



For the Safe And Correct Use of this Unit:

This manual describes safety instructions for correct use of the FP unit. Please keep this manual close at hand, and refer to it when necessary.

The following symbols are used throughout this manual to ensure the safe use of the FP unit. Please make sure to follow all instructions given since they explain important safety points.

 Warning	This mark warns of a situation that could either seriously injure a person or lead to death if the instruction is ignored and/or the unit is used incorrectly.
--	--

 Caution	This mark warns of a situation that could either injure a person or damage property if the instruction is ignored and/or the unit is used incorrectly.
--	--

Other Symbols Used In This Manual

The list below describes the symbols used in this manual.



Explains a situation that requires a moderate amount of caution.



Indicates a word or phrase that has an additional explanation.

*1

A reference point. Describes the word or phrase marked by the asterisk (*) and the corresponding number.



Reference pages on related topics.

①, ②

Operational steps. Please follow these numbered steps in order to perform the desired operation.



Warning

Safety Instructions

For the safe use of this unit, please follow these guidelines:

- Because of the ever present danger of electrical shock, be sure to unplug the power cable from the FP unit before plugging the cable's other end into the wall.
- Do not use power in excess of the unit's specified voltage range since it may cause a fire or electric shock.
- Because the FP unit contains high voltage parts, an electric shock can occur when disassembling the unit. Therefore, please be sure to always unplug the unit before disassembling it.
- Do not modify the FP unit in any way, since it may cause a fire or electric shock.
- When changing the backlight, be sure to turn off the unit's power first, in order to prevent an electric shock.
- Do not use touch panel keys to perform life-threatening or vitally important safety functions. Use separate mechanical switches for such keys.
- If substantial amounts of metallic dust, water or liquids enter the FP unit, turn off the power immediately, unplug the unit's power, and contact your local FP distributor.
- When installing the FP unit, be sure to follow the instructions given in "Chapter 3. Installation and Wiring," to insure it is done correctly.
- Do not use the FP in an environment with flammable gas since it may cause an explosion.



Caution

Safety Instructions

For the correct use of this unit, please follow these guidelines:

- Do not press the screen's touch surface too strongly with either your finger or a hard object, since the touch surface may be damaged.
- When the surface of the display screen becomes dirty or smudged, clean the display with a cloth soaked in a neutral detergent. Do not use paint thinner or organic solvent.
- Do not press on the touch panel's face with sharp objects, such as a mechanical pencil or screwdriver, since it might damage the panel.
- Avoid using or storing the FP in direct sunlight, excessively dusty or dirty environments, or where chemicals or their vapors are present in the air.
- Avoid restricting the FP's natural ventilation, or storing and using the FP in an environment that will increase the FP's internal temperature.
- Please avoid using the FP in areas where sudden, large changes in temperature may occur. These changes can cause condensation to form inside the unit, possibly causing an accident.

Notes on the FP's Liquid Crystal Display (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 the eye with running water for more than 15 minutes, and see a doctor immediately.
- The current brightness of the LCD screen will depend on the screen's current display and the LCD's contrast adjustment. Any brightness variations that result are normal for LCD displays.
- There are minute grid-points on the LCD surface. These points are not defects.
- Sometimes 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. To correct this, turn the unit OFF for 5 or 10 minutes, then ON again. This phenomenon is a common attribute of the LCDs, and 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.

Preface

Thank you for purchasing Digital's TFT type color display panel, the 'FP-570-T*' (hereafter referred to as the *FP unit*).

The FP unit is a TFT type color liquid crystal display monitor for IBM-PC compatible personal computers (VGA mode).

Please read this manual completely to insure the correct use and complete understanding of the FP unit's functions. The FP's analog interface is designed for use with standard VGA mode. Please be aware that this unit may not be able to be connected with nonstandard VGA modes. For more details, please refer to this manual's "PC Connectivity Notes" section.

The term FP-570-T* refers to the following units:

FP-570-TC-11	(AC 100V type)
FR-570-TC21-24V	(DC 24V type - with CE marking)

<Note>

- 1) It is forbidden to copy the contents of this manual, in whole or in part, except for the user's personal use, without the express permission of the Digital Electronics Corporation of Japan.
- 2) The information provided in this manual is subject to change without notice.
- 3) This manual has been written with care and attention to detail; however, should you find any errors or omissions, please contact Digital Electronics and inform them of your findings.
- 4) Please be aware that Digital Electronics is not responsible for any damages resulting from the use of our products, regardless of article 3 above.
- 5) Specifications set out in this manual are for overseas products only, and, as a result, some differences may exist between the specifications given here and the Japanese ones.

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PC Connectivity Notes

The FP unit's analog interface is designed for standard VGA mode. The number of dots (pixels) displayed are as follows:

	Display Mode	Size	Dot Clock Range
V G A	Text Mode	720 x 400, 720 x 350	28.322MHz \pm 1%
	Graphics Mode	640 x 480, 640 x 400, 640 x 350	25.175MHz \pm 1%



- When the unit is used in VGA text mode, the far right side's 80 dots are not displayed.
- The display mode is designated using dip switch SW1-4.

Some types of VGA equipment may not be within the ranges specified above, and, therefore, cannot be connected to the unit.

Also, if the user changes his PC's VGA board, there is the possibility that the new board may not be able to be connected to the FP.

Features of the FP-570-T*

The features of the FP-570-T* are as follows.

- **High Quality TFT Color LCD Display**

This unit is equipped with a 10.4 inch TFT type color LCD. Its superior brightness and wide viewing angle, not found in ordinary laptop type TFT LCDs, widens your scope of applications.

The screen's maximum resolution is 640 x 480 pixels, and can display 260,000 colors.

- **Easy Installation In User's Cabinets and Panels**

The FP-570-T*'s slim, lightweight, and compact design make installation a snap. It was designed specifically for use as your FA (Factory Automation) or OA (Office Automation) system monitor. The flat, front panel meets the rigorous IP65F standard, and, even without any protective cover, the flat panel is highly resistant to both water and dust.

- **Flat Panel can be used as a VGA Display**

Since the FP-570-T* is equipped with an analog RGB interface, it can be connected to any PC with standard VGA mode. (The PC's clock frequency, however, must be within the standard range)

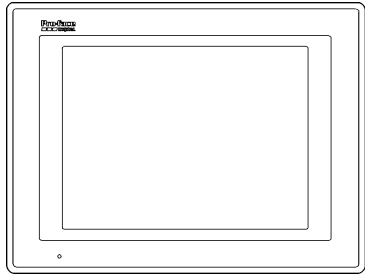
- **Easy Operation With the Built In Touch Panel**

The FP-570-T*'s built in touch panel is standard equipment, allowing touch panel data to be output to a host PC via input/output commands and an RS-232C cable. Ultra convenient for systems requiring both touch panel operation and monitoring.

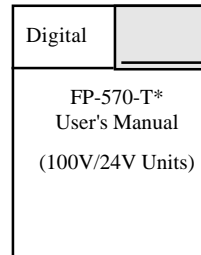
Package Contents

The FP's packing box contains the items listed below. Please check to be sure each is included and is not damaged.

- FP unit (FP-570-TC11 or FP-570-TC21-24V)**



- FP-570-T* User's Manual**



- 3.5 inch floppy disk**
(Contains Touch Panel programs)



- Installation brackets (4)**



These items have all been carefully packed with special attention to product quality. However, should you find anything damaged or missing, please contact your local distributor immediately for prompt service.

MEMO

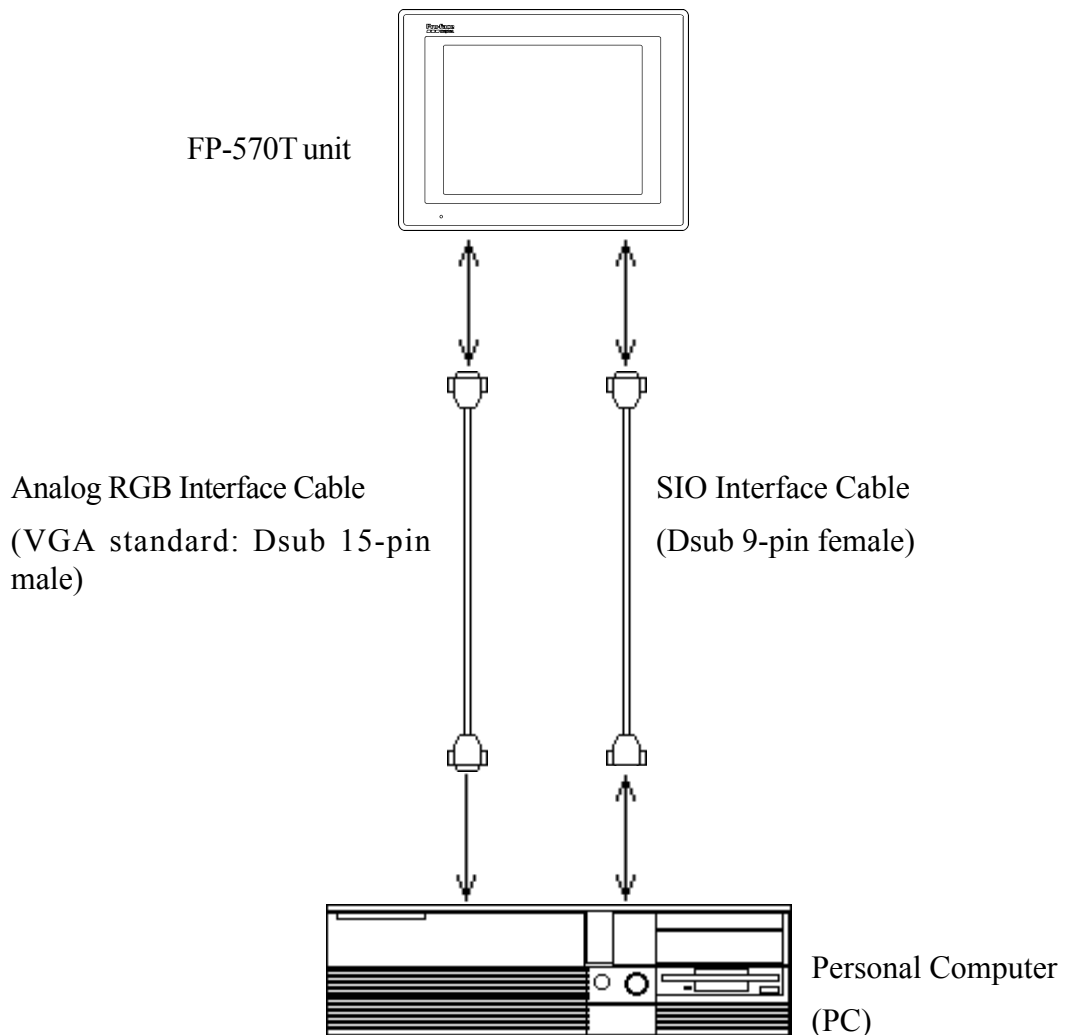
Chapter 1

Introduction

1. Connecting the FP to a PC
2. Optional Equipment

The following diagram illustrates the connection between the FP unit and a PC.

1-1 Connecting the FP to a PC



1-2	Optional Equipment
------------	---------------------------

All optional equipment listed below are products of Digital Electronics Corp.

