

Preface

Digital's PL-5700 series of Panel Computers (hereafter referred to as the "PL") are multipurpose factory automation (FA) computers, which embody Digital's latest, cost-effective architecture.

Before using the PL, be sure to read this manual thoroughly to familiarize yourself with the PL's operation procedures and functions.

The word "PL" refers to the following models:

PL-5700T1-24VC	(with CE marking)
PL-5700T1	(Standard 100V unit)
PL-5701T1	(Standard 100V unit)
PL-5700S1	(Standard 100V unit)
PL-5701S1	(Standard 100V unit)
PL-5700L1	(Standard 100V unit)
PL-5701L1	(Standard 100V unit)

NOTE:

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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 and inform them of your findings.
4. Please be aware that Digital is not responsible for damages resulting from the use of our products, regardless of article 3.
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.

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Safe Product Usage

This manual contains a variety of safety markings to help you safely and correctly operate Digital's PL-5700 series of Panel Computers, which includes the PL-5700T1, PL-5701T1, PL-5700L1, PL-5701L1, PL-5700S1, PL-5701S1, and PL-5700T1-24VC. Be sure to keep this manual handy for future reference.

■ 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 possibility of electrical shock, be sure to connect the power cord to the PL before connecting it to the main power supply.**
- **To avoid fires or electrical shocks, do not use voltages beyond the specified range.**
- **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.**

Preface

- Before replacing the 100V unit's backlight, be sure to turn the unit's power OFF to avoid electrical shocks. (Note: Do NOT attempt to replace the 24V unit's backlight)
- 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 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.



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 not 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.

- **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.**
- **Before the PL is initially started, be sure to install its memory (DIM) module. If this module is not installed, the unit will not operate.**

Notes on Handling the LCD

- The FP'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 (i.e. dark and light points).
- There are minute grid-points on the LCD surface. These points are not defects.
- 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.

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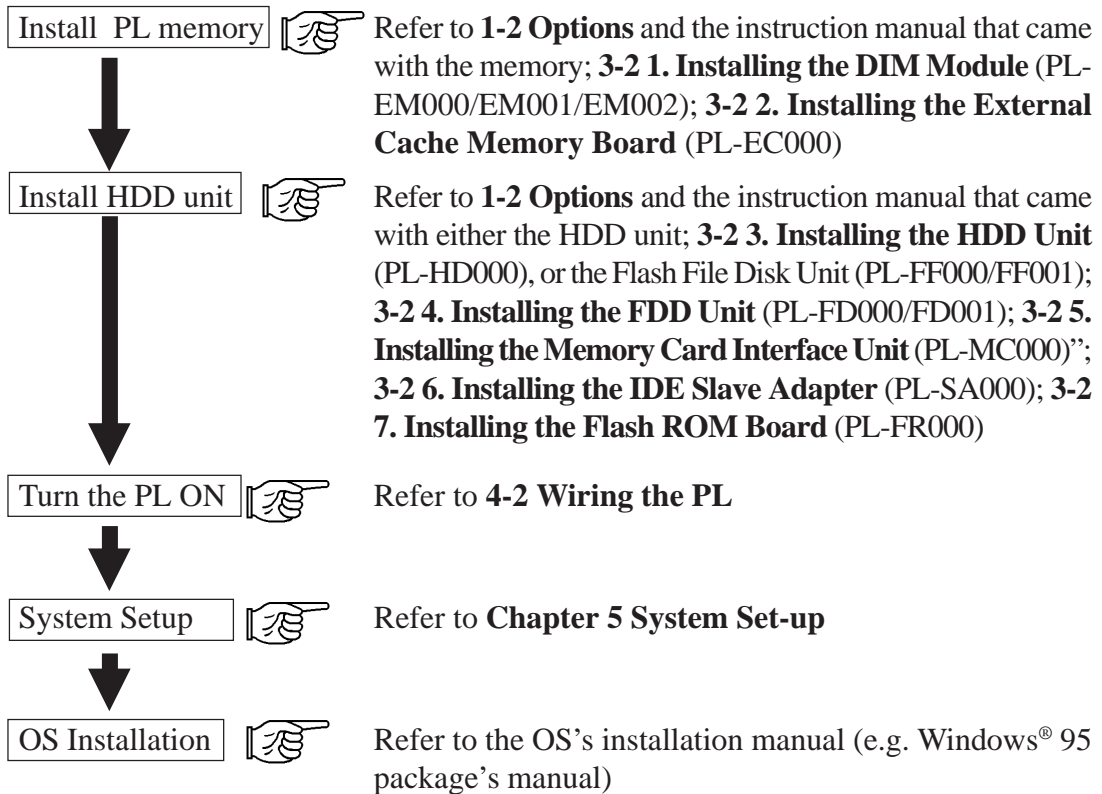
Before Using the PL

Prior to use, be sure your PL is set up as follows.



Caution

- **Before turning the PL ON, be sure to install its memory (DIM module). If this module is not installed, the PL can be turned on, but will not operate.**



- For system setup and OS installation, a PS/2 type keyboard is necessary.
- To use Windows® 3.1 or Windows® 95, install the PL-5700 Driver & Utility Disk’s Display Driver. (For installation information, see the disk’s README.TXT file)
- For information on the PL-5700’s bundled utility software, see the README.TXT file on the Driver & Utility Disk.

Special Features

The main features of PL series displays are as follows:

The Latest, High-Performance Architecture

Designed around the AMD 5x86 133 MHz CPU, the PL utilizes the type of high performance architecture used by most PC compatibles.

Bright 10.4" LCD with a Wide Viewing Angle

The PL's large 10.4-inch 640 x 480 LCD display is available with TFT or STN color, as well as monochrome, each offering excellent visibility and brightness.

- 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.
- In addition to their superior cost performance, Digital's STN type LCDs provide a high quality color display at a reasonable price.
- The black-and-white LCD models are high-performance, low-cost displays, equipped with a virtually maintenance-free backlight. This long lasting light has a service life of 45,000 hours.

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.

High Resolution, Analog-Resistance-Film Touch Panel

Standard equipment with the PL is a high resolution 1024 x 1024 touch panel. Also, the bundled Windows® 95 keyboard emulation utilities and MS-DOS® touch-panel handler allow you to operate a variety of software applications without ever having to connect a keyboard. An optional Windows® 95 mouse emulation utility is also available.

Highly Expandable

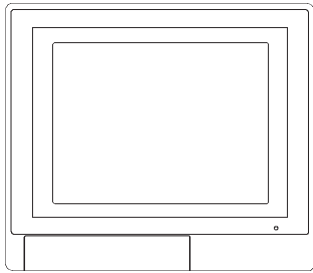
For the easy enhancement of your PL unit, ISA-bus expansion slots are provided. The PL-5700T1, PL-5700T1-24VC, PL-5700S1, and PL-5700L1 each provide three ISA-bus expansion slots, and the PL-5701T1, PL-5701S1, and PL-5701L1 each provide one. These slots can accommodate both Digital's own optional boards as well as other commercially available expansion boards. Digital also offers a wide variety of optional products, such as an HDD unit, an FDD unit, and an external cache memory board.

Unpacking the PL

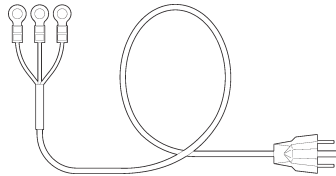
The PL package should include the following items:

PL Unit

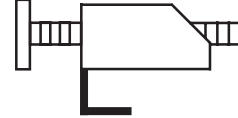
PL-5700T1, PL-5700T1-24VC
 PL-5701T1, PL-5700S1, PL-5701S1,
 PL-5700L1, PL-5701L1



Power Cord (not included with 24V model)



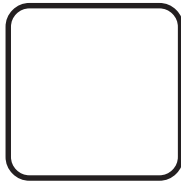
Mounting Brackets (four)



Driver & Utility Disk



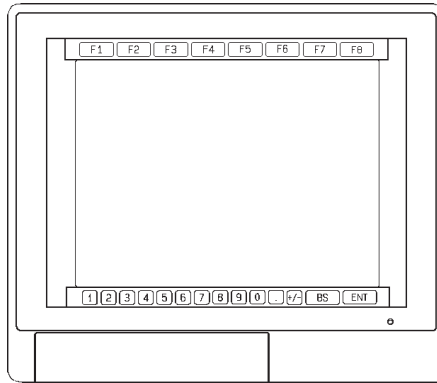
Installation Gasket



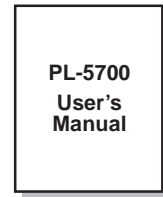
Function Key Labels



When using the function keys, attach the labels as shown below.



Panel Computer PL-5700 Series User's Manual



Information Symbols

This manual uses the following icons.



Indicates a warning or a product limitation. Be sure to follow the instructions given with this icon to insure the safe operation of the PL.



Contains additional or useful information.

*

Indicates terms or items that require further explanation. See the footnote on that page.



Indicates pages containing related information.

1. 2. Indicates steps used to accomplish a given task. Be sure to follow these steps in the order they are written.

1 Overview

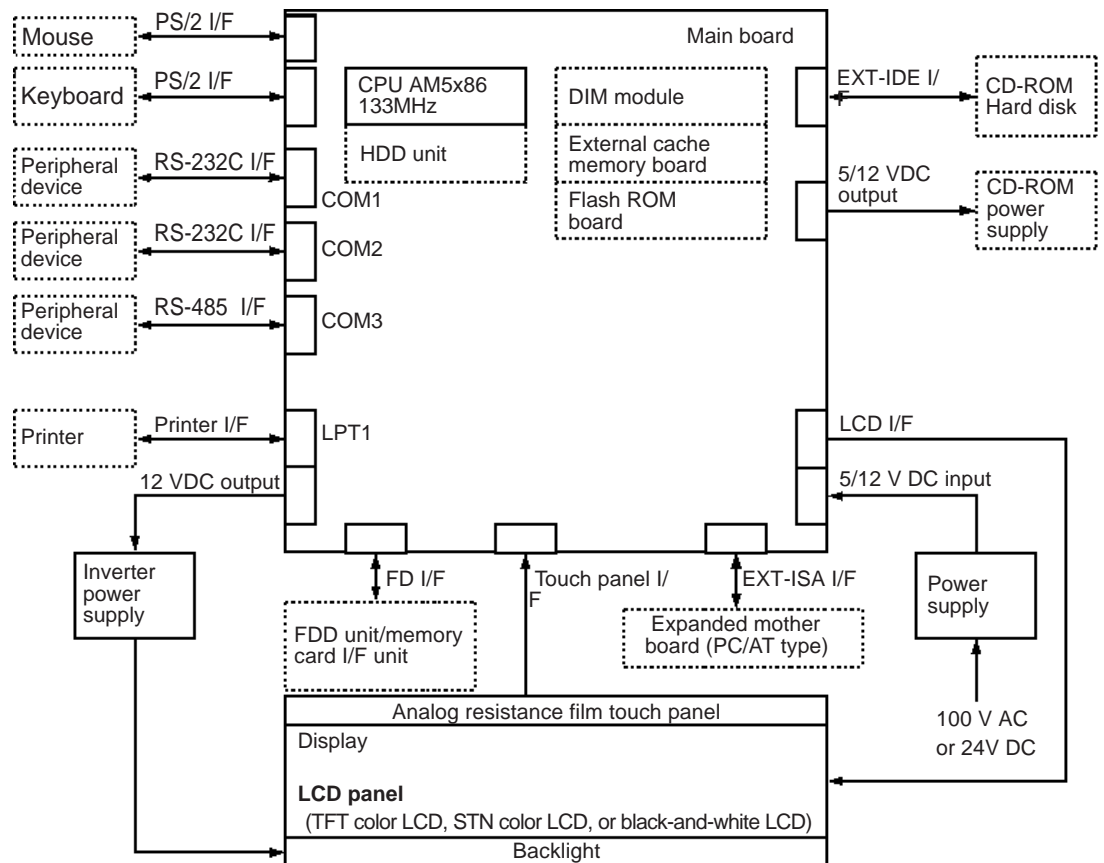
1-1 System Configuration

1-2 Options

1-3 PL Series List

1-1 System Configuration

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



* Devices in **dotted boxes** are Digital optional products or commercially available products.



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-EM000 PL-EM001 PL-EM002	Main memory module (PL-EM000 : 4 MB, PL-EM001 : 8 MB, PL-EM002 : 16MB)
External cache memory board	PL-EC000	256-KB secondary cache board
HDD unit	PL-HD000	Dedicated HDD unit with built-in 2.5" 540 MB hard disk
FDD unit	PL-FD001	PC/AT compatible 3.5" FDD unit
	PL-FD000	PC/AT compatible 3.5" FDD unit for development and maintenance
Memory card interface unit	PL-MC000	JEIDA-compliant (Ver. 4.1) IC memory card interface (Cannot write to flash-memory type cards)
IDE slave adapter	PL-SA000	Adapter for attaching IDE (ATAPI)-compliant CD-ROM drive (DC power cord included)
Flash file disk unit	PL-FF000	3-MB silicon disk unit compatible with hard disks
	PL-FF001	10-MB silicon disk unit compatible with hard disks
Flash ROM board	PL-FR000	Flash ROM board which accommodates up to two 2-MB ROM drives. One drive can be assigned to drive A: or B: (the OS starts from drive A: only). The other drive can be assigned to drive C: or later. Each disk can be separately programmed. (FRQMDISK Programming Tool included.)

Accessories

Name	Model number	Description
Screen protection sheet	PL-CS001	Disposable overlay sheets for display protection and stain resistance. Touch panel switches will still sense your touch when the sheet is in place.

Maintenance Options

Name	Model number	Description
Backlight	GP570-BL00-MS	Replacement backlight available for TFT and STN color LCDs.
Mounting brackets	GP070-AT00-MS	Hardware for installing the PL. Same as PL's original brackets.
Moisture resistant packing	GP570-WP00-MS	Moisture resistant packing used when installing the PL. Same as PL's original packing.

Software Options

TT-WIN for Windows® 3.1	Mouse emulation utilities for the touch panel's screen
TT-WIN for Windows® 95	

1-3 PL Series Panel Types

Model number

PL - 5700 T 1-24VC*

PL-5700 series

Expansion slots
 0 : 3-slot type
 1 : 1-slot type

Display type
 L : Black-and-white LCD
 S : STN color LCD
 T : TFT color LCD

* if "24VC" is not written, the unit is 100V type.

Display \ Expansion Slots	1-Slot type	3-Slot Type
	B/W LCD	PL-5701L1
STN color LCD	PL-5701S1	PL-5700S1
TFT color LCD	PL-5701T1	PL-5700T1/ PL5700T1-24VC

MEMO

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2

2-1 General Specifications

2-2 Performance Specifications

2-3 Interface Specifications

2-4 PL External Features

2-5 PL Dimensions

Specifications

2-1 General Specifications

1 Electrical Specifications

Power supply voltage	85 - 132 VAC, 50/60 Hz
Power consumption	PL-5700T1, PL-5700S1, PL-5700L1 : Max. 150 VA PL-5701T1, PL-5701S1, PL-5701L1 : Max. 120 VA
Allowable dropped voltage time	Max. 20 ms
Withstand voltage	1500 VAC, 20 mA for one minute (between charging terminal and FG terminal)
Insulation resistance	Min. 10MW at 500 VDC (between charging terminal and FG terminal)

2 Environment Specifications

Operating ambient temperature	PL-5700T1, PL-5701T1 : 0 °C 4 to 5°C PL-5700S1, PL-5701S1, PL-5700L1, PL-5701L1 : 0 °C to 40°C
Ambient humidity	30%RH- 85 %RH(non condensing)
Storage temperature	-10°C to 60°C
Operating ambient atmosphere	Free of corrosive gas
Noise immunity (tested by noise simulator)	Noise voltage : 1500Vp-p Pulse duration : 50 ns, 500 ns, 1µs
Electrostatic withstand voltage	5 kV
Vibration resistance	2G : at 10 to 25 Hz applied in X, Y, and Z directions for 30 minutes each (0.5 G when using HDD unit, and 1.0 G when using FDD unit)
Ground	100Ω or less, or your country's applicable standard.
Rating	Equivalent to IP65F (JE M1030)



Be sure to check the specifications of any optional products used.

Also, if the temperature of the PL's electrical cooling fins reaches 100 (+/- 15) degrees, the PL's safety feature will automatically activate, turning the PL OFF. Thus, since these fins are usually 25 degrees hotter than the surrounding atmosphere, once the area surrounding the PL reaches approximately 60 degrees, this safety feature will activate.

Once the temperature of these fins falls below 60 degrees, the unit can be re-started and operation resumed.

3 Dimensions

External dimensions	PL-5700T1, PL-5700S1, PL-5700L1 : 321 mm (W) x 272 mm (H) x 129.3 mm (D) PL-5701T1, PL-5701S1, PL-5701L1 : 321 mm (W) x 272 mm (H) x 96.3 mm (D)
Weight	PL-5700T1, PL-5700S1 : 5.5 kg PL-5701T1, PL-5701S1 : 4.6 kg PL-5700L1 : 4.7 kg PL-5701L1 : 3.8 kg (excluding accessories)

2-2 Performance Specifications

1 Performance Specifications

CPU		AMD 5x86 (133 MHz) manufactured by AMD		
NDP		Not Applicable (Built into CPU)		
DRAM (Main memory)		0 MB (Two DIMM sockets : Max 32 MB memory)		
BIOS		Phoenix (PC compatible)		
Touch-panel	Method	Analog resistance film system		
	Resolution	1024 x 1024		
	Effective area	10.4" screen and surrounding function-key areas		
Interface	Serial	RS-232C	COM1	DB 9-pin male connector
			COM2	DB 9-pin male connector
		RS-485	COM3	Terminal board
	Printer	Centronics standard (DB 25-pin female connector)		
	Keyboard	PS/2 interface (Mini DIN 6-pin female connector)		
	Mouse	PS/2 interface (Mini DIN 6-pin female connector)		

2 Display Functions

	PL-5700T1, PL-5701T1	PL 5700S1, PL-5701S 1	PL 5700L1, PL-5701L 1
Display device	TFT color LCD	STN color LCD	Black and white LCD
Pixel configuration	640 x 480 pixels	640 x 480 pixels	640 x 480 pixels
Effective area	221.1(W) x 158.4 (H) mm	215.1 (W) x 162.3 (H) mm	216.0 (W) x 160.8 (H) mm
Dot pitch	0.33 x 0.33 mm	0.33 x 0.33 mm	0.33 x 0.33 mm
Color resolution	260,000colors	8 colors (halftone by thinned-out frame)	2 colors (halftone by thinned-out frame)
Contrast adjustment	Fixed	8 levels	8 levels
Brightness adjustment	Fixed	Fixed	2 levels (Standard/High)
Maintenance (backlight life)	Replaceable backlight lamp (20,000hours)	Replaceable backlight lamp (20,000hours)	Non-replaceable backlight lamp (Standard brightness : 45,000hours, High brightness : 25,000hours)



Backlight life is designated as the number of hours until the brightness drops to half of the maximum level, in a 25°C environment. Before leaving images on the display for an extended period of time, turn the backlight off if at all possible.



For information about how to replace the backlight, see “7-2 Replacing the 100V Unit’s Backlight.”

■ Display Colors

- Uneven brightness, flickering, or ghosts (caused by cross talk) may occur with the PL-5700S1, PL-5701S1, PL-5700L1, and PL-5701L1, depending on the display colors (especially halftones) or color combinations used. This, however, is a basic characteristic of this type of display, not a defect. Since this flickering can sometimes be caused by the combination of display colors used, selecting other colors may improve the display quality.
- The higher the contrast between the foreground and background colors is, the more likely that crosstalk will occur. Either changing the color combination or decreasing the contrast may help to reduce the amount of cross talk.



See “5-2, System Parameters.”



■ For black-and-white displays : the PL-5700L1 and the PL-5701L1

- These displays normally use only black and white, with grey tones being produced by making the dots flash. This display method, however, may cause flickering to occur with certain halftones.
- If VGA 16-color standard pallet colors are used on a black-and-white display, brightness will increase in order of the pallet numbers, i.e. from 0 (black) to 15 (white). It is not recommended to use those colors marked with asterisks (*) (shown in the figure to the right), since they often cause flickering.
- Pallet colors 2, 6, and 9 may be hard to identify on the screen, since they have almost the same level of brightness.
- Some combinations of colors may not be easy to identify. Whenever you are developing an application it is recommended that you frequently test how your program will appear on the PL.
- Black-and-white tiled displays often appear better than multi-colored displays.
- If you wish to use halftones, be sure to check their display quality during actual PL operation.

0 Black	Dark	
1 Blue	Dark	*
4 Red	Dark	*
5 Magenta	Dark	*
8 Black	Bright	
6 Yellow	Dark	*
2 Green	Dark	
9 Blue	Bright	
3 Cyan	Dark	*
12 Red	Bright	
13 Magenta	Bright	
7 White	Dark	
10 Green	Bright	*
11 Cyan	Bright	*
14 Yellow	Bright	*
15 White	Bright	

Darker ↑
↓ Brighter

■ STN color LCD displays: PL-5700S1 and PL-5701S1

- STN color LCDs use three primary colors - red, green, and blue - to display up to 8 different colors. Halftones are produced by making the dots used in these three colors flash. This mechanism, however, may cause flickering with certain halftones.
- Tiled displays using only pure colors - black, red, green, blue, yellow, magenta, cyan, and white (pallet numbers 0, 12, 10, 9, 14, 13, 11, and 15) - may appear better than displays using different colors.
- If you wish to use halftones, be sure to check their display quality during actual PL operation.

3 Expansion Slots

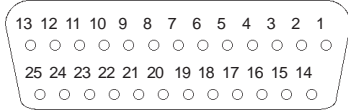
- The PL does not supply -5 or -12 V. As a result, ISA (AT) bus compatible boards which require -5 or -12 V are not available.
- All the DB connectors for external interfaces are equipped with inch type connector screw threads.

	PL-5701T1, PL-5701S1, PL-5701L1	PL-5700T1, PL-5700S1, PL- 5700 T1-24VC, PL-5700L1	
Expansion slots	1	3	
Expansion slot configuration (slot width)	One 3/4 size slot (20 mm)	One 3/4 size slot (20 mm) and two 1/2 size slots (25 mm)	
Electrical capacity	5 V 1.0 A 12 V 0.5 A	3/4 size slot	5 V 1.0 A 12 V 0.5 A
		1/2 size slot	5 V, Total 1.6 A 12 V, Total 0.4 A

2-3 Interface Specifications

1 Printer Interface

DB-25 pin female connector



JBY-25S-1A3A14,
(J.S.T, or equivalent)



“O.D” = “Open Drain.”

“T.S” means “3-state (triple) input/output.”

“TTLIN” means “TTL input.”

