Pro-face
Human Machine Interface

Pro-face

Mitsubishi Electric Q Series
PLC Ladder Monitor

Operation Manual

Preface

Thank you for purchasing Pro-face's PLC Ladder Monitor Add-on Kit for the Mitsubishi Electric Q Series PLC. This manual ("Mitsubishi Electric Q Series PLC Ladder Monitor Operation Manual") explains how to operate the PLC ladder monitor featuer and device monitor featuer while using Pro-face's GP2000 Series operator interfaces.

Be sure to read this manual carefully to understand how to correctly use your PLC Ladder Monitor Add-on Kit.

Be sure to keep this manual close at hand for easy reference.

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Table of Contents

Documentation Conventions

This manual uses the following symbols and terminology.

IMPORTANT	Indicates a potentially damaging action or dangerous situation that could result in abnormal equipment operation or data loss.
Screen editor software	Indicates GP-PRO/PB III for Windows
PLC	Indicates a Programmable Logic Controller (Also known as sequencer).
*	Indicates useful or important supplemental information.
NOTE	Provides useful or important supplemental information.
SEE→	Indicates related information.

Related Units

■ Related PLC units

The table below lists the PLC units that can be used with the Add-on Kit.

Manufac-turer	Series Name	CPU	Link I/F or CPU direct connection	Connection Cable	Device Type in Screen Editor
Mitsubishi Electric	Q Series	Q02 Q02H Q06H Q12H Q25H	CPU direct connection	Mitsubishi Electric's QC30R2 (Requires 9-pin / 25-pin conversion adapter) or Diatrend's DQCABR2-H	Mitsubishi Electric MELSEC-Q(CPU)

■ Related GP units

The table below lists the GP units that can be used with the Add-on Kit software.

Also, to use the Cache Function on a GP/GLC unit, the unit's revision code must be the same as or higher than those listed below.

Series Name	Unit Name	Model No.	Rev.
GP-2000 Series	GP-2401HT	GP2401H-TC41-24V	B-3
	GP-2400T	GP2400-TC41-24V	H-2
	GP-2401T	GP2401-TC41-24V	-2
	GP-2500T	GP2500-TC11	G-2
		GP2500-TC41-24V	C-2
	GP-2500S	GP2500-SC41-24V	A-2
	GP-2500L	GP2500-LG41-24V	B-2
	GP-2501T	GP2501-TC11	D-2
	GP-2501S	GP2501-SC11	E-2
	GP-2501L	GP2501-LG41-24V	-2
	GP-2600T	GP2600-TC11	F-2
		GP2600-TC41-24V	C-2
	GP-2601T	GP2601-TC11	-2
GLC2000 Series	GLC2400T	GLC2400-TC41-24V	F-2
	GLC2500T	GLC2500-TC41-24V	All Rev.
		GLC2500-TC41-200V	All Rev.
	GLC2600T	GLC2600-TC41-24V	E-2
		GLC2600-TC41-200V	All Rev.

IT Series	IT2400 Type A	IT2400-TC41-GP	C-2
	IT2400 Type B	IT2400-TC41-GLC	E

■ Related Screen Editor Software

GP-PRO/PBIII for Windows Ver. 5.0 or later.

When using this product with GLC2000 series or IT2400 Type B, please use GP-PRO/PBIII C-Package03

Service Pack 2 (Ver.7.20) or later.

Memo

1 | Overview and Setup

1.1 Overview

The PLC Ladder Monitor software enables you to read PLC ladder programs and display them as ladder diagrams on the GP unit.

This software operates on the GP unit and the software's boot file is stored in the GP unit's CF Card.

The PLC Ladder Monitor Add-on Kit has the following features:

- Displays PLC ladder programs as ladder diagrams.

- Displays power (ON) lines using bold lines.

- Displays the designated step number.

- Displays circuit data including the designated device address.

- Displays circuit data in which the designated device address is included in the output instruction.

- Displays ladder program comments.

- Calls the Device Monitor feature.

- Use the Device Monitor feature to set, reset or change the value of an arbitrary device.

NOTE
- The Device Monitor feature is not explained in this manual. For information on how to operate this feature,

SEE→ *GP-PRO/PBIII for Windows Device/PLC Connection Manual (Included with the screen editor software).*

1.1.1 System Design

The GP and the PLC are connected in a 1:1 relationship.

Connect one end of the cable to the GP unit's serial interface port, and the other end to the PLC unit's CPU

module RS-232C port.
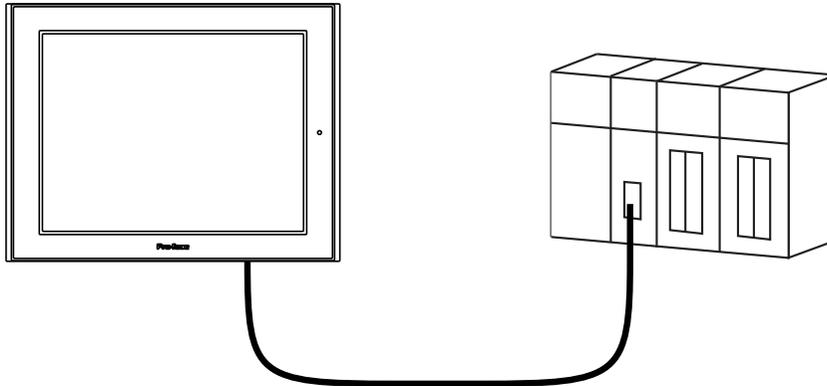
Mitsubishi Electric's
QC30R2
(Requires a 9-pin / 25-pin conversion adapter)
or Diatrend's DQCABR2-H

1.1.2 Operation Mode

The PLC Ladder Monitor feature enables you to:

(1)   Read PLC ladder programs and display them on the GP unit, via [Ladder Monitor].