Item		Model	Description
Maintenance Parts	Backlight Bubs	GP570-BL00-MS	Replacement Backlight bubs for 100V unit (FP-570-TC11)
	Installation Brackets	GP070-AT00-MS	Metal installation brackets for FP-570-T*
	Rubber Gasket	GP570-WP00-MS	Replacement rubber gasket, used when installing the FP. Same as the FP's original gasket.
Optional Parts	Cover Sheet (Hard type)	GP570-DF10-0	Provides disposable screen protection from dust and other elements. The touch panel can be used with the Cover Sheet attached (5 sheets /set)

Chapter 2 Specifications

1. General Specifications
2. Functional Specifications
3. Interface Specifications
4. Cable Diagrams
5. Names and Functions of FP Parts
6. Flat Panel (FP) Dimensions

2-1 General Specifications (For both 100V and 24V Units)

2-1-1 Electrical Specifications

	100V (FP-570-TC11)	24V (FP-570-TC12-24V)
Input Voltage	AC 85V~ 132V 50/60 Hz	DC24V +/-20%
Power Consumption	Under 50W	
Allowable Power Failure	Within 20ms	——
Voltage Endurance	AC1500V 20mA 1 minute (between the live wire and grounding terminals)	AC1000V 10mA 1 minute (between the live wire and grounding terminals)
Isolation Resistance	DC500V -above 10MΩ (between the live wire and grounding terminals)	

2-1-2 Environment Specifications

	100V (FP-570-TC11)	24V (FP-570-TC12-24V)
Operating Temperature	0 ~ 40 degrees Celsius	0 ~ 45 degrees Celsius
Storage Temperature	-10 ~ 60 degrees Celsius	
Ambient Humidity	30 ~ 85% RH (non-condensing)	
Vibration Endurance	2Gs -10 to 25 Hz (X,Y,Z directions -30 minutes each)	
Noise Endurance	Noise voltage: 1200 Vp-p	Noise voltage: 1000 Vp-p
	Pulse length: 1 microsecond	
	Rise time (rise/fall): 1 nanosecond	
Atmosphere	Not immune to corrosive gas	
Ground Connection	Less than 100Ω, or your country's applicable standard	
Rating	Equivalent to P65f (JEM 1030) and NEMA #250 TYPE 4X/L2	

*1 (See the next page's note)

*1 (Continued from previous page)

The front face of the GP unit, installed in a solid panel, has been tested using conditions equivalent to the standard shown in the specification. Even though the GP unit's level of resistance is equivalent to the standard, oils that should have no effect on the GP can possibly harm the unit. This can occur in areas where either vaporized oils are present, or where low viscosity cutting oils are allowed to adhere to the unit for long periods of time. If the GP's front face protection sheet becomes peeled off, these conditions can lead to the ingress of oil into the GP and separate protection measures are suggested. Also, if non-approved oils are present, it may cause deformation or corrosion of the front panel's plastic cover. Therefore, prior to installing the GP be sure to confirm the type of conditions that will be present in the GP's operating environment.

If the installation gasket is used for a long period of time, or if the unit and its gasket are removed from the panel, the original level of the protection cannot be guaranteed. To maintain the original protection level, you need to replace the installation gasket regularly.

2-1-3 Structural Specifications

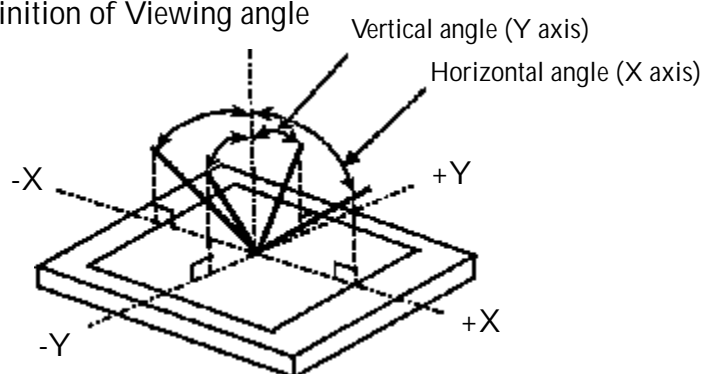
	100V (FP-570-TC11)	24V (FP-570-TC12-24V)
External Dimensions	317W x 243H x 85D mm	
Weight	3.5 kg or less	
Cooling System	Natural air circulation	

Specifications

2-2 Functional Specifications (For both 100 V and 24V Units)

	100V (FP-570-TC11)	24V (FP-570-TC12-24V)
Display Media	TFT color LCD	
Display Colors	260,000 colors	
Resolution	640 x 480 pixels	
Contrast Adjustment	Volume adjustment available (Adjustment dial is located in rear of FP)	
Dot Pitch (mm)	0.33H x 0.33W	
Touch Panel	Resolution: 1024 x 1024	
	Method: Analog Resistance Film	
Display Area (mm)	211W x 158H	
Display Mode (selected with a switch)	VGA text mode: 720x400, 720x350 *Far right side's 80 dots are not displayed. *400 or 350 line display modes are displayed in the center. VGA graphics mode: 640x480, 640x400, 640x350 *400 or 350 line display modes are displayed in the center.	
Viewing Angle *1	horizontal: (X) -45 to 45 degrees vertical: (Y) -30 to 10 degrees	horizontal: (X) -60 to 60 degrees vertical: (Y) -55 to 35 degrees
Interfaces	Analog RGB Interface, SD Interface (touch interface)	
Back light	CFL (under normal temperatures and humidity, lifetime = 20,000 hours)	CFL (under normal temperatures and humidity, lifetime = 25,000 hours)

 *1 Definition of Viewing angle



2-3 Interface Specifications (For both 100V and 24V Units)

2-3-1 Analog RGB Interface

Input signal type	Analog RGB
Input signal characteristic	Image signal: analog RGB Synchronous signal: TTL level, negative true or positive true Scanning type: non-interlase
Adjustment functions	Flicker adjustment (8 levels) Analog RGB contrast adjustment Horizontal display positioning (-16 ~ +15 pixels) Vertical display positioning (-8 ~ +7 pixels)

Display Mode		Size	Dot Clock Range
V G A	Text Mode	720 x 400, 720 x 350	28.32MHz ±1%
	Graphics Mode	640 x 480, 640 x 400, 640 x 350	25.175MHz ±1%



- In VGA text mode, the far right side's 80 pixels do not display.
- Selection of display mode is done via switch SW1-4.

Pin Assignments and Signal Names for Analog RGB

Pin No.	Signal Name	Condition	Pin Location
1	Analog R	R signal input	
2	Analog G	G signal input	
3	Analog B	B signal input	
4	Reserved	NC (spare for input)	
5	Digital grounding	Digital signal GND	
6	Return R	R signal GND	
7	Return G	G signal GND	
8	Return B	B signal GND	
9	Reserved	NC (spare for input)	
10	Digital grounding	Digital signal GND	
11	Reserved	NC (spare for input)	
12	Reserved	NC (spare for input)	
13	H. SYNC	Horizontal synchronous signal input	
14	V. SYNC	Vertical synchronous signal input	
15	Reserved	NC (spare for input)	

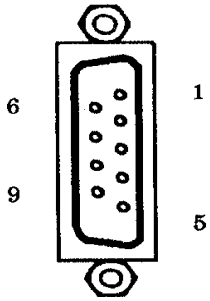
Connector: Mini Dsub 15 pin type
 Connector set screw: Inch type (4-40)

Specifications

2-3-2 Serial Interface

Serial Interface	Baud rate: 9600 bps Data length: 8 bits Parity: none Stop bit: 1
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Pin Assignments and Signal Names for Serial Interface

Pin No.	Signal Name	Condition	Pin Location
1	CD	Carrier Detect (FP->Host)	
2	RD	Receive Data (FP->Host)	
3	SD	Send Data (FP<Host)	
4	DIR	Data Terminal Ready (FP<Host)	
5	GND	Ground	
6	DSR	Data Set Ready (FP->Host)	
7	RS	Request to Send (FP<Host)	
8	CS	Clear to Send (FP->Host)	
9	NC	No connection	

Connector: Dsub 9 pin female

Connector set screw: Inch type (4-40)

Concerning Signal Names

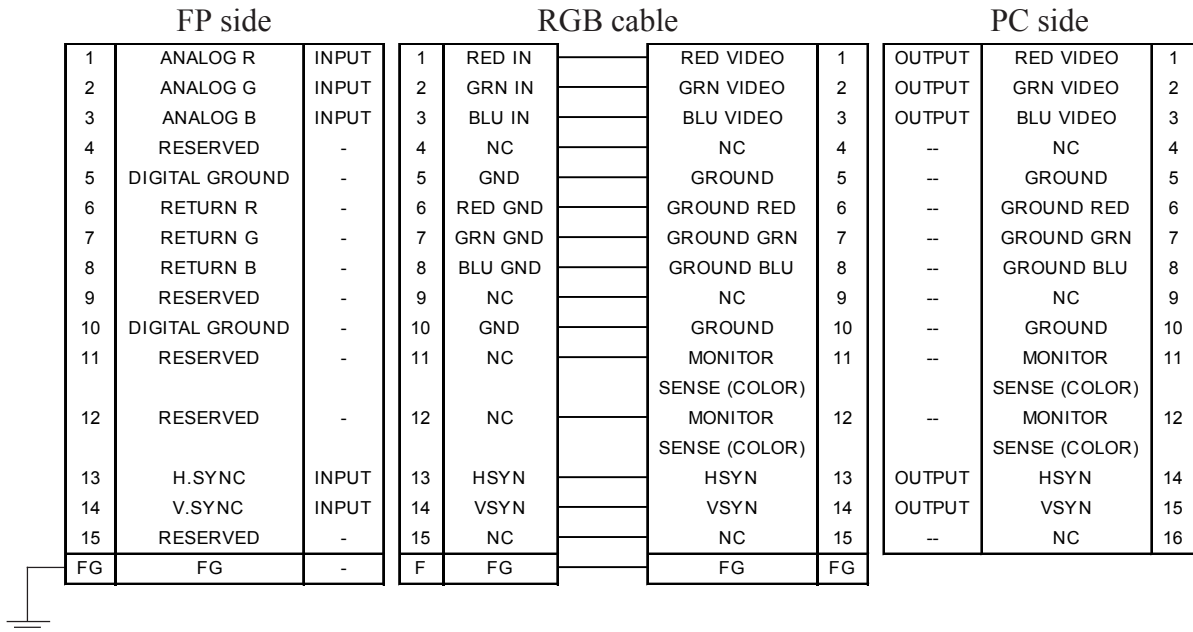
Signal names used for the serial interface on FP units are designed to match the pin order used on most PC serial interfaces, so that a straight cable can be used to connect the two. Therefore, connect each pin's signal to the same signal name on the PC side.

For an example, pin #2 'RD' should be connected to the 'RD' input terminal on the PC's connector.

Refer to section "2-4 Cable Diagrams" for each signal's direction.

2-4 Cable Diagrams

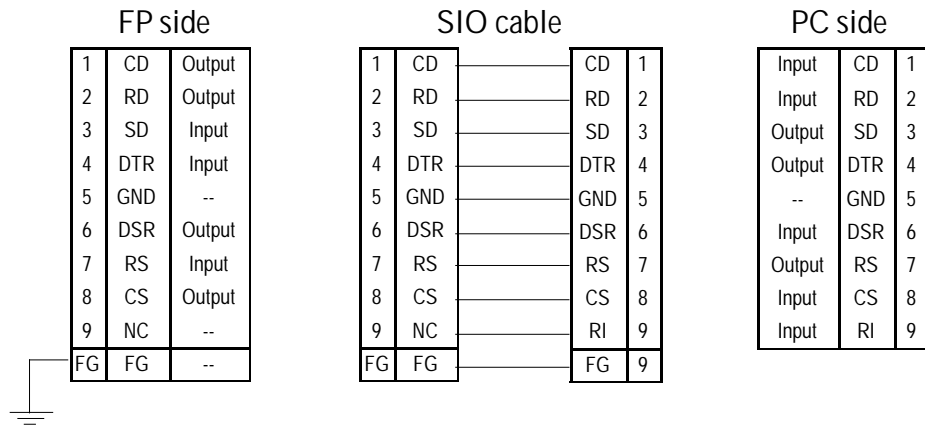
RGB Interface Cable Pin Connections



Signal names for the FP's RGB interface are designed to match the same pin order as the RGB interface on personal computers.

