assigned to	PCI/ISA PnP	IRQ-12 assigned to	PCI/ISA PnP
IRQ-7 assigned to	Legacy ISA	IRQ-14 assigned to	Legacy ISA
IRQ-9 assigned to	PCI/ISA PnP	IRQ-15 assigned to	Legacy ISA

■ **DMA-0 assigned to ‑ DMA-7 assigned to**

Only after the "Resources Controlled By" setting is set to [Manual] can the following <u>DMA-0 assigned to ‑ DMA-7 assigned to</u> settings be changed. These settings are used for the [PCI/ISA PnP] and [Legacy ISA] items.

[PCI/ISA PnP] :   Used for PCI or ISA's PnP Card

[Legacy ISA]   :   Used for ISA Cards that do not comply with PnP

	INITIAL SETTING		INITIAL SETTING
DMA-0 assigned to	PCI/ISA PnP	DMA-5 assigned to	PCI/ISA PnP
DMA-1 assigned to	PCI/ISA PnP	DMA-6 assigned to	PCI/ISA PnP
DMA-3 assigned to	PCI/ISA PnP	DMA-7 assigned to	PCI/ISA PnP

■ **IRQ-3 assigned to ‑ IRQ-15 assigned to**

Only after the "Resources Controlled By" setting is set to [Manual] can the following <u>IRQ-3 assigned to ‑ IRQ-15 assigned to</u> settings be changed. These settings are used for the [PCI/ISA PnP] and [Legacy ISA] items.

[PCI/ISA PnP] :   Used for PCI or ISA's PnP Card

[Legacy ISA]   :   Used for ISA Cards that do not comply with PnP

■ **PCI IRQ Activated By**

Designates allocation method used for the PCI slots. The two selections available are [Level]or [Edge]. The [Level] selection is factory set and recommended for most users.

■ **PCI IDE IRQ Map To**

Designates if the CPU board IDE controller's allocation is performed automatically by the PCI, or fixed as ISA. The two selections available are [PCI-AUTO] or [ISA]. The [PCI-AUTO] selection is factory set and recommended for most users.

■ **Primary IDE INT#**

Only after selecting the "PCI IDE IRQ Map To" menu item's [PCI-AUTO] can the <u>Primary IDE INT#</u> setting be used. These settings can be [A], [B], [C] or [D].

6.   INTEGRATED PERIPHERALS SETUP

Selecting INTEGRATED PERIPHERALS SETUP menu item displays the following screen.

```
                    ROM PCI/ISA BIOS(2A5IIU1C)
                    INTEGRATED PERIPHERALS
                      AWARD SOFTWARE, INC.

  Internal PCI/IDE        : Primary      Com 3 & Com 4 Mode      : Enable
  IDE Primary Master PIO  : Auto         Com 3 Port Resource     : 3E8/IRQ11
  IDE Primary Slave PIO   : Auto         Com 4 Port Resource     : 2E8/IRQ10

  IDE Burst Mode          : Disabled
  IDE Date Port Post Write : Enabled
  IDE HDD  Block Mode     : Enabled

  Onboard FDC Controller  : Enabled
  Onboard Serial Port1    : 3F8/IRQ4     ESC : Quit          ←→↑↓   :Select Item
  Onboard Serial Port2    : 2F8/IRQ3     F1  : Help      PU/PD/+/-  :Modify
  UART2 Mode              : Normal       F5  : Old Values (Shift)F2    :Color
  Onboard Parallel Port   : 3BC/IRQ7     F6  : Load BIOS Defaults
  Parallel Port Mode      : Compatible   F7  : Load Setup Defaults
```

■ **Internal PCI/IDE**

   Designates the internal IDE port's setting. The two selections available are [Disabled]or [Primary]. The [Primary] selection is factory set and recommended for most users.

■ **IDE Primary Master PIO**

   Designates the Master Drive's Operation Mode. Only after the "Internal PCI/IDE" has been set to [Primary] can these IDE Primary Master PIO settings be entered. The two selections available are [Auto] or [Mode0]→[Mode4]. The [Auto] selection is factory set and recommended for most users.

■ **IDE Primary Slave PIO**

   Designates the Slave Drive's Operation Mode. Only after the "Internal PCI/IDE" has been set to [Primary] can these IDE Primary Slave PIO settings be entered. The two selections available are [Auto] or [Mode0]→[Mode4]. The [Auto] selection is factory set and recommended for most users.

■ **IDE Burst Mode**

   Only after the Internal PCI/IDE has been set to [Primary] can these IDE Primary Slave PIO settings be entered. The two selections available are [Disabled] or [Enabled]. The [Disabled] selection is factory set and recommended for most users.

■ **IDE Date Port Post Write**

   The two selections available are [Disabled] or [Enabled]. The [Enabled] selection is factory set and recommended for most users.

■ **IDE HDD Block Mode**

Designates the Hard disk's Block Operation Mode. The two selections available are [Disabled] or [Enabled]. The [Enabled] selection is factory set and recommended for most users.

■ **Onboard FDC Controller**

Designates whether the PL's FDD(Floppy Disk Drive) controller is used or not. The two selections available are [Disabled] or [Enabled]. The [Enabled] selection is factory set and recommended for most users.

■ **Onboard Serial Port1**

Designates the PL's Serial 1(COM1) port address setting. The selections include [Disabled], [2F8/IRQ3] or [3F8/IRQ4]. The [3F8/IRQ4] selection is factory set and recommended for most users.

■ **Onboard Serial Port2**

Designates the PL's Serial 1(COM1) port address setting. The selections include [Disabled], [2F8/IRQ3] or [3F8/IRQ4]. The [2F8/IRQ3] selection is factory set and recommended for most users.

■ **UART2 Mode**

Only when the Onboard Serial Port2 is set to [Disabled] can the <u>UART2 Mode</u> be used. The selections include [Normal], [Sharp IR], [IrDA SIR], [IrDA MIR]or[IrDA FIR].The [Normal] selection is factory set and recommended for most users.

■ **Onboard Parallel Port**

Selects the PL's Parallel Port Address. Normally, use [3BC/IRQ7]. The selections include [Disabled], [3BC/IRQ7], [378/IRQ7] or [278/IRQ5]. When any selection other than [Disabled] is used, [EPP], [ECP], [Compatible] or [Extended] must also be selected. Also, if [EPP] has been selected, either Ver [1.7]or Ver [1.9] must be selected. Last, if [ECP] has been selected, either <u>ECP Mode use DMA</u>'s [1] or [3] must also be selected.

■ **Parallel Port Mode**

Here, the parallel port's single-direction ([Normal]) or dual-direction ([EPP], [ECP] or [ECP→EPP]) modes can be selected. The selections include [Compatible], [Extended] or [ECP]. Normally, [Compatible] is used, however when a selection other than [Compatible] is used, the [ECP mode Use DMA] selection must also be used.

■ **ECP Mode Use DMA**

Designates which DMA setting is used for the ECP mode. The two selections available are [1] or [3]. The [1] selection is factory set and recommended for most users.

■ **Com 3 & Com 4 Mode**

Designates whether the PL's COM3 and COM4 (Touch Panel) are used or not. The two selections available are [Disabled] or [Enabled].

■ **Com 3 Port Resource**

Only when the "Com 3 & Com 4 Mode" is set to [Enabled] will this selection appear. The [3E8/IRQ11] selection is factory set and recommended for users.