(2)   Monitor/change arbitrary PLC device addresses, via [Device Monitor].

After [Ladder Monitor] is started, the GP switches to ladder monitor mode. [Device Monitor] mode can be

used when the GP is in ladder monitor mode, as well as in online (RUN) mode.
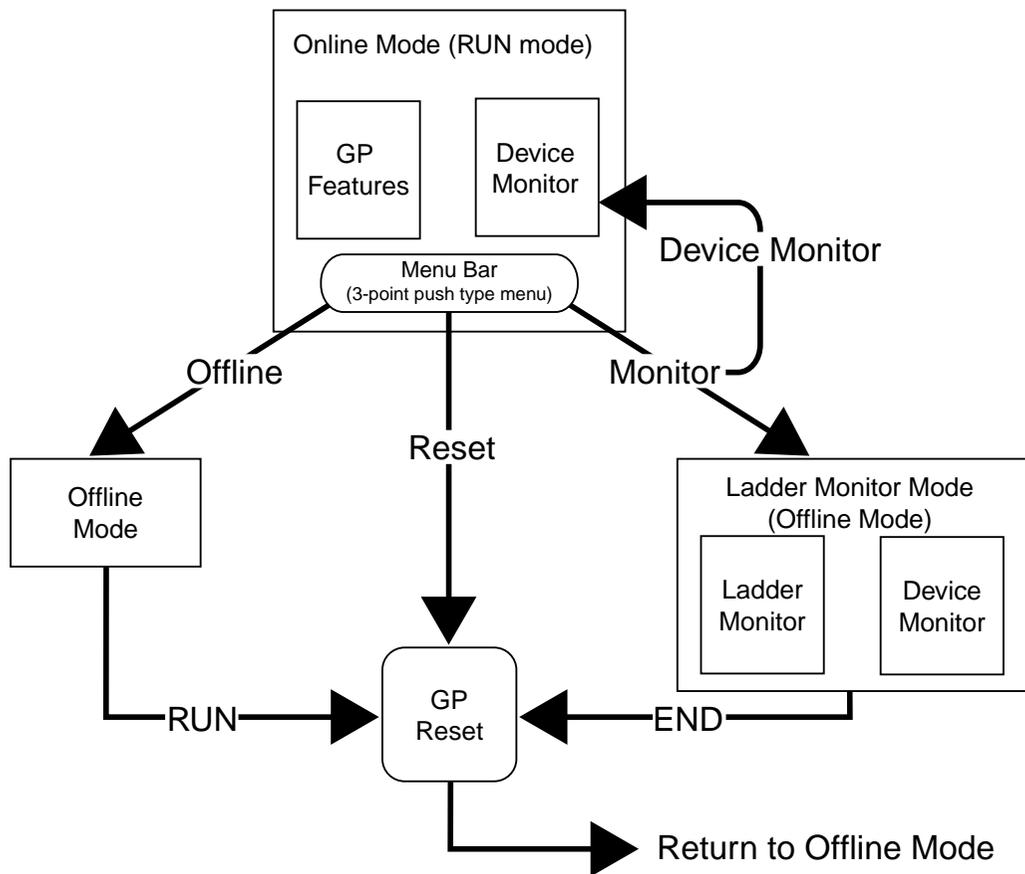
IMPORTANT   • The GP unit will be reset if you switch from online mode to ladder monitor mode.

1.2   Installation Procedure

The following flowchart explains the procedure necessary for installing the Add-on Kit. It is assumed that

GP-PRO/PB III for Windows is already installed, and that the ladder program has been transferred to the PLC.