Specifications

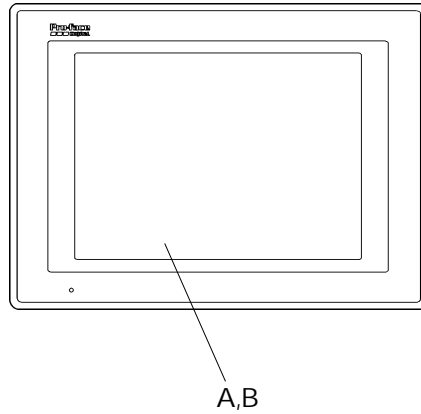
Pin Connections for the SIO Interface Cable



Signal names for the FP's SIO interface are designed to match the same pin order as the SIO interface on personal computers.

2-5 Names and Functions of FP Parts

Front View



A: TFT Color LCD
The display monitor for your host (PLC).

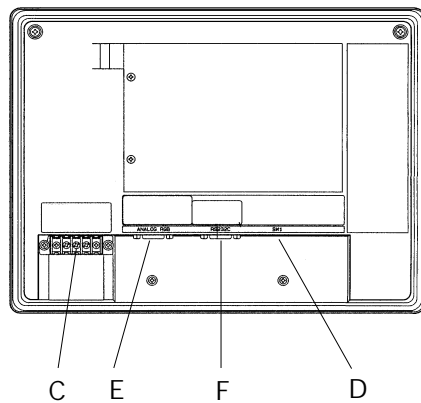
B: Touch Panel
Allows you to perform touch operation.

C: Power Lamp
Indicates if the PL is turned ON.

C: Power Input Terminal Block
Provides the input and ground terminals for a power cable.

D: Setting Switches (Dip switches)

Rear View



E: VGA Interface (analog RGB) Connector

F: Serial Interface
Used for both sending touch panel data to the host, and receiving commands from the host.

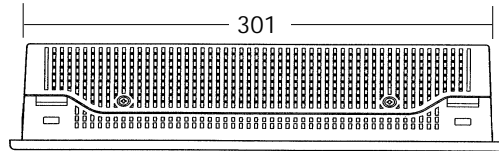
Specifications

2-6 Flat Panel (FP) Dimensions

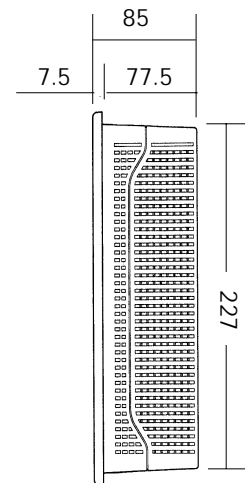
2-6-1 External Dimensions (Both 100V and 24V units)

Unit: mm

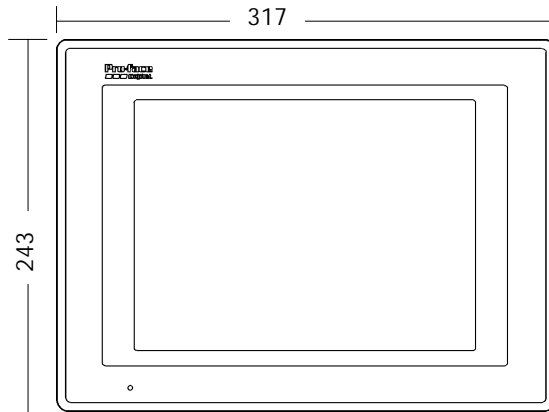
Top View



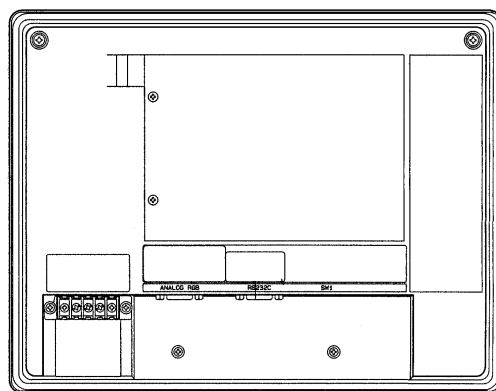
Side View



Front View

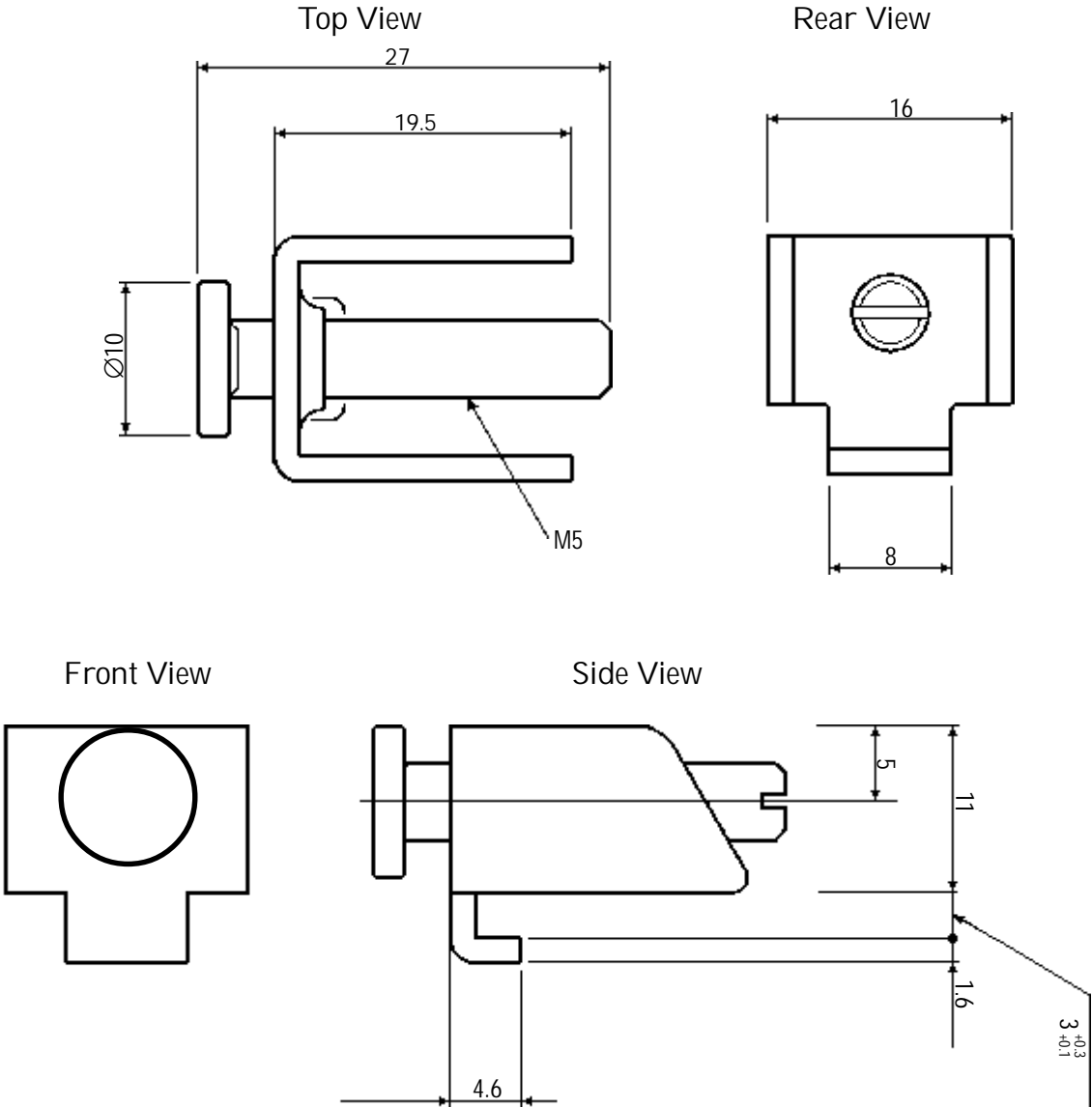


Rear View



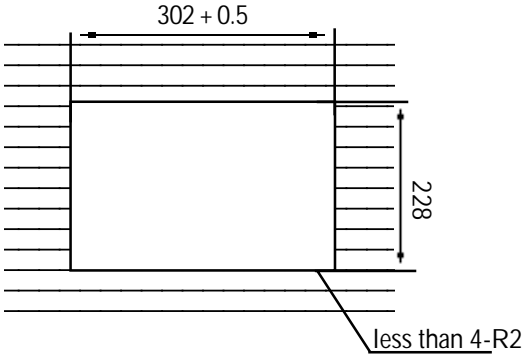
2-6-2 Installation Brackets

Unit: mm



2-6-3 FP Installation Dimensions

Unit: mm



Chapter 3

Installation and Wiring

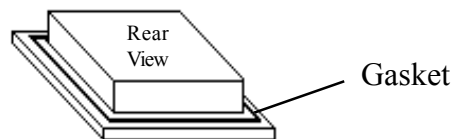
1. Installation
2. Wiring
3. Operation Mode Setup and Display Positioning

3-1 Installation

Install the FP unit using the following steps.

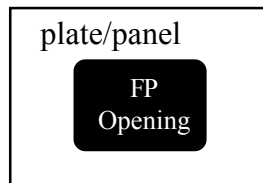


Before mounting the unit, please make sure the gasket is attached.

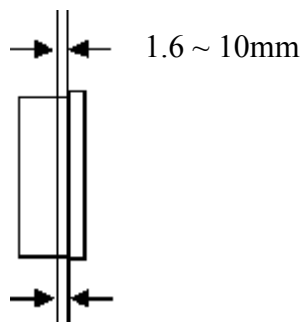


Create an Opening

Following the FP Installation dimensions, create (cut) the FP opening required for installation. The FP's rubber gasket, installation brackets and screws are all required when installing the FP. **REFERENCE** → Chapter 2-6-3 "FP Installation Dimensions".



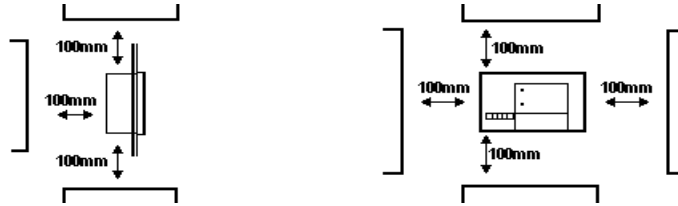
- It is important that the plate/panel surface is flat, clean, and without any jagged edges.
- The Plate/Panel thickness should be between 1.6mm and 10.0mm.