■ **Com 4 Port Resource**

Only when the Com 3 & Com 4 Mode is set to [Enabled] will this selection appear. The [2E8/IRQ10] selection is factory set and recommended for most users.

7. IDE HDD AUTO DETECTION SETUP

Selecting the IDE HDD AUTO DETECTION menu item produces the following screen.

Provides automatic detection of any hard disk connected to the IDE. Normally unused.

```
                    ROM PCI/ISA BIOS(2A5IIU1C)
                        CMOS SETUP UTILITY
                       AWARD SOFTWARE, INC.

  HARD  DISKS  TYPE  SIZE  CYLS  HEAD  PRECOMP  LANDZ  SECT0R  MODE
  Primary  Master  :



           Select Primary Master        Option(N=Skip) : N
           OPTIONS   SIZE   CYLS  HEAD  PRECOMP  LANDZ  SECTOR  MODE
            2(Y)     1630    790   64       0     3161    63      LBA
             1       1632   3162   16     65535   3161    63    NORMAL
             3       1632   1581   32     65535   3161    63    LARGE


   Note  :   Some OS (like SCO-UNIX) must use "NORMAL" for Installation


                              ESC:Skip
```

8. HDD LOW LEVEL FORMAT SETUP

Selecting the HDD LOW LEVEL FORMAT menu item produces the following screen.

Performs low-level formatting of the hard disk. Normally unused.

```
                    ROM PCI/ISA BIOS(2A5IIU1C)
                        CMOS SETUP UTILITY
                      AWARD SOFTWARE, INC.

                        HARD DISK initalizing

                       Please wait a moment...


    Detecting HDD Primary Master  ...  FUJITSU M2724TA

    Detecting HDD Primary Slave   ...  None


    Primary Master:   1632   3162   16    65535   3161   63      Auto
    Primary Slave :    0      0     0      0      65280   0    Auto
```
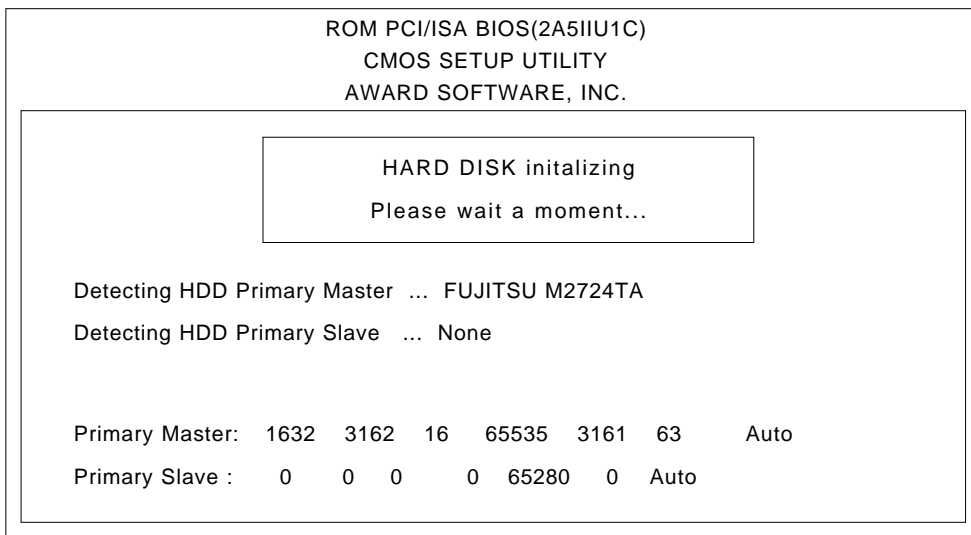
Chapter 6

Bundled Software

1. PL-6700 Floppy Disk File List

The Digital Electronics Corporation has prepared the following additional program files, which are not supported by the standard version of Windows® 95 or WindowsNT® .

This chapter describes the contents of the PL's additional program files, hereafter referred to as "PL Software".

6-1   PL-6700 Floppy Disk File List

⚠ *Important*

 • *If the User installs an OS (operating system) other than that written here, the correct operation of the following programs cannot be guaranteed.*

File Name	Contents
README.95E	This file is for Windows 95 users and contains the latest detailed information about the PL's additional software programs. Please be sure to read this file before operating any of the PL's additional software.
README.NTE	This file is for Windows NT users and contains the latest detailed information about the PL's additional software programs. Please be sure to read this file before operating any of the PL's additional software.

The following additional program files are designed to run on both the Windows® 95 and Windows NT® operating systems.

File Name	Contents
DISP.EXE	This program is used to turn the PL's display ON or OFF. (includes turning backlight OFF)
FANALARM.EXE	Used to detect the CPU's cooler fan alarm.
BLSAVER.SCR	This screen saver program is used to turn the PL's backlight OFF.
PL67API.DLL	This DLL is used by the DISP, FANALARM, and BLSAVER programs. Both the Windows 95 and Windows NT versions of this file are included.
PL67DRV.SYS	This file is the device driver used by the PL67API.DLL, specifically for the Windows NT OS.

MEMO

Chapter 7

Maintenance and Inspection

1. Cleaning the Display
2. Filter Cleaning
3. Periodic Check

This chapter describes how to properly maintain your PL unit.

7-1	Cleaning the Display
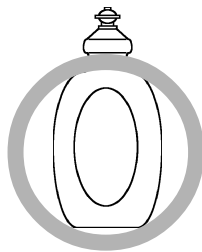
Neutral detergent
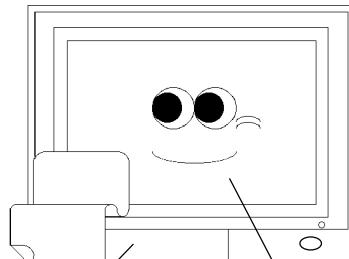
Maintenance panel   Display

When the display surface or frame become dirty, use a soft cloth moistened with neutral detergent to wipe away any dust or stains.
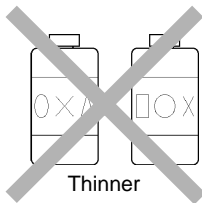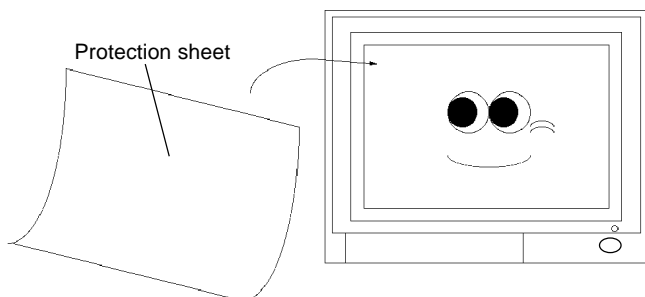
Thinner
Organic solvent
Strong acid
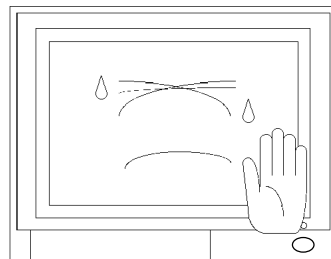
Do <u>not</u> clean the unit with thinner, organic solvents, or strong acids.
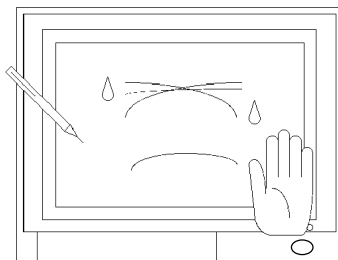
Do not use sharp or hard objects, such as a mechanical pencil or screwdriver, to push on the display. This could damage the unit.