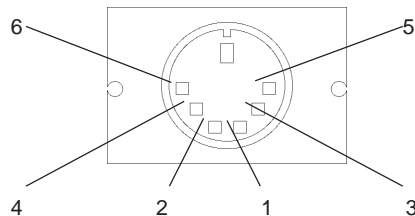
Pin No.	Signal	I/O	Spec.	Pin No.	Signal	I/O	Spec.
1	STROBE	Output	O.D	14	AUTOFD	Output	O.D
2	DATA0	Output	T.S	15	ERROR	Input	TTL IN
3	DATA1	Output	T.S	16	INIT	Output	O.D
4	DATA2	Output	T.S	17	SLCTIN	Output	O.D
5	DATA3	Output	T.S	18	GND		
6	DATA4	Output	T.S	19	GND		
7	DATA5	Output	T.S	20	GND		
8	DATA6	Output	T.S	21	GND		
9	DATA7	Output	T.S	22	GND		
10	ACKNLG	Input	TTL IN	23	GND		
11	BUSY	Input	TTL IN	24	GND		
12	PE	Input	TTL IN	25	GND		
13	SLCT	Input	TTL IN				



Dedicated windows (95, 98, NT) printers cannot be used. Be sure when selecting a printer that the unit supports the HP LaserJet PCL, NEC PR series, EPSON ESC/P24-84 or equivalent protocol. Certain printers with both Windows and DOS drivers may be used. Please contact your PL distributor for details.

2 Keyboard Interface

Mini DIN 6-pin female connector



(Common to keyboard connectors on front and side panels)

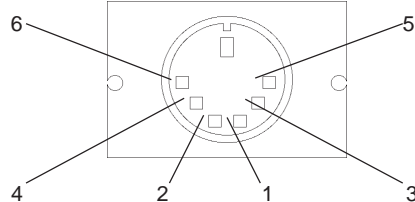
Pin No.	Signal
1	KEY DATA
2	NC
3	GND
4	+5V
5	KEY CLK
6	NC

TCS7568-43-201 manufactured by HOSHIDEN, or equivalent

Compatible keyboards (example) : FKB1424-001 (compact type) by FUJITSU
FKB4874-101

3 Mouse Interface

Mini DIN 6-pin female connector

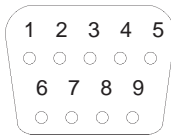


Pin No.	Signal
1	MOUSE DATA
2	NC
3	GND
4	+5V
5	MOUSE CLK
6	NC

TCS7568-43-201 manufactured by HOSHIDEN, or equivalent

4 RS-232C Interface (COM1/COM2)

DB 9 pin male connector



Pin No.	Signal	Pin No.	Signal
1	CD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	R/(5V)*1
5	GND		

JEY-9P-1A3A14 - by J.S.T, or equivalent

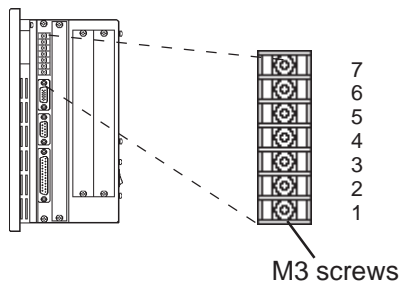
*1 : With COM2, pin 9 can be configured for +5 V output, via a jumper.

See next page's "2-3, 6 Jumper Settings".

5 RS-485 Interface (COM3)



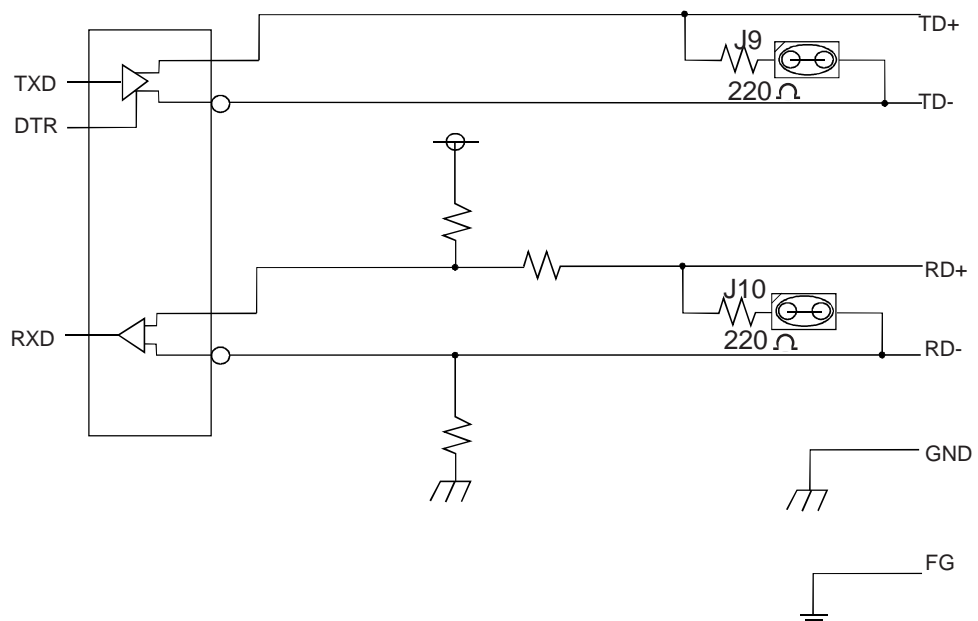
This unit's RS-485 (RS-422) Port is not isolated, therefore, it is crucial that you connect the SG/GND (Signal Ground) terminals. If this is not done, the RS-485 (RS-422) circuit may be damaged.



Pin No.	Signal
1	TD-
2	RD-
3	TD+
4	RD+
5	GND
6	FG
7	NC

<Interface Circuit>

SN751178N or equivalent

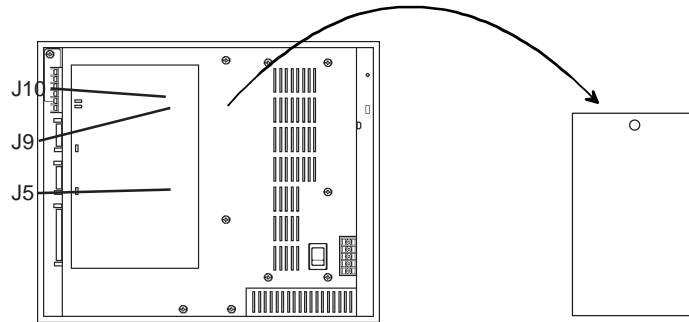



Use the GND and FG terminals only when the connected device requires them.






6 Jumper Settings

Before setting the jumpers, remove the unit's rear maintenance panel.

PL Rear Panel



In the drawing below,  indicates a shorted jumper, and  indicates an open jumper.

Jumper	Setting	Factory-default
J5	COM2: To set pin 9 to: RI input  5 V output 	 RI input
J9	RS-485 output-side terminator	 Terminator enabled
J10	RS-485 input-side terminator	 Terminator enabled

7 Using the Contrast Adjustment Knob

Four of the PL displays (5700L1, 5701L1, 5700S1 and 5701S1) have a contrast control knob so that you can adjust the display's contrast as desired. Digital requests, however, that you use the SETUP utility, CONTSET.EXE, or WCONTSET.EXE for contrast adjustment, instead of this contrast knob.

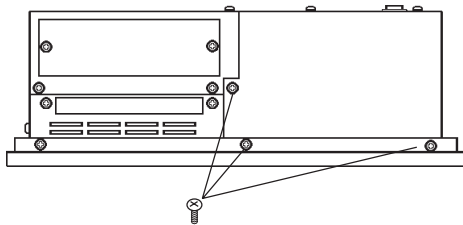


See “5-2, 1. Main ■ Backlight/Contrast,” and “6-1 File List.”

Normally, contrast adjustments are not required, since the contrast level is factory-set at a normally optimal level.

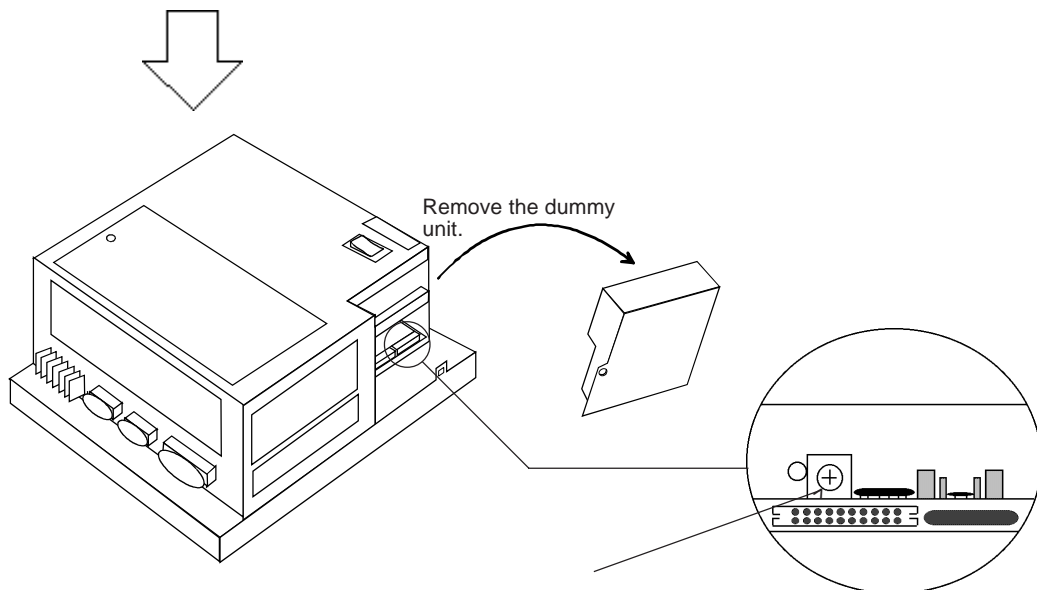
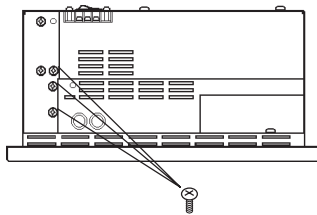
Adjusting the Unit's Contrast

Bottom View



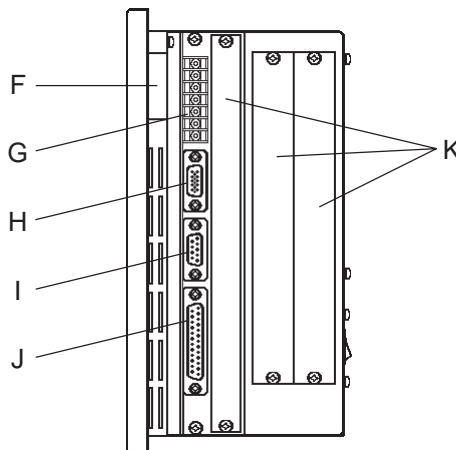
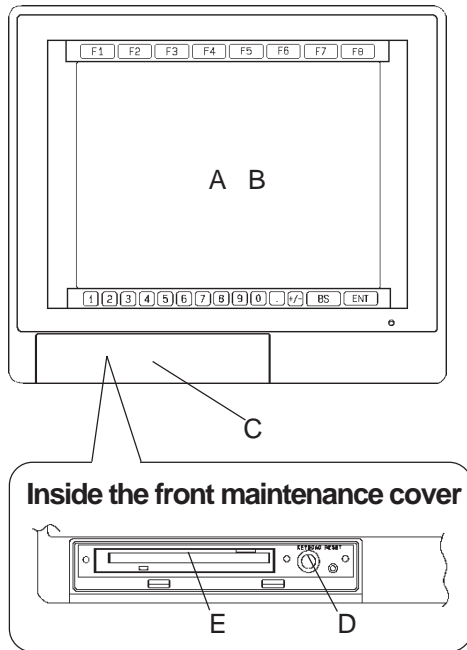
1. Loosen the dummy unit's six attachment screws, located on the bottom and side of the PL.

Side View



To increase the contrast, rotate the control clockwise. To decrease it, rotate the control counter-clockwise.

2-4 PL External Features



This figure shows the PL-5700 T1

A. Display area

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

B. Touch panel

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

C. Front maintenance cover

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

D. Keyboard connector

A PS/2 compatible keyboard can be connected here.

E. Floppy disk/memory card insertion slot

This slot is used if the optional FDD unit or memory card interface is installed.

F. Backlight replacement cover

Remove this hatch to replace the backlight. (With black-and-white LCDs, the backlight is NOT replaceable.)

G. RS-485 connector (COM3)

RS-485 interface, which allows communication with other computers or connection to peripheral devices.

H. RS-232C connector (COM1)

I. RS-232C connector (COM2)

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

J. Printer connector (LPT1)

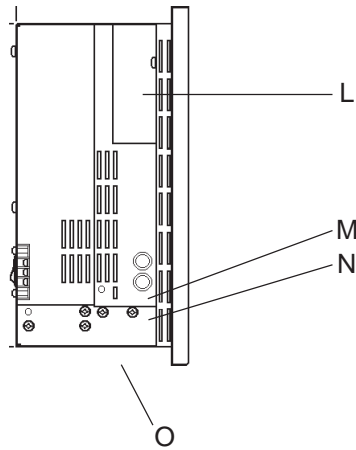
Centronics standard interface (DB 25-pin female connector), which connects a parallel device, such as a printer.

K. Expansion slot

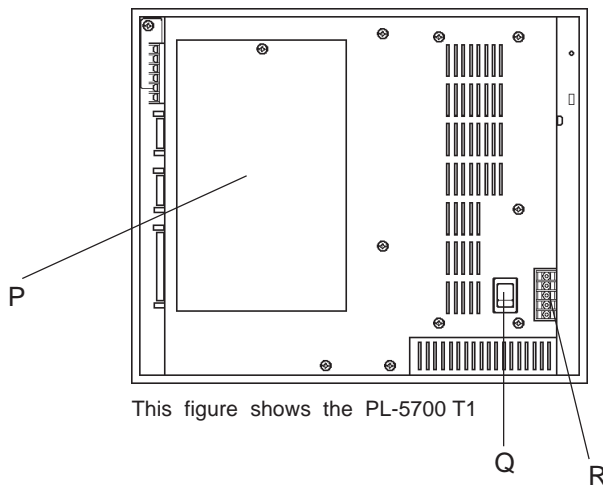
A variety of expansion boards, both Digital's and other companies, can be installed here.

See "3-1 Available Options and Expansion Boards"

The PL-5700T1-24VC, PL-5700T1, PL-5700S1, and PL-5700L1 each have three slots, designated as "slot 1," "slot 2," and "slot 3," starting from the one closest to the front panel. The PL-5701T1, PL-5701S1, and PL-5701L1 provide one slot, designated as "slot 1."



This figure shows the PL-5700 T1



This figure shows the PL-5700 T1

L. HDD cover

Remove this cover to install the HDD unit.

M. Mouse connector

A PS/2 compatible mouse can be attached here.

N. Keyboard connector

A PS/2 compatible keyboard can be attached here.

O. Dummy unit

Remove this unit when attaching the FDD unit or memory card interface unit.

P. Rear maintenance cover

Remove this cover to install the optional external cache board, flash ROM board, or DIM module.

Q. Power switch

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

R. Power input terminal strip

100V AC unit - connect the provided power cord here.

24V DC unit - connect the customer's provided cord here.



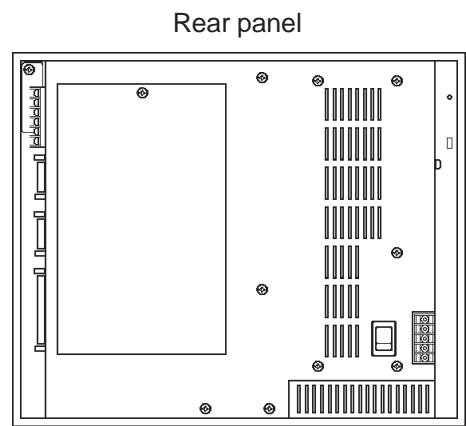
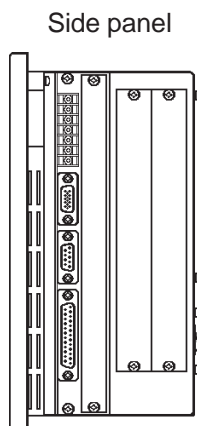
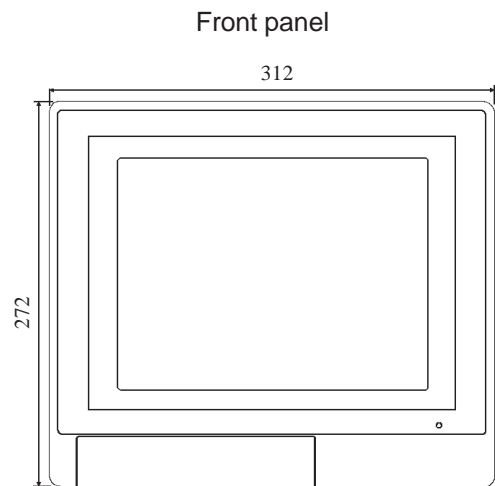
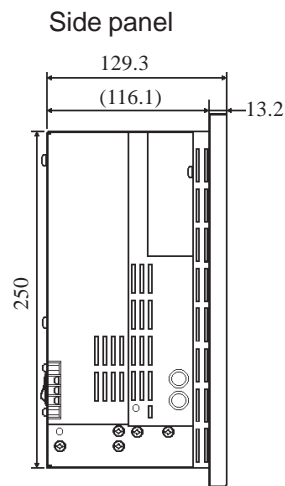
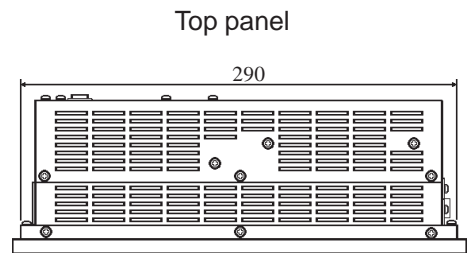
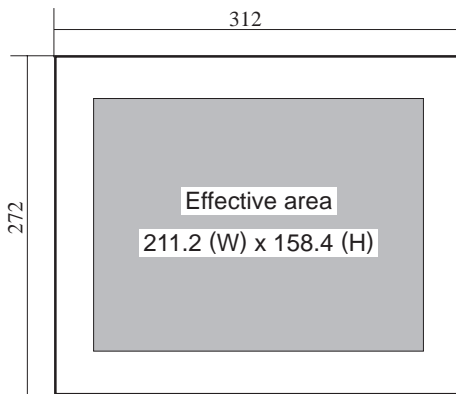
To avoid danger of electrical shocks or fire, be sure to turn the PL's power OFF before connecting the power cord or any peripheral devices to the PL.

2-5 PL Dimensions

1 PL-5700T1-24VC, PL-5700T1, PL-5700S1, PL-5700L1:

<General Dimensions>

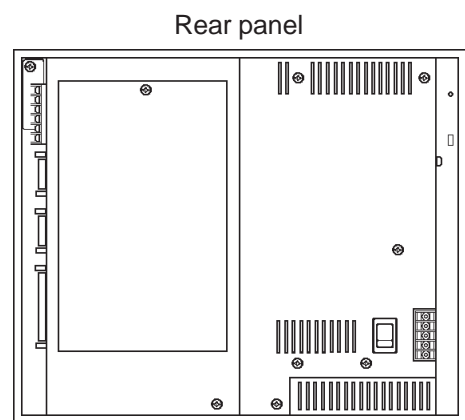
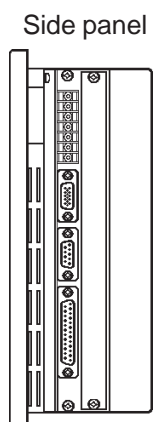
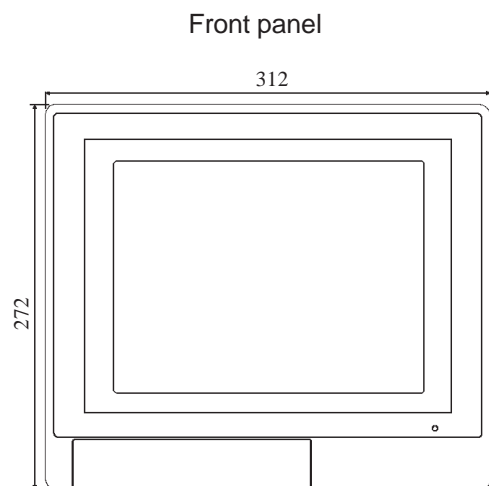
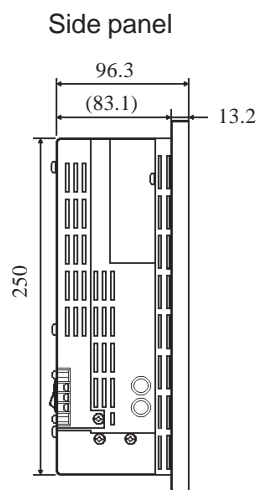
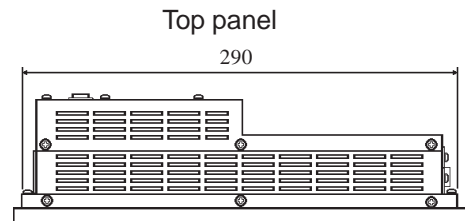
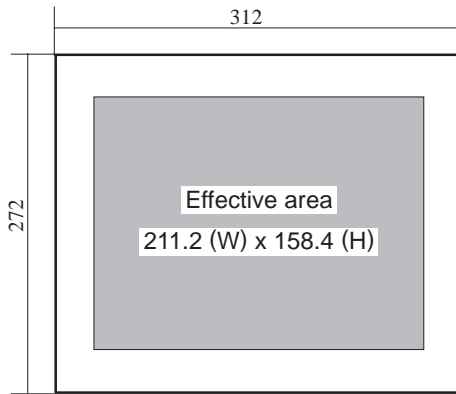
(Measured in mm, excluding projections)



2 PL-5701T1, PL-5701S1, PL-5701L1:

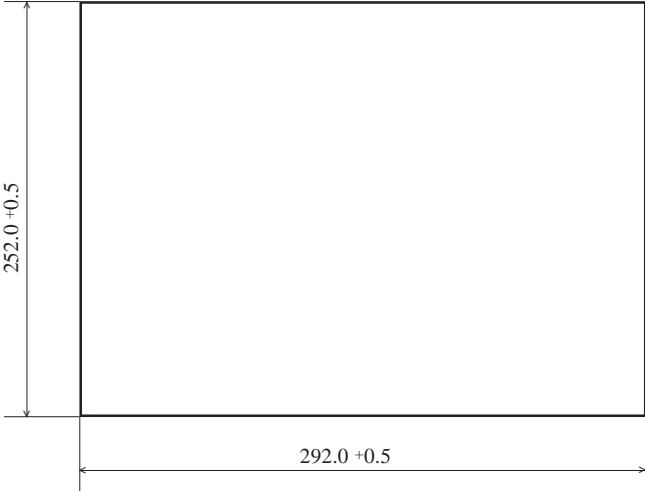
<General Dimensions>

Measured in mm, excluding projections



3 Installation Hole Dimensions

Measured in mm



- Allowable panel/plate thickness is from 1.6 to 10 mm.
- To obtain maximum moisture-resistance, be sure to mount the PL on a flat, smooth panel, free of any dents or deformations.

MEMO

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Installing Optional Units and Expansion Boards

The PL can be equipped with Digital's optional units and expansion boards, as well as a variety of commercially available ISA-bus compatible boards. This chapter describes both the products that can be installed in the PL and their installation method.