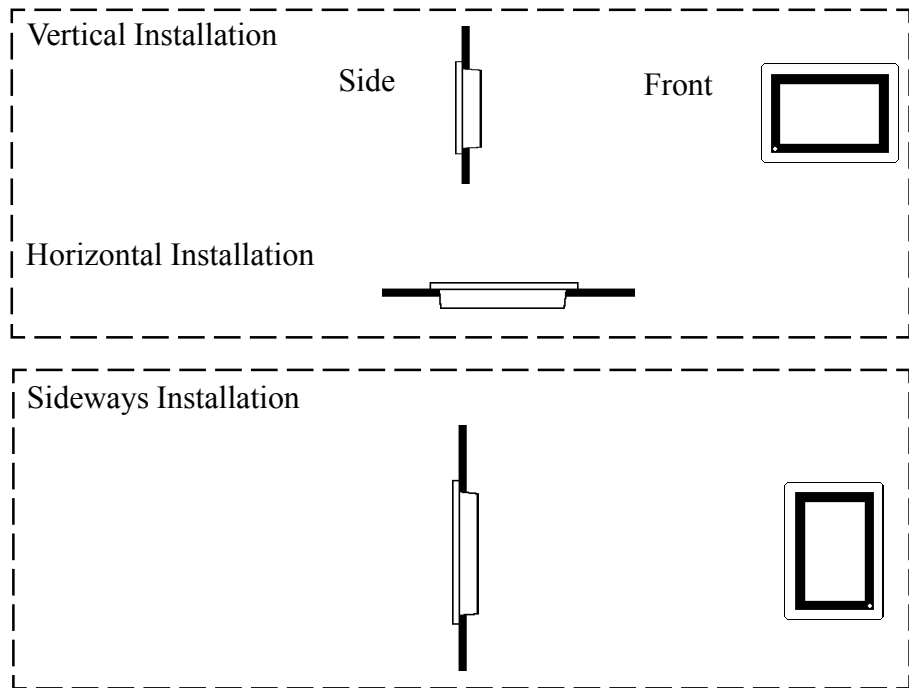
Installation and Wiring



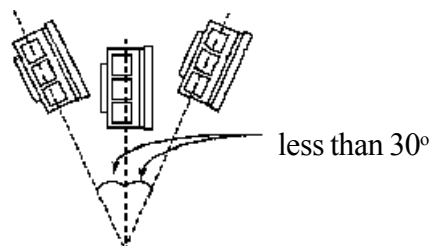
- For easier maintenance and operation, and improved ventilation, be sure the FP unit is mounted at least 100 mm away from any adjacent structures or objects.



- The FP uses natural ventilation through its outer shell for cooling. When installing the unit horizontally or sideways (portrait style), use a fan or air conditioning unit to prevent overheating.

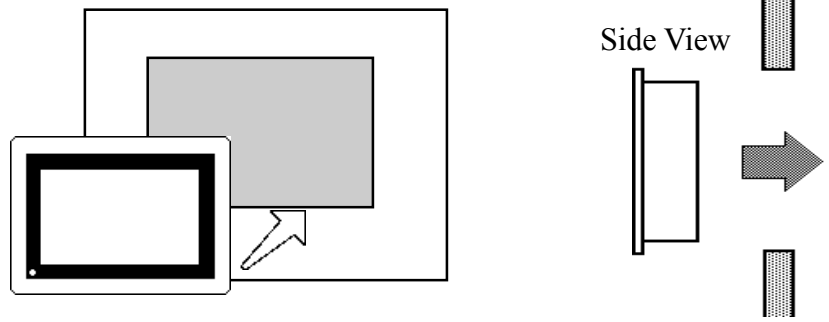


- When installing the FP sideways, place it so that the Power Terminals point upwards.
- Check that heat from surrounding equipment will not cause the FP to overheat.
- Do not use the 100V FP-570-TC11 in an environment that exceeds 40° C, and the 24V FP-570-TC21-24V in an environment that exceeds 45° C.
- Ensure this unit is located as far away as possible from electromagnetic circuits, non-fuse type breakers, and other equipment that can cause arcing.
- When installing the FP unit in a panel with an angled face, the face should not incline either backwards or forwards more than 30°.



Installation and Wiring

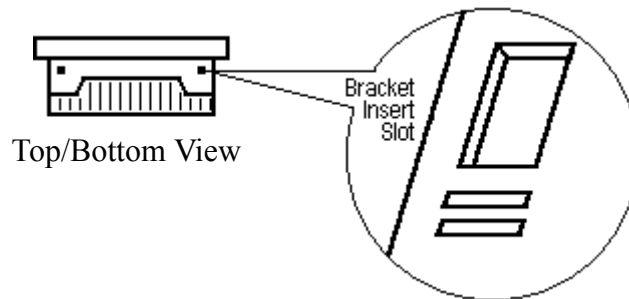
Install the FP unit into the front of the panel.



Install the brackets from the rear of the panel.

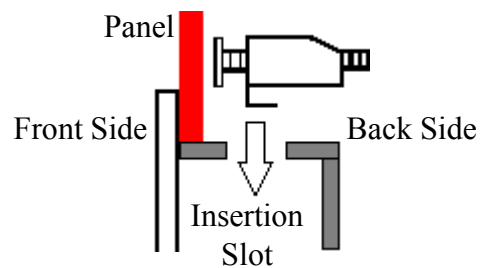
There are a total of 4 insertion slots, 2 on the top and 2 on the bottom of the FP, for the metal installation brackets to hook onto.

①



②

Installation Bracket



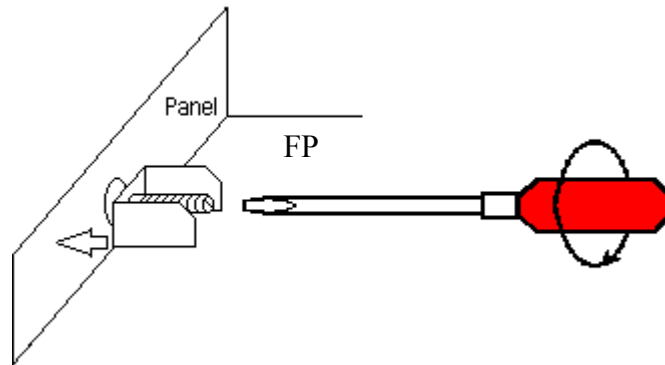
③

After inserting each bracket into its appropriate slot, carefully force it to the back of the FP.



Installation and Wiring

Use a screwdriver to tighten the screw and secure the FP unit in place. A torque of no more than 0.5~0.6 N•m should be required to tighten the screw.



Using too much force may break the case and damage the unit.

Installation and Wiring

3-2 Wiring

3-2-1 Power Cable Connection

⚠ Warning

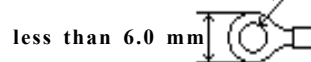
- To prevent electrical shocks, be sure the Power Cable is plugged first into the FP unit, then into the wall (main supply).
- Your FP-570 uses input voltage of either DC24V or AC100V. If your power supply is greater than that required by your unit, it may damage both the power source and the FP unit.
- In lieu of the power switch on the FP unit, please connect a breaker unit.



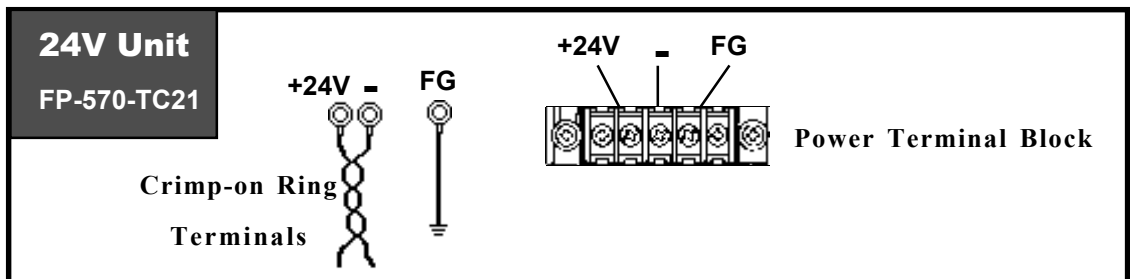
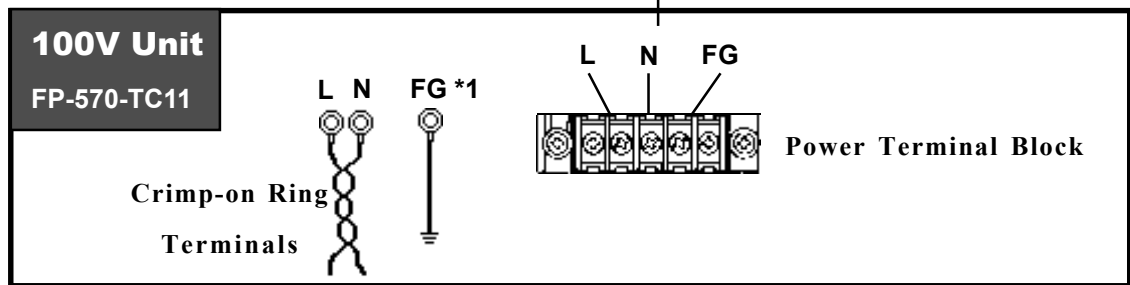
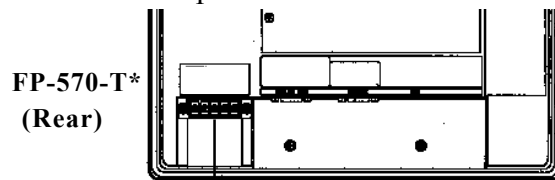
- When connecting the FG terminal, be sure to connect the ground wire. Not grounding the FP unit will create excessive noise and vibration.
- Wherever possible, use thick wires (max. 2mm²) for power terminals, and provide an extra twist to the wire before connecting it.



- The ring terminal size should be as follows. $\phi 3.2$ mm



- To avoid a power short when loosening power terminal screws, use a power terminal with plastic sleeves.



*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

Connect the FP power cable as follows:

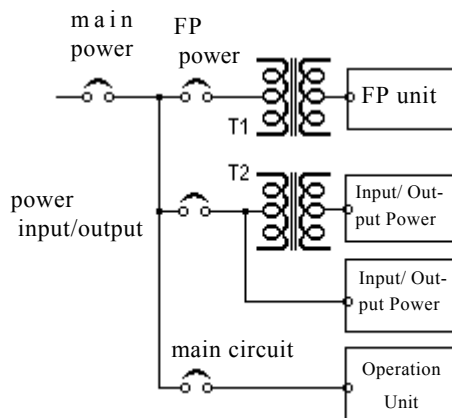
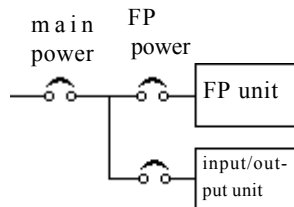
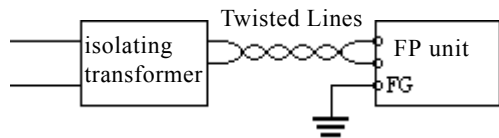
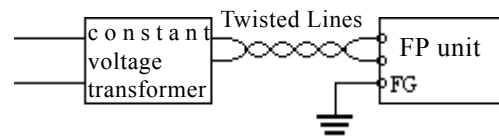
- ① Check to make sure the FP's power cord is disconnected.
- ② Remove the plastic terminal cover.
- ③ Remove the screws from the 3 middle terminals, align the power wire connectors and re-insert the screws. (Check each wire to make sure it is securely connected)



Use no more than 0.5~0.6N•m of torque to tighten the screws.

3-2-2 Precautions: 100V FP-570-TC11 Power Supply

Please pay special attention to the following points when connecting the power cable to the Power Terminal Block at the back of the 100V FP-570-TC11 unit.



- If the supplied voltage exceeds the FP unit's range, connect a voltage transformer.



Chapter 2, "Specifications", for the allowable voltage range.

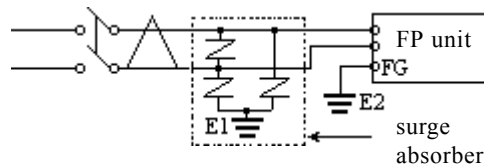
- For between the line and ground, select a power supply that is low in noise. If there is an excess amount of noise, connect a noise reducing transformer.



Use Voltage and Noise Reducing transformers that have capacities that exceed 100VA.

- When supplying power to the FP unit, please separate the input/output and operation unit lines as shown in the figure.
- To increase the noise quality, simply twist the power cable before connecting it to the FP unit.
- The power supply cable must not be bundled or kept close to main circuit lines (high voltage, high current), or input/output signal lines.
- Connect a surge absorber, as shown in the diagram, to deal with power surges.
- To avoid excess noise, make the power cable as short as possible.