Protection sheet

Use the screen protection sheet when using the PL in extremely dirty or dusty areas.

■ **About the Moisture Resistant Gasket**

The moisture resistant gasket protects the GP and improves its water resistance. For instructions on installing the GP's gasket,

▼ *Reference* *Chapter 3.1 "Installation and Wiring"*

⚠ **!** ⚠
Important

- *A gasket which has been used for a long period of time may have scratches or dirt on it, and could have lost much of its water resistance. Be sure to change the gasket periodically (or when scratches or dirt become visible).*

7-2	Filter Cleaning

Since excessive dirt and dust in the filter of the PL-6700's cooling fan can potentially affect the performance of the unit, regular inspection and cleaning of the filter is strongly recommended.

Cleaning the PL-6700 cooling unit's filter:
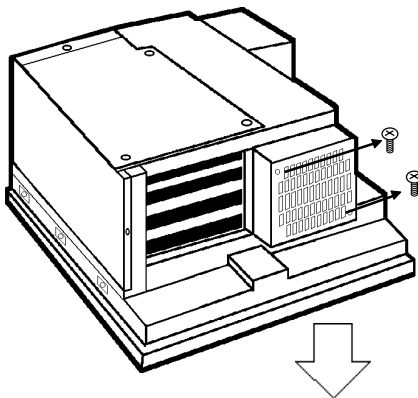
1) **Remove the cooling fan cover's two (2) attachment screws.**

🤚 CAUTION! *Be sure to not drop the filter after removing the cover.*
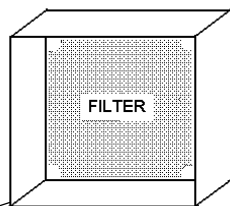
FILTER

2) **Remove the filter from the fan cover.**
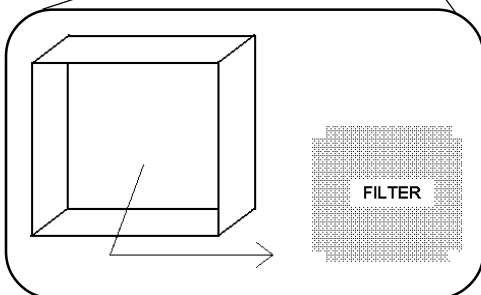
FILTER
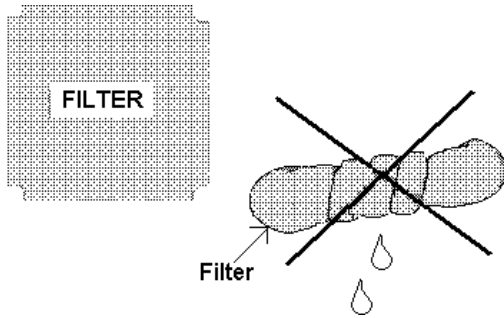
FILTER

Filter

3) Clean the filter completely.
If stubborn dirt or stains are present, wash the filter with a neutral detergent.

CAUTION!

- *Be sure the filter is completely dry before reattaching the filter to the fan cover.*
- *Do not wring the filter to dry it. Allow it to air dry.*

4) After reattaching the filter to the fan cover, reattach the filter cover to the cooling unit with the two cover attachment screws.

7-3	Periodic Maintenance Check Points

Check the PL periodically to ensure it is in good working condition.

- Ambient Environment

  □ Is the ambient temperature within the specified range?

  5 to 40°C   for the PL-6700T andPL-6700S

  □ Is the ambient humidity within the specified range (30 to 85 %RH) ?

  □ Is the atmosphere free of corrosive gas ?

- Electrical Specifications

  □ Is the voltage adequate (85 to 132 V AC, 50/60 Hz) ?

                     (170 to 260V AC, 50/60 Hz) ?

- Installation Conditions

  □ Is the connection cable firmly connected (not loose) ?

  □ Are any bolts or screws loose ?

  □ Are there any flaws or tears in the moisture resistant packing ?

- Display Conditions

  □ Is the display bright enough ?

NOTE

When the PL's backlight needs to be replaced, please contact your nearest authorized service center for prompt service.

MEMO

Hardware Configuration

1. Hardware Configuration
2. Serial Communications
3. Printer Cable Connections
4. BIOS Lists

1	Hardware Configuration

1. I/O Mapping

Address	AT system device	System-specific device
0000H - 001FH	DMA controller (8237)	
0020H - 003FH	Interrupt controller (8259A)	
0040H - 005FH	System timer (8254)	
0060H - 006FH	Keyboard (H8/3332)	
0070H - 007FH	Real-time clock, NMI mask	
0080H - 009FH	DMA bank register	
00A0H - 00BFH	Interrupt controller (8259A)	
00C0H - 00DFH	DMA controller 2 (8237)	
00F0H - 00FFH	Numeric data processor	
016CH - 016FH	Used by main board	016EH FAN ALARM
01F0H - 01FFH	Hard disk (IDE)	
0200H - 0207H	Game I/O *1	
02E8H - 02EFH	Serial port 4 (COM4) : Touch panel	Touch panel
02F8H - 02FFH	Serial port 2 (COM2) : General Use	or, used for IrDA
03B0H - 03BBH	Video controller (VGA)	
03BCH - 03BFH	Parallel port 1 (LPT1) : Printer	
03C0H - 03DFH	Video controller (VGA)	
03E8H - 03EFH	Serial port 3 (COM3): General Use	
03F0H - 03F7H	Floppy disk controller	
03F8H - 03FFH	Serial port 1 (COM1) :General Use	

*1 The game I/O is not used by the PL system, but is normally reserved.

<Extended I/O Bit Mapping>

Address #16EH is used by the PL system: do not assign it to other devices.

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Sw4	Sw3	Sw2	Sw1			CPU Fan	Power Fan

Sw1 to Sw4: Circuit board switch (SW)'s lead.

CPU Fan: H = normal, L = Fan alarm

Power Fan: H = Fan alarm, L = normal

2. Memory Mapping

```
┌─────────────────────────────────┐
│      BIOS ROM : 80 KB           │
├─────────────────────────────────┤ 4000000H
≈                                 ≈
┌─────────────────────────────────┐
│                                 │
│                                 │
│                                 │
│                                 │
│       DRAM area : 64 MB         │
│                                 │
│                                 │
│                                 │
│                                 │
├─────────────────────────────────┤ 100000H
│      BIOS ROM : 80 KB           │
├─────────────────────────────────┤ 0EC000H
│     Extended ROM area *1        │
├─────────────────────────────────┤ 0CC000H
│         VGA BIOS                │
├─────────────────────────────────┤ 0C0000H
│         V-RAM                   │
├─────────────────────────────────┤ 0A0000H
│                                 │
│     Main memory : 640 KB        │
│                                 │
└─────────────────────────────────┘ 000000H
```