3-1 Available Options and Expansion Boards

Optional Products

Name	Model	Description	Installation Location
DIM module	PL-EM000 PL-EM001 PL-EM002	Main memory board (PL-EM000: 4MB (PL-EM001: 8MB (PL-EM002: 16 MB)	Inside the PL
External cache memory board	PL-EC000	256-KB secondary cache memory board	Inside the PL
HDD unit	PL-HD000	Dedicated HDD unit with built-in 2.5" 810-MB hard disk	Inside the PL
FDD unit	PL-FD000	PC/AT compatible, 3.5" FDD integrated unit	Inside the PL. This unit cannot be installed at the same time as the memory card interface unit.
	PL-FD001	PC/AT compatible, 3.5" FDD unit for development and maintenance	Externally connected. Use as either a stand-alone unit or attach to PL's rear panel. The memory card interface unit can be also used, when this unit is installed.
Memory card interface unit	PL-MC000	JEIDA (Ver 4.1)-compliant IC memory card interface	Inside the PL. This unit cannot be installed at the same time as the memory card interface unit.
IDE slave adapter	PL-SA000	Adapter for connecting an IDE-compliant CD-ROM drive. DC power cord included.	Externally connected. Connects to PL's IDE connector.
Flash ROM board	PL-FR000	Flash ROM board which accommodates up to two 2-MB ROM drives. One drive can be assigned to drive A; or B; (the OS starts from drive A; only). Another drive can be assigned to drive C; or succeeding characters (i.e. D; E; etc.). Each disk used can be separately programmed. (FR0MDISK Programming Tool included.)	Inside the PL.
Flash file disk unit	PL-FF000	3MB silicon disk unit compatible with hard disks	Inside the PL.
	PL-FF001	10MB silicon disk unit compatible with hard disks	Inside the PL.

Commercially Available Products

Product	Description	Installation Area
ISA (AT) bus compatible board	<p>Slot 1 on all PLs can accommodate boards up to 210 mm wide. For 3-slot type PLs (PL-5700*1), slots 2 and 3 can accommodate boards up to 160 mm wide.</p> <div style="text-align: center;"> </div>	Plugs into PL's expansion slot.



- Check that your expansion board's "foot" matches the width of the expansion slot. Slot 1 is 20 mm wide, and slots 2 and 3 (3-slot PLs only) are 25 mm wide.
- Since the PL does not supply -5 and -12 V current, ISA(AT)-bus compatible boards requiring -5 or -12 voltage are not available.
- Other 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 your warranty.

<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.

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.



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



The procedures explained in this section apply to all PL models, even though only the PL-5700T1 is shown.

1 Installing DIM Modules (PL-EM000/EM001/EM002)



Be careful when inserting the DIM module into the socket since the clips at both ends of the module are easily bent.

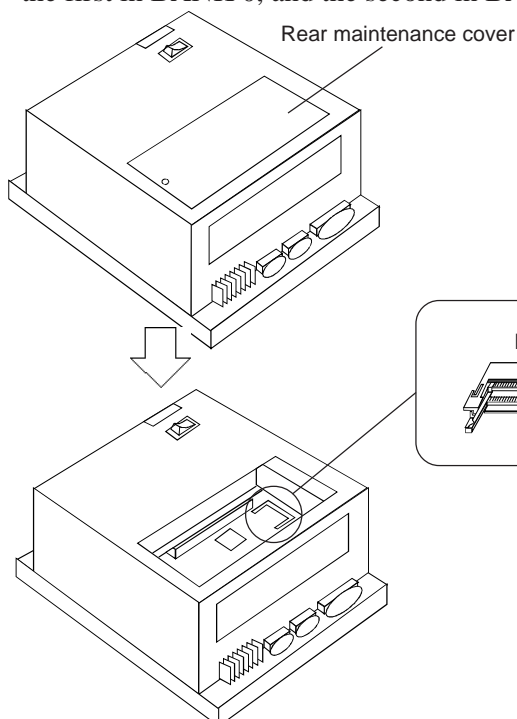
Determine your unit's DIM module combination from the table below.

Total capacity (MB)	4	8		12	16		20		32
BANK 0	4	4	8	4	8	16	4	8	16
BANK 1	-	4	-	8	8	-	16	16	16

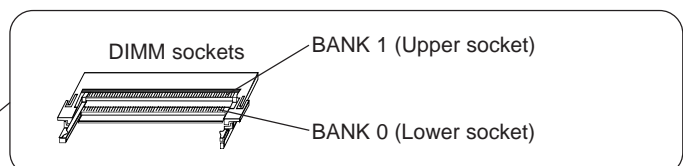


Installing one 8-MB module and one 16 MB module provides **20** MB of memory, not 24 MB.

If you use only one module, be sure to install it in BANK 0. If you use two modules, install the first in BANK 0, and the second in BANK 1.



1. Unscrew and remove the rear maintenance cover.



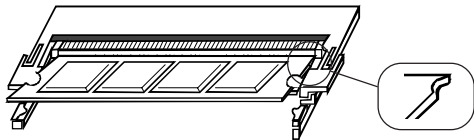


The DIM module can be inserted and removed up to 20 times. Repeated handling may bend the clips on both edges of the module. Hold the module at an angle to the DIMM socket to insert it.

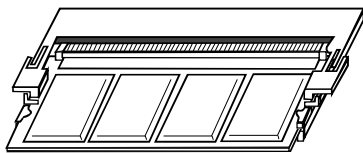


Commercially available DIM modules may result in malfunction or failure of the PL, if specifications differ from Digital's DIM modules.

<Installing a module in BANK 0> (NOTE: These figures show the PL-EM002)



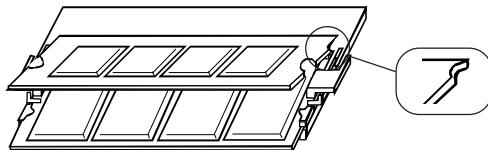
2. Hold the DIM module connector at an angle to the DIMM socket, and insert the connector into the socket



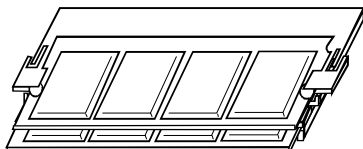
Be sure to hold the module at an angle when inserting it.

3. Push the DIM module inward until the clips on both ends lock.

<Installing a module in BANK 1>



2. Hold the DIM module connector at an angle to the DIMM socket, and insert the connector into the socket.

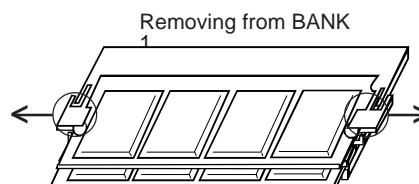
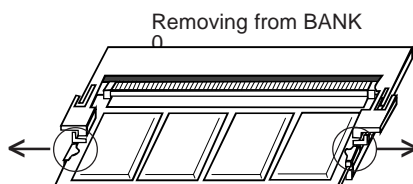


3. Push the DIM module inward until the clips on both ends lock.

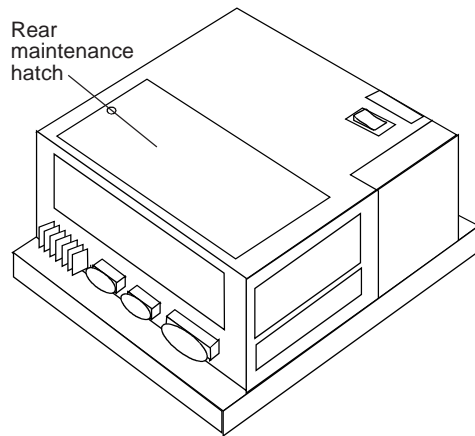
4. Refit the rear maintenance hatch, and tighten the screw.

<Removing the DIM module>

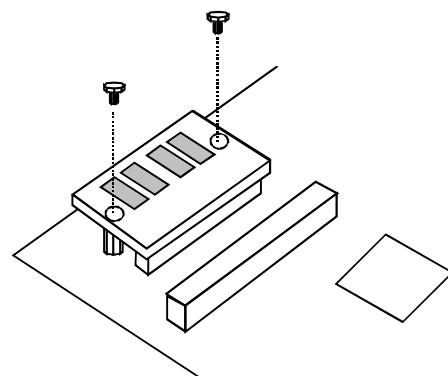
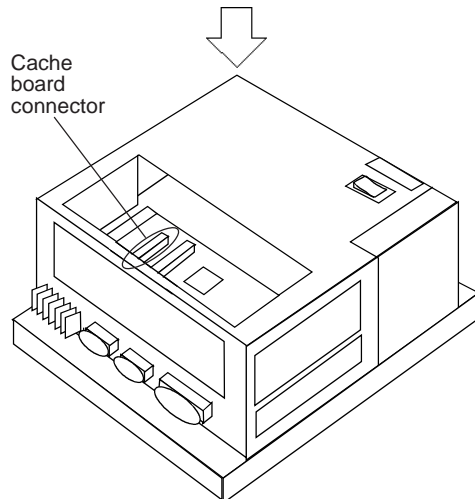
Carefully spread the clips on both edges of the DIM module, in the direction of the arrows, to remove the module.



2 Installing the External Cache Memory Board (PL-EC000)



1. **Unscrew the screw on the rear maintenance hatch and remove the hatch.**

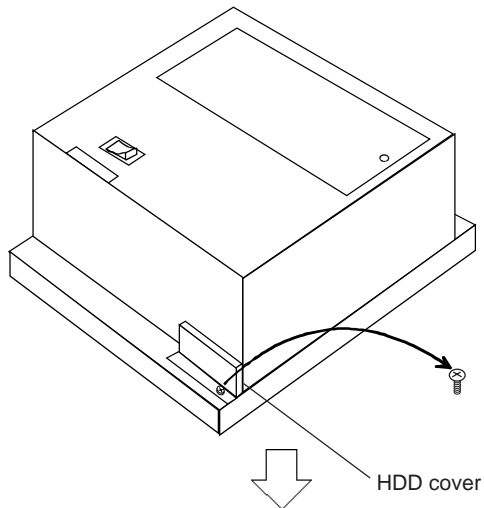


2. **Attach the external cache memory board to the cache board connector, and lock it down by tightening the two screws which came with the memory board.**

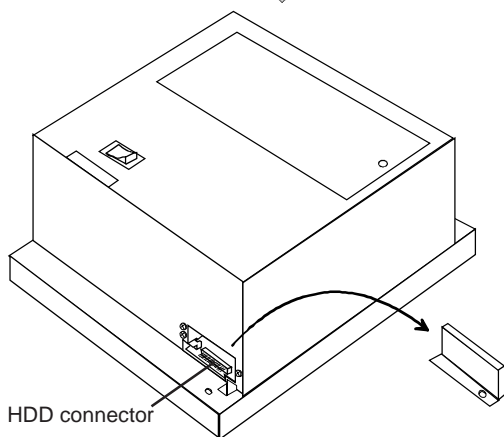
3. **Refit the rear maintenance hatch, and retighten the screw.**

3 Installing the HDD unit (PL-HD000), or Flash File Disk Unit (PL-FF000/FF001)

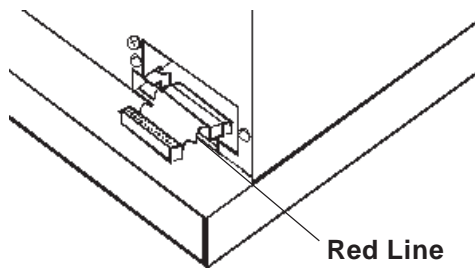
1. Loosen the attachment screw on the side panel of the PL to remove the HDD cover.



Note: This drawing shows the PL-5700T1 unit (3-slot type)

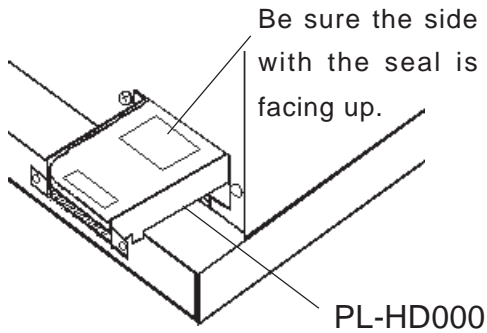


Remove the HDD cover.

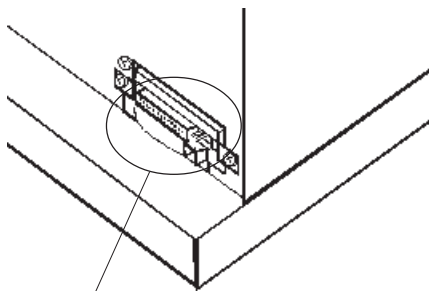


- 2) Insert the PL-HD000 unit's attachment cable into the HD connector. Be sure the cable's red line is facing the direction shown here.

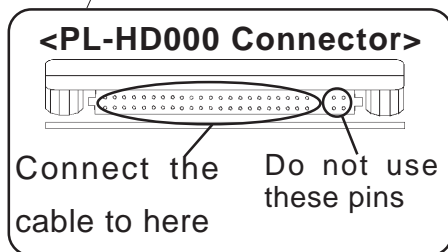
When the Heat Protector is NOT Needed



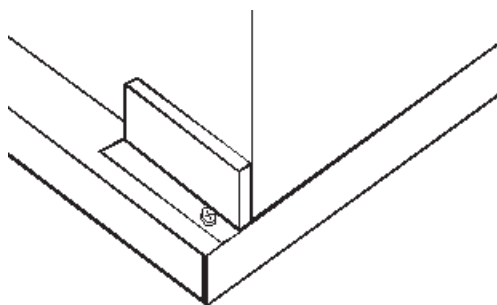
3) Attach the PL-HD000 and secure it in place with the two screws given.



4) Insert the cable into the PL - HD000 unit's connector. Be careful that the pins are aligned as shown in the drawing here. (The four pins on the far right will be unused)

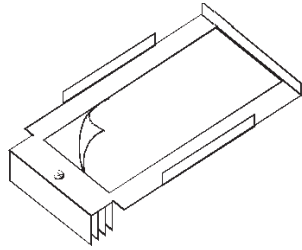


CAUTION: If the pins are inserted incorrectly, the unit may be damaged

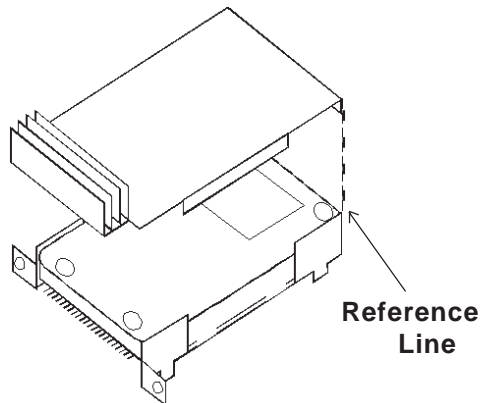


5) Place the cover back in place, and fasten its screws.

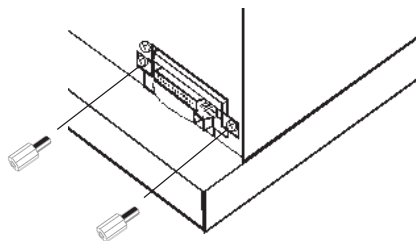
When the Heat Protector is needed:



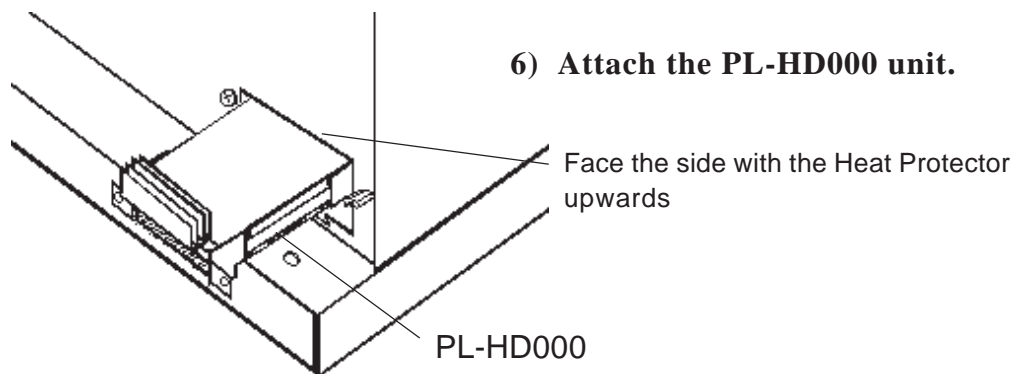
3) Remove (peel off) the Heat Protector's adhesive strip's cover.



4) As shown in the figure here, align the Heat Protector's bent edges with the spaces in the edge(s) of the HD unit. (See Reference Line)

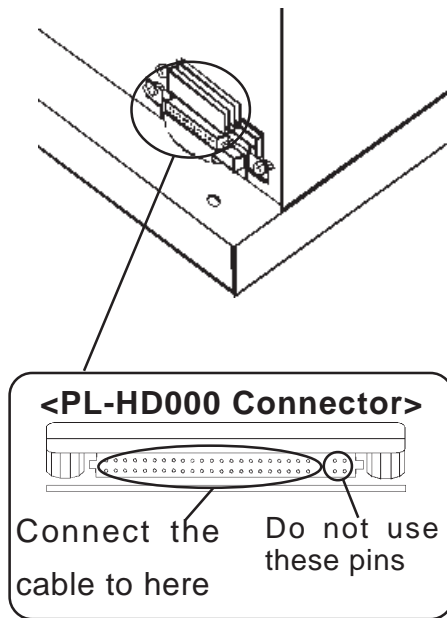


5) Screw the left and right side spacers into the HD unit's attachment face screw holes.



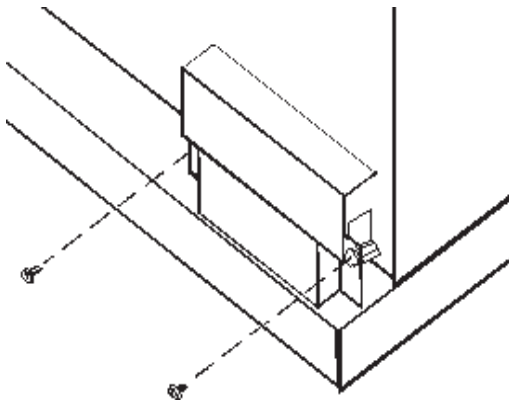
6) Attach the PL-HD000 unit.

When the Heat Protector is needed:



- 7) Connect the cable into the PL-HD000's connector. Refer to the left-hand detail drawing to be sure the cable is connected correctly. (The four pins on the far right will be unused)

CAUTION: If the pins are inserted incorrectly, the unit may be damaged

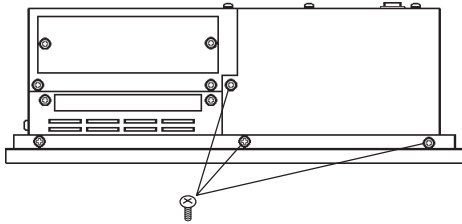


- 8) Place the cover back in place, and fasten its attachment screws in place.

4 Installing the FDD Unit (PL-FD000/FD001)

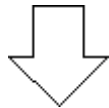
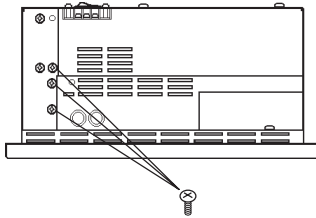
Built-in Type (PL-FD000)

Bottom panel of the PL

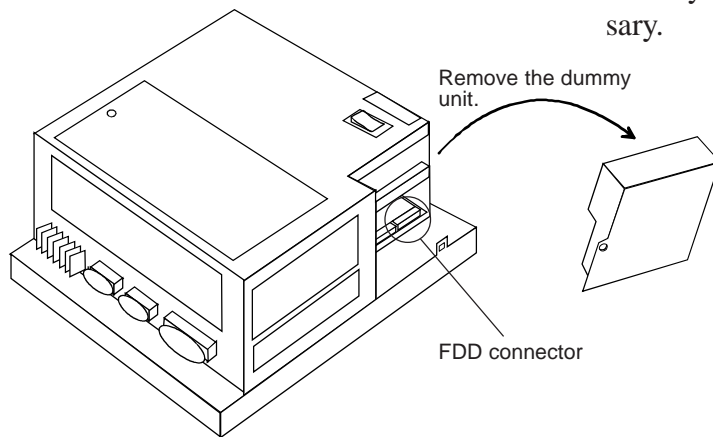


1. Loosen the six screws on the bottom and side panels of the PL, to remove the dummy unit.

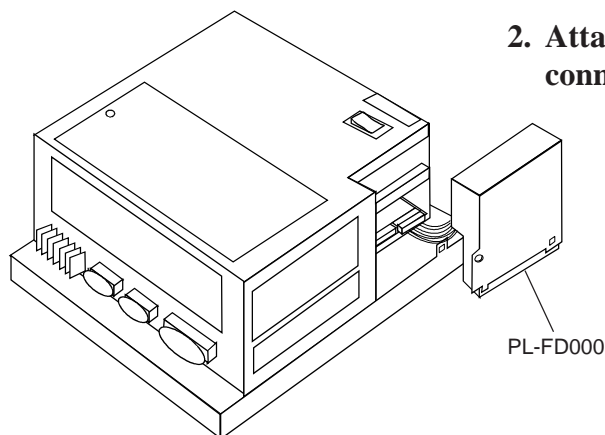
Side panel of the PL



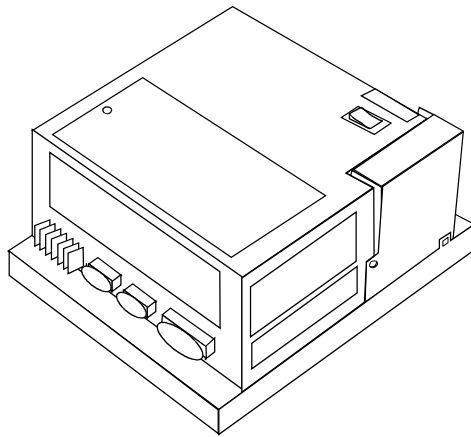
If the PL-FD000 is installed, the dummy unit will no longer be necessary.



2. Attach the PL-FD000 cable to the FDD connector.



Optional Units and Expansion Boards



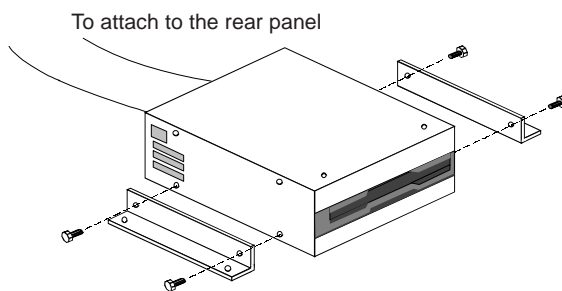
3. To install the PL-FD000, slide the unit down toward the front panel of the PL. Tighten the six screws on the side and bottom panels.



- Be careful not to pinch the cable between the PL body and FDD unit. This may damage the cable.
- The rear maintenance hatch may not have screw holes depending on the date of purchase of the PL. If so, contact a Digital Service Center.