Installation and Wiring

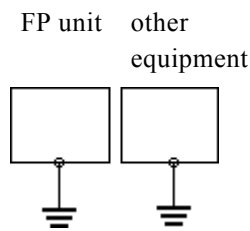


- Make sure the surge absorber (E1) is grounded separately from the FP unit (E2).

- Select a surge absorber that has a maximum circuit voltage greater than that of the peak voltage of the power supply.

3-2-3 Precautions: Grounding

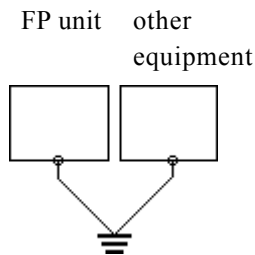
(a) Exclusive grounding (BEST)



- Connect the FP's FG terminal to an exclusive ground. [diagram (a) - Grounding resistance of under 100Ω.]

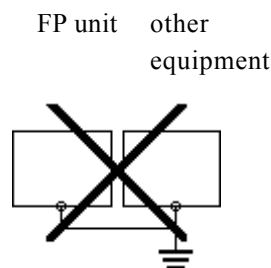
- If exclusive grounding is not possible, use a common connection point. [diagram (b)]

(b) Common grounding (OK)



- The grounding wire should have a cross sectional area greater than 2mm². Make the connection point as close to the FP unit as possible, and make the wire as short as possible. When using a long grounding wire, replace the thin wire with a thicker wire placed in a duct.

(c) Common grounding (BAD)



- If this equipment does not function properly when grounded, disconnect the ground wire from the FG terminal.

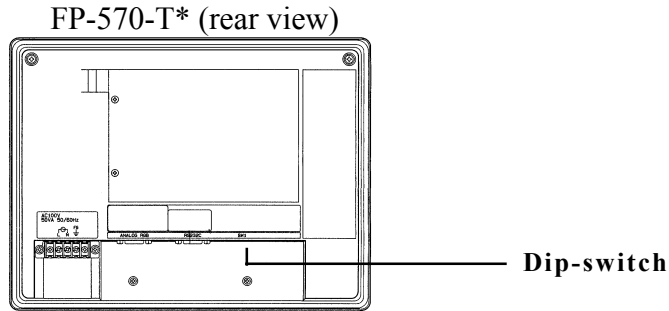
3-2-4 Precautions: Input/Output Signal Lines

- Input and output signal lines must be separated from operating circuit power cables.
- If this is not possible, use a shielded cable and connect the shield to the FP chassis.

3-3 Operation Mode Setup and Display Positioning

3-3-1 Operation Mode Setup and Adjustment

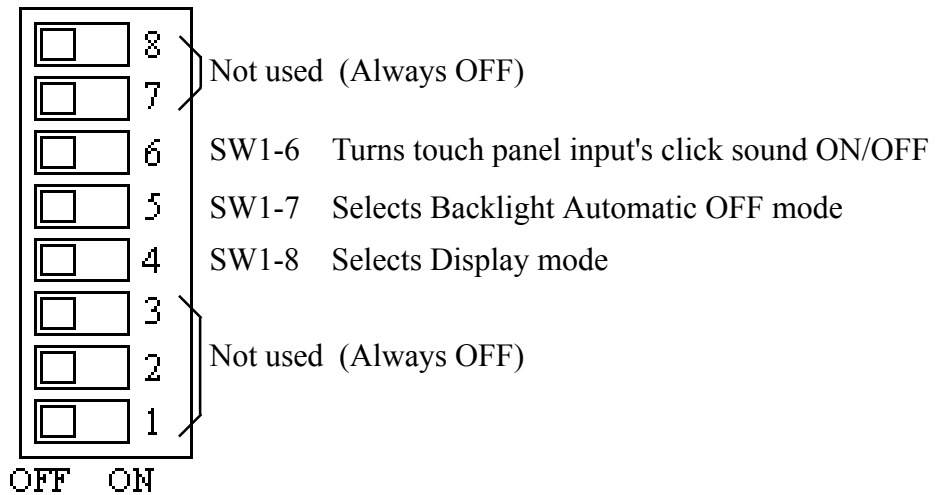
The setup switches (dip-switches) are located in the rear of the unit.



The default settings for the FP were created based on the standard connection method used with IBM-PCs.

Use these dip switches to control the FP unit's display features. If it does not display images properly with the standard settings shown below, please adjust the switches.

SW1



Installation and Wiring

• SW1-4

This switch is used to designate the FP's display mode.

SW1-4	Display Mode
OFF	VGA Standard graphics mode (640 x 480) (Dot clock frequency: 25.175MHz ±1%) and Text mode (720 x 400 or 720 x 350) (Dot clock frequency: 28.322MHz ±1%)
ON	VGA special graphics mode (640 x 400) (Dot clock frequency: 25.175MHz ±1%)

• SW1-5

This switch controls the Automatic Backlight OFF mode.

When this switch is ON, and if there is no SIO transmission or touch operation performed for 5 minutes, the backlight turns off automatically. It will remain OFF until another SIO transmission or touch operation takes place, at which time the backlight automatically turns back on.

If the FP unit is frequently not used, please set this switch ON to extend the life of the backlight. Also, if a display related command is transmitted by the SIO, this Automatic Backlight OFF mode will be automatically disabled.

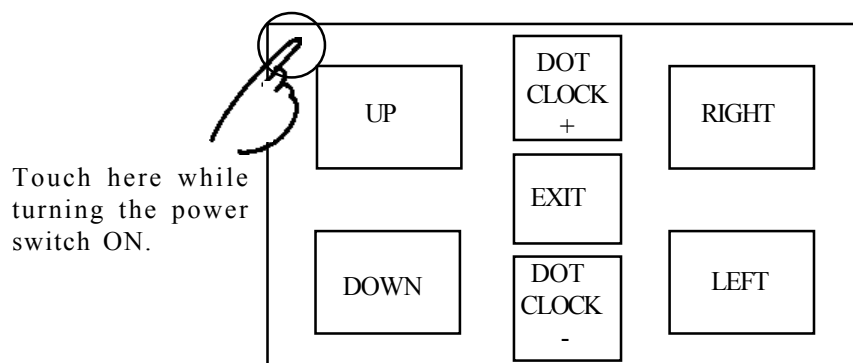
• SW1-6

This controls is used as the touch screen Click sound's ON/OFF switch.

When this is set to ON, a click will sound every time the touch panel is touched.

3-3-2 Adjusting the Touch Panel's Display

Turning ON the FP unit while the upper left corner of the touch panel is pressed will cause the FP to enter display positioning mode. In this mode, by touching certain areas, you can adjust the display's positioning and its dot clock.



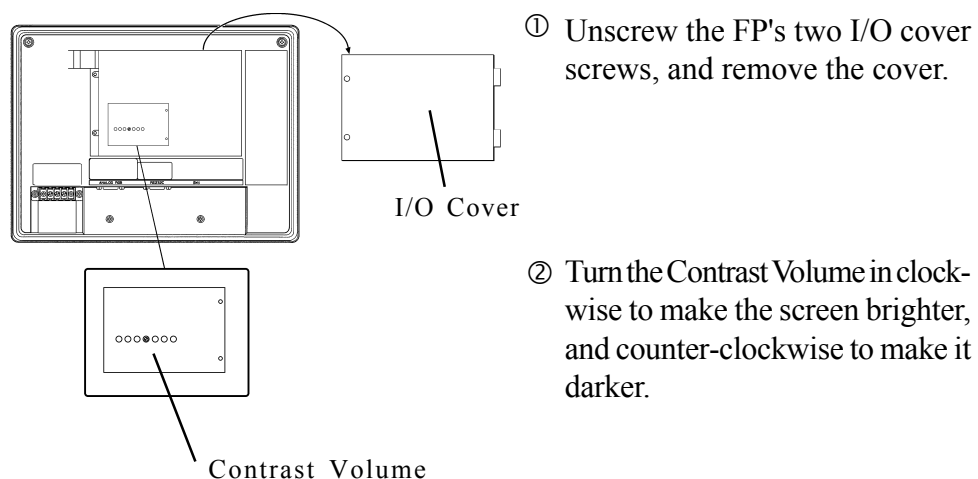
The above touch area data will not display on the screen.

DOT CLOCK	+/-	for screen flicker adjustment
D i s p l a y	UP	moves the display position upwards
Positions	DOWN	moves the display position downwards
	RIGHT	moves the display position to the right
	LEFT	moves the display position to the left

3-3-3 Default Contrast Volume Setting and Adjustment

The default contrast setting for the FP unit is based on the standard IBM-PC series display.

If you connect the FP unit to another type of PC unit, with a different RGB screen output level, then color displacement or screen flicker may occur. In such case, please adjust the display as follows:



When readjusting the contrast, please use a ceramic or plastic screwdriver to avoid causing an electric short or damage from static electricity.

Chapter 4

Touch Panel Commands

1. Command List
2. Boot-up Initialization
3. Touch Interface Data
4. Touch Panel Commands

4-1 Command List

Here, the touch panel commands (host ==> touch panel) supported by the FP-570T are described. The comma (,) used between the transferred format sent by the touch panel to the host computer is only for separating commands, and has nothing to do with the actual touch panel commands.

Command codes and data are all expressed in hexadecimal format.

(Example: 65h = 65 HEX)

<Touch Panel Commands>

Regardless of the dip-switch settings, the FP's display, click sound and buzzer can all be controlled from the host computer (PLC) by sending one-character touch panel commands to the FP unit. The dip-switch settings are only enabled when the FP is turned ON.

Code	Function
65h	Display ON
66h	Display OFF
67h	Backlight ON
68h	Backlight OFF
69h	Click sound (high) ON
6Ah	Click sound (high) OFF
6Bh	Click sound (low) ON
6Ch	Click sound (low) OFF
71h	Buzzer (high) ON
72h	Buzzer (high) OFF
73h	Buzzer (low) ON
74h	Buzzer (low) OFF

4-2 Boot-up Initialization

When the power is turned ON, the touch panel is initialized as follows.

- Clears its internal buffer.
- Initializes the serial communication mode.

Baud rate	9600bps
Data length	8 bits
Parity	none
Stop bit	1 bit

- Initializes the system default values.

Function	Default Setting
Display output	ON
Backlight	ON
Click sound	ON or OFF selected with Dip SW1-6 (high)
Buzzer	OFF
Automatic OFF mode	ON or OFF selected with Dip SW1-5

Touch Panel Commands

4-3 Touch Interface Data

Since the FP uses an analog type touch panel, all 640 x 480 coordinates can be detected. Resolution of the analog touch panel is 1024 x 1024, so a conversion program to convert the coordinates to 640 x 480 becomes necessary.

Also, a calibration program to adjust the actual touch position is needed.

As a result, the following software is included with the FP-570T unit.

ATPH.EXEPasses 640 x 480 touch coordinate data to user program.
(This is not a mouse simulation program)

CALIB.EXE .Calibrates the touch coordinate data to the actual touch position. This program is to be used with ATPH as a set.

OS and Touch Panel Driver Combinations

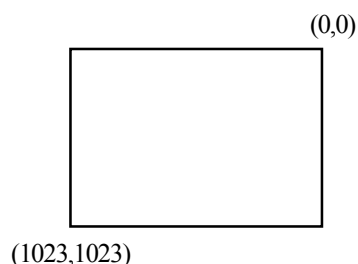
OS	Touch I/F Program	Calibration
Windows® 3.1	TT-WIN *1	Feature included in the touch I/F program
Windows® NT	TT-W INNT *1	Feature included in the touch I/F program
Windows® 95	TT-W IN95 *1	Feature included in the touch I/F program
DOS	ATPH	CALIB.EXE
Others	userprogrammed	userprogrammed

■ Touch Panel Coordinate Data

(1) Resolution

Both the X and Y coordinates have a resolution of 1024.