---
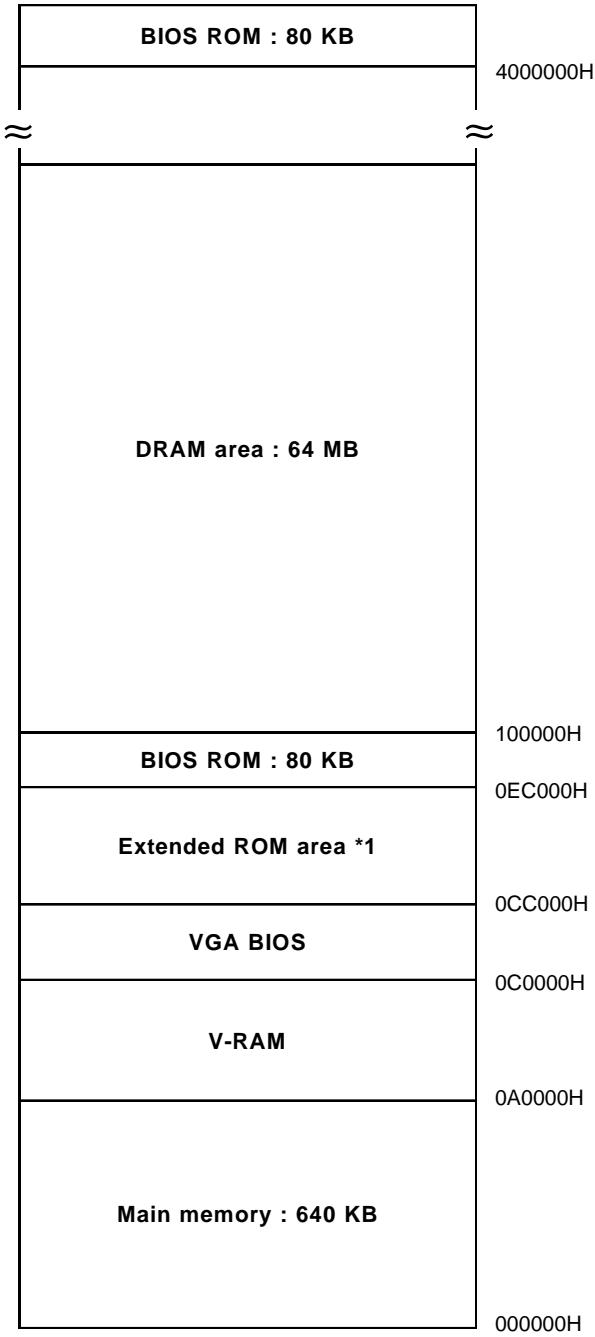
*1 *This area is reserved for extended boards.*

3. IRQ Mapping

■ Hardware Interruption List

	Description
NMI	Parity error or I/O channel check
IRQ 0	Timer (in the chipset)
IRQ 1	Keyboard
IRQ 2	Cascade from controller 2
IRQ 3	Serial port 2 (COM2) : General Use port
IRQ 4	Serial port 1 (COM1) : General Use port
IRQ 5	Available to User
IRQ 6	Floppy disk controller
IRQ 7	Parallel port 1 (LPT1) : Printer port
IRQ 8	Real time clock
IRQ 9	Video controller (VGA) *1
IRQ 10	Serial port 4 (COM4) : Touch panel
IRQ 11	Serial port 3 (COM3) : General Use Port
IRQ 12	PS/2 mouse
IRQ 13	Numeric data processor
IRQ 14	Hard disk (IDE)
IRQ 15	Available to User

■ DMA Channel List

	Description	
DMA 0		
DMA 1		For 8-bit transmission
DMA 2	Floppy disk controller	
DMA 3		
DMA 4	Cascade to controller 1	
DMA 5		For 16-bit transmission
DMA 6		
DMA 7		

*1 IRQ 9 is not used by the PL, but reserved as standard.

2 | Serial Communication

This section explains how to perform serial communications with the PL.

■ RS-232C (COM1/COM2/COM3) Cable Connections

<Example 1>

PL				Dsub 25-pin	
1	CD			1	FG
2	RD			2	SD
3	TD			3	RD
4	DTR			4	RTS
5	GND			5	CTS
6	DSR			6	DSR
7	RTS			7	SG
8	CTS			8	CD
9	RI			20	DTR

<Example 2>

PL				Dsub 25-pin	
1	CD			1	FG
2	RD			2	SD
3	TD			3	RD
4	DTR			4	RTS
5	GND			5	CTS
6	DSR			6	DSR
7	RTS			7	SG
8	CTS			8	CD
9	RI			20	DTR
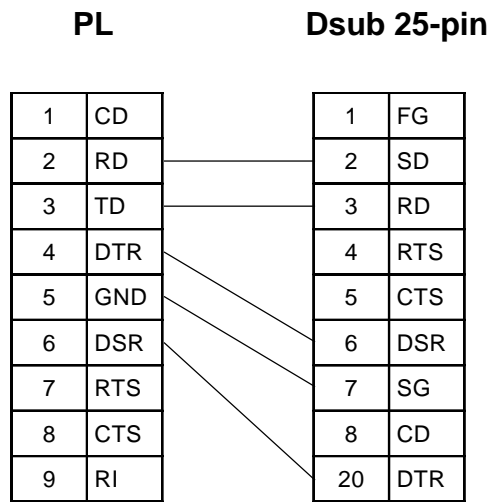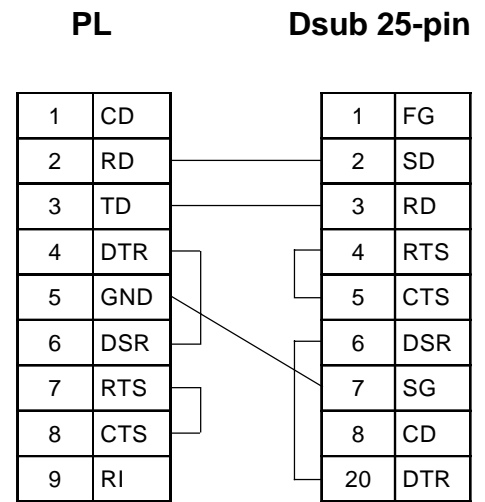
3	**Printer Cable Connections**

Below is an example of how to connect a printer to the PL.

Example: Connection to a printer with Centronics port

Printer (36-pin connector)   **PL (Dsub 25-pin male connector)**

Printer	PL
1	1 $\overline{\text{STROBE}}$
19	14 $\overline{\text{AUTOFD}}$
2	2 DATA 0
20	15 $\overline{\text{ERROR}}$
3	3 DATA 1
21	16 $\overline{\text{INIT}}$
4	4 DATA 2
22	17 $\overline{\text{SLCTIN}}$
5	5 DATA 3
23	18 GND
6	6 DATA 4
24	19 GND
7	7 DATA 5
25	20 GND
8	8 DATA 6
26	21 GND
9	9 DATA 7
27	22 GND
10	10 $\overline{\text{ACKNLG}}$
28	23 GND
11	11 BUSY
29	24 GND
12	12 PE
30	25 GND
13	13 SLCT
31	
14	
32	
15	
33	
16	
34	
17	
35	
18	
36	