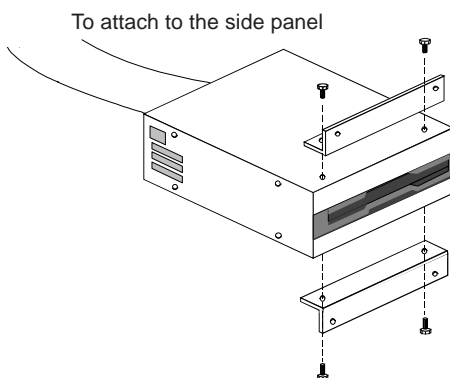
Development and Maintenance Type (PL-FD001)

Attaching the mounting hardware



To attach to the rear panel

To install the PL-FD001 on the REAR panel of the PL, use the four screws which came with the FDD unit to attach the mounting brackets on the top and bottom panels of the FDD unit.

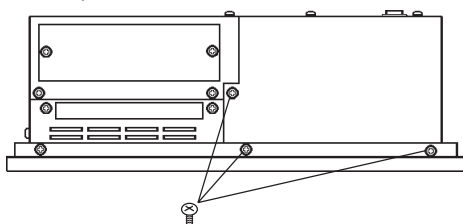


To attach to the side panel

To install the PL-FD001 on the PL's other panel, use the four screws which came with the FDD unit to attach the mounting brackets on the side panels of the FDD unit

When attaching to the PL Chassis

Bottom panel of the PL

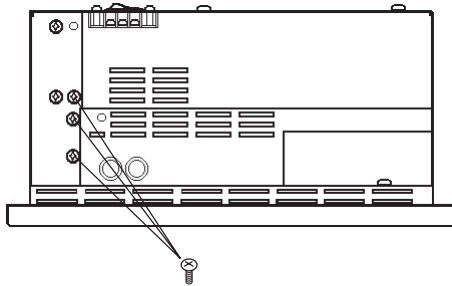


1. Loosen the six screws on the side and bottom panels of the PL to remove the dummy unit or optional PL-MC000 unit.

The figure shows the 3-slot type of PL-5700T1

Optional Units and Expansion Boards

Side panel of the PL

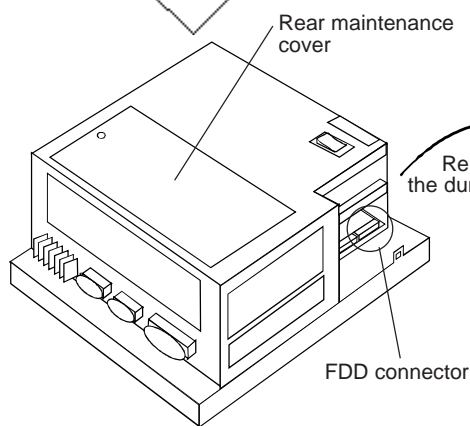


- To prevent short circuits with the expansion board inserted in the slot, use only the plastic screws which came with the PL-FD001 to mount the FDD unit on the rear maintenance cover.

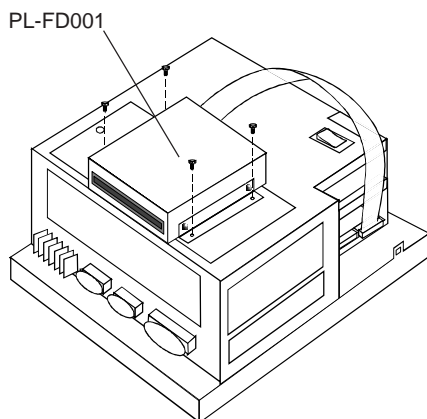
- Be careful not to pinch the cable between the PL body and FDD unit. This may damage the cable.

- If the cable is too long or contacts the 100 VAC input terminals and AC power cord, secure the cable with the PL-FD001's cable clamps.

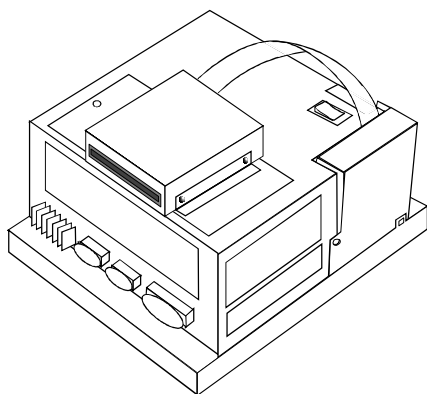
- When installing the PL-MC000, keep the cable away from the memory card's interface. Otherwise, the memory card cannot be installed.



2. Insert the PL-FD001 cable into the FDD connector.



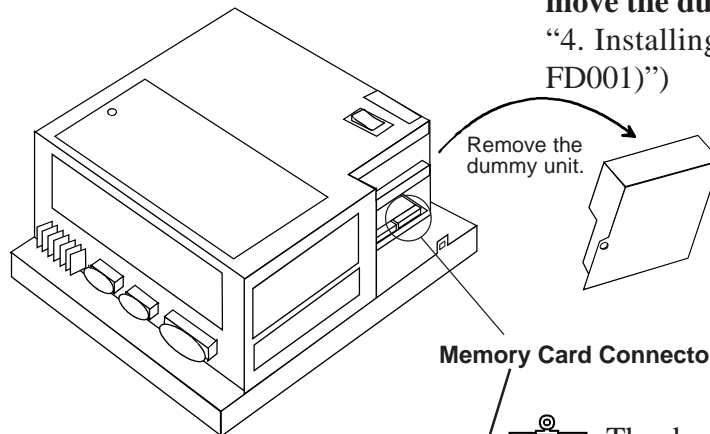
3. Use the four plastic screws which came with the FDD connector to attach the PL-FD001 to the PL's rear maintenance cover.



4. Take the PL-FD001 cable out as shown in the figure, and slide the dummy unit or optional PL-MC000 toward the front panel to set it in place. Then, tighten the six attachment screws on the PL's side and bottom panels.

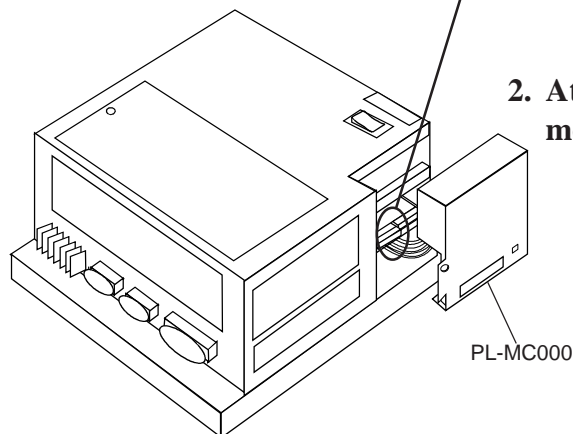
5 Installing the Memory Card Interface Unit (PL-MC000)

1. Loosen the six attachment screws on the side and bottom panels of the PL to remove the dummy unit. (See step 1 in “4. Installing the FDD Unit (PL-FD000/FD001)”)

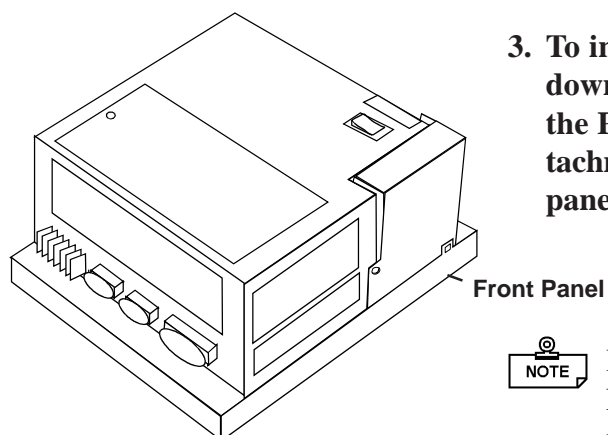


NOTE The dummy unit is no longer needed after the memory card interface unit is installed.

2. Attach the PL-M000 cable to the PL's memory card connector.



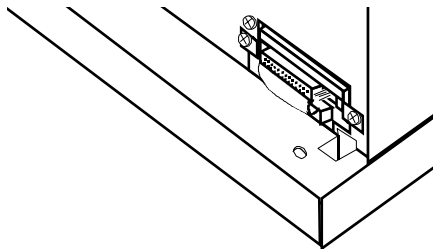
3. To insert the PL-MC000, slide the unit downwards, towards the front panel of the PL. Then, tighten the unit's six attachment screws on the side and bottom panels of the PL.



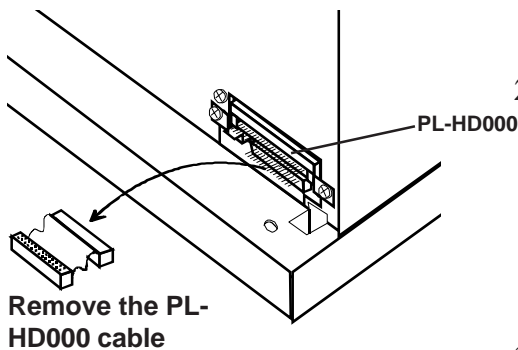
NOTE If you plan to also install the PL-FD001 (for development and maintenance), first attach the PL-FD001, then the PL-MC000.

6 Installing the IDE Slave Adapter (PL-SA000)

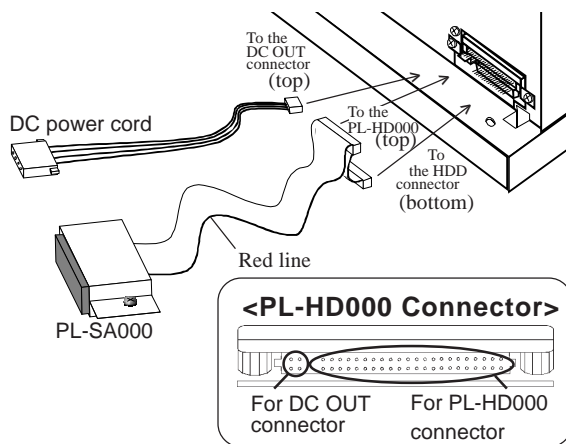
1. **Remove the HDD cover.** See step 1 in “3 Installing the HDD unit (PL-HD000), or Flash File Disk Unit (PL-FF000/FF001).”



2. **Unplug the PL-HD000 cable.**



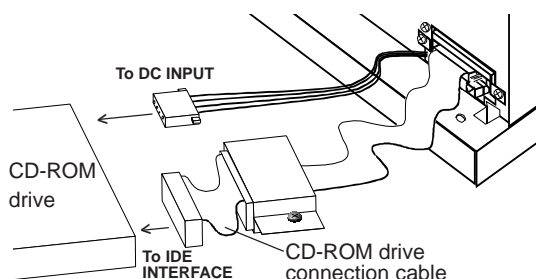
3. **Attach the PL-SA000 to the HDD connector and PL-HD000 connector** (see steps 2 and 4 in “3. Installing the HDD unit (PL-HD000), or Flash File Disk Unit (PL-FF000/FF001).”



If you have difficulty inserting the connector, remove the PL-HD000, connect the cable, and then re-install the PL-HD000.

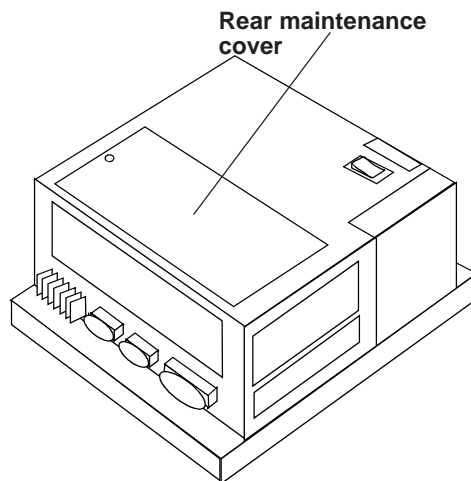
Connect the DC power cord which came with the PL-SA000 to the DC OUT connector.

4. **To connect a commercially available CD-ROM drive, first attach the PL-SA000's CD-ROM drive connection cable to the PL-SA000. Then, connect the CD-ROM drive connection cable to the IDE INTERFACE on the CD-ROM drive. Last, connect the DC power cord to both the DC INPUT on the CD-ROM drive and the PL.**

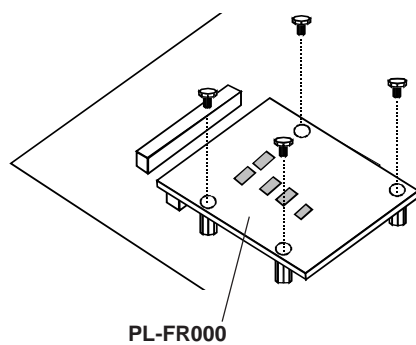
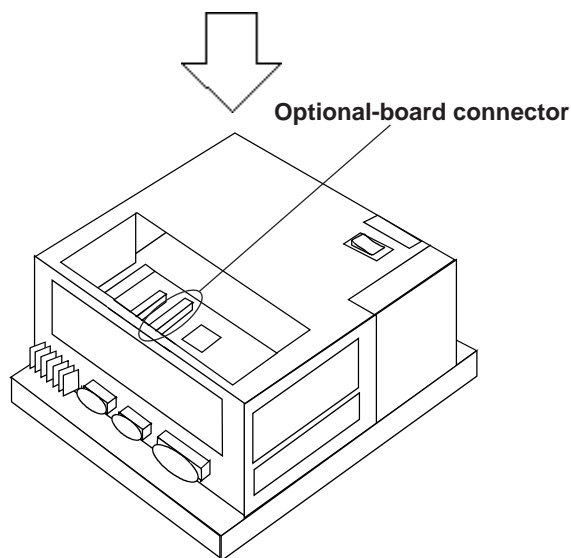


Make sure that pin 1 of the CD-ROM drive connection cable matches pin 1 of the IDE INTERFACE.

7 Installing the Flash ROM Board (PL-FR000)

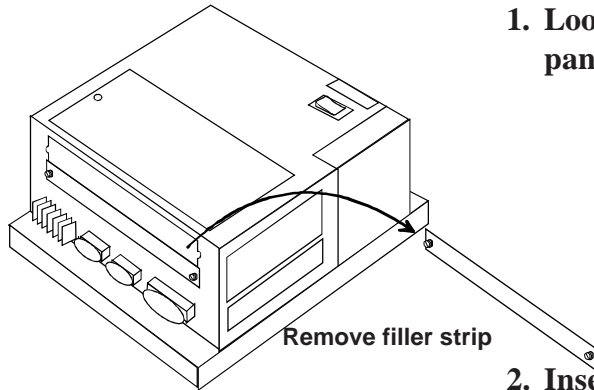


1. Loosen the attachment screw on the rear maintenance cover and remove the cover.

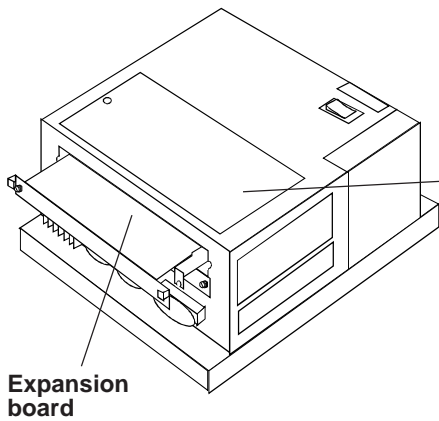


2. Attach the PL-FR000 to the optional-board connector, and lock it in place with the four mounting screws which came with the PL-FR000.
3. Replace the rear maintenance cover and tighten the screw.

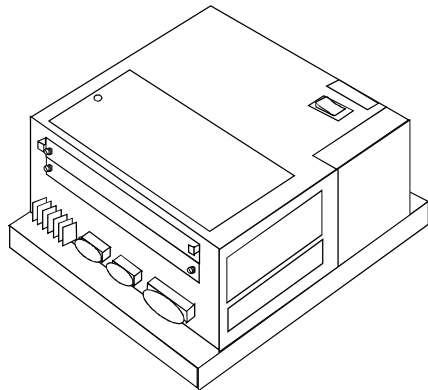
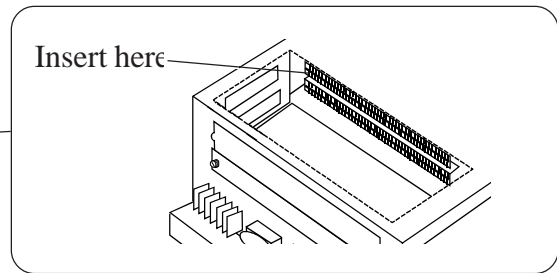
8 Installing an Expansion Board



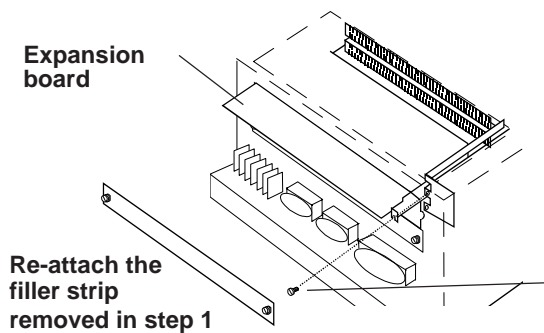
1. Loosen the two screws of the unused expansion slot to remove the filler strip.



2. Insert the expansion board into the expansion slot.



3. Secure the board in place with the two mounting screws.



If your expansion board does not have a front panel, fasten it in place with the PL's internal screw holes, and externally, attach screw (1) which came with the expansion board. Then, replace the filler strip and tighten the strip's two screws.

4

4-1 Installing the PL

4-2 Wiring the PL

Installation and Wiring

This chapter describes how to install and wire the PL.

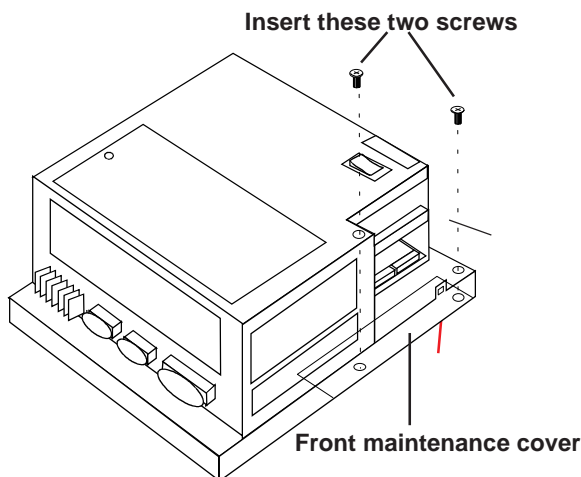
4-1 Installing the PL

1 Installation Procedures

Install the PL following the instructions given below.

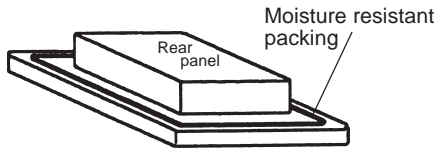
Screw in the front maintenance hatch's attachment screws

To improve the PL's moisture and dust resistance, secure the PL's front maintenance cover in place before installing the PL into a control or operation panel. (This provides protection equivalent to IP65F. If merely clipped on, the protection level is equivalent to IP63F)



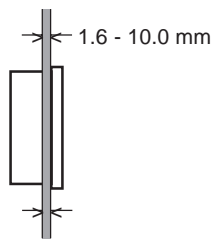
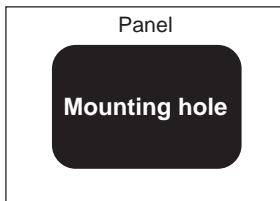
To access the maintenance cover's attachment screw holes, first remove either the dummy or optional unit, located in the rear of the PL (see step 1 in "3-2-4 Installing the FDD Unit"). This will expose the front maintenance cover's attachment screw holes. (See figure on left) Then, use a screwdriver to insert the two cover attachment screws into their respective cover holes (use only M3x6 screws). When the maintenance cover is secured, replace the previously removed unit.

Press the moisture resistant packing into place



Place the PL on a level surface with the display panel facing downward. Fit the PL's moisture resistant packing into the resin bezel's groove.

Create a 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.



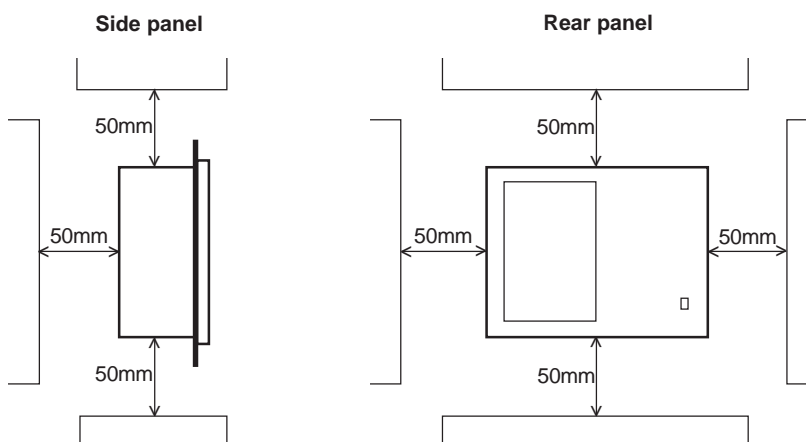
See “2-5 External Appearance and Dimensions”



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

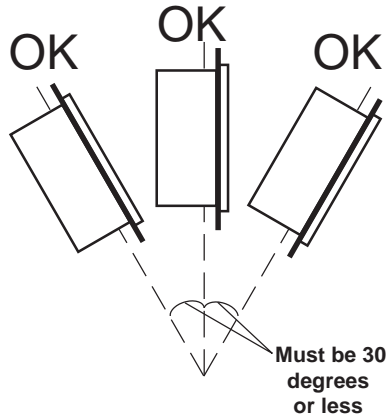


- To enhance the PL's maintainability, operability and ventilation, allow at least 50 mm or more clearance between the PL and any other objects. (The clearance must be large enough to allow you to insert or remove expansion boards and to attach connectors.)



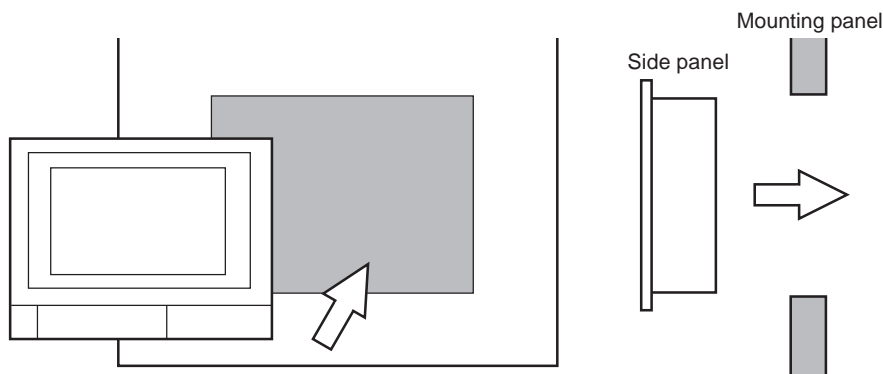
Installation and Wiring

- The PL is intended to be mounted vertically, to allow natural ventilation. The PL can also be tilted up to 30 degrees, if needed.