The origin point (0,0) is located in the upper right corner of the screen.



Screen display origin, with resolution of 640 x 480, is normally at the upper left corner of the screen. Therefore, a software to convert the touch coordinates to display coordinates is needed.

***1 The following software is sold separately.**

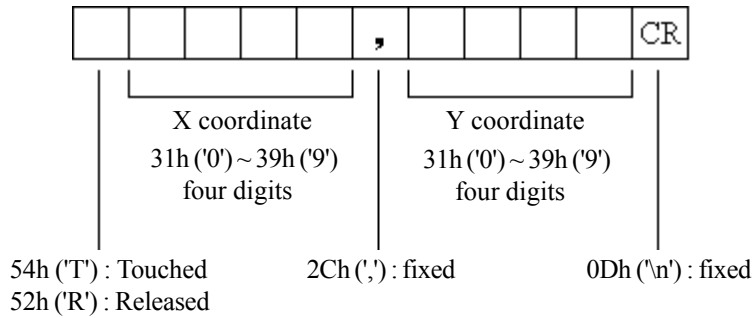
- TT-WIN: A mouse simulation driver for Windows 3.1 -- sold by GUNZE LIMITED.
TT-WINNT: A mouse simulation driver for Windows NT -- sold by GUNZE LIMITED.
TT-WIN95: A mouse simulation driver for Windows 95 -- sold by GUNZE LIMITED.

Touch Panel Commands

(2) Data Format

All data is in 8-bit ASCII format, and is structured in the following 11 byte strings.

Header: 1 byte (T = touched; R = released)
X coordinate: 4 bytes (0000 ~ 1023)
Separator: 1 byte (,)
Y coordinate: 4 bytes (0000 ~ 1023)
Termination code: 1 byte (CR = 0Dh)



<Example> If the coordinate (X=23, Y=500) is touched.

T0023, 0500CR — touched
T0023, 0500CR — continuous output with the same location
T0024, 0500CR — moving the location without releasing touch
T0024, 0499CR —
⋮ —
⋮ — continuous data output unless finger is released
T0022, 0501CR —
T0023, 0500CR —
R0023, 0500CR — when released, only 1 unit of data is sent

(3) Sampling Rate

A maximum of 87 points per second.

Touch Panel Commands

4-4 Touch Panel Commands

The following are touch panel commands sent from the host computer to the FP unit.



The letter inside the bracket next to the command code shows the actual character used for that code.

Display ON 65h (e)

Turns on FP-570T's display. Backlight is also turned on simultaneously.

Display OFF 66h (f)

Turns off FP-570T's display. Backlight is also turned off simultaneously.

Backlight ON 67h (g)

Turns on FP-570T's backlight. Display is also turned on simultaneously.

Backlight OFF 68h (h)

Turns off FP-570T's backlight. Display is also turned off simultaneously.

Regarding the Automatic Backlight OFF mode and display commands:



When the FP unit is in Automatic Backlight OFF mode (Dip SW1-5 = ON), and if a display related command is transmitted to the unit, the Automatic Backlight OFF mode will be cancelled.

Automatic Backlight OFF mode is only initialized at boot up.

Click sound (high) ON 69h (i)

Makes a high click sound when the touch panel is touched.

Click sound (high) OFF 6Ah (j)

The high click sound will not activate.

Click sound (low) ON 6Bh (k)

Makes a low click sound when the touch panel is touched.

Click sound (low) OFF 6Ch (l)

The low click sound will not activate.

Buzzer (high) ON 71h (q)

Turns on the buzzer output (high).

Buzzer (high) OFF 72h (r)

Turns off the buzzer output (high).

Buzzer (low) ON 67h (s)

Turns on the buzzer output (low).

Buzzer (low) OFF 68h (t)

Turns off the buzzer output (low).

Touch Panel Commands

The order of priority for the buzzer and click sounds is as follows. They are not processed simultaneously.

Sound	Command Code	Priority Order
Buzzer (high) ON	71h	high ↑ ↓ low
Buzzer (low) ON	73h	
Click sound (high) ON	69h	
Click sound (low) ON	6Bh	

Also, if the OFF command for each buzzer item is transferred, regardless of the priority order, only that buzzer item is turned off.

<Example>

If the following three commands are sent at the same time...

Buzzer (high) ON
 Buzzer (low) ON
 Click sound (high) ON

... the Buzzer (high) activates. However, when the Buzzer (high) OFF command is sent afterwards, the Buzzer (low) will activate.

Reserved

The following commands are reserved. If these commands are used, they are sometimes treated as errors.

20h	Reserved
21h	
22h	
23h	
25h	
26h	
27h	
28h	
29h	
2Ah	
2Bh	
33h	
3Ch	
41h	
42h	
43h	
44h	
45h	
46h	
47h	

Chapter 5

Touch Panel Communication Programs

1. Bundled Software
2. Operation Environment
3. Touch Panel Input Drivers

5-1 Bundled Software

The 3.5 inch floppy disk pictured below, included with the FP unit, contains the following utilities:

- A touch panel handler -- for easy detection of touch panel data
- A calibration program -- for making touch coordinate adjustments.



Touch panel handler : ATPH. EXE

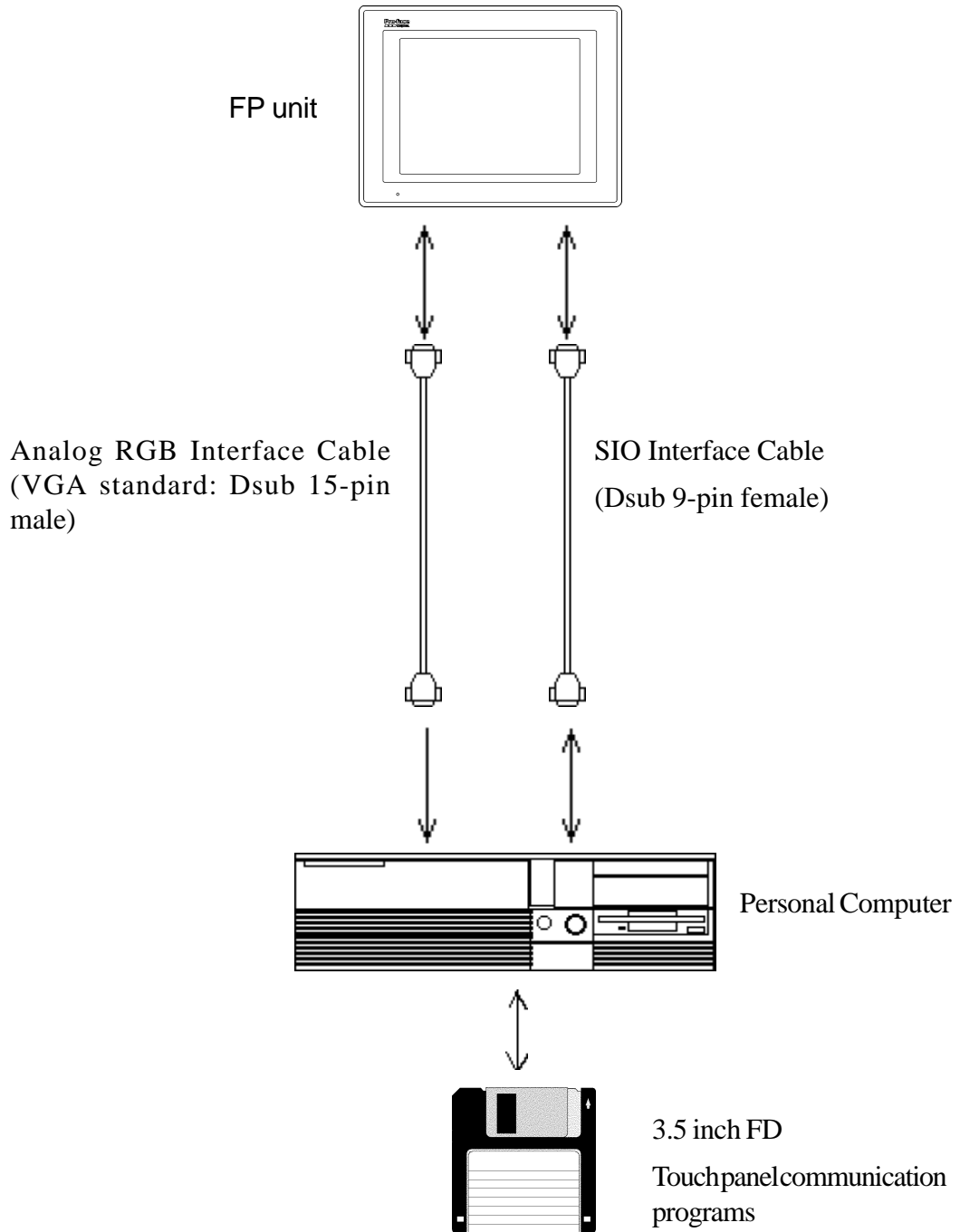
Touch panel data calibration program : CALIB. EXE



These programs only run on PC/AT compatible machines under the MS-DOS environment.

Touch Panel Communication Program

5-2 Operation Environment



Touch Panel Communication Program

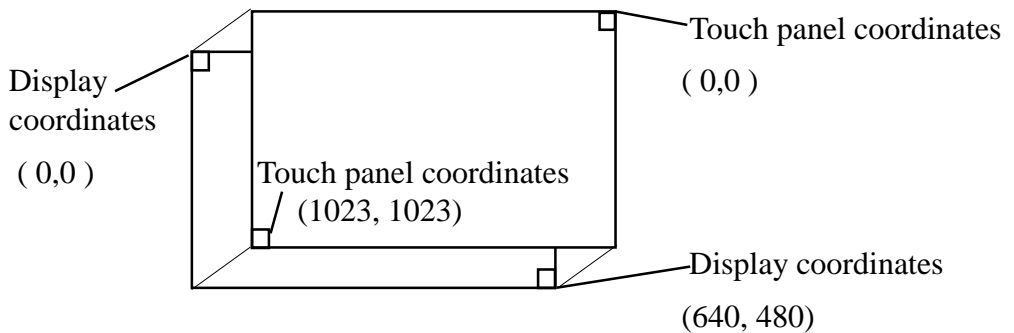
5-3 Touch Panel Input Drivers

5-3-1 ATPH.EXE (Touch Panel Handler)

Input for the analog touch panel is carried out at a resolution of 1024 x 1024 dots, with the origin point located in the upper right corner of the panel. The origin point of the display panel, however, is located in the upper left corner, and its resolution is 640 x 480 dots.

Since the coordinates of the touch panel and the display panel do not match, the ATPH.EXE (Touch panel handler) is used to convert touch panel input data to match the both resolution and the origin point of the display panel, so that it can pass the absolute input coordinates to the application software.



The following picture shows the relation between the touch panel and the display panel coordinates.



* The touch panel coordinates are converted to the display coordinates when "ATPH.EXE" is activated.

Touch Panel Communication Program

■ How to Operate the Software

ATPH -d [parameter]  or ATPH -r 

* Explanation of parameters

- d Attach this parameter all the time.
- a <n> Selects the I/O base address of the SIO port where the touch panel is connected.
(hexadecimal, default = 2f8)
n = 3f8 (COM1)
2f8 (COM2)
- q <n> Selects the interrupt level (IRQ) for the SIO port where the touch panel is connected. (default = 3)
n = 4 (COM1)
3 (COM2)
- i<n> Sets the vector number for the function call's software interrupt.
(hexadecimal, default = 59)
- r Removes the current (resident) memory command.
- c <path> Specifies the data file made by CALIB.EXE (touch panel data calibration) that contains the correction value.
("ATPH. CAL" in the current directory is selected for default.)