Connector Case   **Shield**   **Connector Case**
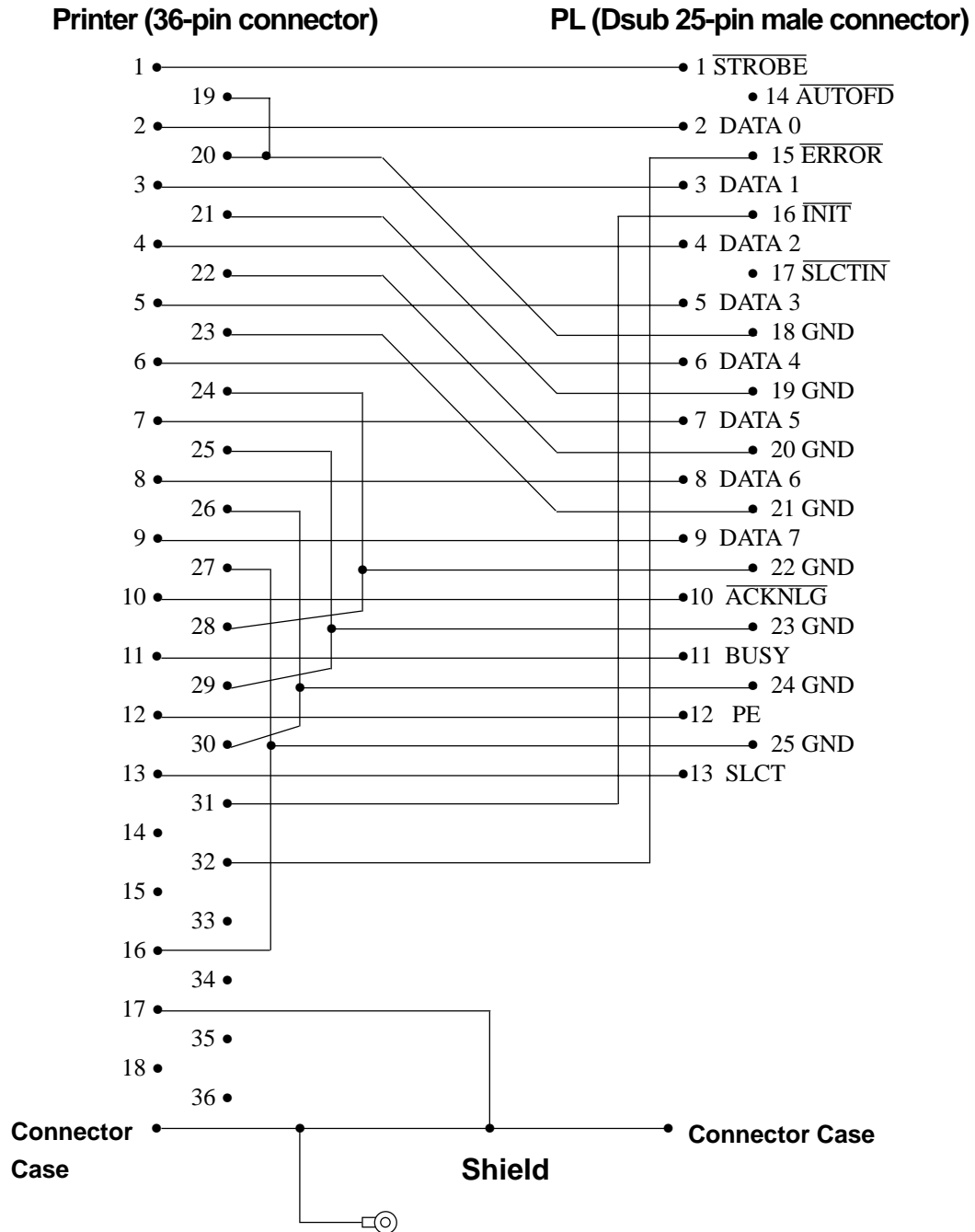
4	**BIOS Lists**

■ INT 5h Display Hard Copy

Operation	Input	Output
Screen hard copy		0050:0000h Print-screen flag 0: Hard copy function unused or completed successfully 1: Now printing -1: Error

■ INT 10h Video BIOS

Operation	Input	Output
Setting video mode	AH = 00h AL = Value of selected mode (Bits 0 ~ 6), Video RAM clear(Bit 7)	
Setting cursor shape	AH = 01h CH = Cursor start position and display CL = Cursor end position	
Setting cursor position	AH = 02h BH = Page No. DH = Value of specified line DL = Value of specified column	
Reading cursor position	AH = 03h BH = Page No.	CH = Cursor start position and display CL = Cursor end position DH = Current cursor line position DL = Current cursor column position
Reading light pen position	AH = 04h	AH = 0: Light pen switch is off. = 1: Light pen switch is on. BX = X coordinate (0 - 319, 639) CH = Y coordinate (0 - 199) CX = Y coordinate in new graphic mode (0, XXX) DH = Light pen line position in character units DL = Light pen column position in character units
Switching active page	AH = 05h AL = Page No.	

Scrolling up	AH = 06h
	AL = Number of lines to scroll up
	BH = Attribute of line to clear
	CH = Highest line in scroll up range
	CL = Farthest left column in scroll up
	   range
	DH = Lowest line in scroll up range
	DL = Farthest right column in scroll up
	   range	

Scrolling down	AH = 07h
	AL = Number of lines to scroll down
	BH = Attribute of line to clear
	CH = Highest line in scroll down range
	CL = Farthest left column in scroll down
	   range
	DH = Lowest line in scroll down range
	DL = Farthest right column in scroll down
	   range	

Operation	Input	Output
Reading character/attribute at cursor position	AH = 08h BH = Page No.	AL = Character code AH = Attribute (In text mode)
Writing character/attribute at cursor position	AH = 09h AL = Character code BH = Page No. BL = Attribute CX = Number of characters to output	
Writing character at cursor position	AH = 0Ah AL = Character code BH = Page No. BL = Attribute (Effective only in graphic mode) CX = Number of characters to output	
Setting color pallet		
Setting overscan, background color, and display color brightness	AH = 0Bh BH = 00h BL = Color code	
Setting color group	AH = 0Bh BH = 01h BL = Color group	
Writing point in graphic mode	AH = 0Ch AL = Attribute BH = Page No. CX = X coordinate DX = Y coordinate	
Reading point in graphic mode	AH = 0Dh BH = Page No. CX = X coordinate DX = Y coordinate	AL = Attribute
Writing character/attribute at cursor position and move cursor	AH = 0Eh AL = Character code BL = Attribute (Effective only in graphic mode)	
Reading video data	AH = 0Fh	AH = Number of single lines AL = Video mode BH = Active page No.
Setting pallet register		
Setting pallet register	AH = 10h AL = 00h BH = Pallet code BL = Pallet register No.	
Setting overscan register	AH = 10h AL = 01h BH = Pallet code	
Setting pallet register and overscan register	AH = 10h AL = 02h ES:DX= 17-byte data address	
Setting attribute code intensity/brink	AH = 10h AL = 03h BH = 00h: Set attribute bit 7 to intensity function. = 01: Set attribute bit 7 to blink function.	
Reading basic pallet register	AH = 10h AL = 07h BL = Basic pallet register to read (0 - 15)	BH = Value read

Operation		Input	Output
Setting pallet register			
	Reading overscan register	AH = 10h AL = 08h	BH = Value read
	Reading basic pallet register and overscan register	AH = 10h AL = 09h ES:DX = 17-byte buffer in which return value is located	
	Setting expansion pallet register	AH = 10h AL = 10h BX = Selected expansion pallet register DH = Red value CH = Green value CL = Blue value	
	Setting block in expansion pallet register	AH = 10h AL = 10h ES:DX = Color value table BX = First expansion pallet register to set CX = Number of blocks set inexpansion pallet registers	