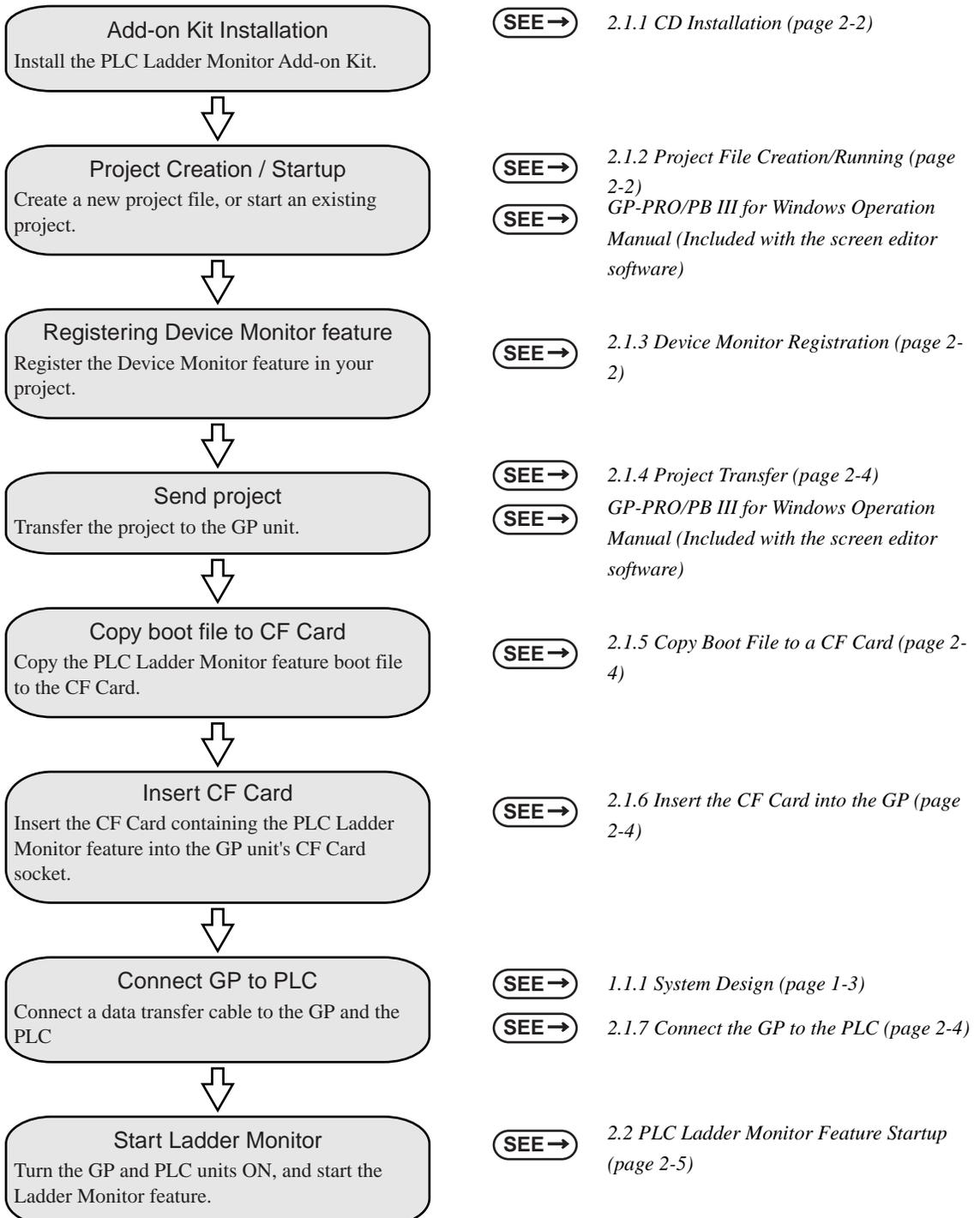|	
Add-on Kit Installation Install the PLC Ladder Monitor Add-on Kit.	**SEE →** *2.1.1 CD Installation (page 2-2)*
Project Creation / Startup Create a new project file, or start an existing project.	**SEE →** *2.1.2 Project File Creation/Running (page 2-2)* **SEE →** *GP-PRO/PB III for Windows Operation Manual (Included with the screen editor software)*
Registering Device Monitor feature Register the Device Monitor feature in your project.	**SEE →** *2.1.3 Device Monitor Registration (page 2-2)*
Send project Transfer the project to the GP unit.	**SEE →** *2.1.4 Project Transfer (page 2-4)* **SEE →** *GP-PRO/PB III for Windows Operation Manual (Included with the screen editor software)*
Copy boot file to CF Card Copy the PLC Ladder Monitor feature boot file to the CF Card.	**SEE →** *2.1.5 Copy Boot File to a CF Card (page 2-4)*
Insert CF Card Insert the CF Card containing the PLC Ladder Monitor feature into the GP unit's CF Card socket.	**SEE →** *2.1.6 Insert the CF Card into the GP (page 2-4)*
Connect GP to PLC Connect a data transfer cable to the GP and the PLC	**SEE →** *1.1.1 System Design (page 1-3)* **SEE →** *2.1.7 Connect the GP to the PLC (page 2-4)*
Start Ladder Monitor Turn the GP and PLC units ON, and start the Ladder Monitor feature.	**SEE →** *2.2 PLC Ladder Monitor Feature Startup (page 2-5)*

Memo

2 | Operation

2.1   Installation

Please perform the following installation procedure prior to using the PLC Ladder Monitor feature.

2.1.1   CD Installation

In Windows Explorer, double-click on the CD's Setup.exe file to start the installer program. Follow the

installer program's directions.

IMPORTANT   • Prior to running the installer program, GP-PRO/PB III for Windows Ver. 5.0 or

later screen editor software must be installed on your system.Refer to the section

of the GP-PRO/PBáV for Windows Setup Guide that relates to your unit's OS

2.1.2   Project File Creation/Running

Create a new project file, or run an existing project file.

For project file details,

SEE→   *GP-PRO/PB III for Windows Operation Manual (Included with the screen editor software)*
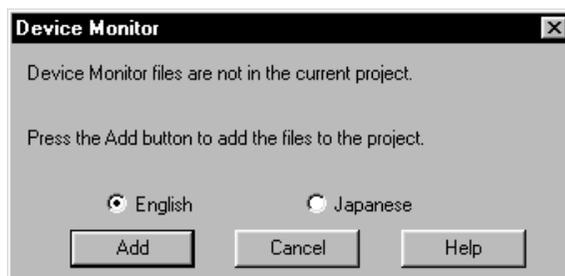
2.1.3   Device Monitor Registration

Register the Device Monitor feature in your project.