When this program runs, the following message will display on the screen.

Analog Touch Panel Handler ATPH. EXE Version 1.00
Copyright (c) 1993 Digital Electronics Corporation

Stay resident.

After execution, the command stays in memory.



- When the data file made by CALIB. EXE is not found or cannot be opened, the following message appears. In such a case, the program will run without data correction.

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

- If data correction is not carried out successfully, the display position may not match with the touch panel input position.

Touch Panel Communication Program

■ Function

ATPH. EXE has the following functions, which are activated by software interrupt (Default = INT59H) function calls.

< INT 59H Function List >

Function Code	Contents
8100h	Touch panel input (infinite wait)
8101h	Touch panel input (instant return)
8102h	Non-destructive input
0200h	Input buffer clear
8500h	Detection of touch panels condition
FE00h	Resident Confirmation

■ Function Explanation

Function 8100h	Touch panel input (infinite wait)
----------------	------------------------------------

Returns touch coordinates. Waits infinitely for input.

< input > AX = 8100h

< output > AH = 0 : normal termination

BX = Y : coordinate (0 - 479)

DX = X : coordinate (0 - 639)

CX = Number of effective input buffer for the analog touch panel.

Function 8101h	Touch panel input (instant return)
----------------	--------------------------------------

Returns touch coordinates. It will quit the function if there is no input.

< input > AX = 8101h

< output > AH = 0 : input

1 : no-input

BX = Y : coordinate (0 - 479)

DX = X : coordinate (0 - 639)

CX = Number of effective input buffer for the analog touch panel.

Function 8102h	Non-renewing touch panel input
----------------	--------------------------------

Sends the position coordinates, and does not renew the panel's input buffer.

< input > AX = 8102h

< output > AH = 0 : input

1 : no-input

BX = Y : coordinate (0 - 479)

DX = X : coordinate (0 - 639)

CX = Number of effective touch panel input buffers.

Touch Panel Communication Program

Function 0200h	Input buffer clear
----------------	--------------------

Clears the touch panel's input buffer.

< input > AX = 0200h

< output > AH = 0 : normal end

Function 8500h	Detection of touch panel's conditions
----------------	---------------------------------------

Returns the touch panel condition.

< input > AX = 8500h

< output > AH = status at 640 x 480 mode

Bit 1	Bit 0	Contents
0	0	touched
0	1	no-change
1	0	(not used)
1	1	released

Function FE00h	Confirmation of resident memory
----------------	---------------------------------

If ATPH.EXE is resident in memory, a fixed message and its version number are returned.

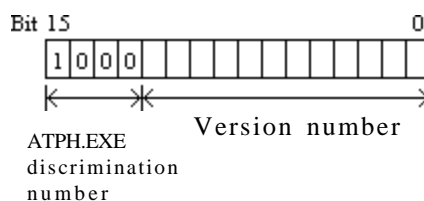
< input > AX = FE00h

< output > AH = 0 : normal termination

BL = 'Y'

BH = 'B'

CX = version number



Carry = clear

Touch Panel Communication Program

5-3-2 CALIB.EXE (Touch Panel Data Calibration)

Because of changes in operational environment and the unit's deterioration, differences in theoretical and actual touch coordinates arise; and therefore these differences must be corrected periodically, via a utility software called CALIB.EXE (touch panel data calibration).

By touching the designated position on the display (upper left and lower right), CALIB.EXE calculates the difference between the theoretical and actual coordinates. Then, from the result, a correction data file to be used by ATPH (touch panel handler) is made.

■ How to Operate

CALIB -d [parameter] 

* Explanation of parameters

- d Attach this parameter all the time.
- a <n> Selects the I/O base address of the SIO port where the touch panel is connected. (hexadecimal, default = 2f8)
n = 3f8 (COM1)
2f8 (COM2)
- q <n> Selects the interrupt level (IRQ) for the SIO port where the touch panel is connected. (default = 3)
n = 4 (COM1)
3 (COM2)
- c <path> Specifies the data file made by CALIB.EXE (touch panel data calibration) that contains the correction value.



When the touch panel is connected to COM2, the default value can be used.

■ Operation Procedure

```
■
Analog Touch Panel Calibration CALIB.EXE Version 1.01
Copyright (c) 1994 Digital Electronics Corporation

          Calibration Mode

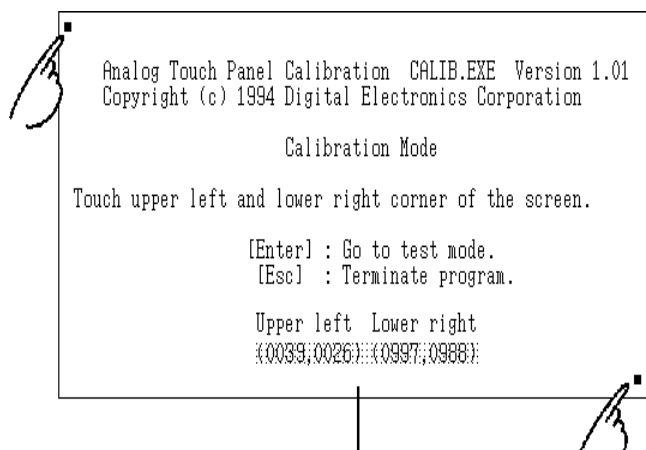
Touch upper left and lower right corner of the screen.

[Enter] : Go to test mode.
[Esc]   : Terminate program.

Upper left Lower right
(0000,0000) (0000,0000)
■
```

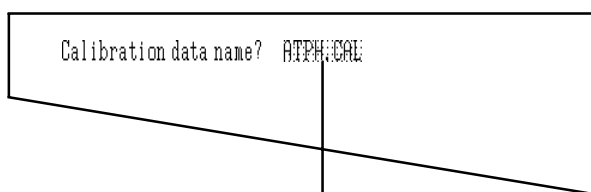
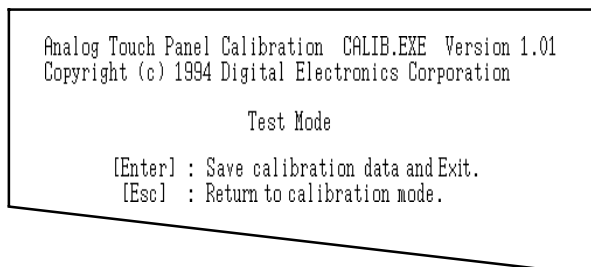
- ① When CALIB. EXE is executed, the message on the left displays on the screen. Then the two designated position, upper left and lower right corners, starts to blink.

Touch Panel Communication Program



The actual value is shown on the display.

Terminate program without saving calibration data ? (Y/N)



Enter the file name

- ② Touch the designated positions, one after the other.



- Do not touch two points at the same time.
- Touch right above the designated position.
- By re-touching the points, the actual coordinates will redisplay.

Correction data will be calculated from the difference between the actual and the theoretical values.



Press the [Esc] key to terminate the program. Press the [Y] key after the message on the left is shown, and the program will terminate without saving any calibration data. If the [N] key is pressed, the system will return to "calibration mode".

- ③ To enter "test mode", press the [Enter] key.

This mode tests whether the calibration has been processed correctly or not. The calibration is confirmed as successful if the locus shown on the display matches as touched. Otherwise, return to the "calibration mode" and redo the calibration by touching the right blinking position.



Press the [Esc] key to return to "calibration mode".

- ④ If the test result is OK, press the [Enter] key. After the following message appears, enter the name of the data file and press the [Enter] key.



When the data filename is specified from the parameter (-C=[path]) during the execution of CALIB.EXE, the program will terminate without showing the message on the left.

Chapter 6

Troubleshooting

1. Troubleshooting

6-1 Troubleshooting

6-1-1 Possible Device Problems

Possible types of trouble while using this unit are as follows.

- No display
 - No display appears after the unit is switched on.
 - The screen disappears during running mode.
 - The screen does not display normally.
- Touch panel doesn't function

The touch panel does not react when pressed, or its reaction time is abnormally long.



Warning

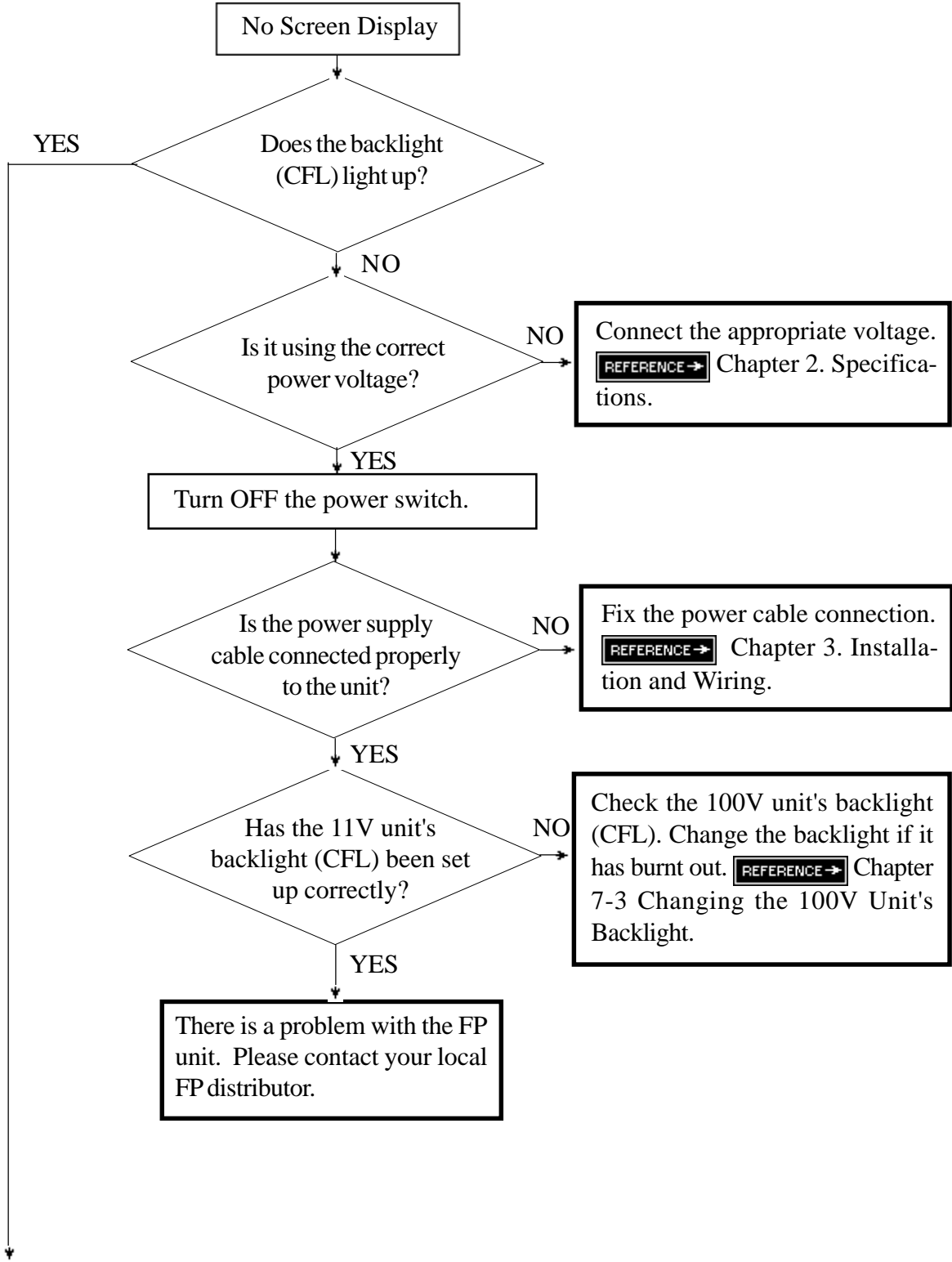
- Because of the danger of electric shocks, be sure the power cable is not connected when wiring the unit.
- When changing the backlight, there is a danger of electric shocks or burns, so be sure to turn the unit OFF and wear gloves.