	Selecting pallet page mode	AH = 10h
		AL = 12h
		BL = 00h
		BH = Pallet page mode
		   = 00h: 4-pallet page mode
		   = 01h: 16-pallet page mode	

	Selecting pallet page	AH = 10h AL = 13h BL = 01h BH = Expansion pallet page No.	
	Reading expansion pallet register	AH = 10h AL = 15h BX = Expansion pallet register to read	
	Reading block in expansion pallet register	AH = 10h AL = 17h ES:DX = Buffer address of value to read BX = Expansion pallet address No. where to start reading CX = Number of registers to read	Buffer selected in ES:DX

	Reading pallet page	AH = 10h
		AL = 17h
			Current pallet page
			BL = mode
			   = 0: 4-pallet page mode
			   = 1: 16-pallet page mode
			BH = Current expansion pallet page mode

	Gray scale conversion	AH = 10h AL = 1Bh BX = First expansion pallet register CX = Number of expansion pallet registers to convert	
Font registration			
	Font registration of user-defined character	AH = 11h AL = 00h BH = Number of vertical bits in character BL = Character generator bank No. CX = Number of characters to register DX = First character code to register ES:BP = Top address in user-defined table	

Operation	Input	Output
Font registration		
8 x 14 dot font registration (PC character set, inside video BIOS ROM)	AH = 11h AL = 01h BL = Character generator bank No.	
8 x 8 dot font registration (PC character set, inside video BIOS ROM)	AH = 11h AL = 02h BL = Character generator bank No.	
Overwriting character map register	AH = 11h AL = 03h BL = Character map register value	
8 x 16 dot font registration (PC character set, inside video BIOS ROM)	AH = 11h AL = 04h BL = Character generator bank No.	
Font registration of user-defined character (Video controller auto set)	AH = 11h AL = 10h BH = Number of vertical bits in character (Horizontal fixed to 8 bits) BL = Character generator bank No. CX = Number of characters to register DX = First character code to register ES:BP = Top address in user-defined table	
8 x 14 dot font registration (PC character set, inside video BIOS ROM) [Video controller auto set]	AH = 11h AL = 11h BL = Character generator bank No.	
8 x 8 dot font registration (PC character set, inside video BIOS ROM) [Video controller auto set]	AH = 11h AL = 12h BL = Character generator bank No.	
8 x 16 dot font registration (PC character set, inside video BIOS ROM) [Video controller auto set]	AH = 11h AL = 14h BL = Character generator bank No.	
Font registration (CGA) in 0:7Ch (INT 1Fh)	AH = 11h AL = 20h ES:BP = Top address in font table	

Font registration (CGA) in 0:10Ch (INT 43h)	AH = 11h
	AL = 21h
	BL = 0: (Number of lines per DL register value)
	    1: 14 lines
	    2: 25 lines
	    3: 43 lines
	CX = Number of vertical bits per character
	DL = Number of screen lines (When BL = 0)
	ES:BP = Top address in font table	

8 x 14 dot font registration (PC character set, inside video BIOS ROM) [Graphics]	AH = 11h
	AL = 22h
	BL = 0: (Number of lines per DL register value)
	    1: 14 lines
	    2: 25 lines
	    3: 43 lines
	DL = Number of screen lines (When BL = 00h)	

Operation	Input	Output
Font registration		

8 x 8 dot font registration (PC character set, inside video BIOS ROM) [Graphics]	AH = 11h
	AL = 23h
	BL = 0: (Number of lines per DL register value)
	  1: 14 lines
	  2: 25 lines
	  3: 43 lines
	DL = Number of screen lines (When BL = 00h)	

8 x 16 dot font registration (PC character set, inside video BIOS ROM) [Graphics]	AH = 11h
	AL = 24h
	BL = 0: (Number of lines per DL register value)
	  1: 14 lines
	  2: 25 lines
	  3: 43 lines
	DL = Number of screen lines (When BL = 00h)	

Reading font table data	AH = 11h
	AL = 30h
	BL = 0: Return INT 1Fh (CGA font) entry address with ES:BP register.
	  1: Return INT 43h entry address with ES:BP register.
	  2: Return 8 x 14 font address with ES:BP register.
	  3: Return 8 x 8 font address with ES:BP register.
	  4: Return 8 x 8 font (80h) address with ES:BP register.
	  5: Reserved
		CX = Number of vertical bits per character
		DL = Number of lines per screen - 1
		ES:BP = Address of data specified in BH

Performance selection		
Reading video mode data (Color/B/W mode)	AH = 12h BL = 10h	BH = 0: Color mode 1: B/W mode (MDA mode) BL = Video RAM memory size CH = Reserved CL = DIP switch setting
Selecting video BIOS print-screen	AH = 12h BL = 20h	

Selecting vertical resolution	AH = 12h
	BL = 30h
	AL = Selected vertical resolution
	  = 00h: 200 display lines
	  = 01h: 350 display lines
	  = 02h: 400 display lines
		AL = 12h Successfully executed

Default pallet load enable/disable	AH = 12h
	BL = 31h
	AL = Load selection
	  0: Default pallet loading enabled
	  1: Default pallet loading disabled
		AL = 12h Successfully executed

Video enable/disable	AH = 12h BL = 32h AL = 0: Video enabled 1: Video disabled	AL = 12h Successfully executed
Gray scale enable/disable	AH = 12h BL = 33h AL = 0: Gray scale enabled 1: Gray scale disabled	AL = 12h Successfully executed

Operation	Input	Output
Performance selection		

Cursor emulator enable/disable	AH = 12h
	BL = 34h
	AL = Selection
	    0: Cursor emulator enabled
	    1: Cursor emulator disabled
		AL = 12h : Successfully executed

Screen ON/OFF	AH = 12h BL = 36h AL = 0: Screen ON 1: Screen OFF	AL = 12h : Successfully executed
Character string output to screen		
Character output without cursor movement	AH = 13h AL = 00h BH = Page No. BL = Attribute CX = Length DH = Starting line position of first character in character string DL = Starting column position of first character in character string ES:BP = Top address in character string	
Character output with cursor movement	AH = 13h AL = 01h BH = Page No. BL = Attribute CX = Number of characters DH = Starting line position of first character in character string DL = Starting column position of first character in character string ES:BP = Top address in character string	
Character output and attribute selection without cursor movement	AH = 13h AL = 02h BH = Page No. CX = Number of characters DH = Starting line position of first character in character string DL = Starting column position of first character in character string ES:BP = Top address in character string	
Character output and attribute selection with cursor movement	AH = 13h AL = 03h BH = Page No. CX = Number of characters DH = Starting line position of first character in character string DL = Starting column position of first character in character string ES:BP = Top address in character string	
Display combination code		
Reading display combination code	AH = 1Ah AL = 00h	AL = 1Ah : Successfully executed BL = Active-display code BH = Nonactive-display code
Writing display combination code	AH = 1Ah AL = 01h BL = Active-display code BH = Nonactive-display code	AL = 1Ah : Successfully executed
Status information	AH = 1Bh BX = Implementation type ES:DI = Return information buffer	AL = 1Bh : Successfully executed