Starting from the screen editor software's main screen, the procedure for registering the Device Monitor fea-

ture is explained below.

■ Registering the Device Monitor screen

Select the [Screen / Setup] menu's [Device Monitor] feature.
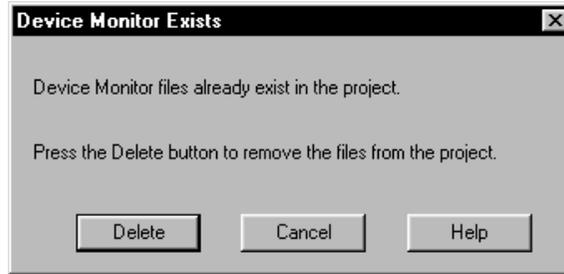
Click [Add] to register the feature.

NOTE   • To register the Device Monitor feature, at least 90KB of free GP space must be available. There-

fore, after sending your project to the GP unit, be sure to check that at least 90KB of space is

remaining for this feature.

You can check the amount of GP memory used by your project via the Project Manager's
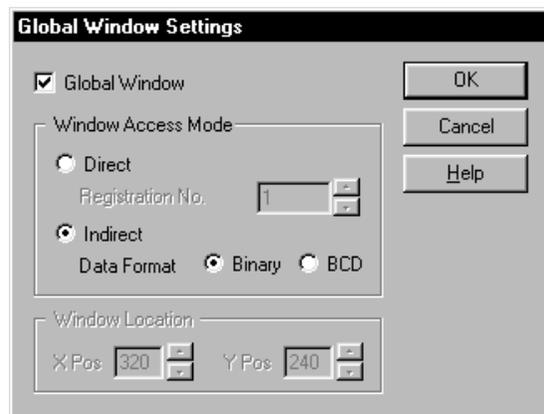
[Project] -> [Property] screen.

The following screen appears if the Device Monitor feature has already been registered.

Device Monitor Exists

Device Monitor files already exist in the project.

Press the Delete button to remove the files from the project.

| Delete | Cancel | Help |

Click [Delete] to delete the currently registered Device Monitor data. Then, select [Screen / Setup] menu's [Device Monitor], and click [Add] to register the feature again.

■ Registering the Global Window

Select the [GP Settings] feature's [Extended Settings] tab, and click [Global Window]. The following [Global Window Settings] screen will appear.

Global Window Settings

☑ Global Window

Window Access Mode
- ○ Direct
  - Registration No.   1
- ● Indirect
  - Data Format   ● Binary   ○ BCD

Window Location
- X Pos 320   Y Pos 240

| OK | Cancel | Help |

Enter the following settings:

[Global Window Settings] - Select [Global Window].

[Window Access Mode] - Select [Indirect].

[Data Format] - Select [Binary]

Click [OK] to confirm these settings.

2.1.4 Project Transfer

Next, transfer the project to the GP unit.

For project transfer details,

SEE→   *GP-PRO/PB III for Windows Operation Manual (Included with the screen editor software).*

2.1.5 Copy Boot File to a CF Card

Insert a CF Card into your PC's CF Card reader and copy the Ladder Monitor boot file to the CF Card's root directory.

The boot file is located in GP-PRO/PB III for Windows screen editor software's [PROTOCOL] folder.

Mitsubishi Electric's Q Series Ladder Monitor boot file filename: MEL_QP.SYS

To copy this program to a CF card, the card must have at least 2MB or more free space.

2.1.6 Insert the CF Card into the GP

Remove the CF Card from your PC's card reader and insert it in the GP unit's CF Card socket.

For CF Card socket insertion details,

SEE→   *Your GP unit User Manual (Separately sold).*

2.1.7 Connect the GP to the PLC

Connect the data transfer cable between the GP and the PLC.

For cable connection details,

SEE→   *1.1.1 System Design (page 1-3)*

SEE→   *GP-PRO/PB III for Windows Device/PLC Connection Manual (Included with the screen editor software)*
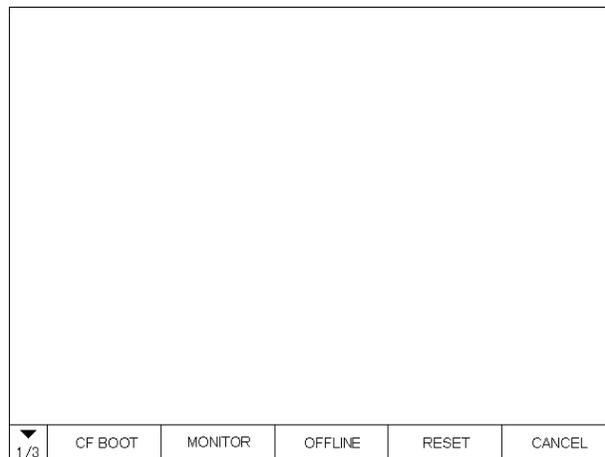
2.2 PLC Ladder Monitor Feature Startup

Either of the following two methods can be used to start the PLC Ladder Monitor feature.