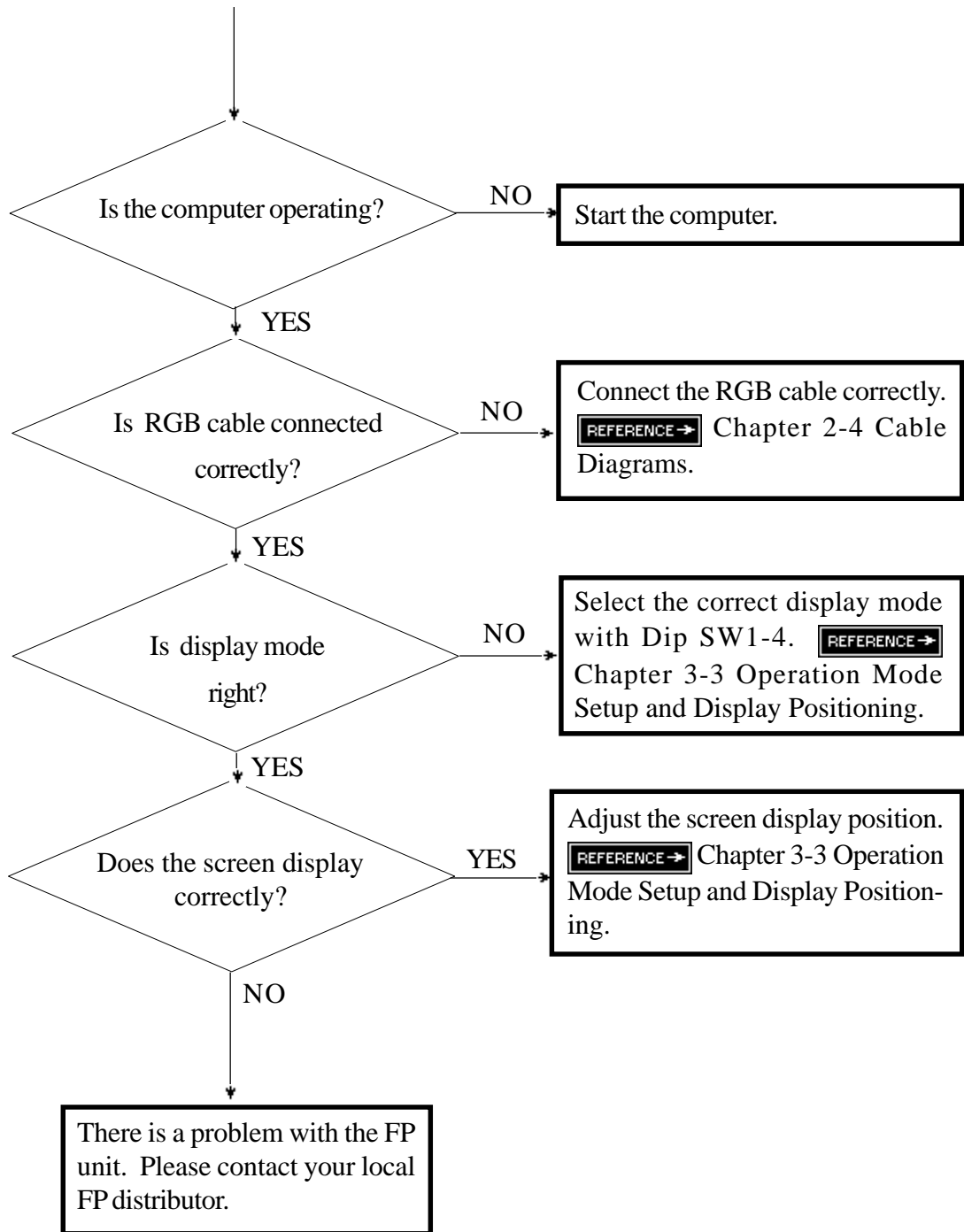
This section assumes that the FP is the cause of a problem, not the host (PLC). When the host is the problem, please refer to its corresponding manual.

6-1-2 No Display

When the screen does not display when powering up, or if the screen turns OFF by itself, use the flowchart below to find an appropriate solution.



Troubleshooting



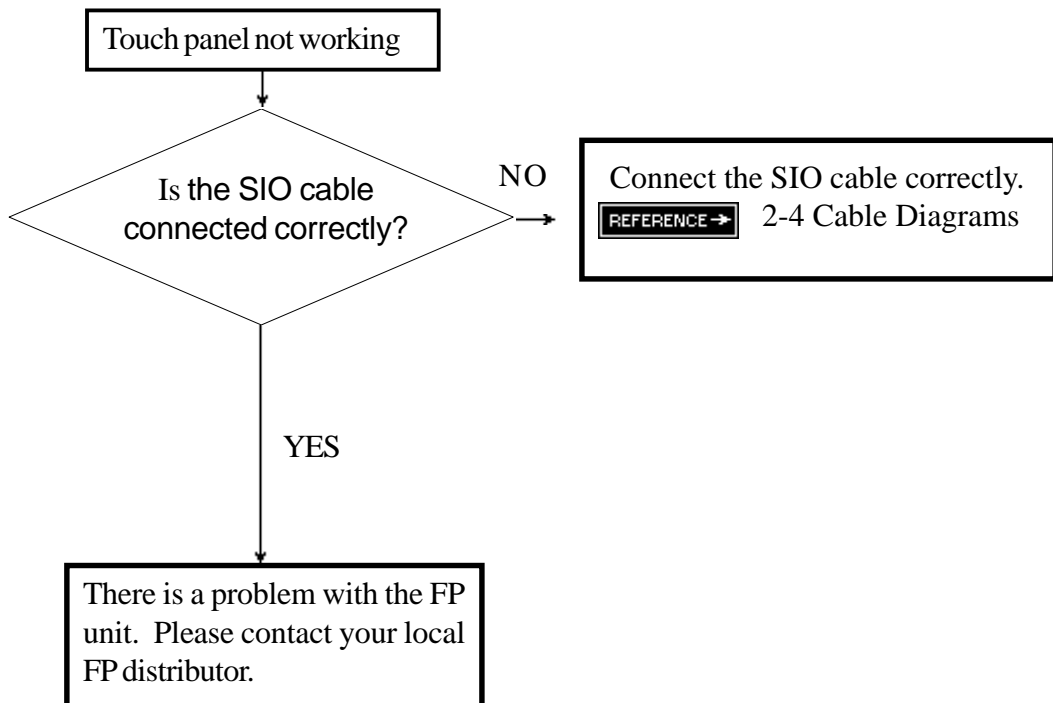
6-1-3 The Touch Panel Does Not Work

When the touch panel does not react, or its reaction is very slow after it is pressed, follow the flowchart below to find the origin of the problem and the appropriate solution.



From a personal computer, touch panel data communication can be performed by the CALIB.EXE program. Please execute CALIB.EXE to check touch panel's operations.

REFERENCE → 5-3-2 CALIB.EXE (Touch Panel Data Calibration)



Chapter 7

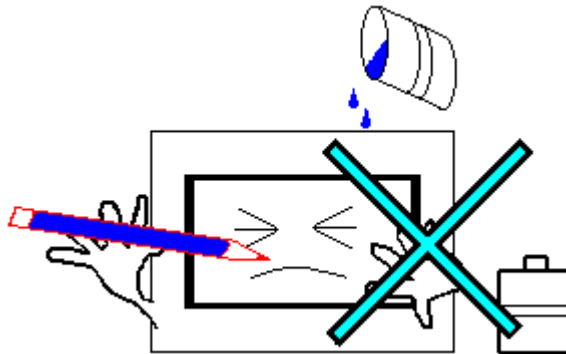
Maintenance

1. Cleaning
2. Periodic Checkup
3. Changing the 100V Unit's Backlight

7-1 Cleaning

7-1-1 Cleaning the Display

When the display or the border around the display become dirty, soak a soft cloth in a neutral detergent, wring it well and wipe the display.



- Do not use paint thinner, organic solvents, or highly acidic compounds to clean the unit.
- Do not press the touch-screen with hard or pointed objects, such as a mechanical pencil, since they may damage the surface of the screen.

7-2 Periodic Check-Up

To maintain your unit in its best condition, please check your unit periodically.

Inspection Items:

Surrounding Environment

- Is the surrounding temperature within the allowable range?
- Is the humidity within the specified range? (30~85% RH)
- Is the atmosphere free of corrosive gas?

FP Temperature

- When the FP unit is mounted into a cabinet, the conditions inside the cabinet are considered to be the environment.

Electrical Specifications

- Is the input voltage appropriate? (AC 100V or DC 24V)

Attachments

- Is the cable connected properly? Is it loose?
- Are the mounting brackets holding the unit securely?
- Are there many scratches, cuts or traces of dirt on the rubber gasket?

7-3 Changing the 100V (FP570-TC11) Unit's Backlight

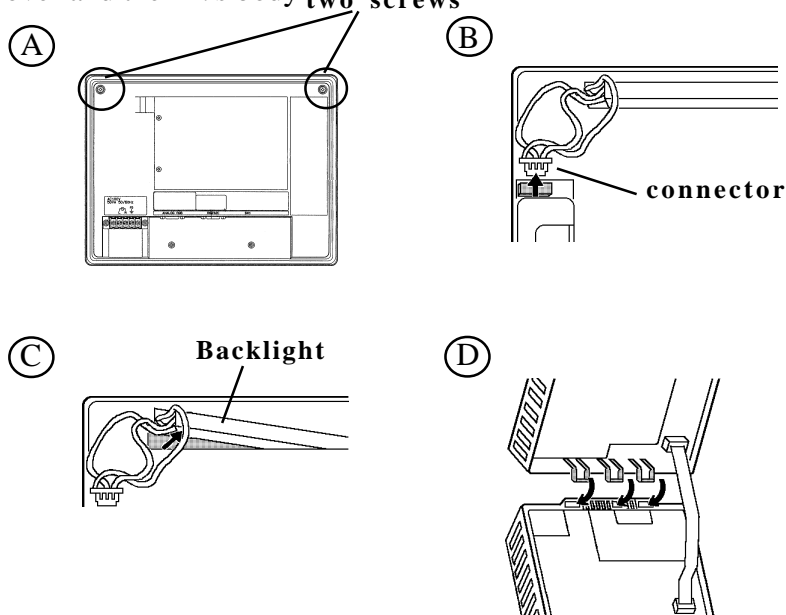


Warning

- Whenever changing the Backlight, be sure the power has been turned OFF.
- When the unit is Hot, be sure to use gloves to prevent injury.
- When the unit is still ON, high voltage runs through the Backlight area—*do not touch!*.
- When the power has just been turned OFF, both the unit and Backlight are still very hot.
- The 24V (FP571-TC21-24V) unit's backlight should only be changed by an authorized Digital serviceman. **Do not attempt to change this backlight by yourself!**

Change the Backlight following the instructions shown below. Be sure to wear gloves.

- ① Unplug the FP.'s power cord.
- ② With a screwdriver, unscrew the two screws on the upper rear face of the unit.
- ③ Open only the upper part of FP, and remove the backlight's connector.
- ④ Take the old backlight out.
- ⑤ Insert a new Backlight, and reconnect the power connector.
- ⑥ Put the panel cover back in place and reattach its screws. In this step, be careful not to pinch any of the connector's wiring between the Backlight cover and the FP.'s body **two screws**





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