Operation	Input	Output
Video status save & restore		

Reading buffer size	AH = 1Ch
	AL = 00H
	CX = Request status
	    Bit 0: Video hardware status
	    Bit 1: Video BIOS data area
	    Bit 2: Expansion pallet register ssave / restore
		AL = 1Ch : Successfully executed
		BX = Buffer size in 64-byte units

Status save	AH = 1Ch
	AL = 01h
	CX = Request status
	    Bit 0: Video hardware status
	    Bit 1: Video BIOS data area
	    Bit 2:Expansion pallet register ssave / restore
	ES:BX = Address of data save area
		AL = 1Ch : Successfully executed

Status save as	AH = 1Ch
	AL = 02h
	CX = Request status
	    Bit 0: Video hardware status
	    Bit 1: Video BIOS data area
	ES:BX = Bit 2: Expansion pallet register ssave / restore	

■ INT 11h Reading System Data

Operation	Input	Output

Reading system data		AX = System configuration data
		
		AX bit
		
		                    : Number of printer ports
		                    : Number of RS-232C
		Bits 15 & 14 ports
		Bits 11, 10 & 9 : Number of internal
		Bits 7 & 6 FDDs
		        0, 0 : 1
		        0, 1 : 2
		Bits 5 & 4 : Screen mode
		        0, 1 : 40 x 25 line mode
		        1, 0 : 80 x 25 line mode
		Bit 1 : 80287 CPU yes/no
		        0 : No
		        1 : Yes
		Bits 13, 12, 8, 3, 2 & 0 : Reserved

■ INT 12h Reading Memory Size

Operation	Input	Output
Reading memory size		AX =Memory size in 1 K units

■ INT 13h Disk BIOS

Operation	Input	Output
Disk reset	AH = 00h DL = Drive No. (FDD:00h-01h;HDD:80h-81h)	CY = 0: Successfully completed 　 = 1: Error AH = Status Floppy disk status table **Status** / **Description** 　　Successfully completed 00h: Wrong command sent 01h: Cannot find address mark. 02h: Attempted writing on protected 03h: disk 04h: Cannot find requested sector. 06h: Disk was changed. 08h: DMA overrun 10h: CRC error during diskette 20h: reading 40h: Crashed FDC 80h: Crashed during seek operation 　　Timer overflowed Hard disk status table **Status** / **Description** 00h: Successfully completed 01h: Wrong command sent 02h: Cannot find address mark. 04h: Cannot find requested sector. 07h: Drive parameter error 08h: DMA overrun 10h: Error during reading 20h: Crashed HDC 40h: Crashed during seek operation 80h: Timer overflowed BBh: Undefined error
Reading disk drive data	AH = 01h DL = Drive No. (FDD:00h-01h, HDD:80h-81h)	AH = Disk drive status
Reading sector	AH = 02h AL = Number of sectors CH = Track No. CL = Sector No. CH = Cylinder No. CL = Insignificant 8 bits 　　Sector No. (Bits 0 - 6) 　 = Cylinder No. 　　Significant 2 bits (Bits 7 - 8) DH = Head No. DL = Drive No. (FDD: 00h - 01h, 　　HDD: 80h - 81h) ES:BX = Buffer address	CY = 0: Successfully completed 　 = 1: Error AH = Status

Operation	Input	Output

Writing sector	AH = 03h
	AL = Number of sectors
	CH = Track No.
	CL = Sector No.
	CH = Cylinder No. Insignificant 8 bits
	CL = Sector No. (Bits 0 - 6)
	   = Cylinder No. Significant 2 bits (Bits 7-8)
	DH = Head No.
	DL = Drive No. (FDD: 00h - 01h,
	              HDD: 80h - 81h)
	ES:BX = Buffer address
		CY = 0: Successfully completed
		    = 1: Error
		AH = Status

Sector content check	AH = 04h
	AL = Number of sectors
	CH = Track No.
	CL = Sector No.
	CH = Cylinder No. Insignificant 8 bits
	CL = Sector No. (Bits 0 - 6)
	   = Cylinder No. Significant 2 bits (Bits 7- 8)
	DH = Head No.
	DL = Drive No. (FDD: 00h - 01h,
	              HDD: 80h - 81h)
		CY = 0: Successfully completed
		    = 1: Error
		AH = Status

Track/Cylinder format	AH = 05h
	AL = Track/Cylinder No.
	    Insignificant 8 bits
	CL = Track/Cylinder No.
	    Significant 2 bits (Bits 7 - 8)
	DH = Head No.
	DL = Drive No.
	ES:BX = Top address in format data table
		CY = 0: Successfully completed
		    = 1: Error
		AH = Status

Reading drive parameters	AH = 08h
	DL = Drive No. (FDD: 00h - 01h,
	              HDD: 80h - 81h)
		CY = 0: Successfully completed
		    = 1: Error
		AH = Status
		
		When FDD drive No. specified in DL
		
		ES:DI = Drive parameter starting address
		CH = Insignificant 8 bits in 10 bit value for max.
		    number of tracks
		CL = Bits 7 & 6: Insignificant 2 bits in 10 bit value
		         for max. number of tracks
		    Bits 5 - 0: Max. number of sectors per track
		DH = Max. number of heads
		DL = Number of built-in floppy disk drives
		BL = Bits 3 - 0: CMOS valid drive type value
		    Bits 7 - 4: Fixed to 0
		
		When HDD drive No. specified in DL
		
		CH = Max. number of cylinders
		CL = Max. number of usable sectors and
		    Significant bit in max. number of cylinders
		DH = Max. number of usable heads
		DL = Number of built-in hard disk drives

Operation	Input	Output
Hard disk drive parameter initialization	AH = 09h DL = Drive No.	CY = 0: Successfully completed = 1: Error AH = Status
Hard disk seek	AH = 0Ch CH = Insignificant 8 bits in cylinder No. CL = Significant 2 bits in cylinder No. DL = Drive No. DH = Head No.	CY = 0: Successfully completed = 1: Error AH = Status
Hard disk drive reset	AH = 0Dh DL = Drive No.	CY = 0: Successfully completed = 1: Error AH = Status
Hard disk drive ready check	AH = 10h DL = Drive No.	CY = 0: Successfully completed = 1: Error AH = Status
Hard disk drive recalibration	AH = 11h DL = Drive No.	CY = 0: Successfully completed = 1: Error AH = Status

Disk type check	AH = 15h
	DL = Drive No.
		CY = 0: Successfully completed
		    = 1: Error
		CX:DX = Total number of sectors (HDD only)
		AH = 00h: No disk
		    = 01h: Floppy disk unchanged
		    = 02h: Disk was changed
		    = 03h: Hard disk

Media change check	AH = 16h
	DL = Drive No.
		AH = 00h: Disk unchanged
		    = 01h: Inconsistent parameter
		    = 06h: Disk was changed (Carry bit ON)
		    = 80h: Drive not ready

Setting drive type for formatting	AH = 17h
	DL = Drive No.
	AL = 0: No disk
	    1: Use 2-sided disk on 2-sided drive.
	    2: Use 2-sided disk on high-density drive.
	    3: Use 2HD disk on high-density drive.
	    4: Use 720K disk on 720K-byte drive.
		CY = 0: Successfully completed
		    = 1: Error
		AH = Status

Setting media type for formatting	AH = 18h CH = Insignificant 8 bits in 10 bit value for max. number of tracks CL = Bits 7 & 6: 10 bit value for max. number of tracks Bits 5 - 0: Max. number of sectors per track DL = Drive No.	ES:DI = Address of drive parameter table for floppy disk type AH = 00h and CY =0: Supports tracks and number of tracks per sector. AH = 01h and CY =1: Cannot use function. AH = 00h and CY =1: Does not support tracks and number of tracks per sector.