2.2.1 Via the Menu Bar

(1) To call up the GP screen's Menu Bar, simultaneously press the areas marked by (i), (ii) and (iii) (See below)
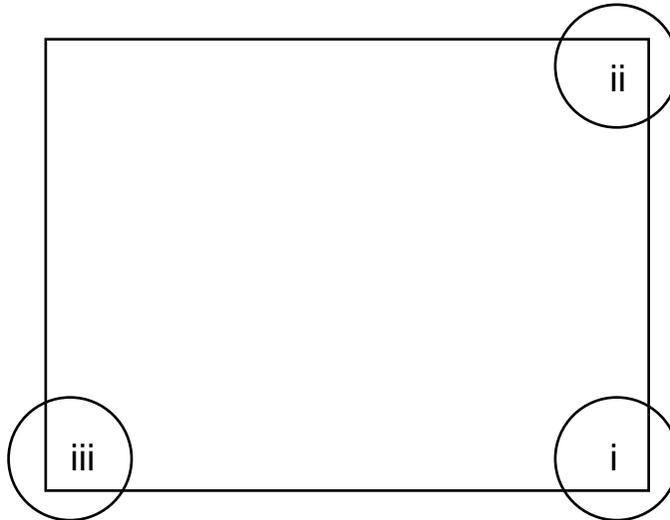
(2) After the Menu Bar appears, select [MONITOR].

| | CF BOOT | MONITOR | OFFLINE | RESET | CANCEL |

▼
1/3

NOTE • If the Device Monitor feature has not been registered correctly, the [MONITOR] button will not be displayed in the Menu Bar.
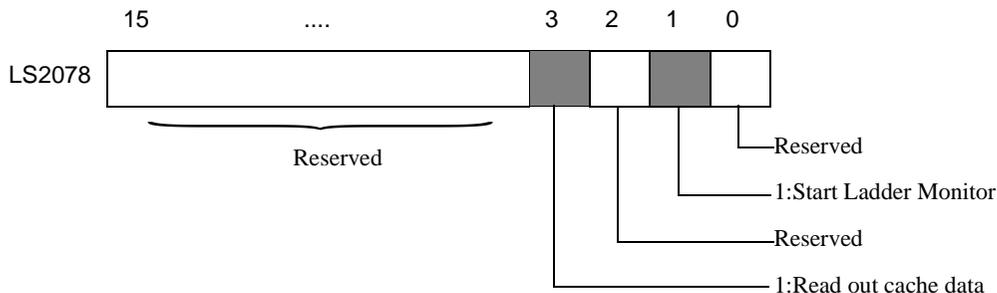
SEE→ *2.1.3 Device Monitor Registration (page 2-2)*

(3) [Menu] screen is displayed,touch the [Ladder Monitor] button.

2.2.2　Turning the Extended Special Relay Area ON

Use a bit switch etc. to turn ON the GP internal memory's extended special relay LS2078's bit 1. This will start up the PLC Ladder Monitor feature

.

Bit 1:Turning this bit ON starts the Ladder Monitor. The Ladder Monitor menu will not appear.

Bit 3:Immediately after the Ladder Monitor starts, turning this bit ON displays the ladder program cached in the CF card. When using Bit 3, be sure to turn Bit 1 ON at the same time.

(cf. "Related Units" - "Related GP Units")

If there is no cache data on the CF card, simply turning Bit 1 ON will read out the current data.

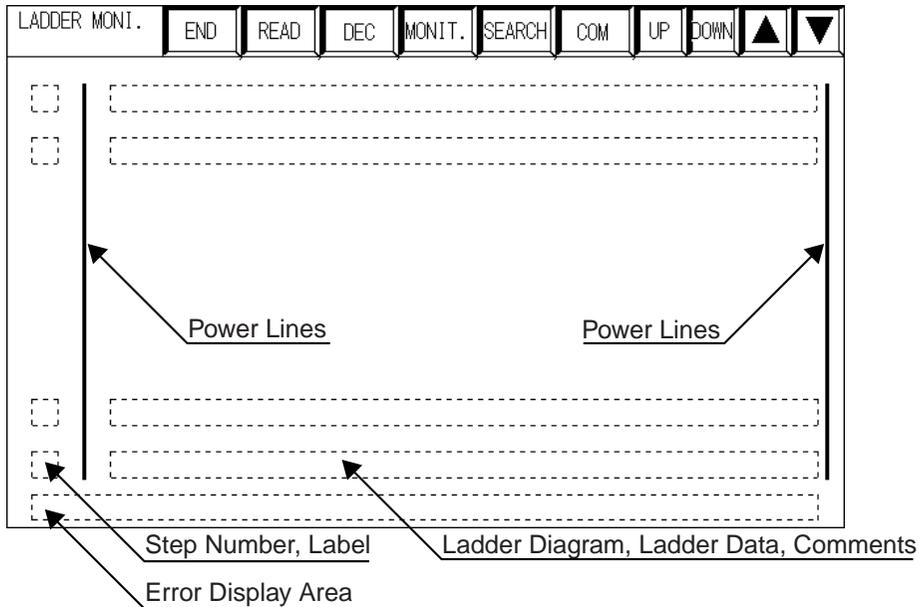* Prior to using the Cache feature, the data must be read into a PC one time.