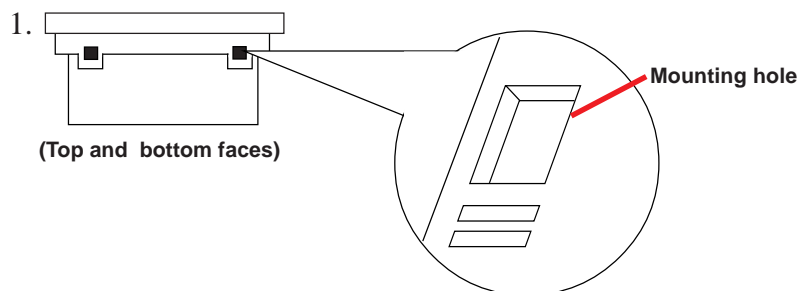
- Avoid placing the PL next to other devices that might cause overheating.
- The PL's operating temperatures are a maximum 40°C for the PL-5700T1-24VC, PL-570*S1 and PL-570*L1, and 45°C for the PL-570*T1.
- Keep the PL away from arc-generating devices such as magnetic switches and non-fuse breakers.

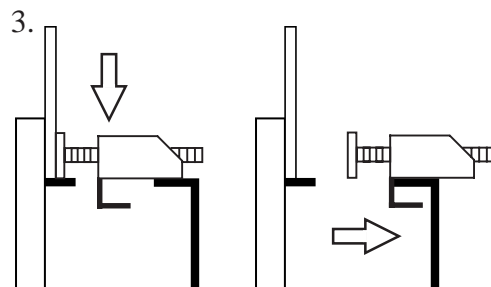
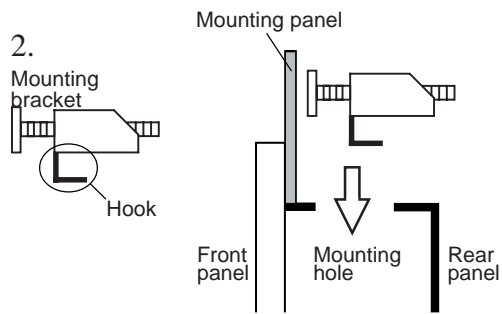
Insert the PL into the front of the mounting panel



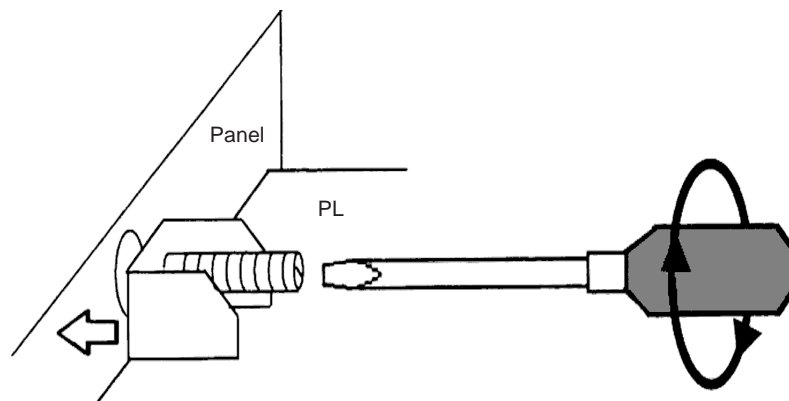
Secure the rear panel of PL in place with the mounting brackets (4)

Hook the mounting brackets into the two mounting holes on the top face, and the two holes on the bottom face of the PL's body.





Use a driver 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.



Excessive torque may damage the panel or bracket.

4-2 Wiring the PL

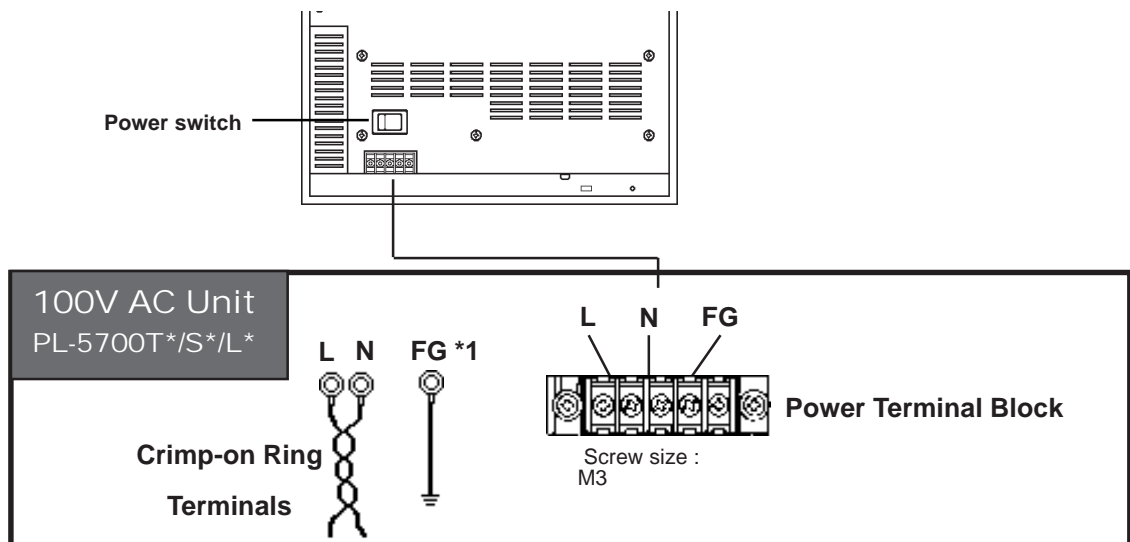
1 Connecting the Power Cord (not included with 24V unit)



WARNING

- To prevent electric shocks, be sure to turn the PL OFF before connecting the power cord.
- The PL-5700T1, PL-5701T1, PL-5700S1, PL-5701S1, PL-5700L1, and PL-5701L1 are all designed to run on a 100V AC power supply. To avoid the dangers of fire, electric hazards, and damage to equipment, use only the specified power supply voltage.

The power cord must be connected to the power terminals, on the rear of the PL.

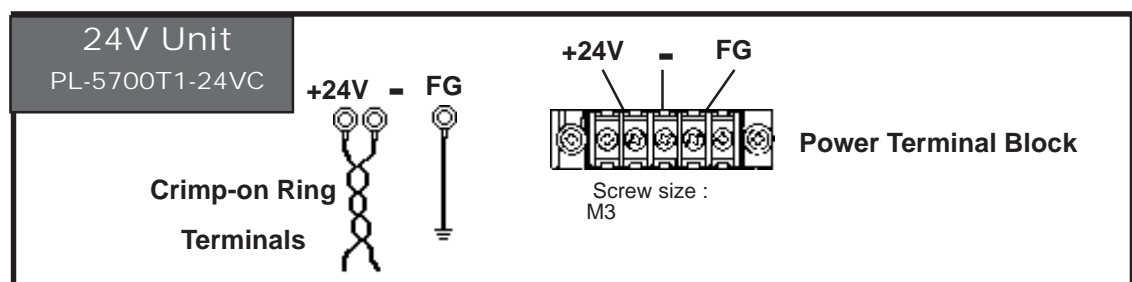


*1 The three power terminals are:

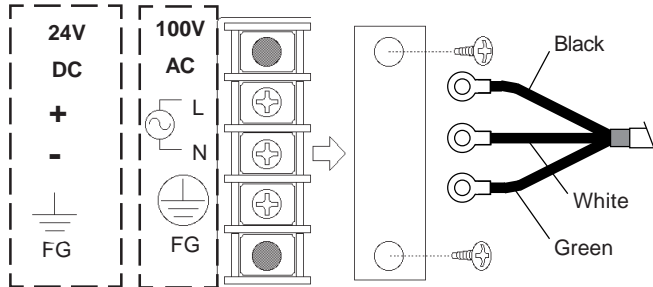
AC100V L = AC Input Terminal—live line

AC100V N = AC Input Terminal—neutral line

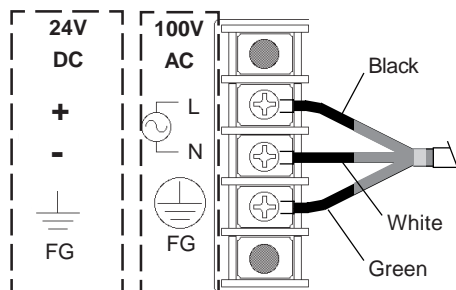
FG = Ground Terminal connected to the FP chassis



Follow the instructions below when connecting the power cord.



1. Make sure the POWER switch is OFF. Then, remove the power input terminals' transparent cover, located on the rear panel of the PL.



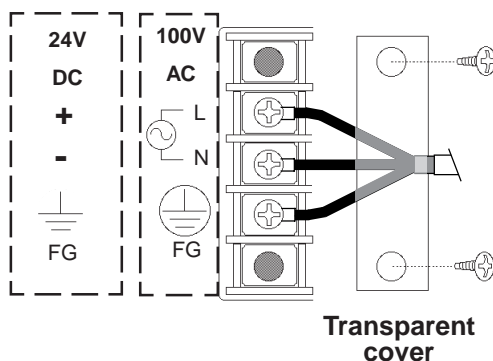
2. Loosen and remove the middle three screws from the terminal board. Align crimp terminals to each screw hole, and tighten the screws.



- 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.

Max. 6.0 mm ϕ 3.2 mm or larger

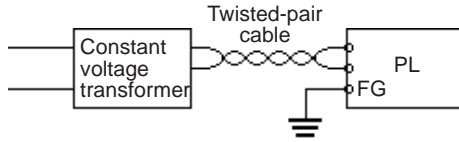
- The colors in the figure above are for the cable which came with the PL.



3. Reattach the protective transparent cover.

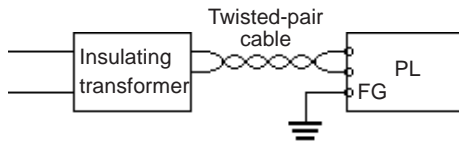
2 Cautions: 100V PL-5700T*/S*/L* Units

When connecting power to the 100V PL Unit's AC power terminals, please be aware of the following:

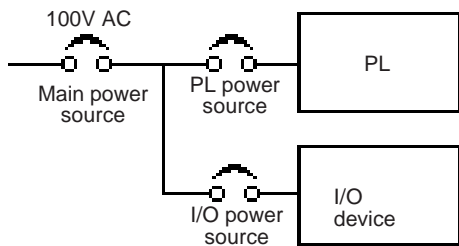


- If voltage fluctuations are expected to vary beyond the specified range, connect a constant voltage transformer.

For information about the specified voltage, refer to “2-1 General Specifications”

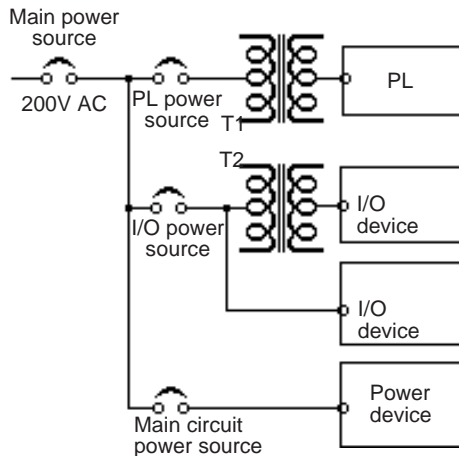


- Use a low-noise power supply both between the lines and between the PL and its ground. If there is still excess noise, connect an insulating transformer (noise-prevention type) .

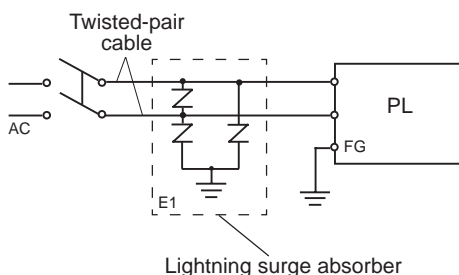


Be sure any constant or insulating transformer used has a capacity of 200V AC or more.

- Wire the power cords of the 100V PL, I/O devices, and power supply devices separately.



- 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.



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

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

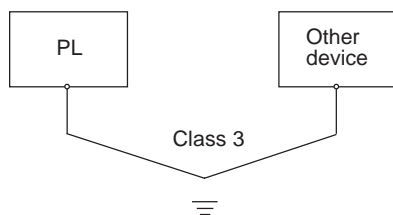
(a) Dedicated ground



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

Figure (a) = Class III Ground with a maximum grounding resistance of 100Ω .

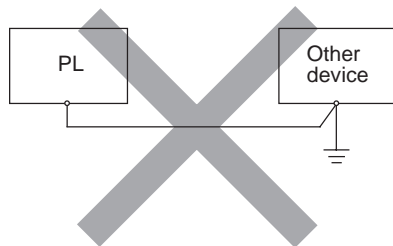
(b) Shared ground allowed



- 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



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.

**1 Use a grounding resistance of less than 100Ω and a 2mm^2 or greater thickness wire, or your country's applicable standard. For details, contact your local GP distributor.*

5

System Setup

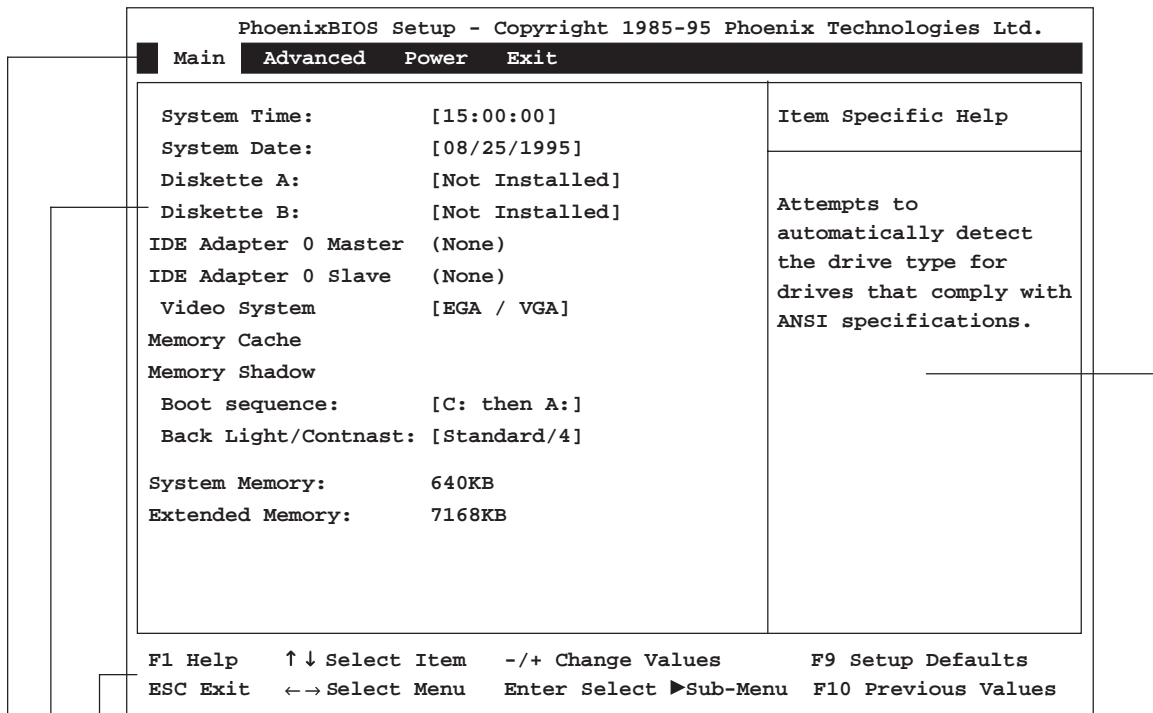
5-1 Setup Procedures

5-2 System Parameters

This chapter describes how to configure the system before operating the PL, and lists the system parameters.

5-1 Setup Procedures

1. Turn on the PL's power.
2. When the message "Press <F2> to Enter SETUP" appears, press the [F2] key. The SETUP utility will start and the following screen will appear.



Key list

Lists the keys available for setting up the PL.

Help display area

Provides detailed information about the item at the cursor position.

System set-up area

Lists system parameters for the selected menu.

Menu bar

Contains four menus: Main, Advanced, Power and Exit.



The keys available for operating the SETUP utility are as follows.

- [F1] : Provides information related to the entire SETUP utility. Use the [↑] or [↓] key to scroll the display.
- [↑] [↓] : Moves the cursor to select an item from the menu.
- [-][+] : Changes the value at the cursor position.
- [F9] : Returns the parameters listed in the system setup area to the default values.
- [ESC] : Goes to the Exit menu.
- [←][→] : Changes the menu screens.
- [Enter] : If the [Enter] key is pressed while the cursor is placed on the item marked with a black delta (▶), a submenu will appear. Pressing the [ESC] key on the submenu will return you to the main menu.
- [F10] : Returns the parameters listed in the system setup area to the CMOS's current values.

5-2 System Parameters

1 Main

■ System Time

Enter the hour, minute, and second values, in the order and ranges given below.

Hour : 00 - 23

Minute : 00 - 59

Second : 00 - 59

Use the [Enter] key to place the cursor on an item you want to change, and enter the desired value.

■ System Date

Enter the month, day, and year, in the order and ranges given below.

Month : 01 - 12

Day : 01 - 31

Year : four digits

Use the [Enter] key to place the cursor on an item you want to change, and enter the desired value.

■ Diskette A Diskette B

These parameters are required when one or two floppy disk drives are connected. Possible options are as follows.

Not Installed

360kB, 5 1/4

1.2 MB, 5 1/4

720kB, 3 1/2

1.44 MB, 3 1/2 *

2.88 MB, 3 1/2



If no floppy disk drive is installed, select the “Not Installed” option. Selecting other options may cause an error.

* If the optional flash ROM board is installed, set this parameter to “1.44 MB, 3 1/2.”

■ IDE Adapter 0 Master IDE Adapter 0 Slave

These parameters are required only when the optional HDD unit is installed on the PL. Set the type of hard disk for each master and slave unit connected to the IDE connector.

Place the cursor on the “IDE Adapter 0 Master” parameter, and press the [Enter] key to display the following screen.

PhoenixBIOS Setup - Copyright 1985-95 Phoenix Technologies Ltd.	
Main Advanced Power Exit	
IDE Adapter 0 Master (None)	Item Specific Help
Autotype Fixed Disk: [Press Enter] Type: [None] Cylinders: Heads: Sectors/Track: Write Precomp:	Attempts to automatically detect the drive type for drives that comply with ANSI specifications.
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults ESC Exit ←→ Select Menu Enter Select▶Sub-Menu F10 Previous Values	

▶ Autotype Fixed Disk

Press the [Enter] key to set the hard disk parameters automatically.

▶ Type

Select a set of hard disk settings, from 1 to 39, which matches your hard disk specifications. If a correct set is not found, select the “User” option and set values for the “Cylinders,” “Heads,” “Sectors/Track,” and “Write Precomp” parameters.

Set the “IDE Adapter 0 Slave” parameters in the same way.

System Set-up

■ Video System

Set the type of the display.



You must select the “EGA/VGA” option for the PL to operate correctly.

■ Memory Cache

Press the Enter key to set the cache memory parameters.

■ Memory Shadow

Memory shadow copies information from the ROM BIOS to RAM to improve the PL’s performance.

▶ System shadow

This parameter is fixed as “Enabled,” since information in the system BIOS must be copied to RAM.

▶ Video shadow

Selects whether or not information in the video BIOS is copied to RAM.

▶ Shadow Memory Regions

Selects the starting address to which the BIOS information is copied to. This parameter is required when installing a board containing the extended BIOS in the extended ROM area.

■ Boot sequence

Selects the drive from which you want to start the OS.

■ BackLight/Contrast

With the PL-5700L1 and PL-5701L1, adjust the brightness and contrast for the display. With the PL-5700S1 and PL-5701S1, only the contrast can be adjusted.

Standard/ 0	B right/ 0	Darker
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
Standard/ 7	B right/ 7	B righter
Standard brightness	High brightness	

Every time the [+] key, the selection scrolls forward (down). Each press of the [-] key moves the selection in the opposite direction.



- The PL-5700T1 and PL-5701T1 do not have a brightness adjustment or a contrast setting. The PL-5700S1 and PL-5701S1 also do not have a brightness setting. The default setting is [Standard/4].

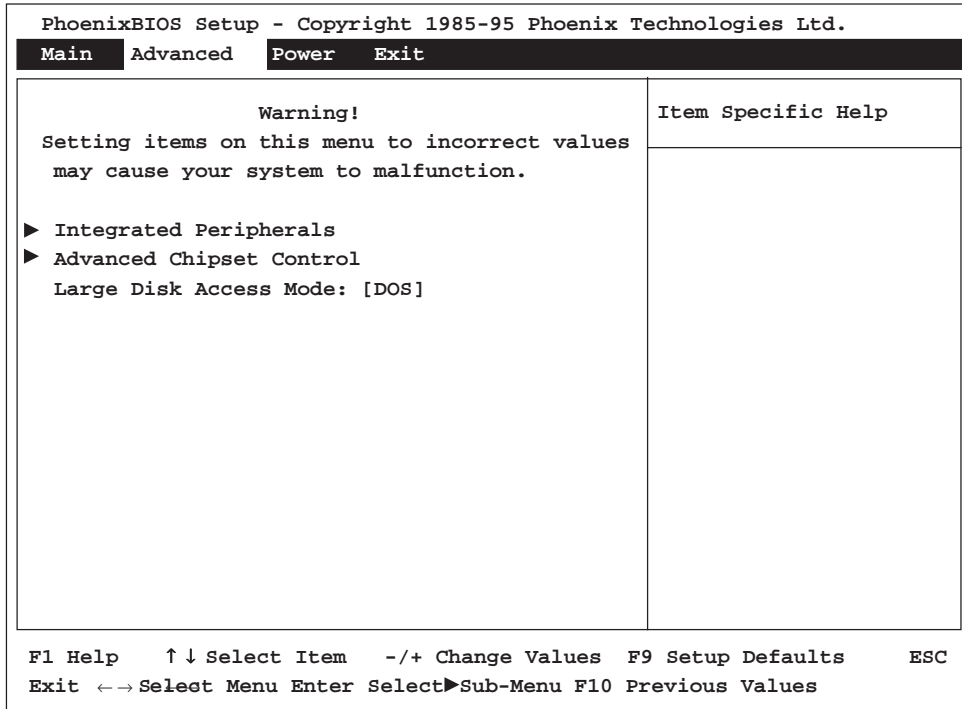
■ System Memory

Extended Memory

The main and extended memory amounts will appear.