■ INT 14h RS-232C

Operation	Input	Output

Setting RS-232C line mode	AH = 00h
	AL = Line mode/Parameter
	    Bits 7, 6, 5: Baud rate
	      0, 0, 0: 110 Bauds
	      0, 0, 1: 150 Bauds
	      0, 1, 0: 300 Bauds
	      0, 1, 1: 600 Bauds
	      1, 0, 0: 1200 Bauds
	      1, 0, 1: 2400 Bauds
	      1, 1, 0: 4800 Bauds
	      1, 1, 1: 9600 Bauds
	    Bits 4&3: Parity
	      X, 0: No parity
	      0, 1: Odd parity
	      1, 2: Even parity
	    Bit 2: Stop bits
	      0: 1 bit length
	      1: 2 bit length
	    Bits 1&0: Word length
	      1, 0: 7 bits
	      1, 1: 8 bits
	DX = Port No.	

Sending 1-byte data	AH = 01h
	AL = Data to send
	DX = Port No.
		AH = Line control status
		    Bit 7: Time over error
		    Bit 6: Transmission shift register empty
		    Bit 5: Transmission hold register empty
		    Bit 4: Break detected
		    Bit 3: Framing error
		    Bit 2: Parity error
		    Bit 1: Overrun
		    Bit 0: Data ready

Receiving 1-byte data	AH = 02h DX = Port No.	AL = Received data AH = Line control status

Reading communication port status	AH = 03h
	DX = Port No.
		AL = Line control status
		AL = Modem status
		    Bit 7: Carry detected
		    Bit 6: Call signal received
		    Bit 5: Data-set ready
		    Bit 4: Transmission enabled (CTS)
		    Bit 3 - 0: Not in use

■ INT 15h Other System Services

Operation	Input	Output

Wait time check	AH = 83h
	AL = 00h: Interval timer start
	      01h: Interval timer stop
	ES:BX = End flag address
	CX:DX = Wait time in 1 µsec units
		CY = 0: Successfully completed
		     = 1: Error

Operation	Input	Output
Joystick		

Reading button status	AH = 84h
	DX = 00h
		AL = Button status
		    00h: Pressed
		    01h: Not pressed
		    Bit 7: 2nd button status on 2nd joystick
		    Bit 6: 1st button status on 2nd joystick
		    Bit 5: 2nd button status on 1st joystick
		    Bit 4: 1st button status on 1st joystick

Reading resistance value	AH = 84h DX = 01h	AX = Resistance value of horizontal coordinate of 1st joystick BX = Resistance value of vertical coordinate of 1st joystick CX = Resistance value of horizontal coordinate of 2nd joystick DX = Resistance value of vertical coordinate of 2nd joystick
Wait timer overwait	AH = 86h CX:DX = Wait time in μsec units	CY = 0: Successfully completed = 1: Already triggered or not supported

Transmitting memory block in protect mode	AH = 87h
	ES:SI = Top address in descriptor
	
	ES:SI = <table><tr><td>Dummy (00h)</td></tr><tr><td>GDT (00h)</td></tr><tr><td>Source segment descriptor</td></tr><tr><td>Destination segment descriptor</td></tr><tr><td>BIOS CS (00h)</td></tr><tr><td>SS (00h)</td></tr></table>
	CX = Number of words to transfer
		ZF = 1: Successfully completed
		CY = 1: Error
		AH = 00h: Successfully completed
		    = 01h: RAM parity error
		    = 02h: Not in protect mode

Engaging the protect mode	AH = 89h BH = Offset of insignificant (mask) interrupt vector address BL = Offset of significant (slave) interrupt vector address ES:SI = Top address in below table <table><tr><td>CS dummy (00h)</td></tr><tr><td>GDT</td></tr><tr><td>IDT</td></tr><tr><td>DS</td></tr><tr><td>ES</td></tr><tr><td>SS</td></tr><tr><td>CS</td></tr><tr><td>TEMP BIOS CS(00h)</td></tr></table>	CY = 0: Successfully completed AH = 00h CS = CS value specified in ES:SI table DS = DS value specified in ES:SI table ES = ES value specified in ES:SI table SS = DS value specified in ES:SI table CY = 1: Error AH = FFh

■ **INT 16h Keyboard BIOS**

Operation	Input	Output
Reading data by key input	AH = 00h	AH = Secondary code AL = Primary code (Character code)
Data check by key input	AH = 01h	ZF = 0: Input data exists. = 1: Input data does not exist. AH = Secondary code AL = Primary code (Character code)
Reading shift status	AH = 02h	AL = Shift status
Setting repeat delay and repeat rate	AH = 03h AL = 05h BH = Delay time (Bits 0 &1) BL = Primary code (Bits 0 - 4)	
Writing key data	AH = 05h CH = Secondary code CL = Primary code	AL = 00h: Successfully completed = 01h: No available space in buffer (CY =1)
Wiring data by key input (101/AX keyboard compatible)	AH = 10h	AH = Secondary code AL = Primary code (Character code)
Data check by key input (101/AX keyboard compatible)	AH = 11h	ZF = 0: Input data exists. = 1: Input data does not exist. AH = Secondary code AL = Primary code (Character code)
Reading shift status (101/AX keyboard compatible)	AH = 12h	AL = Shift status 1 AH = Shift status 2

■ **INT 17h Printer BIOS**

Operation	Input	Output
1-character output	AH = 00h AL = Character code of character to DX = output Device No.	AH = Printer status
Printer initialization	AH = 01h DX = Device No.	AH = Printer status
Status check	AH = 02h DX = Device No.	AH = Printer status

■ INT 1Ah Setting/Reading Time and Date

Operation	Input	Output
Reading clock	AH = 00h	CX = Significant 16 bits of current clock data DX = Insignificant 16 bits of current clock data AL = Overflow flag on 24-hour system
Setting clock	AH = 01h CX = Significant 16 bits of clock data DX = Insignificant 16 bits of clock data	

Reading time	AH = 02h	CH = Hours (BCD)
		CL = Minutes (BCD)
		DH = Seconds (BCD)
		DL = Summertime option (0 or 1)
		CY = End status
		    0: Successfully completed
		    1: Error

Setting time	AH = 03h CH = Hours (BCD) CL = Minutes (BCD) DH = Seconds (BCD) DL = Summertime option (0 or 1)	

Reading date	AH = 04h	CH = Western calendar (Year given as 2-digit
		    BCD, significant 2 bits: 19 or 20)
		CL = Year (BCD)
		DH = Month (BCD)
		DL = Day (BCD)
		CY = End status
		    0: Successfully completed
		    1: Error

Setting date	AH = 05h CH = Western calendar (Year given as 2- digit BCD, significant 2 bits: 19 or 20) CL = Year (BCD) DH = Month (BCD) DL = Day (BCD)	

Setting alarm	AH = 06h
	CH = Hours (BCD)
	CL = Minutes (BCD)
	DH = Seconds (BCD)
		CY = End status
		    0: Successfully completed
		    1: Error

Clearing alarm	AH = 07h	

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