NOTE

• Bits other than bit 1 are reserved. Do not write data to any of these bits.

2.3   Screen Names

The following sections explain PLC Ladder Monitor screen layout.

2.3.1   Main screen

The PLC Ladder Monitor's main screen contains the following information.

Power Lines   Power Lines

Step Number, Label   Ladder Diagram, Ladder Data, Comments

Error Display Area

The number of rows that can be displayed on the screen varies depending on the comment mode. There are

three comment modes

- No comment mode................................(11 contacts + 1 FUNC instruction) x 8 rows

- Comment mode....................................(11 contacts + 1 FUNC instruction) x 3 rows

- Compressed comment mode.................(11 contacts + 1 FUNC instruction) x 5 rows

For details regarding comments,

SEE→   *2.4.4 Comments (page 2-15)*

2.3.2   Ladder Diagrams

Types of ladder diagram screen data are shown below.

Step Number

Current Value

Device Comment
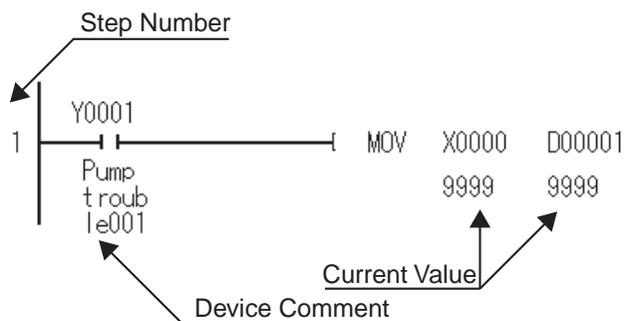
2.4 Screen Operation

The following information explains how to operate the Ladder Monitor screen.

LADDER MONI.	END	READ	DEC	MONIT.	SEARCH	COM	UP	DOWN	▲	▼

.
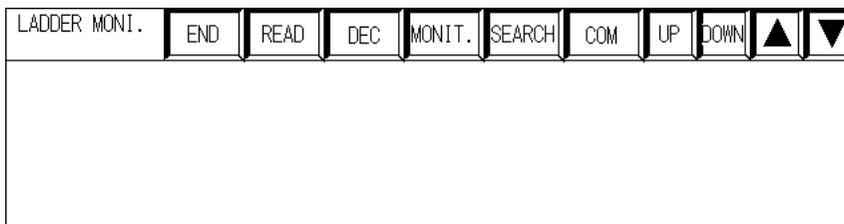
END	Quits the PLC Ladder Monitor software. The GP unit is reset and switches to ONLINE mode.
READ	Reads in the PLC's ladder programs.
DEC	Switches the style of data display between decimal and hexadecimal.
MONIT.	Starts the Device Monitor feature. The [Monitor MENU] will appear.
SEARCH	Calls up the [Search Menu] to search for ladder program data.
COM	Changes the device comment display format.
UP DOWN	Scrolls through the ladder diagram one row at a time.
▲ ▼	Scrolls through the ladder program one page at a time.

2.4.1 PC Read

Touching the main screen's 〈 READ 〉 key displays the [Select Ladder File] screen.

.

```
Select Ladder File                              LD:  PG   CMT:  PG        1/1
 Name       | Type | Size | Data       | Time  | Title
 * MAIN       SEQ      160  2003-07-29   09:49   Program A1
 - BPRO1      SEQ     2160  2003-07-31   10:32   Program B1
 - BPRO2      SEQ     1160  2003-07-31   11:15   Program B2
 - SUB        SEQ     5160  2003-08-08   16:21   Common Subroutine
 * COMMENT    COM     2160  2003-07-29   09:53   Device Name 1




 END | LADDER DRIVE | COMMENT DRIVE | To The End | All Area | ▲ | ▼
```

.

LADDER DRIVE	Select the source of the ladder program. The selected drive will be displayed in the screen top section's [LD:] area.
COMMENT DRIVE	Select from where the comment is to be read. The selected drive will be displayed in the screen top section's [CMT:] area.
To The End	Reads in selected ladder program data, up to its END instruction.
All Area	Reads in all selected ladder program data.

Touch the ladder program to be read. A * mark is displayed to the left of the ladder program you selected.

Touching the ladder program again will cancel the selection.

Similarly, touch the comment to select it.

NOTE   • You cannot select and read only a comment file.

■ Searching Drives for Data

Follow the procedure outlined below to search for the ladder program's drive, and display only drives that contain files.

- Sequence program search

  PG -> SRAM -> FLASH -> Internal RAM -> Internal ROM -> CACHE

- Comment file search

  PG -> SRAM -> FLASH -> Internal RAM -> Internal ROM -> CACHE -> CF

[CACHE]

- For a Sequence Program (cf. "Related Units" - "Related GP Units")

When the Ladder Program is read out from "PG", "SRAM", "FLASH", "RAM", or "ROM", the data ("MEL_QP.CCH") is stored in [LADMON] folder of the CF card. With "CACHE", the ladder program stored in the CF card is read out and displayed. Since no communication is being performed with the PLC, this read-out is very fast. If CACHE is not available, the word "CACHE" will not be displayed. The ladder logic information shown by CACHE is for the previously read-out PLC ladder logic data. If the PLC's ladder logic data has been changed or updated, or if the PLC has been changed, be sure to read out the latest ladder logic data from the PLC

* Be sure the CF card used has 2MB or more free space.