2 Advanced

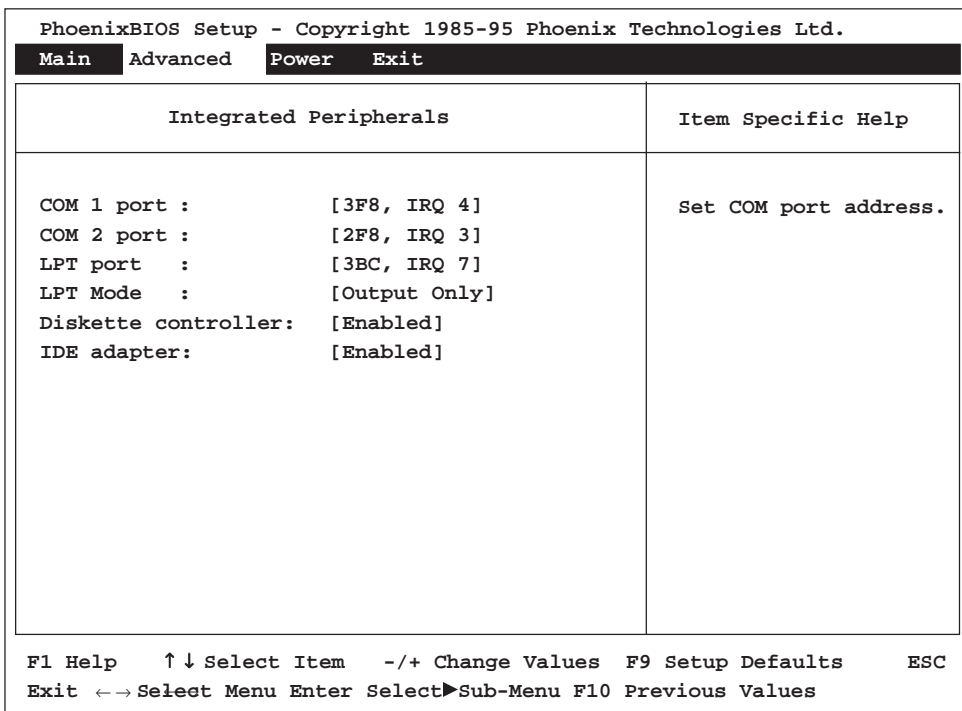
Select the “Advanced” menu from the menu bar to display the following window.



▶ Integrated Peripherals

Align the cursor with this item and press the [Enter] key to set advanced parameters for the chipset.

Normally, use the default value.



System Set-up

COM 1 Port

This setting designates the value used for the PL's COM 1 port address. The selections include [Disabled], [3F8/IRQ4], [2F8/IRQ3], [2E8/IRQ3] and [Auto]. The factory setting is [3F8/IRQ4] and is recommended.

COM 2 Port

This setting designates the value used for the PL's COM 1 port address. The selections include [Disabled], [2F8/IRQ3], [3E8/IRQ4], [2E8/IRQ3] and [Auto]. The factory setting is [2F8/IRQ3] and is recommended.

LPT Port

This setting designates the value used for the PL's LPT port address. The selections include [Disabled], [3BC/IRQ7], [378/IRQ7], or [278/IRQ5]. When using any setting other than [Disabled], the LPT mode setting must be changed to [Output Only] or [Bi-Directional]. The factory setting is [3BC/IRQ7] and is recommended.

LPT Mode

This setting designates the mode of the PL's LPT port address. The selections include [Output Only] (unidirectional), and [Bi-Directional] (both directions). The factory setting is [Output Only] and is recommended. When the LPT Port is set to [Disabled], this setting is also disabled.

Diskette controller

The selections include [Disabled] or [Enabled]. The factory setting is [Enabled] and is recommended.

IDE adapter

The selections include [Disabled] or [Enabled]. The factory setting is [Enabled] and is recommended.

► **Advanced Chipset Control**

Press the [Enter] key to set advanced parameters for the chipset.

Normally, use the default value.

System Information List and Default Settings

System Information	Default values
ATCLK Selection	CLK/4
Multiple ALE	Enabled
xtra bus wait states	1
Master mode byte swap	Disabled
Parity check	Disabled
Hidden refresh	Disabled
Slow refresh	Disabled
Read wait states	4-3-3-3 1Wait
Write wait states	1
Turbo Mode	Enabled
AT Clock Mode	Sync
DMA Clock	Systemclock/2
8Bit DMA Waits	1
16 Bit DMA Waits	1
DMA MEMR# Signal	Normal
IO Wait State	4

■ Large Disk Access Mode

If your hard disk contains 528 MB or more of memory, select the type of OS to be used.

DOS : MS-DOS

Other : OS other than MS-DOS

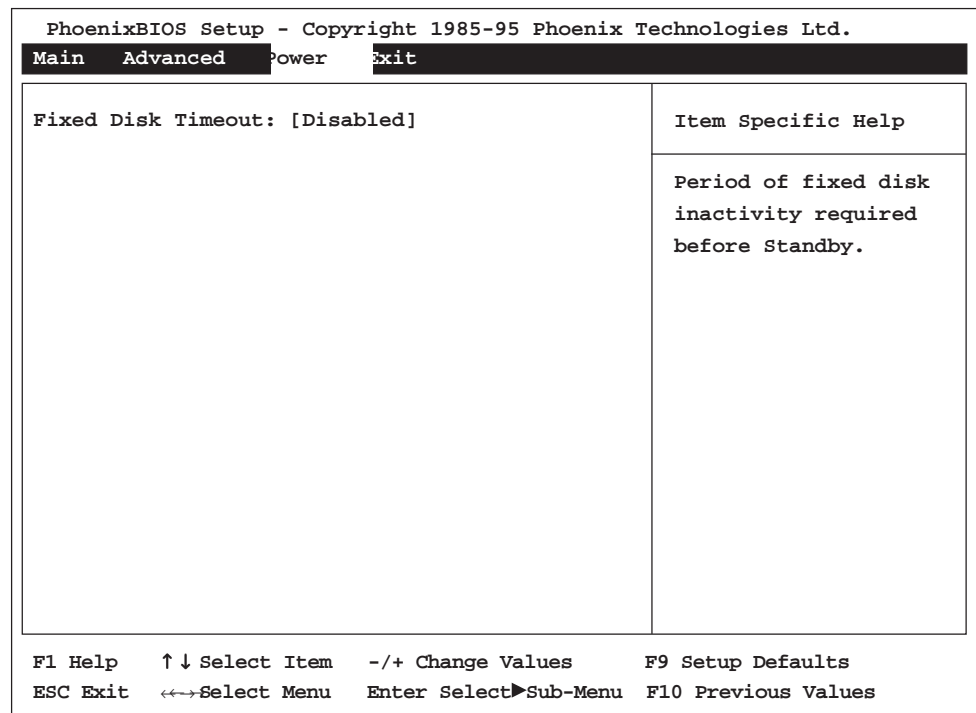
3 Power

Select the “Power” menu from the menu bar to display the following screen.

■ Fixed Disk Timeout (Time before Standby)

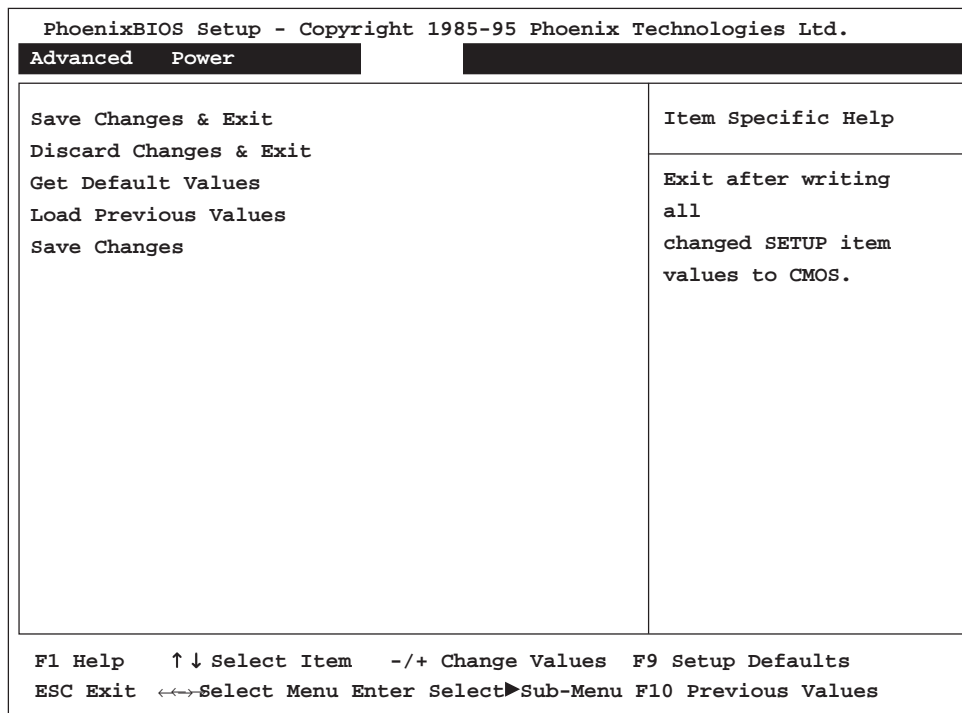
Set the number of minutes to elapse from when the PL last accesses the hard disk to when the hard disk motor stops.

Every time the [+] key is pressed, the selections are highlighted in the following order: “Disabled,” → “1min,” → “2min,” → “3min,” → “4min,” → “5min,” → “10min,” → “16min.” Each press of the [-] key moves the selection in the opposite direction.



4 Exit

Select the “Exit” menu from the menu bar to display the following screen.



■ Save Changes & Exit

Select this option to store your changes in the CMOS and reset the PL.

■ Discard Changes & Exit

Select this option to abort your changes and reset the PL.

■ Get Default Values

Select this option to return the parameter settings to the default.

■ Load Previous Values

Select this option to load the parameter settings from the CMOS.

■ Save Changes

Select this option to store your changes in the CMOS.

6

Bundled Software

6-1 File List

6-2 Touch Panel Input File

6-3 Other Files

The PL comes with programs not supplied in the standard MS-DOS or Windows® OS, including touch panel input programs. This chapter explains the types of software bundled with this product, hereafter referred to as “this software.”

6-1 File List



- Digital does not guarantee this software will work with OSs other than those listed here.

File name	Description
README.TXT	Contains detailed information on included files and up-to-date news. Read this file before using any of the bundled software.

The following software runs on Windows® 3.1/3.11 and/or Windows® 95.

File name	Description
WCONTSET.EXE	CONTSET utility's explanation and update for Windows®3.1/Windows® 95
BLSAVER.SCR	Turns off the backlight. Contains Screen Saver for Windows®3.1 and Screen Saver for Windows®95.



- WCONTSET.EXE cannot be used with the PL-5700T1, PL-5700T1-24VC, or PL-5701T1.

Also, the brightness setting is unused on the PL5700S1 and PL-5701S1.

The following software runs only on Windows® 3.1 or 3.11.

File name	Description
FUNCKEY.EXE	Utility for use with Windows 3.1/3.11 software. Is used to record and automate keystrokes, which are activated via touching user defined function keys around the periphery of the Touch Panel.

The following PL-5700 software is for use with MS-DOS systems



- Must be version 3.21 or later.
- Digital does not guarantee this software will work with any OS other than those previously mentioned.
- This software is made for use with MS-DOS. Do not use it in a Windows® environment.
- CONTSET.EXE cannot be used with the PL-5700T1, PL-5700T1-24VC or PL-5701T1. Also, the brightness setting is ignored on the PL5700S1 and PL-5701S1.



- For an explanation of the EXTCOM.SYS, CONTSET.EXE, WCONTSET.EXE and FUNCKEY.EXE applications, refer to their respective README.TXT file.

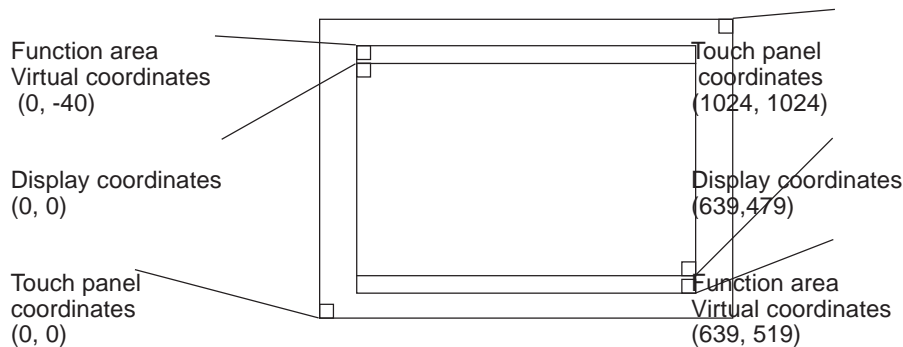
File name	Description
PLATPH.EXE	Touch panel handler Converts input from the touch panel in line with display panel resolution (640 x 480). It is also compatible with Digital Panel Computers of the PL-386 family.
PLCALB.EXE	Touch panel data calibration By touching the specified position on the panel, the difference between the logic value and measured value is corrected. Furthermore, using the PLATPH.EXE application, it is possible to create files with data based on calibration results obtained here.
KEYEM_PLEXE	Keyboard emulator Displays a picture of a keyboard on the screen, enabling input from the touch panel.
DISP.EXE	Display On/Off program Turns the display, including the backlight, on/off.
FANALARMEXE	Detects alarms in the CPU cooling fan.
EXTCOM.SYS	COM port driver (reception interrupt acknowledge). For details, see the README.TXT file on the same disk.
CONTSET.EXE	For setting contrast with the PL-5700S1 and PL-5701S1 when equipped with the backlight brightness and contrast control utility for the PL-5700L1 and PL-5701L1.

6-2 Touch Panel Input File

1 PLATPH.EXE (Touch Panel Handler)

With an analog touch panel, input is recognized within a 1024 x 1024 pixel area, with the lower left-hand corner as the coordinate origin point. However, most display panels use the upper left-hand corner as the origin point and have a resolution of 640 x 480 pixels. Consequently, depending on the conditions of use, the touch panel position and display position may not be the same. Here, the PLATPH.EXE application solves this problem by converting input from the touch panel into the corresponding display panel coordinates, allowing the use of application programs which use absolute coordinate input or area input from a touch panel.

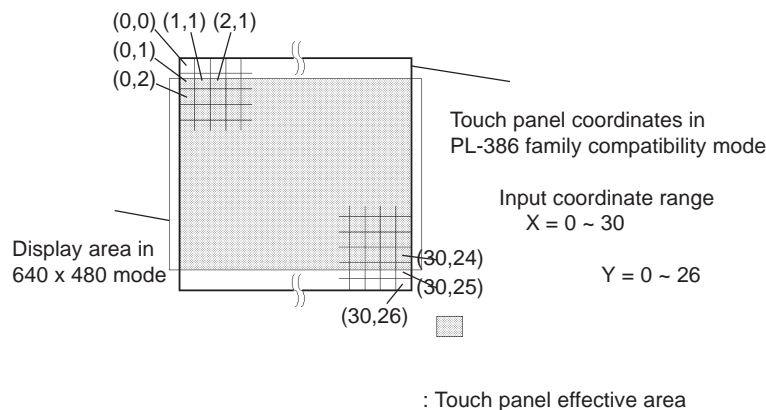
The relationship between touch panel coordinates and display coordinates is as follows.



Relationship between touch panel coordinates and display coordinates when using the PL-386 Series compatibility mode

To ensure compatibility with 16 x 14 (31 x 27 by double precision) touch panels used on the Digital PL-386 family of Panel Computers, the TPH.EXE (PL-386 command) function can be used as is.

The relationship between touch panel coordinates and display coordinates is as follows.



The touch panel handler cannot be used in conjunction with the TT-WIN mouse emulator on Windows®. Cancel the resident program before starting up Windows®.

■ Start-up

PLATPH [Parameter] [↵] or PLATPH -r[↵]

* Parameters

- a<n> Specifies the I/O base address of the touch panel's SIO port.
 Hexadecimal, Default: 2e8 (COM4)
 n= 3f8 (COM1)
 2f8 (COM2)
 3e8 (COM3)
 2e8 (COM4)
- q<n> Specifies the interrupt level (IRQ) of the touch panel's SIO port.
 Default: 10 (COM4)
 n= 4 (COM1)
 3 (COM2)
 11 (COM3)
 10 (COM4)
- i<n> Sets the software interrupt vector number when calling up functions.
 Hexadecimal, Default: n=59
- r Cancels the resident command.

-c <path name> Specifies the data file containing the calibrated value obtained from the PLCALIB.EXE application (touch panel data calibration).

When defaulted to, the PLATPH.CAL of the current directory is specified.

* Example platph -a2e8 -q10 -cc:\platph.cal



Normally, only "platph" is needed.

At startup, the following message will appear on the screen.

**Analog Touch Panel Handler PLATPH.EXE Version X.XX
 Copyright (c) 199X Digital Electronics Corporation
 Stay resident.**

After startup, these commands reside in memory.



- If an error is generated because, for example, there is no file created by the PLCALIB.EXE application, the following message appears on the screen, and the system will start up in a mode that does not calibrate data.

**WARNING!! Can't open CAL file.
 Stay resident.**

- Unless properly calibrated, the display and touch panel input positions may not be the same.

Bundled Software

■ Functions

PLATPH.EXE calls up functions using a software interrupt (default: INT 59h).



For information on functions in the PL-386 compatibility mode, see pages 6-7 to 6-10.

INT 59h Function List

Function code	Description
8100h	Touch panel input (unrestricted wait)
8101h	Touch panel input (???auto restore???)
8102h	Touch panel non-destructive input
0200h	Input buffer clear
8500h	Touch panel status detection
FE00h	Reside check

8100h Touch panel input (unrestricted wait)

Returns coordinates of the area/position touched. Waits until data is input.

Input AX = 8100h

Output AH = 0: Successfully completed
BX = Y coordinate in 640 x 480 mode (-40 - 519)
DX = X coordinate in 640 x 480 mode (0 - 639)
CX = Number of valid input buffers on touch panel

8101h Touch panel input (immediate restore)

Returns coordinates of the area/position touched. Immediately restored if nothing is entered.

Input AX = 8101h

Output AH = 0: Input ON
1: Input OFF
BX = Y coordinate in 640 x 480 mode (-40 - 519)
DX = X coordinate in 640 x 480 mode (0 - 639)
CX = Number of valid input buffers on analog touch panel

8102h Touch panel non-destructive input

Returns coordinates of the area/position touched. Does not update the touch panel input buffer.

Input AX = 8102h

Output AH = 0: Input on
1: Input off
BX = Y coordinate in 640 x 480 mode (-40 - 519)
DX = X coordinate in 640 x 480 mode (0 - 639)
CX = Number of valid input buffers on analog touch panel

0200h Input buffer clear

Clears touch panel input buffers.

Input AX = 0200h

Output AH = 0: Successfully completed

8500h Touch panel status detection

Returns touch panel status

Input AX = 8500h

Output AH = Status in 640 x 480 mode

Bit 1	Bit 0	Description
0	0	Area pressed
0	1	Unchanged
1	0	Not available
1	1	Area released

* For an explanation on how to use the function, see “function 500h.”

FE00h Resident check

When the PLATPH.EXE application resides in memory, returns a fixed message and version.

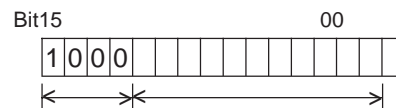
Input AX = FE00h

Output AH = 0: Successfully completed

BL = ‘Y’

BH = ‘B’

CX = Version No.



PLATPH.EXE Version No.

ID code

Carry = Clear

Functions available in PL-386 Compatibility Mode

The following data details the functions available in the PL-386 compatibility mode (when the user's PL-386 application is used without further conversion, updating or formatting).

INT 59h Function List

Function code	Description
0000h	Touch panel initialization
0100h	Touch panel input (unrestricted wait)
0101h	Touch panel input (??? auto restore???)
0102h	Touch panel non-destructive input
0300h	Coordinate code register
0400h	Coordinate code input (unrestricted wait)
0401h	Coordinate code input (??? auto restore???)
0402h	Coordinate code non-destructive input
0500h	Touch panel status detection

0000h Touch panel initialization

Same as 0200h (Input buffer clear)

Input AX = 0000h

Output AH = 0: Successfully completed

0100h Touch panel input (unrestricted wait)

Returns coordinates of the area/position touched. Waits until input is made.

Input AX = 0100h

Output AH = 0: Successfully completed
BH = Y coordinate range in PL-386 compatibility mode (0 - 26)
BL = X coordinate range in PL-386 compatibility mode (0 - 30)
CX = Number of valid data sets in touch panel input buffers

0101h Touch panel input (immediate restore)

Returns coordinates of the area/position touched. Immediately restored after input is made.

Input AX = 0101h

Output AH = 0: Input on ("1" when input is off)
BH = Y coordinate range in PL-386 compatibility mode (0 - 26)
BL = X coordinate range in PL-386 compatibility mode (0 - 30)
CX = Number of valid data sets in touch panel input buffers

0102h Touch panel non-destructive input

Returns coordinates of the area/position touched. Does not update touch panel input buffer.

Input AX = 0102h

Output AH = 0: Input present (No input = 1)
 BH = Y coordinate range in PL-386 compatibility mode (0 - 26)
 BL = X coordinate range in PL-386 compatibility mode (0 - 30)
 CX = Number of valid data sets in touch panel input buffers

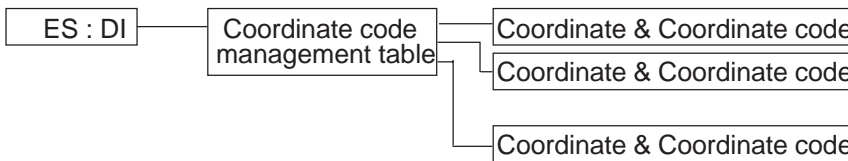
0300h Coordinate code register

Registers code corresponding to the display coordinates.

Input AX = 0300h
 ES = Segment from coordinate code management table
 DI = Offset from coordinate code management table

Output AH = 0: Successfully completed

* Relationship between coordinate code management table and coordinate code



*** Coordinate code management table setup**

The coordinate code management table manages positions of multiple coordinate code lists.

Number (n) of registered coordinate code lists	
Offset of 1st coordinate code list	
Segment of 1st coordinate code list	
≈	≈
Offset of 2nd coordinate code list	
Segment of 2nd coordinate code list	
:	
Offset of nth coordinate code list	
Segment of nth coordinate code list	

Bundled Software

* Coordinate code list setup

The coordinate code list determines which code is returned when the touch panel is pressed in a specific area. These coordinates specify the display coordinates.

Number (n) of registered coordinate codes	
Display coordinate designation mode	
Left side X coordinate of 1st area (X1)	
Top side X coordinate of 1st area (Y1)	
≈ Right side X coordinate of 1st area (X2)	≈
Bottom side X coordinate of 1st area (Y2)	
Coordinate code of 1st area (code)	
:	
Left side X coordinate of nth area (X1)	
Top side X coordinate of nth area (Y1)	
Right side X coordinate of nth area (X2)	
Bottom side X coordinate of nth area (Y2)	
Coordinate code of nth area (code)	

0400h Coordinate code input (unrestricted wait)

Returns coordinates of the area/position touched and coordinate code. Waits until data is entered.

Input AX = 0400h

Output AH = 0: Successfully completed
 BH= Y coordinate range in PL-386 compatibility mode (0 - 26)
 BL= X coordinate range in PL-386 compatibility mode (0 - 30)
 CX= Number of valid data sets in touch panel input buffers
 DX= Coordinate code



To use function 0400h, it is necessary to first register the coordinate codes.

0401h Coordinate code input (immediate restore)

Returns coordinates of the area/position touched and coordinate code. Immediately restored after data is entered.

Input AX= 0401h

Output AH= 0: Input on (“1” when input is off)
 BH= Y coordinate range in PL-386 compatibility mode (0 - 26)
 BL = X coordinate range in PL-386 compatibility mode (0 - 30)
 CX= Number of valid data sets in touch panel input buffers
 DX= Coordinate code



To use function 0401h, it is necessary to first register the coordinate codes.

0402h Coordinate code non-destructive input

Returns coordinates of the area/position touched. Does not update the touch panel input buffer.