- For a Comment file

When the comment file is read out from "PG", "SRAM", "FLASH", "RAM", or "ROM", the data ("***.QCD") is stored in [LADMON] folder of the CF card. With "CACHE", the comment file stored in the CF card is read out and displayed.

* Be sure the CF card used has 2MB or more free space.
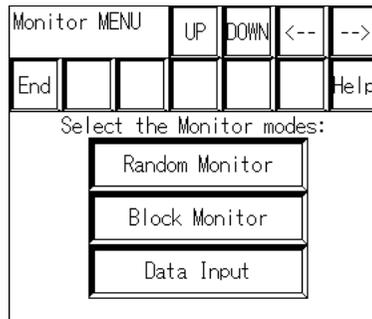
[CF]

- For a Comment file only

Comment file data (*.WCD) of a project created using the Mitsubishi Electric Corporation programming tool "GX Developer" is read out from a CF card. Since readout of PLC data is not performed, this data is read out quickly. Prior to performing this, be sure to create the [LADMON] folder in the CF card and copy the comment file (*.WCD) to this folder.

2.4.2 Device Monitor

Touching the main screen's |MONIT.| key displays the [Monitor MENU]. The Device Monitor feature allows

you to monitor PLC devices.

```
┌──────────────────────────────────────────┐
│ Monitor MENU    │ UP │DOWN│<-- │ --> │    │
├─────┬───┬───┬───┬───┬─────┬─────────┤
│ End │   │   │   │   │     │Help│    │
├──────────────────────────────────────────┤
│        Select the Monitor modes:          │
│        ┌─────────────────────┐            │
│        │   Random Monitor    │            │
│        └─────────────────────┘            │
│        ┌─────────────────────┐            │
│        │    Block Monitor    │            │
│        └─────────────────────┘            │
│        ┌─────────────────────┐            │
│        │     Data Input      │            │
│        └─────────────────────┘            │
└──────────────────────────────────────────┘
```

NOTE

• This manual does not explain Device Monitor feature operation or related details. For Device
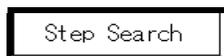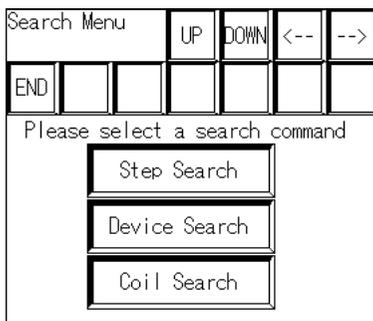
Monitor details,

SEE→ *GP-PRO/PB III for Windows Device/PLC Connection Manual (Included with the screen editor soft-*
ware)

2.4.3 Search Feature

Touching the main screen's $\boxed{\text{SEARCH}}$ key displays the [Search Menu].

This screen is used to designate the step number or device address of the circuit that will appear at the top of

the main screen.

| Step Search	Used to designate the step number of the circuit that will appear at the top of the main screen.
Device Search	Used to designate the device address of the circuit that will appear at the top of the main screen.
Coil Search	Used to designate the output instruction containing the device address of the circuit that will appear at the top of the main screen.

■ Step Numbers Search

Touching the $\boxed{\text{Step Search}}$ key displays the [Search Step] screen, which is used to designate a step

number. Use the screen's numeric keys (1 to 0) to enter a step number, and press $\boxed{\text{ENT}}$ to start the
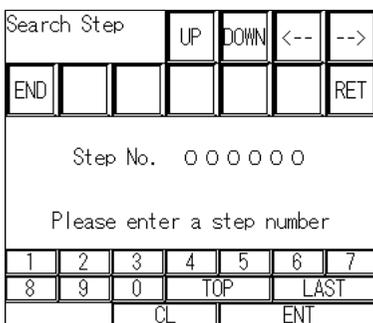
search.

TOP	Searches for and displays the ladder program's first step number.
LAST	Searches for and displays the ladder program's last step number.
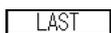
■ Device Search / Coil Search

Touching the [Device Search] key displays the [Search Device] screen. Touching the

[Coil Search] key displays the [Search Coil] screen.

Select the type of search to perform.

```
Search Device   UP  DOWN  <--  -->
                          NEXT  RET
   Please select a type of device
         X        Y        M

         L        F        SM
```

| Next | Displays other device type characters. |

| RET | Returns to the [Search Menu]. |

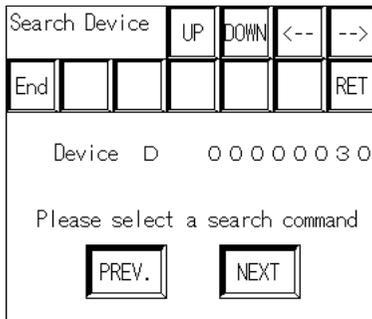After you select the device type, the following screen appears. Here, enter the device address. Use the character keys to enter the device address, and press [ENT] to start the search.

```
Search Device   UP  DOWN  <--  -->
                                RET
   Device  D    0 0 0 0 0 0 0

      Please enter an address
   1   2   3   4   5   6   7
   8   9   0   A   B   C   D
   E   F     CL        ENT
```

◆ Searching for the designated device address

The circuit is displayed with the designated device address at the top of the main screen.