Input AX= 0402h

Output AH= 0: Input on (“1” when input is off)
 BH= Y coordinate range in PL-386 family compatibility mode (0 - 26)
 BL = X coordinate range in PL-386 family compatibility mode (0 - 30)
 CX= Number of valid data sets in input buffers on touch panel
 DX= Coordinate code



To use function 0402h, it is necessary to first register the coordinate codes.

0500h Touch panel status detection

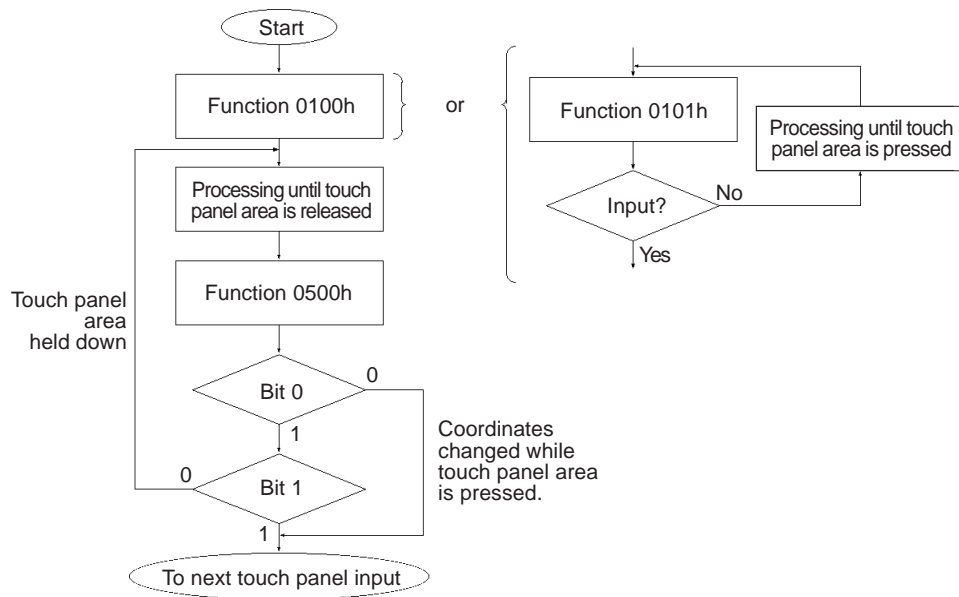
Returns the touch panel’s current status

Input AX = 0500h

Output AH = Status in PL-386 compatibility mode

Bit 1	Bit 0	Description
0	0	Area pressed
0	1	Unchanged
1	0	Not available
1	1	Area released

How to use function 0500h



2 PLCALIB.EXE (Touch Panel Data Calibration)

By touching the specified position (upper left-hand corner or lower right-hand corner) on the panel, the difference between the screen's logical value and its measured value is corrected. Furthermore, it is possible to create files with data based on calibration results obtained here, to be used with the PLATPH.EXE application (Touch Panel Handler).

■ Start-up

PLCALIB [Parameter] 

* Parameter

-a<n> Specifies the I/O base address of the touch panel's SIO port.
Hexadecimal, Default: 2e8 (COM4)
n= 3f8 (COM1)
 2f8 (COM2)
 3e8 (COM3)
 2e8 (COM4)

-q<n> Specifies the interrupt level (IRQ) of the touch panel's SIO port.
Default: 10 (COM4)
n= 4 (COM1)
 3 (COM2)
 11 (COM3)
 10 (COM4)

-c <path name> Specifies the data file containing the calibrated value obtained from the PLCALIB.EXE application (touch panel data calibration).
When defaulted to, the PLATPH.CAL of the current directory is specified.

* Example platph -a2e8 -q10 -cc:\platph.cal



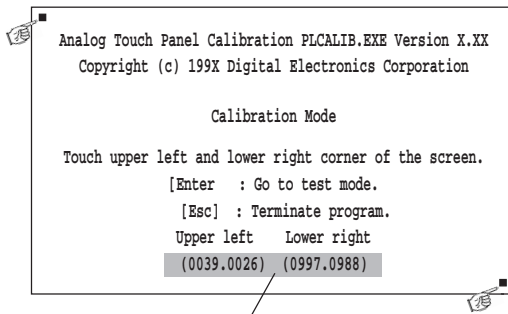
Normally, only "platph" is needed.

■ Operation

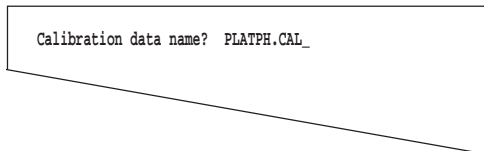
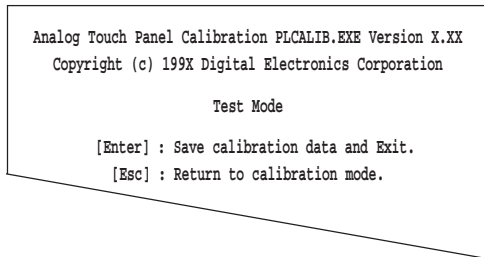
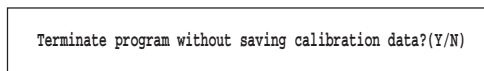
```

■ Analog Touch Panel Calibration PLCALIB.EXE Version X.XX
  Copyright(c) 199X Digital Electronics Corporation
    Calibration Mode
  Touch upper left and lower right corner of the screen.
    [Enter] : Go to test mode.
    [Esc]  : Terminate program.
  Upper left  Lower right
  (0000,0000) (0000,0000)
  ■
    
```

① When the PLCALIB.EXE application is opened up, the message shown at the left will appear on the screen, and two points will light up, in both the upper left-hand and lower right-hand corners.



The measured value is displayed on the screen.



② Touch each point, in the order it appears.



- Do not touch both points simultaneously.
- Touch the panel exactly on the lit up areas.
- The measured value is redisplayed if you touch the panel again.

The difference between the logic value and the measured value is obtained.



- To quit programming, press the [Esc] key. Then, when the message shown on the left appears, press the [Y] key. The program will end without saving data. Here, pressing the [N] key will return you to the calibration mode.

③ Start up the “Test Mode” with the [↵] key.

This mode tests the calibrated value to determine if it is correct or not.

The perimeter is OK if it is drawn along the path you traced by finger. Otherwise, return to the “Calibration Mode” and touch the lit up areas again.



- You can return to the “Calibration Mode” with the [Esc] key.

④ If test results are OK, press the [Enter] key.

When the message shown at the left appears, input the data file name and press the [↵] key.



- When specifying the data file name for the parameter (-C=[path name]) at the PLCALIB.EXE start-up, the program ends without displaying the message shown on the left.

6-3 Other Files

1 DISP.EXE (Display ON/OFF Program) *MS-DOS® only

This application turns the display, including the backlight, ON or OFF.

■ Start-up

DISP ON or DISP OFF

The command's execution result is set on the MS-DOS ERROR LEVEL. ERROR LEVELS are as follows.

ERROR LEVEL	DESCRIPTION
0	Successfully completed
1	Expansion BIOS (INT 5Fh) error
-1	Other (command parameter, etc.) error

2 FANALARM.EXE (CPU Cooling Fan Alarm Detection Program)

*MS-DOS® /Windows® 3.1 only

This application sounds a buzzer when the CPU cooling fan stops.

■ Start-up

FANALARM or FANALARM -r

* Parameters

-r Cancels the resident command.

If the fan stops and the buzzer sounds, promptly save any data not yet saved, quit all current applications, and check the fan.



- There is no function for silencing the buzzer. Only turning the power OFF will turn it off.
- In a multitasking environment such as Windows®, the buzzer may be turned off by another task.

3 BLSAVER.SCR (Windows® 3.1 Screen Saver/ Windows® 95 Screen Saver)

This application turns off the backlight.

■ How to use

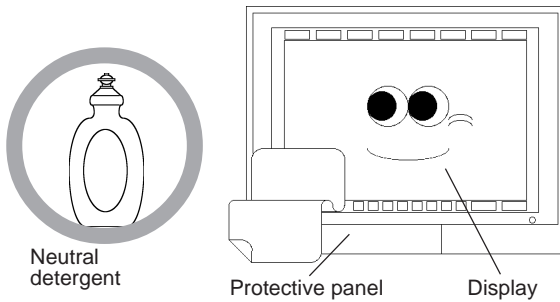
- 1) Copy the BLSAVER.SCR application into the directory where installed Windows® 3.1/Windows® 95.
- 2) Select "Control Panel" >> "Display" >> "Screen Saver" >> "Back light OFF".
- 3) Set the "Wait" value and close the Control Panel.

If no input is made from the keyboard, mouse or touch panel within the set amount of time, the backlight will turn off. The backlight turns back on when input is made from the keyboard, mouse or touch panel.

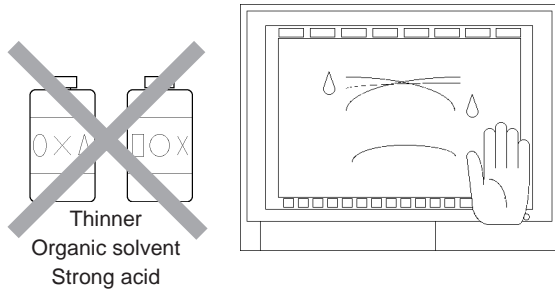
Maintenance and Inspection

This chapter describes how to maintain the PL to ensure more comfortable use.

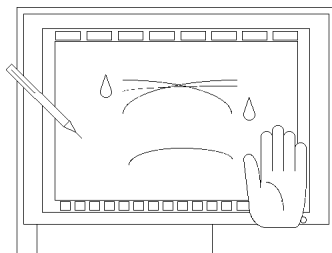
7-1 Cleaning the Display



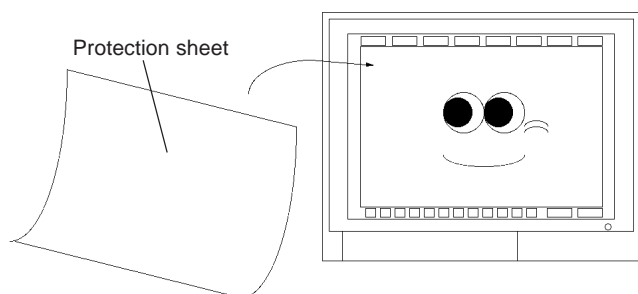
When the display surface or frame become dirty, use a soft cloth moistened with neutral detergent to wipe away dust or stains.



Do not 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.



Use the screen protection sheet when using the unit in especially dirty or dusty areas.

7-2 Replacing the 100V Unit's Backlight

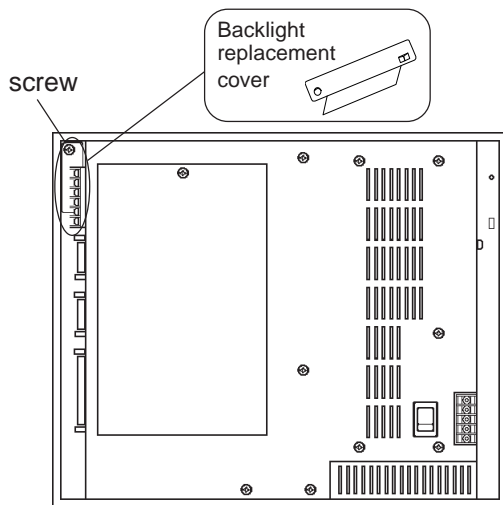
If the 100V unit's display becomes dark while running the PL, there may be a problem with the backlight. If a problem is found or if the backlight is burnt out, you will need to replace it with a new one.



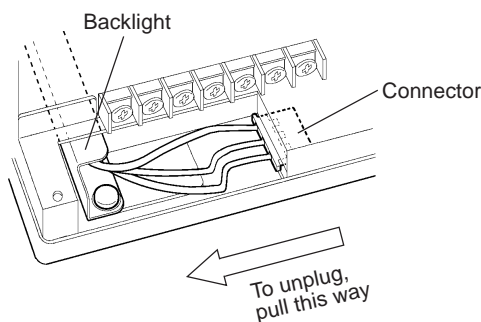
With the PL-570*T1 and PL-570*S1, you can replace the backlight by yourself. However, if your model is the PL-570*L1 or the PL-570T1-24VC, you will need to ask a Digital service person to replace the backlight. Please contact your nearest Digital Service Center. Also, when using the PL-570*T1 or PL-570*S1, replace the backlight following the instructions below. The part number of the replacement backlight is "GP570-BL00-MS."

WARNING

- Only a Digital serviceman should replace the 24V AC unit's backlight.
- To avoid electric hazards and burns, turn OFF the power to the PL before replacing the backlight. Also, be sure to wear gloves when handling the backlight.
- Be careful not to drop or break the old backlight.



1. Loosen the screw on the backlight replacement cover on the rear panel of the PL, to remove the cover.



2. Unplug the backlight's connector, and remove the screw which holds the backlight in place. Be careful not to drop this screw inside the PL.

3. Slide the replacement backlight into the PL, secure it in place with the attachment screw, and re-attach the connector.

4. Replace the backlight's cover and tighten its attachment screw. Be careful not to pinch the connector lines between the PL body and this cover.

7-3 Periodic Check

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

- Ambient environment check points
 - Is the ambient temperature within the specified range?
 - 0 to 45°C for the PL-5700T1 and PL-5701T1
 - 0 to 40°C for the PL-5700S1, PL-5700T1-24VC, PL-5701S1, PL-5700L1, and PL-5701L1
 - Is the ambient humidity within the specified range (30 to 85 %RH) ?
 - Is the atmosphere free of corrosive gas ?

- Electrical specifications check
 - Is the voltage adequate (85 to 132 V AC, 50/60 Hz for the 100V AC units) ?
(19.2V to 28.8V DC, 50/60 Hz for the 24V DC unit) ?

- Installation check points
 - 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 check
 - Is the display bright enough ?

MEMO

A ppendix

1. Hardware Configuration
2. Serial Communications
3. Printer Cable Connections
4. Touch Panel Handler Sample Program
5. BIOS Lists

1 Hardware Configuration

1 I/O Mapping

Address	AT system device	System-specific device
0000H - 001FH	DMA controller (8237)	
0020H - 002FH	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	
0103H	Used by main board	
016CH - 016FH	Used by main board	Flash ROM board bank
0170H - 0171H	Memory card interface	Memory card interface memory bank
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 purpose	
0378H - 037FH	Parallel port 2 (LPT2) : Contrast controller	Used for STN color LCD and black-and-white LCD (Reserved if TFT color LCD) *2
03B0H - 03BBH	Video controller (VGA)	
03BCH - 03BFH	Parallel port 1 (LPT1) : Printer	
03C0H - 03DFH	Video controller (VGA)	
03E8H - 03EFH	Serial port 3 (COM3) : Reserved	RS-485
03F0H - 03F7H	Floppy disk controller	
03F8H - 03FFH	Serial port 1 (COM1) : General-purpose	

For information on I/O bit mapping, see the next page.

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

*2 : The PL system uses these addresses: do not assign them to other devices.

<Extended I/O Bit Mapping>

Description	Address	D7	D6	D5	D4	D3	D2	D1	D0
Status register	#16EH R	FAN NG	FAN NGEN	S EL 1	REG 2	REG 1	FDD MODE	B LON	R EGO
Status register	#16EH W	IO INIT	FAN NGEN	S EL 1	REG 2	REG 1	FDD MODE	B LON	R EGO

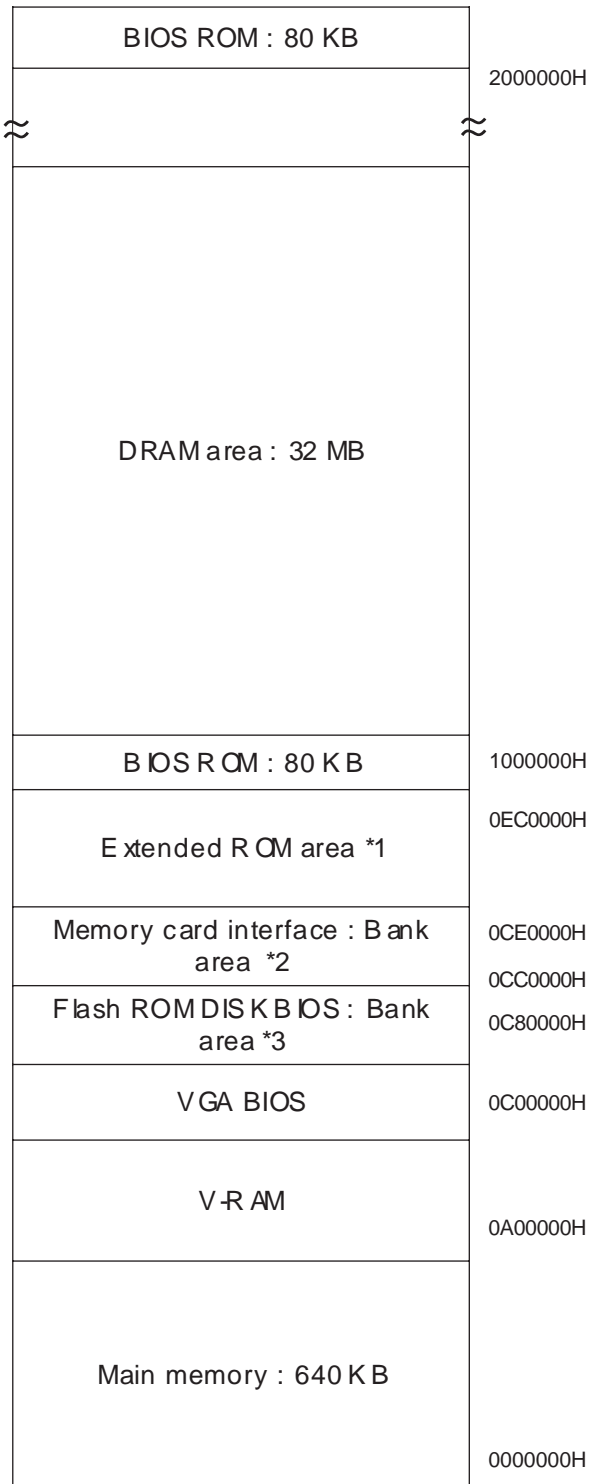
Address #16EH is used by the PL system: do not assign it to other devices.

Bit name	Description
REG0	Read/Write *1
REG 1	Read/Write *1
REG 2	Read/Write *1
S EL 1	Super IO S E L E C T *1
F DD MODE	2MB/1.6MB *1
IO INIT	Super IO initialization, 1: Normal operation *2
F AN NGEN	1 : Fan alarm (IR Q15) enabled, 0 : Disabled
F AN NG	Read only, 1 : Fan abnormal, 0 : Normal
B LON	1 : Backlight OFF 0 : Backlight ON

*1 : The PL system uses this bit. Do not assign it to other devices. This bit must be always “1,” do not write “0” for it.

*2 : You cannot read this bit for the purpose of editing or overwriting data.

2 Memory Mapping



*1 : This area is reserved for extended boards.

*2 : This area is occupied only when the optional memory card interface unit is installed.

*3 : This area is occupied only when the optional flash ROM board unit is installed.

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-purpose port
IRQ 4	Serial port 1 (COM1) : General-purpose port
IRQ 5	Available (LPT2)
IRQ 6	Fbppy 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) : RS 485
IRQ 12	Available (PS/2 mouse)
IRQ 13	Numeric data processor
IRQ 14	Hard disk (IDE)
IRQ 15	Available (FAN stop detection is possible)

■ DAM Channel List

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

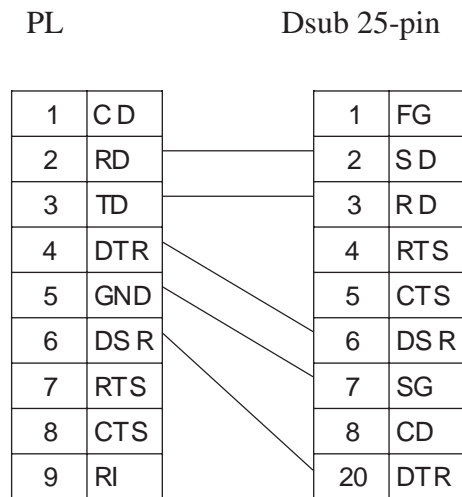
*1 : IRQ 9 is not used by the PL, but reserved as standard.

2 Serial Communications

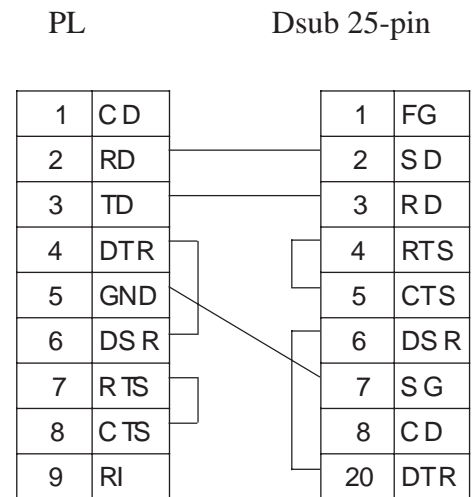
This section explains how to perform serial communications with the PL.

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

<Example 1>



<Example 2>



■ Sample output program

Below is a sample program for sending 1 character from the RS-232C connector.