Next, a screen that enables you to search for identical device addresses is displayed.

```
┌─────────────────────────────────────────┐
│ Search Device │ UP │DOWN│<--│ --> │
│ End │   │   │   │   │   │ RET │
│                                          │
│         Device  D    0 0 0 0 0 0 3 0     │
│                                          │
│      Please select a search command      │
│              PREV.      NEXT             │
└─────────────────────────────────────────┘
```

PREV.   Starting from the current ladder rung, searches backward for identical device
         addresses, until the first row of the program is reached.

NEXT   Starting from the current ladder rung, searches forward for identical device
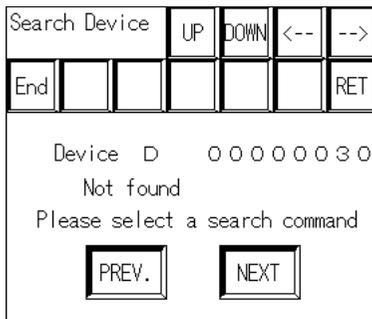   addresses, until the last row of the program is reached.

End   Exits the search feature and returns to the main screen.

RET   Returns to the [Search Menu].

◆ When the designated device address is not found

The following screen is displayed when the device address search is unsuccessful.

```
┌─────────────────────────────────────────┐
│ Search Device │ UP │DOWN│<--│ --> │
│ End │   │   │   │   │   │ RET │
│                                          │
│         Device  D    0 0 0 0 0 0 3 0     │
│                 Not found                │
│      Please select a search command      │
│              PREV.      NEXT             │
└─────────────────────────────────────────┘
```

■ Using a double-touch to search for a coil

When you touch the device address displayed on the main screen twice in succession, the output instruction containing the designated address appears at the top of the main screen. This is similar in function to the coil search.

2.4.4 Comments

Touching the main screen's [COM] key displays device comments.

Touching the [COM] key changes the comment mode in the following order.

Comment mode -> compressed comment mode -> No comment mode

In comment mode, a maximum of 5 single-byte characters x 3 rows can be displayed. In compressed comment mode, a maximum of 5 single-byte characters x 3 rows can be displayed (Characters are compressed to half the original length). To display all comments, please use the Comment zoom feature.

◆ Comment zoom feature

Touching a comment in the main screen will display that comment's entire text in the main screen's lower left corner.

2.5   Usage Restrictions

2.5.1   Notation

- When monitoring bit devices used in a FUNC instruction, dividing the bit address by 16 calculates the word address.

- For a circuit, the maximum number of rows that can be displayed is 25. If the circuit contains more than 25 rows, rows from the 26th row will be omitted, and only the first 25 rows will be displayed. Also, when searching for a device, if an abbreviation has been used for the device, when it is found, the device itself will not be displayed, however, the start of the circuit that contains the device will be shown

- Contacts, coils and frames through which power flows are indicated by bold (thick) lines. However, lines connecting two contacts are displayed normally.

- The main screen is displayed at the GP unit's center at 640 x 400 resolution. Blank space may be displayed at the top, bottom, left or right corners of the screen, depending on the PLC model used.

3 | Errors

3.1 Error Messages

3.1 Error Messages

The following table lists errors that can occur when using the CF Card.

Message	Possible Cause	Solution
CF Card switch is OFF	The lid of CF Card is open.	Check whether the lid of CF card is open.
CF Card is not installed	The CF Card has not been inserted into the GP unit's CF Card socket.	Check whether CF card is inserted correctly.
CF Card Data Error	CF card data is unusual. CF card is not formatted.	Check whether the contents of CF card can be read correctly. Check whether CF card is formatted.
Cannot read from CF Card	Cannot read the file from CF Card. CF card was extracted during reading.	Check whether a file required for a ladder monitor exists. It checks whether CF card is inserted correctly.
Cannot write to CF Card	Cannot Write to file on the CF Card. CF card was extracted during writing. Availability of CF card is insufficient.	Check whether CF card is inserted correctly. Check whether the capacity of CF card is vacant.
A file is not found	System file of a ladder monitor does not exist.	Check whether a MEL_QP.SYS file exists in CF card.
Ladder error *1	The read data was not convertible for the ladder figure. A cable is extracted during read-out of a ladder.	Check whether there is any ladder command to which the ladder monitor does not correspond. Check whether a cable with PLC is correct, and PC read-out is performed again.

*1 When a circuit error occurs, the rudder display and reference after it cannot be performed.

The error message is detected when either of the following two conditions are satisfied.

(1)   When screens are changed to display a new page.

(2)   When a file's data is read again.

Solutions to the above errors vary depending on when the error occurred.

Error Occurrence	Internal Processing	Recovery
When reading the ladder program	Suspends processing after error message is displayed. After recovery, processing continues.	Insert the CF Card correctly.

| When reading the comment file | Suspends processing after error message is displayed. After recovery, processing continues. | Insert the CF Card correctly. |
| When the comment is being displayed. | Turns OFF comment display after error message is displayed. Continue processing as before. | Insert the CF Card correctly, and read the comment file again. |