- Because the PL uses an AT-compatible BIOS, the serial communication BIOS (INT 14 h) does not support communications by interrupt. Therefore, install a reception interrupt function in the application.

```

#include <stdio.h>
#include <dos.h>

union      REGS   ir,or;

main( ){
    ir.h.ah  =  0x00 ;    /* Initialization */
    ir.h.al  =  0xe3 ;    /* 9600bps,8bit,NONE,1stop */
    ir.x.dx  =  0 ;      /* COM1 */
    int86 (0x14,&ir,&or) ;

    ir.h.ah  =  0x01 ;    /* 1 character output */
    ir.h.al  =  0x32 ;    /* '2' */
    ir.x.dx  =  0 ;      /* COM1 */
    int86 (0x14,&ir,&or) ;
}
    
```

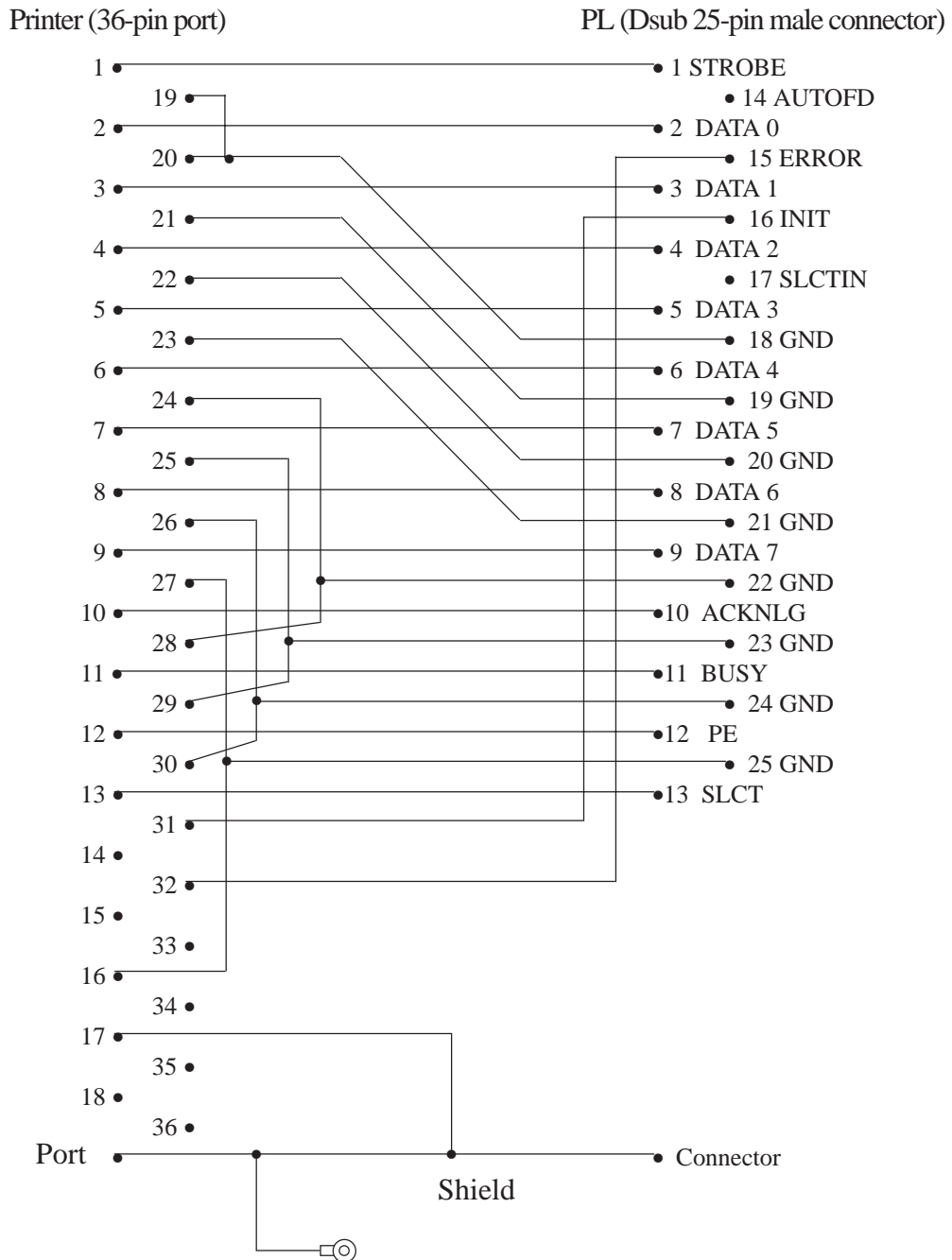


- Changing commands or parameters also changes function (mode setting, data reception, etc.).

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



4 Touch Panel Handler Sample Program

The following sample program was created with the PLATPH.EXE (Touch Panel Handler) application.

Sample Program made with the Touch Panel Handler

Compiler Method

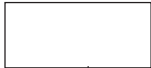
`cl sample.c`

If not adding GRAPHICS.LIB to SLIBCE.LIB, add `/link graphics.lib`.

F1	F2	F3	F4	F5	F6	F7	F8
----	----	----	----	----	----	----	----

Please press one of the touch panel keys.

Pressing either “Z” or on the square shown to the right, will quit this program.



“Quit” key

1	2	3	4	5	6	7	8	9	0	.	+	BS	ENT
---	---	---	---	---	---	---	---	---	---	---	---	----	-----

Function Key area

This sample program is designed to perform processing based on the touch panel input received from either the upper or lower function keys, or the screen’s designated Quit key area.

```

/* This sample program is used by the PLATPH.EXE touch panel handler.
 * Input can be performed by pressing on designated areas of the screen.
 * Before starting this program, be sure to start the PLATPH.EXE program
 */

```

```

#include <stdlib.h>
#include <stdio.h>
#include <dos.h>
#include <graph.h>
#include <conio.h>

```

```

#define ATPH_SYS_CALL 0x59          /* ATPH System Call */
#define KEYBOARD_BIOS 0x16         /* Key Board BIOS */
#define WRITE_DATA 0x05           /* Key Board Input */
#define TP_IN_NOWAIT 0x8101       /* ATPH Input */
#define TP_CONDITION 0x8500       /*TouchPanelCondition*/

#define ZKEYCODE 0x7a            /* "Z" keycode */
#define DATA8254 0x40           /* Timer Data */
#define CTRL8254 0x43            /* Timer Controller */
#define CTRL8042 0x61            /* Buzzer ON/OFF */
#define BEEP_TIME 20000          /* Beep's ON period */

#define FALSE 0
#define TRUE 1

struct function_coordinate
{
    short sx;                    /* X coordinate (left,upper) */
    short sy;                    /* Y coordinate (left,lower) */
    short ex;                    /* X coordinate (Right Upper) */
    short ey;                    /* Y coordinate (Right,lower) */
    short key;                   /* Key Code */
}

tpcd [] =
{
    480, 40, 559, 80, 0x2c7a,    /* Square's display */

    1, -40, 79, -1, 0x1e61,     /* Function Sheet F1 */
    80, -40, 159, -1, 0x3062,   /* Function Sheet F2 */
    160, -40, 239, -1, 0x2e63,  /* Function Sheet F3 */
    240, -40, 319, -1, 0x2064,  /* Function Sheet F4 */
    320, -40, 399, -1, 0x1265,  /* Function Sheet F5 */
    400, -40, 479, -1, 0x2166,  /* Function Sheet F6 */
    480, -40, 559, -1, 0x2267,  /* Function Sheet F7 */
}

```

Appendix

```
560, -40, 639, -1, 0x2368, /* Function Sheet F8 */

1, 479, 39, 519, 0x0231, /* Function Sheet 1 */
40, 479, 79, 519, 0x0332, /* Function Sheet 2 */
80, 479, 119, 519, 0x0433, /* Function Sheet 3 */
120, 479, 159, 519, 0x0534, /* Function Sheet 4 */
160, 479, 199, 519, 0x0635, /* Function Sheet 5 */
200, 479, 239, 519, 0x0736, /* Function Sheet 6 */
240, 479, 279, 519, 0x0837, /* Function Sheet 7 */
280, 479, 319, 519, 0x0938, /* Function Sheet 8 */
320, 479, 359, 519, 0x0a39, /* Function Sheet 9 */
360, 479, 399, 519, 0x0b30, /* Function Sheet 0 */
400, 479, 439, 519, 0x342e, /* Function Sheet . */
440, 479, 479, 519, 0x272b, /* Function Sheet + */
480, 479, 559, 519, 0x0e08, /* Function Sheet BS */
560, 479, 639, 519, 0x1c0d, /* Function Sheet ENT*/
0, 0, 0, 0, 0
};
```

```
struct key_code
{
    char keyname[3]; /* Touch Key Name */
    short keycode; /* Key Code */
}

kbcd[]=
{
    " Z ", 0x7a, /*Display Square */

    " A ", 0x61, /* Function Sheet F1 */
    " B ", 0x62, /* Function Sheet F2 */
    " C ", 0x63, /* Function Sheet F3 */
    " D ", 0x64, /* Function Sheet F4 */
    " E ", 0x65, /* Function Sheet F5 */
    " F ", 0x66, /* Function Sheet F6 */
```

```

" G ", 0x67,          /* Function Sheet F7 */
" H ", 0x68,          /* Function Sheet F8 */

" 1 ", 0x31,          /* Function Sheet 1 */
" 2 ", 0x32,          /* Function Sheet 2 */
" 3 ", 0x33,          /* Function Sheet 3 */
" 4 ", 0x34,          /* Function Sheet 4 */
" 5 ", 0x35,          /* Function Sheet 5 */
" 6 ", 0x36,          /* Function Sheet 6 */
" 7 ", 0x37,          /* Function Sheet 7 */
" 8 ", 0x38,          /* Function Sheet 8 */
" 9 ", 0x39,          /* Function Sheet 9 */
" 0 ", 0x30,          /* Function Sheet 0 */
" . ", 0x2e,          /* Function Sheet . */
" + ", 0x2b,          /* Function Sheet + */
"B S", 0x08,          /* Function Sheet BS */
"ENT", 0x0d,          /* Function Sheet ENT*/
0, 0
};

```

union REGS inregs, outregs;

```

/*****

```

```

/* BUZZER ON */

```

```

*****/

```

```

void buzzer_on(void)

```

```

{

```

```

    int timer;

```

```

    outp (CTRL8253, 0xb6);

```

```

    outp (DATA8253+2, 0x33);

```

```

    outp (DATA8253+2, 0x05);          /* Length of buzzer sounding */

```

Appendix

```
    outp (CTRL8042, ((inp(CTRL8042) | 0x3) & 0xff));
                                     /* Buzzer On      */

    for (timer = 0 ; timer<BEEP_TIME; timer++);
}

/*****/
/* BUZZER OFF */
/*****/
void buzzer_off(void)
{
    outp (CTRL8042, (inp(CTRL8042) & 0xfc));    /* Buzzer Off    */
}

/*****/
/* WAIT TOUCHPANEL OFF */
/*****/
void wait_touch_off(void)
{
    while(1)
    {
        inregs.x.ax = TP_CONDITION;
        int86(ATPH_SYS_CALL, &inregs, &outregs);

        if(outregs.h.ah == 3)                /* Touch Panel Off */
        {
            break;
        }

        else if(outregs.h.ah == 0)          /* Touch Panel On  */
        {
            inregs.x.ax = TP_IN_NOWAIT;
            int86(ATPH_SYS_CALL, &inregs, &outregs);

            /* ATPH Function Call*/
        }
    }
}
```

```
    }
}

/*****
/* INPUT TUCHPANEL */
*****/

void touchpanel_on(void)
{
    int i, value;

    inregs.x.ax = TP_IN_NOWAIT;
    int86(ATPH_SYS_CALL, &inregs, &outregs);

    if(outregs.h.ah == 0)                /* Touch Panel On */
    {
        value=FALSE;
        for(i=0; tpcd[i].sx; i++)
        {
            if(                          /* Time in area */
                ((short)outregs.x.dx > tpcd[i].sx)&&
                ((short)outregs.x.bx > tpcd[i].sy)&&
                ((short)outregs.x.dx < tpcd[i].ex)&&
                ((short)outregs.x.bx < tpcd[i].ey))
            {
                inregs.h.ah = WRITE_DATA;
                inregs.x.cx = tpcd[i].key;
                int86(KEYBOARD_BIOS, &inregs, &outregs);

                buzzer_on();
                wait_touch_off();
                buzzer_off();
                value=TRUE;
                break;
            }
        }
    }
}
```

Appendix

```
    }
}

if(value == FALSE)           /* time out (of) area    */
{
    wait_touch_off();
}
}
}

/*****
/* KEYBOARD INPUT*/
*****/

int keyboard_on(void)
{
    int i, ky;

    if(kbhit())
    {
        ky=getch();
        for(i=0; kbcd[i].keycode; i++)
        {
            if(ky == kbcd[i].keycode)
            {
                printf("push key is [%s]. \r",kbcd[i].keyname);
                if(ky == ZKEYCODE)
                {
                    printf(" push [%s]key. finishprogram. \n",kbcd[i].keyname);

                    return(TRUE);           /* Program End    */
                }
                break;
            }
        }
    }
}
```

```

    }
    return(FALSE);
}

/*****/
/* MAIN VARIABLES */
/*****/

void main(void)
{
    if(!(_setvideomode(_VRES16EXCOLOR)))
    {
        printf("error: can't set graphics mode ");

        exit(1);                /* ERROR:Program End */
    }
    _rectangle(_GBORDER,tpcd[0].sx,tpcd[0].sy,tpcd[0].ex,tpcd[0].ey);
                                /* MAKE A SCREEN FRAME */
    printf("please push touchpanel or key \n");
    printf("End program by pressing [ Z ]key or screen. \n");

    while(1)
    {
        touchpanel_on();
        if(keyboard_on())
        {
            _setvideomode(_DEFAULTMODE);    /* RETURN TO VIDEOMODE */
            exit(0);
        }
    }
}

```


5 BIOS Lists

■ INT 5h Display Hard Copy

Operation	Input	O	utput
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	O	utput
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		0: Light pen switch is off. 1: Light pen switch is on. AH = X coordinate (0 - 319, 639) = Y coordinate (0 - 199) BX = Y coordinate in new graphic mode CH = (0, XXX) CX = Light pen line position in character units DH = DL = Light pen column position in character units
Switching active page	AH = 05h AL = Page No.		
Scrolling up	07h AH = Number of lines to scroll up AL = Attribute of line to clear BH = Highest line in scroll up range CH = 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	06h AH = Number of lines to scroll down AL = Attribute of line to clear BH = Highest line in scroll down range CH = 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- 17-byte data address DX =	
Setting attribute code intensity/blink	AH = 10h AL = 03h AL = 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

Appendix

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 ESDX = 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 = Color value table ESDX = First expansion pallet register to BX = set CX = Number of blocks set in expansion 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 ESDX = 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 ESBP = 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 = 021h 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 ESBP = 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 ESBP = Top address in font table	
Font registration (CGA) in 0:10Ch (INT 43h)	11h AH = 21h AL = 0: (Number of lines per DL register value) BL = 1: 14 lines 2: 25 lines 3: 43 lines CX = Number of vertical bits per character DL = Number of screen lines (When BL = 0) ESBP = Top address in font table	
8 x 14 dot font registration (PC character set, inside video BIOS ROM) [Graphics]	11h AH = 22h AL = 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)	

Appendix

Operation	Input	Output
Font registration		
8 x 8 dot font registration (PC character set, inside video BIOS ROM) [Graphics]	11h AH = 23h AL = 0: (Number of lines per DL BL = 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]	11h AH = 24h AL = 0: (Number of lines per DL BL = register value) 1: 14 lines 2: 25 lines 3: 43 lines DL = Number of screen lines (When BL = 00h)	
Reading font table data	11h 30h AH = 0: Return INT 1Fh (CGA font) entry address AL = 0: with ESBP register. BL = 1: Return INT 43h entry address with ESBP 1: register. 2: Return 8 x 14 font address with ESBP 2: register. 3: Return 8 x 8 font address with ESBP 3: register. 4: Return 8 x 8 font (80h) address with 4: ESBP register. 5: Reserved	Number of vertical bits per CX = character DL = Number of lines per screen - 1 ESBP = Address of data specified in BH
Performance selection		
Reading video mode data (Color/BW mode)	AH = 12h BL = 10h	BH = 0: Color mode 1: BW mode (MDA mode) BL = Video RAM memory size CH = Reserved CL = DIP switch setting
Selecting video BIOS print-screen	AH = 12h BL = 10h	
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
Grayscale enable/disable	AH = 12h BL = 33h AL = 0: Grayscale enabled 1: Grayscale 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 = 6h 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 ESBP = 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 ESBP = 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 ESBP = 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 ESBP = 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 ESDI = Return information buffer	AL = 1Bh: Successfully executed

Appendix

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 save / 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 save / restore E SBX = 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 Bit 2: Expansion pallet register save / restore E SBX =	

Operation	Input	Output
Reading system data		AX = System configuration data AX bit Bits 15 & 14 : Number of printer ports Bits 11, 10 & 9 : Number of RS 232C ports Bits 7 & 6 : Number of internal 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

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

Operation	Input	Output																																																
Disk reset	AH = 00h Drive No. DL = (FDD:00h-01h; HDD: 80h-81h)	CY= 0: Successfully completed = 1: Error AH = Status Floppy disk status table <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="width: 15%;">Status</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Successfully completed</td></tr> <tr><td>01h</td><td>Wrong command sent</td></tr> <tr><td>02h</td><td>Cannot find address mark.</td></tr> <tr><td>03h</td><td>Attempted writing on protected disk</td></tr> <tr><td>04h</td><td>Cannot find requested sector.</td></tr> <tr><td>06h</td><td>Disk was changed.</td></tr> <tr><td>08h</td><td>DMA overrun</td></tr> <tr><td>10h</td><td>CRC error during diskette reading</td></tr> <tr><td>20h</td><td>Crashed FDC</td></tr> <tr><td>80h</td><td>Crashed during seek operation</td></tr> <tr><td>BBh</td><td>Timer overflowed</td></tr> </tbody> </table> <p style="text-align: center; margin-top: 10px;">Hard disk status table</p> <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="width: 15%;">Status</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Successfully completed</td></tr> <tr><td>01h</td><td>Wrong command sent</td></tr> <tr><td>02h</td><td>Cannot find address mark.</td></tr> <tr><td>03h</td><td>Cannot find requested sector.</td></tr> <tr><td>04h</td><td>Drive parameter error</td></tr> <tr><td>07h</td><td>DMA overrun</td></tr> <tr><td>10h</td><td>Error during reading</td></tr> <tr><td>20h</td><td>Crashed HDC</td></tr> <tr><td>40h</td><td>Crashed during seek operation</td></tr> <tr><td>80h</td><td>Timer overflowed</td></tr> <tr><td>BBh</td><td>Undefined error</td></tr> </tbody> </table>	Status	Description	00h	Successfully completed	01h	Wrong command sent	02h	Cannot find address mark.	03h	Attempted writing on protected disk	04h	Cannot find requested sector.	06h	Disk was changed.	08h	DMA overrun	10h	CRC error during diskette reading	20h	Crashed FDC	80h	Crashed during seek operation	BBh	Timer overflowed	Status	Description	00h	Successfully completed	01h	Wrong command sent	02h	Cannot find address mark.	03h	Cannot find requested sector.	04h	Drive parameter error	07h	DMA overrun	10h	Error during reading	20h	Crashed HDC	40h	Crashed during seek operation	80h	Timer overflowed	BBh	Undefined error
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Reading disk drive data	AH = 01h Drive No. DL = (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) DL = Head No. Drive No. (FDD: 00h - ESB- 01h, HDD: 80h - 81h) X = Buffer address	CY= 0: Successfully completed = 1: Error AH = Status																																																

Appendix

Operation	Input	Output
Writing sector	AH = 03h AL = Number of sectors CH = Track No. CL = Sector No. CH = Cylinder No. Insignificant 8 bits CL = bits = Sector No. (Bits 0 - 6) DH = Cylinder No. Significant 2 bits DL = (Bits 7-8) Head No. E SBX = Drive No. (FDD: 00h - 01h, Drive No. (HDD: 80h - 81h) 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 = bits = Sector No. (Bits 0 - 6) DH = Cylinder No. Significant 2 bits DL = (Bits 7- 8) Head No. Drive No. (FDD: 00h - 01h, Drive No. (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. E SBX = 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, Drive No. (HDD: 80h - 81h)	CY = 0: Successfully completed = 1: Error AH = Status When FDD drive No. specified in DL E S: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 DH = tracks DL = Bits 5 - 0: Max. number of BL = sectors per track Max. number of heads Number of built-in floppy disk drives 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. DH = number of cylinders Max DL = number of usable heads 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 CL= cylinder No. DL = Significant 2 bits in DH = cylinder No. Drive No. 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 CL= tracks Bits 7 & 6: 10 bit value for max. Bits 7 & 6: number of DL = tracks Bits 5 - 0: Max. number of sectors per track Drive No.	ES:DI Address of drive parameter table = for floppy disk type 00h and CY =0: Supports tracks AH = and number 00h or CY=0: of tracks per AH = sector. AH = 01h and CY=1: Cannot use function. 00h and CY =1: Does not support tracks and 00h or CY=1: number of tracks per sector.

Appendix

Operation	Input	Output
Setting RS-232C line mode	AH = 00h AL = Line mode/Parameter Bits 7, 6, 5: Baud rate Bits 0, 0, 0: 110 Baud Bits 0, 0, 1: 150 Baud Bits 0, 1, 0: 300 Baud Bits 0, 1, 1: 600 Baud Bits 1, 0, 0: 1200 Baud Bits 1, 0, 1: 2400 Baud Bits 1, 1, 0: 4800 Baud Bits 1, 1, 1: 9600 Baud Bits 4&3: Parity Bits X, 0: No parity Bits 0, 1: Odd parity Bits 1, 2: Even parity Bit 2: Stop bits Bit 0: 1 bit length Bit 1: 2 bit length Bits 1&0: Word length Bits 1, 0: 7 bits 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 ESBX = End flag address CX:DX = Wait time in 1 μ sec 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 E:SI = Top address in descriptor E:SI = <table border="1" style="display: inline-table; border-collapse: collapse; vertical-align: top;"><tr><td>Dummy (00h)</td></tr><tr><td>GDI (00h)</td></tr><tr><td>Source segment descriptor</td></tr><tr><td>Destination segment descriptor</td></tr><tr><td>BDS 5 (00h)</td></tr><tr><td>SS (00h)</td></tr></table> CX = Number of words to transfer	Dummy (00h)	GDI (00h)	Source segment descriptor	Destination segment descriptor	BDS 5 (00h)	SS (00h)	ZF = 1: Successfully completed CY = 1: Error AH = 00h: Successfully completed = 01h: RAM parity error = 02h: Not in protect mode		
Dummy (00h)										
GDI (00h)										
Source segment descriptor										
Destination segment descriptor										
BDS 5 (00h)										
SS (00h)										
Engaging the protect mode	AH = 89h BH = Offset of insignificant (mask) interrupt vector BL = address Offset of significant (slave) E:SI = interrupt vector address Top address in below table <table border="1" style="display: inline-table; border-collapse: collapse; vertical-align: top;"><tr><td>CS dummy (00h)</td></tr><tr><td>GDI</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 BDS (00h)</td></tr></table>	CS dummy (00h)	GDI	IDT	DS	ES	SS	CS	TEMP BDS (00h)	CY = 0: Successfully completed AH = 00h CS = CS value specified in E:SI table DS = DS value specified in E:SI table ES = ES value specified in E:SI table SS = DS value specified in E:SI table CY = 1: Error AH = FFh
CS dummy (00h)										
GDI										
IDT										
DS										
ES										
SS										
CS										
TEMP BDS (00h)										

Appendix

■ INT 16h Keyboard BIOS

Operation	Input	O	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)
Writing 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	O	Output
1-character output	AH = 00h AL = Character code of DX = character to 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 = 01h	CX = Significant 16 bits of current clock DX = data AL = Insignificant 16 bits of current clock data Overflow flag on 24-hour system
Setting clock	AH = 01h CX = Significant 16 bits of clock DX = data 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 = 20 DH = Year (BCD) DL = Month (BCD) CY = Day (BCD) 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 = significant 2 bits: 19 or 20 DH = Year (BCD) DL = Month (BCD) 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	

■ INT 5Fh Expansion BIOS

Operation	Input	Output
Display ON/OFF (including backlight)	AX = 0800h BL = 0 : OFF 1 : ON	AH = 0: Successfully completed 1: Error
Reading contrast *1	AX = 0A00h	AH = 0: Successfully completed AL = Contrast setting (00h - 07h, 10H - AH = 17H) AL = 1: CMOS error 3: Default value
Setting contrast *2	AX = 00A01h BL = Contrast setting (00h - 07h, 10h - 17h)	AH = 0: Successfully completed = 1: CMOS error / contrast setting successfully completed

*1 Backlight contrast control is available only on the PL-5700L1 and PL-570111. It is not supported by the PL-5700T1 or PL-5701T1.

*2 8 contrast levels: D2, D1, D0, 000b (dark) ~ 111b (bright)
Backlight brightness: D4, 0b (dark) ~ 1b (bright)